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000000                          .REPT 0
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IDENTIFICATION

PRODUCT CODE: AC-8520C-MC

PRODUCT NAME: CZDLBCO DL11-E ON LINE TEST

PRODUCT DATE: JULY 1979

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: ROBERT WHITTON

1. ABSTRACT

TWO SEPARATE DIAGNOSTIC PROGRAMS ARE PROVIDED FOR THE DL11-E (ASYNCRONOUS LINE INTERFACE), CZDLA (DL11-E OFF LINE TESTS) AND CZDLB (DL11-E ON LINE TESTS). THE OFF LINE TESTS TEST ALL DL11-E LOGIC AND MAY BE USED TO INDIVIDUALLY TEST UP TO 31 DL11-E'S. THE OFF LINE TESTS DO NOT REQUIRE THE USE OF A MODEM, HOWEVER A SPECIAL JUMPER CONNECTOR IS REQUIRED. THE ON LINE TESTS ARE ESSENTIALLY DATA RELIABILITY TESTS REQUIRING THE USE OF MODEMS AND A SUITABLE TERMINAL DEVICE.

THREE STARTING ADDRESSES ARE PROVIDED. THEY ARE:

200 - NORMAL START
210 - REMAP DEVICES PRESENT AND RESTART
220 - MODIFY DEVICE ADDRESSES IF NON STANDARD
INSTRUCTIONS TO DO THIS ARE TYPED OUT.

THIS DOCUMENT DESCRIBES THE ON LINE TESTS.

THE AVAILABLE TESTS ARE:

PRG0 SINGLE CHARACTER LINE MODE DATA TEST
PRG1 BINARY COUNT LINE MODE DATA TEST
PRG2 MESSAGE TRANSMIT ONLY W/W/O PARITY
PRG3 RECEIVE DATA TEST
PRG4 MESSAGE TRANSMIT (SPIRAL) ONLY W/W/O PARITY.

2. REQUIREMENTS

2.1 EQUIPMENT

A. PDP 11 SYSTEM

B. DL11-E(S)

C. SUITABLE TERMINAL DEVICE (ASR 33, 37, DATA POINT, ETC)

D. MODEM TYPE 103 OR 202 OR EQUIVALENT

2.2 STORAGE

THIS PROGRAM USES 8K OF MEMORY

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 94
 95                          3.      OPERATING PROCEDURE:
 96
 97                          3.1     LOADING PROCEDURE
 98
 99                                  THE ABSOLUTE LOADER IS USED TO LOAD THE PROGRAM.
100
101                          3.2     DL11-E PARAMETER SELECTION
102
103                                  THE SELECTABLE DL11-E PARAMETERS ARE:
104
105                                  BIT1-0                  CHARACTER LENGTH
106
107                                  BIT1    BIT0            CHAR. LENGTH
108                                   0       0                   8
109                                   0       1                   7
110                                   1       0                   6
111                                   1       1                   5
112
113                                  WHEN A TERMINAL IS INVOLVED DL11-E PARAMETERS SHOULD BE
114                                  SET ACCORDING TO TERMINAL SPECIFICATIONS.
115
116                          3.3     PDP-11 STANDARD OPERATING PARAMETERS
117
118                                  SW15    1               HALT ON ERROR
119                                  SW14    1               SCOPE LOOP (NOT USED)
120                                  SW13    1               INHIBIT ERROR PRINTOUT
121                                  SW12    1               INHIBIT TRACE TRAP (NOT USED)
122                                  SW11    1               INHIBIT ITERATION (NOT USED)
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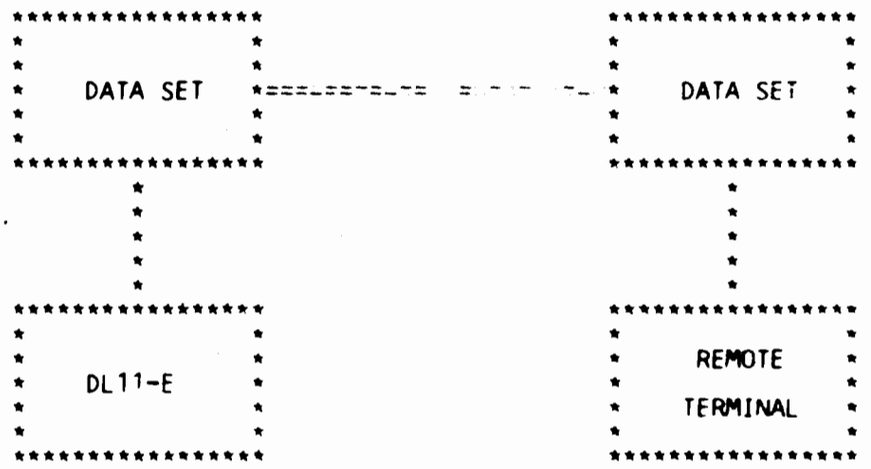
3.4 GENERAL

THERE ARE THREE CONFIGURATIONS USING DL11-E/MODEM PAIRS WHICH MAY BE SELECTED BY PRG0 AND PRG1. THESE CONFIGURATIONS ARE SELECTED BY THE USER WHEN REQUESTED BY THE PROGRAM DURING THE LINE CONNECTION ROUTINE.
THE FOLLOWING PROCEEDURES SHOULD BE FOLLOWED TO SELECT ANY OF THE THREE SELECTABLE CONFIGURATIONS:

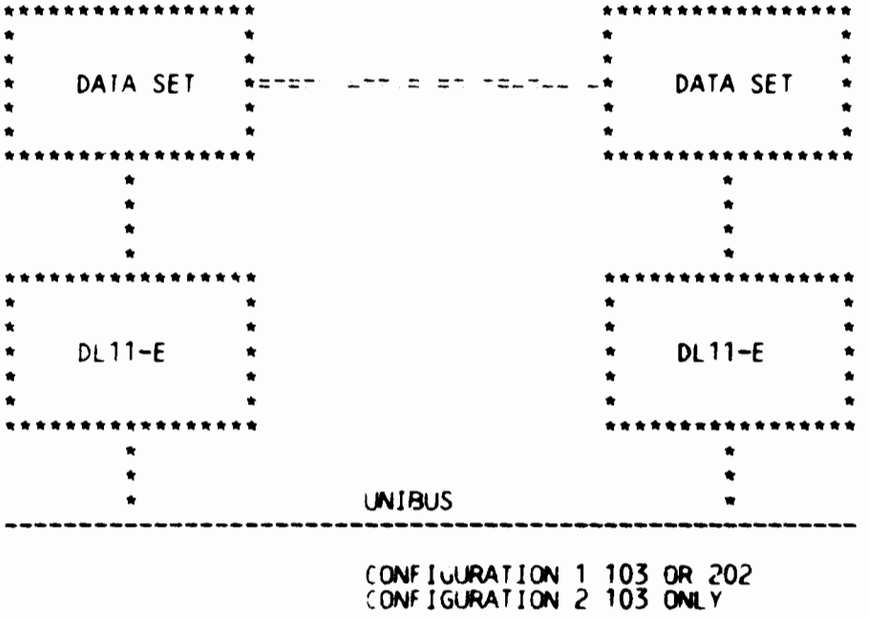
CONFIGURATION 0: THIS CONFIGURATION TRANSMITS DATA FROM THE DL11-E CONNECTED TO THE LINE THAT WAS CALLED TO THE MODEM THAT CALLED (THE CALLER). THIS CONFIGURATION MAY BE USED TO TRANSMIT DATA TO A TERMINAL DEVICE. NOTE NO DATA CHECKING IS PERFORMED BY THE PROGRAM,HOWEVER,DATA MAY BE VISUALLY CHECKED AT THE TERMINAL DEVICE. TO INITIATE PROGRAM ACTION CALL THE MODEM CONNECTED TO A DL11-E FROM A MODEM CONNECTED TO THE TERMINAL DEVICE. WHEN THE PHONE RINGS AT THE PDP11 THE PROGRAM WILL REQUEST THE CONFIGURATION. SET BITS0-1=00 BY TYPING IN OCTAL FOLLOWED BY A CR. WHEN THE 'HANDSHAKING' IS COMPLETED THE PROGRAM WILL REQUEST DL11-E PARAMETERS. TYPE THE PARAMETERS AS REQUESTED. THE PROGRAM WILL TYPE 'LINE CONNECTION MADE' AND BEGIN DATA TRANSMISSION.



CONFIGURATION 0

CONFIGURATION 1: THIS CONFIGURATION TRANSMITS DATA FROM THE DL11-E CONNECTED TO THE LINE THAT WAS CALLED TO THE DL11-E CONNECTED TO THE LINE THAT CALLED (THE CALLER). TO INITIATE PROGRAM ACTION CALL THE DL11-E YOU WISH TO TRANSMIT ON FROM THE LINE CONNECTED TO THE DL11-E YOU WISH TO RECEIVE THE DATA ON. WHEN THE PHONE RINGS AT THE PDP11 THE PROGRAM WILL REQUEST THE CONFIGURATION AND MODEM TYPE. TYPE BIT0-1=01 & BIT2=0 IF A 103 (OR EQUIV.) AND BIT2=1 IF A 202 (OR EQUIV.).
THE PROGRAM WILL REQUEST THE LINE NUMBER THAT YOU CALLED FROM. TYPE THIS IN OCTAL FOLLOWED BY A CARRIAGE RETURN. WHEN THE CARRIER

IS HEARD IN THE HEADSET PRESS THE DATA BUTTON ON THE DATA SET.
YOU HAVE APPROXIMATLY 10 SECONDS IN WHICH TO DO THIS. WHEN
THE 'HANDSHAKING' IS COMPLETED THE PROGRAM WILL REQUEST
DL11-E PARAMETERS. TYPE THE PARAMETERS AS REQUESTED.
THE PROGRAM WILL TYPE 'LINE CONNECTION MADE' AND
BEGIN DATA TRANSMISSION. WHEN 100. CHARACTERS HAVE BEEN
PROCESSED (TRANSMITTED/RECEIVED AND CHECKED) THE BELL WILL
RING AT THE TTY, AND ANOTHER 100. CHARACTER BLOCK WILL BE
PROCESSED.
NOTE, DL11-E#X REFERS TO THE 'CALLED' DL11-E, AND DL11-E#Y RE-
FERS TO THE CALLING DL11-E.



CONFIGURATION 1 103 OR 202
CONFIGURATION 2 103 ONLY

CONFIGURATION 2: THIS CONFIGURATION TRANSMITS DATA FROM BOTH
THE CALLED TRANSMITTER AND THE TRANSMITTER CONNECTED TO THE
LINE THAT WAS CALLING,I.E. IN ADDITION TO THE DATA TRANSMITTED
AS IN CONFIGURATION 1 DATA IS ALSO TRANSMITTED IN THE REVERSE
DIRECTION. TO INITIATE PROGRAM ACTION CALL THE DL11-E YOU WISH
TO TRANSMIT ON FROM THE DL11-E YOU WISH TO RECEIVE/TRANSMIT ON.
WHEN THE PHONE RINGS AT THE PDP11 THE PROGRAM WILL REQUEST THE
CONFIGURATION AND MODEM TYPE. TYPE BIT0-1 -10 AND BIT2=0. NOTE:
********DO NOT USE MODEM TYPE 202 (OR EQUIV) USING CONFIG #2****
THE PROGRAM WILL REQUEST THE LINE YOU CALLED FROM. TYPE THE
NUMBER IN OCTAL FOLLOWED BY A CR. WHEN THE CARRIER IS
HEARD IN THE HEADSET PRESS THE DATA BUTTON ON THE DATA SET.
NOTE YOU HAVE APPROXIMATLY 10 SECONDS IN WHICH TO DO THIS.
WHEN THE 'HANDSHAKING IS COMPLETED THE PROGRAM WILL REQUEST
TWO SETS OF DL11-E PARAMETERS. THE CHARACTER LENGTH OF BOTH SETS
MUST BE THE SAME AND THE SPEED OF THE SECOND SET MUST BE GREATER
THAN THE SPEED OF THE FIRST. WHEN THE PARAMETERS HAVE BEEN LOAD-
ED THE PROGRAM WILL TYPE 'LINE CONNECTION MADE' AND BEGIN TO
WAY DATA TRANSMISSION. WHEN 100. CHARACTERS HAVE BEEN RECEIVED
AND CHECKED THE BELL WILL RING AT THE TTY, AND ANOTHER BLOCK
OF 100. CHARACTERS WILL BE PROCESSED.
NOTE, DL11-E#X REFERS TO THE 'CALLED' DL11-E, AND DL11-E#Y RE-
FERS TO THE 'CALLING' DL11-E.

3.5 LINE NUMBERS

LINE NUMBER REFERS TO THE ADDRESSES TO WHICH THE DL11-E RESPONDS.

LINE 00 77561X	LINE 10 77571X	LINE 20 77601X	LINE 30 77611X
LINE 01 77562X	LINE 11 77572X	LINE 21 77602X	LINE 31 77612X
LINE 02 77563X	LINE 12 77573X	LINE 22 77603X	LINE 32 77613X
LINE 03 77564X	LINE 13 77574X	LINE 23 77604X	LINE 33 77614X
LINE 04 77565X	LINE 14 77575X	LINE 24 77605X	LINE 34 77615X
LINE 05 77656X	LINE 15 77576X	LINE 25 77606X	LINE 35 77616X
LINE 06 77567X	LINE 16 77577X	LINE 26 77607X	LINE 36 77617X
LINE 07 77570X	LINE 17 77600X	LINE 27 77610X	

4. USE PROCEDURE

THIS PROGRAM HAS BEEN MODIFIED TO RUN WITH OR WITHOUT
A CONSOLE PROCESSOR.
IF A CONSOLE MACHINE IS USED; THEN THE PROGRAM
LOOKS AT THE HARDWARE SWITCH REGISTER.
IF A CONSOLE-LESS MACHINE IS USED;THEN THE PROGRAM
AUTOMATICALLY LOOKS AT THE CONTENTS OF LOCATION
SOFTSR (176) AS A SWITCH REGISTER.

IF A HARDWARE SWITCH REGISTER DOES NOT EXIST, THE PROGRAM WILL
USE THE CONTENTS OF LOCATION 176 AS THE VALUE OF THE SWITCHES.
THE PROGRAM WILL PRINT OUT THE PRESENT CONTENTS OF THE SOFTWARE
SWITCH REGISTER WHEN THE PROGRAM IS STARTED. IT WILL THEN ASK
FOR THE NEW CONTENTS TO BE INPUT TO THE SOFTWARE SWITCH REGISTER.
TYPE CARRIAGE RETURN TO FINISH INPUT.

4.1 PRG0 SINGLE CHARACTER LINE MODE DATA TEST

A. LOAD ADDRESS = 000200 (RESTART LOAD ADDR. = 000200)

B. START - PROGRAM WILL REQUEST PROGRAM NUMBER

C. THE PROGRAM WILL NOW REQUEST THE DATA. TYPE THE DATA IN OCTAL
FOLLOWED BY A CARRIAGE RETURN.

D. MAKE LINE CONNECTION. SEE SECT 3.4

4.2 PRG1 - BINARY COUNT LINE MODE DATA TEST

A. LOAD ADDRESS = 000200

B. START - PROGRAM WILL REQUEST PROGRAM NUMBER

C. MAKE LINE CONNECTION SEE SECT 3.4

4.3 PRG2 - SPECIAL MESSAGE XMIT ONLY

A. LOAD ADDRESS = 000200

B. START - PROGRAM WILL REQUEST PROGRAM NUMBER

C. DEPRESS START - THE PROGRAM WILL IDENTIFY ITSELF AND
TYPE INSTRUCTIONS TO SELECT DESIRED DL11-E PARAMETERS

(SEE SECT 3.2)

D. TYPE IN PARAMETERS. IF IT IS DESIRED TO TRANSMIT
DATA WITH PARITY SET BIT6. ALSO SET BIT5 TO TRANSMIT ODD
PARITY AND CLEAR TO TRANSMIT EVEN PARITY.

BIT6	1/0	ENABLE/DISABLE PARITY
BIT5	1/0	TRANSMIT ODD/EVEN PARITY

```
310
311                                   E.  WHEN 'MAKE LINE CONNECTION ' IS TYPED CALL THE DL11-E
312                                   YOU WISH TO TRANSMIT ON FROM THE TERMINAL MODEM.
313                                   WHEN THE 'HANDSHAKING' IS COMPLETED THE MESSAGE
314                                   'THE QUICK BROWN FOX JUMPED OVER THE LAZY DOGS BACK
315                                   0123456789' WILL BE TRANSMITTED. TO TERMINATE, HANG UP.
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316                             4.4     PRG3 - RECEIVE TRANSMIT MESSAGE TEST
317
318                                     A.  LOAD ADDRESS = 000200
319
320                                     B.  START - PROGRAM WILL REQUEST PROGRAM NUMBER
321
322                                     C.  THE PROGRAM WILL IDENTIFY ITSELF AND
323                                         TYPE INSTRUCTIONS TO SELECT DESIRED OPTIONS.
324
325                                     D.  SET IN OPTIONS AND PRESS CONTINUE.
326
327                                     E.  WHEN 'MAKE LINE CONNECTION' IS TYPED CALL THE DL11-E
328                                     YOU WISH TO TRANSMIT ON. WHEN THE 'HANDSHAKING' IS COMPLETED
329                                     THE DL11-E WILL TRANSMIT A CRLF TO THE TERMINAL DEVICE. AT THIS
330                                     TIME YOU MAY BEGIN TO SEND DATA FROM THE DEVICE TO THE DL11-E
331                                     WHERE IT WILL BE ECHOED BACK TO THE TERMINAL. TYPE ANY CHARACTER
332                                     TO SIGNAL START OF MESSAGE. THEN TYPE MESSAGE AND THE SAME
333                                     CHARACTER TO SIGNAL END OF MESSAGE. CONTROL C WILL CAUSE THE
334                                     BUFFERS CONTENTS TO BE TRANSMITTED WHEN TYPED.
335
336                                     F. IF NO ECHO IS DESIRED (ON A CHARACTER BASIS FOR EXAMPLE
337                                     WHEN USING A TERMINAL THAT PRODUCES ITS OWN LOCAL COPY)
338                                     SET BIT7 OF SWITCH REGISTER.
339
340                             4.5     PRG4 - SPECIAL MESSAGE XMIT ONLY
341
342                                     A.  LOAD ADDRESS = 000200
343
344                                     B.  OPTIONS
345                                         1.  BITS 0-2 = 4
346                                         2.  BITS 3-6 = LINE NUMBER (SEE SECT 3.5)
347
348                                     C.  DEPRESS START - THE PROGRAM WILL IDENTIFY ITSELF AND
349                                         TYPE INSTRUCTIONS TO SELECT DESIRED DL11-E PARAMETERS
350
351                                         (SEE SECT 3.2)
352
353                                     D.  SET IN PARAMETERS IF IT IS DESIRED TO TRANSMIT
354                                     DATA WITH PARITY RAISE SR6. ALSO RAISE SR5 TO TRANSMIT ODD
355                                     PARITY AND LOWER TO TRANSMIT EVEN PARITY.
356
357                                         BIT6    1/0     ENABLE/DISABLE PARITY
358                                         BIT5    1/0     TRANSMIT ODD/EVEN PARITY
359
360                                     E.  WHEN 'MAKE LINE CONNECTION ' IS TYPED CALL THE DL11-E
361                                     YOU WISH TO TRANSMIT ON FROM THE TERMINAL MODEM.
362                                     WHEN THE 'HANDSHAKING' IS COMPLETED A SPIRAL
363                                     PATTERN WILL BE TRANSMITTED. TO TERMINATE, HANG UP.
```

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                        5.      PROGRAM DESCRIPTIONS

                        5.1     PRG0 - SINGLE CHARACTER LINE MODE DATA TEST

                                PRG0 TRANSMITS USER SPECIFIED DATA AND A CARRIAGE RETURN/LINE FEED
                                EVERY 72ND CHARACTER.

                        5.2     PRG1 - BINARY COUNT PATTERN LINE MODE DATA TEST

                                PRG1 TRANSMITS A BINARY COUNT PATTERN.  THIS PROGRAM IS THE SAME
                                AS PRG0 EXCEPT FOR THE DATA TRANSMITTED.

                        5.3     PRG2 - SPECIAL MESSAGE TRANSMIT ONLY

                                PRG2 TRANSMITS THE MESSAGE
                                THE QUICK BROWN FOX JUMPED OVER THE LAZY DOGS BACK 0123456789.
                                NO DATA ERROR CHECKING IS PERFORMED BY THE PROGRAM.

                        5.4     PRG3 - RECEIVE/TRANSMIT MESSAGE TEST

                                PRG3 - RECEIVES DATA FROM A TERMINAL AND READS THE RECEIVED MESSAGE
                                BACK, AND TYPES THE MESSAGE ON THE PDP-11 TTY WHEN THE MESSAGE
                                IS TERMINATED.  CHARACTERS MAY BE ECHOED BACK (IF REQUIRED) ON
                                A CHARACTER BASIS THEREBY CREATING LOCAL COPY AS THE MESSAGE
                                IS TYPED.
                                TRANSMISSION MAY BEGIN AT THE TERMINAL WHEN A CR/LF IS RECEIVED
                                AT THE TERMINAL.  THIS PROGRAM IS RESTRICTED TO USE BY ONLY
                                FULL DUPLEX MODEMS.

                        5.5     PRG4 - SPECIAL MESSAGE TRANSMIT ONLY

                                PRG4 TRANSMITS A SPIRAL PATTERN.
                                NO DATA CHECKING IS PERFORMED BY THE PROGRAM.
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                                6.0     ERRORS
                                        THERE ARE TWO TYPES OF ERRORS WHICH ARE DETECTED BY THESE TESTS
                                        LINE FAILURE,AND DATA ERRORS.
                                        LINE FAILURES ARE DETECTED AND REPORTED BY ALL TESTS, AND
                                        DATA ERRORS ARE DETECTED ONLY IN PRG 0 &1 WHEN USING CONFIG-
                                        URATIONS 1 OR 2. DATA ERRORS IN THE OTHER TESTS MAY BE DETECT-
                                        ED BY VISUAL INSPECTION OF THE DATA AT THE TERMINAL.
                                        LINE FAILURES ARE REPORTED BY TYPING THE PC,THE RECEIVER CON-
                                        TROL STATUS REGISTER ADDRESS, AND ITS CONTENTS. SEE THE PRO-
                                        GRAM LISTING FOR A DETAILED DESCRIPTION OF THE ERROR.
                                        THE MOST FREQUENTLY ENCOUNTERED ERROR WILL PROBABLY BE THE
                                        LOSS OF CARRIER. THIS ERROR WILL BE REPORTED IF AFTER A LINE
                                        CONNECTION IS MADE THE CARRIER IS LOST, EITHER BY 'HANGING UP'
                                        OR A 'GLITCH' ON THE LINE CAUSING THE CARRIER TO MOMENTARILY
                                        DROP. IN EITHER INSTANCE THE PROGRAM DISCONNECTS THE DL11-E
                                        FROM THE MODEM (BY CLEARING DATA TERMINAL READY) AND THE
                                        LINE WILL HAVE TO BE RECONNECTED TO RESUME TESTING.
                                        IF IT IS PHYSICALLY IMPOSSIBLE TO GET TO THE DATA BUTTON
                                        WITHIN THE TIME ALLOTTED (APPROX. 10 SECONDS) TO MAKE THE
                                        LINE CONNECTION, THIS TIME MAY BE INCREASED BY PUTTING A
                                        LARGER NUMBER INTO THE DELAY. PATCH THE LARGER NUMBER
                                        INTO THE ADDRESS FOLLOWING THE DELAY EMT (BETWEEN RINTBG AND
                                        RINTBH).FOR EXAMPLE PATCHING IN 72460 WILL ALLOW APPROXIMATELY
                                        30 SECONDS IN WHICH TO RESPOND.

                                        DATA ERRORS ARE REPORTED BY TYPING THE PC, THE RECEIVER CONTROL
                                        REGISTER ADDRESS OF THE LINE THAT FAILED,WHAT THE DATA SHOULD
                                        HAVE BEEN,WHAT THE DATA WAS,AND THE CHARACTER NUMBER.

                                        PC=XXXXXX 174010 DATA S/B 301 WAS 321 CHAR NO 23

                                        THIS TYPEOUT INDICATES A DATA ERROR ON LINE 1
                                        IF CONFIGURATION 2 IS SELECTED TWO ERROR TYPOUTS MAY OCCUR
                                        FOR A SINGLE ERROR DEPENDING ON WHERE THE ERROR OCCURED. CON-
                                        FIGURATION 2 COMPARES THE DATA RECEIVED AT THE CALLED DL11-E
                                        WITH THE DATA TRANSMITTED BY THE CALLED DL11-E, AND ALSO THE DATA
                                        RECEIVED AT THE CALLING DL11-E (CALLER) WITH THE DATA TRANSMITTED
                                        BY THE CALLED DL11-E.
                                        IF FOR EXAMPLE A DATA ERROR OCURRED AT THE RECEIVER OF THE CALLING
                                        DL11-E CAUSING IT TO TRANSMIT INCORRECT DATA TO THE CALLED DL11-E TWO
                                        TYPEOUTS WILL OCCUR AS SHOWN BELOW:

                                        PC=XXXXXX 174010 DATA S/B 301 WAS 321 CHAR NO 23
                                        PC=XXXXXX 174000 DATA S/B 301 WAS 321 CHAR NO 23

                                        THESE TYPEOUTS SHOW THAT THE RECEIVER ON LINE 0 WAS THE CAUSE
                                        OF THE ERROR AND THE RECEIVER ON LINE 1 RECEIVED THE CORRECT
                                        INCORRECT DATA.



                                ********** ECO HISTORY **********
                                CHGC1 - NEW STORAGE LOCATIONS FOR REFERENCE IN ^G MODE
                                CHGC2 - CHANGE START UP FOR ENTERING SOFTWARE SWITCH REGISTER INFO.
                                CHGC3 - SOFTWARE STORAGE LOCATIONS
                                CHGC4 - ROUTINE TO CHECK PRINTOUT, UPDATE SOFTWARE SWITCH REG.
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                        CHGC5 - NEW MESSAGES FOR SOFTWARE SWITCH REG ROUTINES.
                        CHGC6 - PART OF CHGC2.  NECESSARY TO DIVIDE INTO TWO PARTS
                        ************************************
                                .ENDR
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                                        .TITLE  CZDLBCO DL11-E ON LINE TSET
                                        .ENABLE ABS,AMA
                                ;THIS TEST CHECKS THE DL11-E USING MODEMS
                                ;REFER ALSO TO TEST DZDLA (DL11-E OFF LINE TESTS)
                                ;STARTING PROCEEDURE
                                ;       LOAD ADDRESS 200
                                ;
                                ;       STACK POINTER IS AT 1200
                                ;       PRESS START
                                ;
                                ;AVAILABLE PROGRAMS
                                ;       PRG0- SINGLE CHARACTER LINE MODE DATA TEST.
                                ;       PRG1- SPECIAL BINARY COUNT LINE MODE DATA TEST.
                                ;       PRG2- SPECIAL MESSAGE XMIT ONLY W/W/O PARITY
                                ;       PRG3- RECEIVE DATA TEST
                                ;       PRG4- SPIRAL PATTERN MESSAGE XMIT ONLY W/W/O PARITY
                                ;       PRG5- DATA ECHO TEST (USES FACILITY AT MAYNARD)

                                ;STANDARD SR SWITCH OPTIONS (SWITCH SET TO A 1 )
                                ;SR15- HALT ON ERROR.
                                ;SR14- SCOPE (NOT USED)
                                ;SR13- INHIBIT PRINTOUT
                                ;SR12- INHIBIT TRACE (NOT USED)
                                ;SR11- INHIBIT ITERATION (NOT USED)
000000                                  .=0
000000  004576                          ERTP                    ;UNASSIGNED TRAP
000002  000000                          0
000004  004576                  MACHER: ERTP                    ;SP OVERFLOW, BUS ERROR TRAP
000006  000040                          40
000010  004576                          ERTP                    ;RESERVED INSTRUCTION TRAP
000012  000100                          100
000014  004576                          ERTP                    ;TRACE TRAP
000016  000140                          140
000020  004704                          MAPVEC                  ;TRAP TO MAP VECTOR
000022  000340                          PRTY7
000024  002724                          PFAIL                   ;POWER FAIL TRAP
000026  000340                          PRTY7
000030  002300                          EMTINT                  ;EMT TRAP
000032  000340                          PRTY7
000034  004576                          ERTP
000036  000340                          340
000040  000042                          .+2
000042  000000                          HALT
000167                                  .REPT   119.
                                        .+2
                                        4                       ;TRAP TO MAP MAKER
                                        .ENDR

                                ;EQUATE STATEMENTS
177776                                  PSW=177776
001200                                  STKPTR=1200
000000                                  OPEN=0
100000                                  MANUAL=BIT15
100000                                  BIT15=100000
040000                                  BIT14=40000
020000                                  BIT13=20000
```

```
  513  010000                    BIT12=10000
  514  004000                    BIT11=4000
  515  002000                    BIT10=2000
  516  001000                    BIT9=1000
  517  000400                    BIT8=400
  518  000200                    BIT7=200
  519  000100                    BIT6=100
  520  000040                    BIT5=40
  521  000020                    BIT4=20
  522  000010                    BIT3=10
  523  000004                    BIT2=4
  524  000002                    BIT1=2
  525  000001                    BIT0=1
  526  005726                    POPSP=5726              ;POP THE STACK. SAME AS TST (6)+
  527  022626                    POPSP2=022626           ;POP STACK TWICE. SAME AS CMP (6)+,(6)+
  528  000340                    PRTY7=340               ;PRIORITY LEVEL DEFINITIONS
  529  000300                    PRTY6=300
  530  000240                    PRTY5=240
  531  000200                    PRTY4=200
  532  000140                    PRTY3=140
  533  000100                    PRTY2=100
  534  000040                    PRTY1=40
  535  000000                    PRTY0=0
  536  104000                    TYPE=EMT+0
  537  104001                    TYPES=EMT+1
  538  104002                    STALL=EMT+2
  539  104003                    ERROR=EMT+3
  540  104004                    DATCHK=EMT+4
  541  104005                    CHALT=EMT+5
  542  104006                    STRXV=EMT+6
  543  104007                    STTXV=EMT+7
  544  104010                    EHALT=EMT+10
  545  104011                    SAVREG=EMT+11
  546  104012                    RSTREG=EMT+12
  547  104013                    ERROR1=EMT+13
  548  104014                    ERRTX=EMT+14
  549  104015                    ERRRX=EMT+15
  550  104016                    DELAY=EMT+16
  551  000000                    N=0
  552  000000                    A=0
  553
  554                            .MACR   CNVOA   SRC,DST,COUNT
  555                            JSR     %5,OACNV        ;GO TO OCTAL TO ASCII CONVERT.
  556                            SRC                     ;SOURCE ADDR.
  557                            DST                     ;DESTINATION ADDR.
  558                            COUNT                   ;#OF DIGITS TO CONVERT.
  559                            .ENDM
  560
  561                            .MACR   ISR     N
  562                    RISR'N':        MOV     #'N',%0
  563                            JMP     RISR            ;GO TO COMMON INTERRUPT SERVICE ROUTINE
  564
  565                            .ENDM
  566
  567                            .MACR   ISRT    N
  568                    TISR'N':        MOV     #'N',%0         ;PUT LINE # IN R0
```

```
                                        JMP     TISR            ;GO TO COMMON INTERRUPT SERVICE

                                        .ENDM

                                        .MACR   RRCV    N,A
                                        175610+N                ;ADDRESS OF RECEIVER LINE # 'A'
                                        .ENDM

                                        .MACR   RBUFF   N,A
                                        175612+N                ;ADDRESS OF RECEIVER BUFFER LINE # 'A'
                                        .ENDM

                                        .MACR   TXMT    N,A
                                        175614+N                ;ADDRESS OF TRANSMITTER CSR LINE # 'A'
                                        .ENDM

                                        .MACR   TBUFF   N,A
                                        175616+N                ;ADDRESS OF TRANSMIT BUFFER LINE # 'A'
                                        .ENDM


                                ;**********  CHGC3  **********

                        000170          .=170
000170  177570          SRPTR:          177570          ;SOFT SW REG POINTER
000172  177570          DISPREG:        177570          ;DISPLAY POINTER
000174  000000          DISPLAY:        OPEN            ;SOFTWARE DISPLAY REGISTER
000176  000000          SWREG:          OPEN            ;SOFTWARE SWITCH REG


                                ;******************************


                        000200          .=200
000200  012737  001436  000312          MOV     #START,STAD     ;SET UP FOR NORMAL START
000206  000407          BR      STCONT  ;CONTINUE
000210  012737  001432  000312          MOV     #REMAP,STAD     ;SET FOR A REMAP START
000216  000403          BR      STCONT
000220  012737  002102  000312          MOV     #MODEV,STAD     ;SET TO MODIFY ON START
000226  012706  001200  STCONT: MOV     #STKPTR,%6      ;SET BOTTOM OF STAC
                        ;*********************
000232  013746  000006  CHGC2:  MOV     6,-(SP)         ;SAVE CURRENT VECTOR
000236  013746  000004          MOV     4,-(SP)
000242  012737  000262  000004          MOV     #64$,@#4        ;SET UP LOC. 4 FOR NON-EXISTANT
                                                        ;MEMORY TRAP
000250  022777  177777  177712          CMP     #-1,@SRPTR      ;REFERENCE HARDWARE SWITCH REGISTER
000256  001402          BEQ     65$             ;IF IT = -1, USE SOFT SW REG
000260  000407          BR      66$             ;THEN USE HARDWARE SW REG
000262  022626          64$:    CMP     (SP)+,(SP)+     ;CORRECT THE STACK  NO HDWE SW REG
000264  012737  000176  000170  65$:    MOV     #SWREG,SRPTR    ;POINT TO SOFT SW REG
000272  012737  000174  000172          MOV     #DISPLAY,DISPREG  ;POINT TO SOFT DISP REG
000300  012637  000004          66$:    MOV     (SP)+,@#4       ;RESTORE VECTORS
000304  012637  000006          MOV     (SP)+,@#6
```

```
                        ;*********************
000310  000137                  JMP     @(PC)+          ;JUMP TO SELECTED START
000312  000000          STAD:   0
                                .=1200
001200  000000          RXCSR:  0                       ;RECEIVER CSR UNDER TEST
001202  000000          RXBUF:  0                       ;RECEIVER BUFFER UNDER TEST
001204  000000          TXCSR:  0                       ;TRANSMITTER CSR UNDER TEST
001206  000000          TXBUF:  0                       ;TRANSMITTER BUFFER UNDER TEST
001210  000000          RXVTR:  OPEN                    ;RECEIVER VECTOR
001212  000200          RXLVL:  PRTY4                   ;RECEIVER PRIORITY LEVEL
001214  000000          TXVTR:  OPEN                    ;TRANSMITTER VECTOR
001216  000200          TXLVL:  PRTY4                   ;TRANSMITTER PRIORITY LEVEL
001220  177560          TKS:    177560                  ;LSR CSR
001222  177562          TKB:    177562                  ;LSR BUFFER
001224  177564          TPS:    177564                  ;LSP CSR
001226  177566          TPB:    177566                  ;LSP BUFFER
001230  000060          TKVTR:  60                      ;LSR INTERRUPT VECTOR
001232  000200          TKLVL:  PRTY4                   ;LSR PRIORITY LEVEL
001234  000064          TPVTR:  64                      ;LSP INTERRUPT VECTOR
001236  000200          TPLVL:  PRTY4                   ;LSP PRIORITY LEVEL
001240  000000          PRGNUM: OPEN                    ;CONTAINS CURRENT PROGRAM#
001242  000000          PRGID:  OPEN                    ;CONTAINS PROGRAM INDICATORS
001244  006502          PRGTAB: PRG0                    ;PRG0 START ADDRESS
001246  006616                  PRG1                    ;PRG1 START ADDRESS
001250  006720                  PRG2                    ;PRG2 START ADDRESS
001252  007016                  PRG3                    ;PRG3 START ADDRESS
001254  007552                  PRG4                    ;PRG4 START ADDRESS
001256  007764                  PRG5                    ;PRG5 START ADDRESS
001260  002432                  INCPRG
001262  002432                  INCPRG
001264  003200          EMITAB: TYP                     ;POINTER TO TYPEOUT ROUTINE
001266  003322                  TYPS                    ;POINTER TO CHAINED MESSAGES ROUTINE
001270  000000                  OPEN                    ;POINTER TO RANDOM STALL ROUTINE
001272  002570                  ERR                     ;POINTER TO ERROR ROUTINE
001274  002470                  DTCHK                   ;POINTER TO DATA CHECK ROUTINE
001276  002444                  CHLT                    ;COMMON HALT
001300  003120                  STRVRV                  ;POINTER TO ROUTINE TO SET RCVR VECTOR AND PRIORITY
001302  003150                  STXMTV                  ;POINTER TO ROUTINE TO SET XMIT VECTOR AND PRIORITY
001304  002456                  EHLT                    ;POINTER TO ERROR HALT ROUTINE.
001306  002332                  SAVRG                   ;POINTER TO SAVE REGISTERS ROUTINE
001310  002372                  RSTRG                   ;POINTER TO RESTORE REGISTERS ROUTINE
001312  002612                  ERR1                    ;POINTER TO ERROR ROUTINE
001314  002766                  TXERR                   ;POINTER TO XMIT ERROR ROUTINE
001316  003010                  RXERR                   ;POINTER TO RCVR ERROR ROUTINE
001320  003544                  DLY                     ;POINTER TO DELAY ROUTINE
001322  000000          PARBIT: OPEN
001324  000000          COUNT:  OPEN
001326  000000          SAVE:   OPEN
001330  000000          LINE:   OPEN
001332  000000          CONFIG: OPEN
001334  000000          NUMBER: OPEN

001336  000000          OLDPS:  0
001340  000000          TOPC:   0
001342  000000          FROMPC: 0
001344  000000          FTITLE: 0
```

```
                                FNONE:  0
                                FMAP:   0
                                TEMP1:  0
                                LINENO: 0
                                RECDAT: OPEN
                                XMTDAT: OPEN
                                CARMSK: OPEN
                                CTRD:   OPEN
                                TXCSRT: OPEN
                                RXCSRT: OPEN
                                TEMP:   OPEN
                                SRT:    OPEN
                                INBUFP: OPEN
                                BUFFP:  OPEN
                                CALLER: OPEN
                                CALLED: OPEN
                                OTBUFP: OPEN                    ;CONTAINS ADDRESS FROM WHERE NEXT TRAN-
                                                                ;SMITTED CHAR. (IN OUTBUF) IS TO COME
                                TBUFFP: OPEN
                                MODEM:  OPEN                    ;CONTAINS MODEM TYPE 0=103,4-202
                                        OPEN                    ;CONTAINS ADDRESS FROM WHERE NEXT TRANS-
                                                                ;MITTED CHAR. (CALLER'S LINE) IS TO COME
                                ;**********  CHGC1  **********
                                COUNT1: OPEN                    ;LOOP COUNT FOR TEST
                                CNT:    OPEN                    ;ITERATION COUNT
                                FILL1:  OPEN                    ;ZERO FILL SWITCH
                                MODE:   OPEN                    ;NUMBER OF DIGITS TO TYPE
                                TEMPST: OPEN                    ;TEMP WORK LOCATION
                                TIB:    OPEN                    ;TEMPORARY KYBD BUFFER STORAGE
                                ;******************************


                                REMAP:  CLR     FTITLE
                                START:  MOV     #STKPTR,%6      ;SET BOTTOM OF SP STACK.
                                        RESET
                                        CLR     PSW
                                        MOV     #ERTP,MACHER
                                        MOV     #40,MACHER+2
                                        TST     FTITLE          ;TITLE PRINTED
                                        BNE     START1          ;YES, SKIP THIS
                                        TYPE
                                        MTITLE
                                        INC     FTITLE          ;SET TITLE PRINTED FLAG
                                        CLR     FNONE           ;CLEAR NO DEVICE FLAG
                                        MOV     #-1,LINENO
                                        MOV     #MAPNE,MACHER   ;SET UP FOR NO DEVICE ANSWER
                                        MOV     #PRTY7,MACHER+2
                                        MOV     #RCSR,%4        ;SET UP DEVICE POINTER
                                MAPA:   INC     LINENO
                                        CMP     %4,#RBUF        ;LAST DEVICE
                                        BEQ     MAPEND          ;YES
                                        CLR     PSW
                                        TST     @(4)            ;TEST DEVICE
                                        NOP
                                        NOP
```

```
  737  001562  000404                        BR      MAPOK
  738  001564  062704  000002        MAPNE:  ADD     #2,%4
  739  001570  022626                        POPSP2
  740  001572  000760                        BR      MAPA
  741  001574  011437  001352        MAPOK:  MOV     (4),TEMP1       ;SAVE DEVICE FOR TYPING
  742  001600  004537  003606                JSR     %5,DACNV
  743  001604  001352                        TEMP1
  744  001606  012723                        MDADR
  745  001610  000006                        6
  746  001612  004537  003606                JSR     %5,DACNV
  747  001616  001354                        LINENO
  748  001620  012715                        MLINE
  749  001622  000002                        2
  750  001624  011401                        MOV     (4),%1          ;GET RXCSR DEVICE ADDRESS
  751  001626  004737  004762                JSR     %7,FORMAD
  752  001632  052737  000001  001350        BIS     #BIT0,FMAP
  753  001640  042777  000100  177336        BIC     #BIT6,@TXCSR
  754  001646  052777  000100  177330        BIS     #BIT6,@TXCSR
  755  001654  000240                        NOP
  756  001656  012737  000340  177776        MOV     #PRTY7,PSW
  757  001664  005737  001210                TST     RXVTR
  758  001670  001406                        BEQ     MAPOKA
  759  001672  013701  001354                MOV     LINENO,%1
  760  001676  006301                        ASL     %1
  761  001700  013761  001210  011120        MOV     RXVTR,VECTAB(1) ;STORE VECTOR
  762  001706  042777  000100  177270 MAPOKA: BIC     #BIT6,@TXCSR
  763  001714  004537  003606                JSR     %5,DACNV
  764  001720  001210                        RXVTR
  765  001722  012735                        MTRAP
  766  001724  000004                        4
  767  001726  104000                        TYPE
  768  001730  012715                        MLINE
  769  001732  005237  001346                INC     FNONE
  770  001736  062704  000002                ADD     #2,%4
  771  001742  000674                        BR      MAPA
  772  001744  012737  004576  000004 MAPEND: MOV     #ERTP,MACHER
  773  001752  012737  000040  000006        MOV     #40,MACHER+2
  774  001760  005737  001346                TST     FNONE
  775  001764  001007                        BNE     START1
  776  001766  104000                MAPERR: TYPE
  777  001770  012745                        MNONE
  778  001772  005037  001344                CLR     FTITLE
  779  001776  000000                        HALT
  780  002000  000137  001436                JMP     START
  781                                ;*******************
  782  002004                        CHGC6:
  783  002004  022737  000176  000170 START1: CMP     #SWREG,SRPTR    ;IS SOFT SWREG SELECTED
  784  002012  001015                        BNE     60$             ;IF NOT, BR OVER NEXT OPER
  785  002014  004737  010464                JSR     PC,CNTLU        ;SOFT SW REG INPUT ROUTINE
  786  002020  013701  001230                MOV     TKVTR,R1
  787  002024  012721  010712                MOV     #TTINTS,(R1)+   ;VECTOR ADDRESS TO LOC 60
  788  002030  013721  001232                MOV     TKLVL,(R1)+     ;PRIORITY TO LOC 62
  789  002034  005777  177162                TST     @TKB            ;CLEAR DONE FLAG
  790  002040  012777  000100  177152        MOV     #100,@TKS       ;SET TTY INTERRUPT ON
  791                                ;*******************
  792  002046  005037  177776        60$:    CLR     PSW
```

```
002052  104000                         TYPE
002054  012762                         MSWSEL
002056  004737  003372                 JSR     PC,RDOCT        ;GET INPUT
002062  012600                         MOV     (SP)+,%0                  ;(SR) TO R0
002064  042700  177770                 BIC     #177770,%0      ;LIMIT (SR) TO BITS 2-0
002070  010037  001240                 MOV     %0,PRGNUM       ;SAVE PROGRAM #
002074  006300                         ASL     %0              ;R0X2
002076  000170  001244                 JMP     @PRGTAB(0)      ;GO TO SELECTED PROGRAM.

                               ;
002102  012706  001200         MODEV:  MOV     #STKPTR,%6
002106  000005                         RESET
002110  005037  177776                 CLR     PSW
002114  104000                 MODEV1: TYPE
002116  015203                         MMOD1
002120  004737  003372                 JSR     PC,RDOCT        ;GET INPUT
002124  011600                         MOV     (SP),%0
002126  042700  177740                 BIC     #177740,%0
002132  006300                         ASL     %0
002134  022627  000036                 CMP     (SP)+,#36
002140  101403                         BLOS    MODEV2          ;BRANCH IF > 36
002142  104000                         TYPE
002144  015131                         MMODX
002146  000762                         BR      MODEV1
002150  104000                 MODEV2: TYPE
002152  015321                         MMOD2
002154  004737  003372         JSR     PC,RDOCT                ;GET INPUT
002160  032716  000001                 BIT     #BIT0,(SP)
002164  001403                         BEQ     MODEV3
002166  104000                         TYPE
002170  015153                         MMODD
002172  000766                         BR      MODEV2
002174  012601                 MODEV3: MOV     (SP)+,%1                  ;SAVE DEV ADR
002176  010003                         MOV     %0,%3
002200  062703  011216                 ADD     #RCSR,%3
002204  010113                         MOV     %1,(3)
002206  062701  000002                 ADD     #2,%1           ;UPDATE DEV ADR
002212  010003                         MOV     %0,%3
002214  062703  011314                 ADD     #RBUF,%3
002220  010113                         MOV     %1,(3)
002222  062701  000002                 ADD     #2,%1           ;UPDATE DEV ADR
002226  010003                         MOV     %0,%3
002230  062703  011412                 ADD     #TCSR,%3
002234  010113                         MOV     %1,(3)
002236  062701  000002                 ADD     #2,%1           ;UPDATE DEV ADR
002242  010003                         MOV     %0,%3
002244  062703  011510                 ADD     #TBUF,%3
002250  010113                         MOV     %1,(3)
002252  104000                         TYPE
002254  015367                         MMOD3
002256  004737  003372                 JSR     PC,RDOCT        ;GET INPUT
002262  022627  177777                 CMP     (SP)+,#177777
002266  001712                         BEQ     MODEV1
002270  005037  001344                 CLR     FTITLE
002274  000137  001436                 JMP     START

                               ;
                               ;EMT TRAP INTERPRETER
```

```
                        EMTINT: MOV     @%6,-(6)        ;GET SAVED PC.
002302  162716  000002          SUB     #2,@%6          ;DECREMENT PC BY 2.
002306  017616  000000          MOV     @(6),@%6
002312  006116                  EMTA:   ROL     @%6             ;EMT ARG X 2.
002314  042716  177001          BIC     #177001,@%6     ;REMOVE 7 MSB.
002320  062716  001264          ADD     #EMTTAB,@%6     ;FORM EMT RTN ADDR.
002324  017616  000000          MOV     @(6),@%6
002330  000136                  JMP     @(6)+           ;GO TO EMT ROUTINE.
                        ;
                        ;SAVE REGS 0 TO 4 SUBROUTINE.
002332  012637  002366  SAVRG:  MOV     (6)+,SVRPC      ;SAVE PC AND PSW.
002336  012637  002370          MOV     (6)+,SVRPSW
002342  010446                  MOV     %4,-(6)         ;SAVE REGS 0 - 4
002344  010346                  MOV     %3,-(6)         ;IN STACK.
002346  010246                  MOV     %2,-(6)
002350  010146                  MOV     %1,-(6)
002352  010046                  MOV     %0,-(6)
002354  013746  002370          MOV     SVRPSW,-(6)     ;RESTORE PC AND PSW.
002360  013746  002366          MOV     SVRPC,-(6)
002364  000002                  RTI                     ;EXIT.
002366  000000          SVRPC:  OPEN
002370  000000          SVRPSW: OPEN
                        ;
                        ;RESTORE REGS 0 TO 4 SUBROUTINE.
002372  012637  002426  RSTRG:  MOV     (6)+,RSTPC      ;SAVE PC AND PSW.
002376  012637  002430          MOV     (6)+,RSTPSW
002402  012600                  MOV     (6)+,%0         ;RESTORE REGS 0 - 4
002404  012601                  MOV     (6)+,%1         ;FROM STACK.
002406  012602                  MOV     (6)+,%2
002410  012603                  MOV     (6)+,%3
002412  012604                  MOV     (6)+,%4
002414  013746  002430          MOV     RSTPSW,-(6)     ;RESTORE PC AND PSW.
002420  013746  002426          MOV     RSTPC,-(6)
002424  000002                  RTI                     ;EXIT
002426  000000          RSTPC:  OPEN
002430  000000          RSTPSW: OPEN
002432  104000          INCPRG: TYPE                    ;TYPE INCORRECT PROGRAM SELECTED.
002434  014121                  AINPRG
002436  000000                  HALT
002440  000137  001436          JMP     START
                        ;COMMON HALT ROUTINE
002444  011600          CHLT:   MOV     @%6,%0          ;DEVELOP ADDRESS OF CALLER.
002446  162700  000002          SUB     #2,%0
002452  000000                  HALT                    ;HALT. ADDRESS OF CALL INSTRUCTION
002454  000002                  RTI                     ;IN DATA LIGHTS.
                        ;
                        ;CONDITIONAL ERROR HALT ROUTINE.
002456  005777  175506  EHLT:   TST     @SRPTR          ;CHECK FOR HALT ON ERROR.
002462  100001                  BPL     EHLTA           ;BRANCH IF NO HALT DESIRED.
002464  000000                  HALT                    ;HALT.
002466  000002          EHLTA:  RTI                     ;IN DATA LIGHTS.
                        ;
                        ;DATA CHECK ROUTINE.
002470  043737  001362  001360  DTCHK:  BIC     CARMSK,XMTDAT   ;CLEAR UNTRANSMITTED BITS
002476  123737  001356  001360          CMPB    RECDAT,XMTDAT   ;COMPARE TRANSMITTED AND RECEIVED
002504  001430                  BEQ     DTCHKA          ;CHARS. BRANCH IF SAME.
```

```
 905  002506                                          CNVOA   RECDAT,CWAS,3
 906  002520                                          CNVOA   XMTDAT,CSB,3
 907  002532                                          CNVOA   RXCSR,CSRADD,6
 908  002544  104013                                  ERROR1
 909  002546  013126                                  CSRADD
 910  002550  004537  004274                          JSR     5,BDCNV         ;CONVERT
 911  002554  001364                                  CTRD                    ;CHAR #
 912  002556  014112                                  CRNUM                   ;TO DECIMAL
 913  002560  000004                                  4                       ;4 BITS
 914  002562  104013                                  ERROR1
 915  002564  014047                                  CERDAT
 916  002566  000002                          DTCHKA: RTI                     ; EXIT.
 917                                          ;
 918  002570  012737  177777  002702          ERR:    MOV     #-1,ERRB        ;SET UP ONE MESSAGE CALL.
 919  002576  012737  000240  002704                  MOV     #240,ERRB+2
 920  002604  005037  002722                          CLR     ERRE
 921  002610  000413                                  BR      ERRA
 922  002612  011637  002702          ERR1:   MOV     @%6,ERRB        ;DEVELOP ADDT'L MESSAGE ADDR.
 923  002616  017737  000060  002702                  MOV     @ERRB,ERRB      ;STORE AT ERRB.
 924  002624  012737  177777  002704                  MOV     #-1,ERRB+2
 925  002632  012737  000002  002722                  MOV     #2,ERRE
 926  002640  032777  020000  175322  ERRA:   BIT     #BIT13,@SRPTR   ;INHIBIT ERROR PRINT?
 927  002646  001020                                  BNE     ERRC            ;BRANCH TO INHIBIT PRINT.
 928  002650  011637  002720                          MOV     @%6,ERRD        ;DEVELOP CALLING ADDR.
 929  002654  162737  000002  002720                  SUB     #2,ERRD
 930  002662                                          CNVOA   ERRD,APC,6      ;CONVERT CALL ADDR TO ASCII.
 931  002674  104011                                  SAVREG
 932  002676  104001                                  TYPES                   ;TYPE:
 933  002700  013176                                  EMO                     ;ERROR HEADER,
 934  002702  000000                          ERRB:   OPEN                    ;ADDT'L ERROR MESSAGE IF ANY.
 935  002704  177777                                  -1
 936  002706  104012                                  RSTREG
 937  002710  104010                          ERRC:   EHALT                   ;GO ERR HALT IF DESIRED.
 938  002712  063716  002722                          ADD     ERRE,@%6
 939  002716  000002                                  RTI                     ;EXIT.
 940  002720  000000                          ERRD:   OPEN
 941  002722  000000                          ERRE:   OPEN
 942                                          ;
 943                                          ;POWER FAIL SERVICE
 944  002724  012737  002734  000024  PFAIL:  MOV     #PWRUP,@#24
 945  002732  000000                                  HALT
 946  002734  012737  002724  000024  PWRUP:  MOV     #PFAIL,@#24
 947  002742  000005                                  RESET
 948  002744  012706  001200                          MOV     #STKPTR,%6
 949  002750  104000                                  TYPE
 950  002752  015073                                  MPWRF
 951  002754  013700  001240          RESTRT: MOV     PRGNUM,%0
 952  002760  006300                                  ASL     %0
 953  002762  000170  001244                          JMP     @PRGTAB(0)
 954                                          ;
 955  002766                          TXERR:  CNVOA   TXCSRT,ATXWAS,6 ;CONVERT CONTENTS OF TXCSR TO ASCII.
 956  003000  012737  013214  003104                  MOV     #ATXCSR,CRXTXB
 957  003006  000410                                  BR      CRXTX
 958  003010                          RXERR:  CNVOA   RXCSRT,ARXWAS,6 ;CONVERT CONTENTS OF RXCSR TO ASCII.
 959  003022  012737  013235  003104                  MOV     #ARXCSR,CRXTXB
 960  003030  011637  003102          CRXTX:  MOV     @%6,CRXTXA      ;DEVELOP ADDR OF ADDTT'L ERROR MESSAGE.
```

```
  961  003034  017737  000042  003102          MOV     @CRXTXA,CRXTXA
  962  003042  032777  020000  175120          BIT     #BIT13,@SRPTR   ;INHIBIT PRINT?
  963  003050  001017                          BNE     CRXTXC          ;BRANCH TO INHIBIT PRINT.
  964  003052  011637  002720                  MOV     @%6,ERRD        ;DEVELOP CALLING ADDR.
  965  003056  162737  000002  002720          SUB     #2,ERRD
  966  003064                                  CNVOA   ERRD,APC,6      ;CONVERT CALLING ADDR TO ASCII.
  967  003076  104001                          TYPES                   ;TYPE ERROR MESSAGE.
  968  003100  013176                          EMO                     ;ERR HEADER
  969  003102  000000                  CRXTXA: OPEN                    ;ADDT'L ERR MESSAGE
  970  003104  000000                  CRXTXB: OPEN                    ;TXCSR OR RXCSR CONTENTS.
  971  003106  177777                          -1
  972  003110  104010                  CRXTXC: EHALT                   ;GO HALT IF DESIRED.
  973  003112  062716  000002                  ADD     #2,@%6
  974  003116  000002                          RTI                     ;EXIT.
  975                                  ;
  976                                  ;ROUTINE TO SET RECEIVER INTERRUPT VECTOR AND PRIORITY
  977  003120  017637  000000  003140  STRVRV: MOV     @(6),STPRA+2    ;MOVE VECTOR ADDR TO STPRA+2
  978  003126  062716  000002                  ADD     #2,@%6          ;SET UP EXIT
  979  003132  013701  001210                  MOV     RXVTR,%1
  980  003136  012721  000000          STPRA:  MOV     #OPEN,(1)+      ;SET VECTOR ADDRESS
  981  003142  013721  001212                  MOV     RXLVL,(1)+      ;SET PRIORITY
  982  003146  000002                          RTI                     ;EXIT
  983                                  ;
  984                                  ;ROUTINE TO SET TRANSMITTER INTERRUPT VECTOR AND PRIORITY.
  985  003150  017637  000000  003170  STXMTV: MOV     @(6),STPPA+2    ;MOVE VECTOR ADDR TO STPPA+2
  986  003156  062716  000002                  ADD     #2,@%6          ;SET UP EXIT
  987  003162  013701  001214                  MOV     TXVTR,%1
  988  003166  012721  000000          STPPA:  MOV     #OPEN,(1)+      ;SET VECTOR ADDRESS.
  989  003172  013721  001216                  MOV     TXLVL,(1)+      ;SET PRIORITY
  990  003176  000002                          RTI                     ;EXIT.
  991                                  ;
  992                                  ;SUBROUTINE TO OUTPUT ASCII MESSAGE ON TELETYPE PRINTER.
  993  003200  010037  003370          TYP:    MOV     %0 ,SAVR0               ;SAVE R0
  994  003204  011600                          MOV     @%6,%0          ;GET ADDRESS THAT CONTAINS MESSAGE ADDRESS.
  995  003206  062716  000002                  ADD     #2,@%6          ;SET UP EXIT.
  996  003212  011000                          MOV     @%0,%0          ;ADDRESS OF MESSAGE TO R0.
  997  003214  112037  003320          TYPA:   MOVB    (0)+,TYPDAT     ;GET CHARACTER
  998  003220  122737  000100  003320          CMPB    #100,TYPDAT     ;CHECK FOR"@"CHARACTER
  999  003226  001003                          BNE     TYPC            ;BRANCH IF NOT"@".
 1000  003230  013700  003370                  MOV     SAVR0,%0                ;RESTORE R0
 1001  003234  000002                          RTI                     ;TERMINATOR CHAR. DONE. EXIT.
 1002  003236  122737  000045  003320  TYPC:   CMPB    #45,TYPDAT      ;CHECK FOR"%".
 1003  003244  001412                          BEQ     TYPF            ;BRANCH IF"%"
 1004  003246  004737  003254                  JSR     %7,TYPD         ;TYPE CHAR IN TYPDAT
 1005  003252  000760                          BR      TYPA
 1006  003254  113777  003320  175744  TYPD:   MOVB    TYPDAT,@TPB     ;OUTPUT CHARACTER TO PRINTER
 1007  003262  105777  175736                  TSTB    @TPS            ;WAIT FOR DONE FLAG.
 1008  003266  100375                          BPL     .-4
 1009  003270  000207                          RTS     %7              ;EXIT
 1010  003272  112737  000015  003320  TYPF:   MOVB    #15,TYPDAT      ;MOVE CARRIAGE RETURN CODE TO TYPDAT
 1011  003300  004737  003254                  JSR     %7,TYPD         ;GO TYPE CHAR.
 1012  003304  112737  000012  003320          MOVB    #12,TYPDAT      ;MOVE LF CODE TO TYPDAT.
 1013  003312  004737  003254                  JSR     %7,TYPD         ;GO TYPE CHAR.
 1014  003316  000736                          BR      TYPA
 1015  003320  000000          TYPDAT: OPEN
 1016                                  ;SUBROUTINE TO OUTPUT A SERIES OF ASCII MESSAGES ON TELETYPE PRINTER
```

```
1017  003322  010037  003370          TYPS:   MOV     %0,SAVR0
1018  003326  011600                  TYPSAA: MOV     @%6,%0          ;GET ADDRESS THAT CONTAINS MESSAGE ADDRESS
1019  003330  062716  000002                  ADD     #2,@%6          ;UPDATE TO NEXT MESSAGE ADDRESS
1020  003334  011037  003364                  MOV     @%0,TYPSB       ;ADDRESS OF MESSAGE TO TYPSB
1021  003340  022737  177777  003364          CMP     #-1,TYPSB       ;CHECK FOR TERMINATOR
1022  003346  001003                          BNE     TYPSA           ;BRANCH IF NOT TERMINATOR.
1023  003350  013700  003370                  MOV     SAVR0,%0                ;RESTORE R0
1024  003354  000002                          RTI                     ;TERMINATOR, EXIT
1025  003356  013700  003370          TYPSA:  MOV     SAVR0,%0
1026  003362  104000                          TYPE                    ;CALL ON TYP SUB TO TYPE MESSAGE
1027  003364  000000                  TYPSB:  OPEN                    ;ADDRESS OF MESSAGE GOES HERE
1028  003366  000757                          BR      TYPSAA          ;GO PROCESS NEXT MESSAGE
1029  003370  000000                  SAVR0:  OPEN
1030                                  ;
1031                                  ;SUBROUTINE TO READ OCTAL DATA FROM THE TELETYPE PRINTER
1032  003372  011646                  RDOCT:  MOV     (SP),-(SP)      ;MAKE ROOM FOR DATA WORD
1033  003374  010046                          MOV     %0,-(SP)        ;SAVE R0
1034  003376  010146                          MOV     %1,-(SP)        ;SAVE R1
1035  003400  005001                  INDAT:  CLR     %1              ;CLEAR DATA WORD
1036  003402  005037  001324                  CLR     COUNT           ;SET NO. OF DIGITS = 0
1037  003406  105777  175606          RDDAT:  TSTB    @TKS            ;TEST TTY READ STATUS
1038  003412  100375                          BPL     RDDAT           ;WAIT
1039  003414  117746  175602                  MOVB    @TKB,-(SP)      ;PUSH DIGIT ON STACK
1040  003420  042716  000200                  BIC     #BIT7,(SP)
1041  003424  105777  175574          ECDAT:  TSTB    @TPS            ;TEST TTY PRINT STATUS
1042  003430  100375                          BPL     ECDAT           ;WAIT
1043  003432  111677  175570                  MOVB    (SP),@TPB       ;ECHO CHARACTER
1044  003436  122716  000015                  CMPB    #15,(SP)        ;IS IT A TERMINATOR?
1045  003442  001432                          BEQ     RETRN           ;BR IF YES
1046  003444  122716  000177                  CMPB    #177,(SP)       ;IS IT A RUBOUT?
1047  003450  001423                          BEQ     RREAD           ;BR IF YES
1048  003452  122716  000060                  CMPB    #60,(SP)        ;IS IT AN OCTAL DIGIT?
1049  003456  003020                          BGT     RREAD           ;BR IF NO
1050  003460  122716  000067                  CMPB    #67,(SP)        ;TEST AGAIN
1051  003464  002415                          BLT     RREAD           ;BR IF NO
1052  003466  005237  001324                  INC     COUNT           ;INC NO. OF DIGITS
1053  003472  022737  000067  001324          CMP     #67,COUNT       ;MORE THAN SIX DIGITS?
1054  003500  003407                          BLE     RREAD           ;BR IF YES
1055  003502  006301                          ASL     %1              ;CLEAR LOWEST THREE BITS
1056  003504  006301                          ASL     %1              ;OF DATA WORD
1057  003506  006301                          ASL     %1
1058  003510  162716  000060                  SUB     #60,(SP)        ;CONVERT TO BINARY
1059  003514  062601                          ADD     (SP)+,%1        ;ADD DIGIT TO DATA WORD
1060  003516  000733                          BR      RDDAT           ;GET NEXT DIGIT
1061  003520  104000                  RREAD:  TYPE                    ;TELL USER ABOUT ILLEGAL CHARACTER
1062  003522  014001                          DTERR
1063  003524  005726                          TST     (SP)+           ;GET RID OF ILLEGAL CHARACTER
1064  003526  000724                          BR      INDAT           ;START SUBROUTINE AGAIN
1065  003530  010166  000010          RETRN:  MOV     %1,10(SP)       ;STORE DATA WORD ON STACK
1066  003534  005726                          TST     (SP)+           ;INC STACK POINTER
1067  003536  012601                          MOV     (SP)+,%1        ;RESTORE R1
1068  003540  012600                          MOV     (SP)+,%0        ;RESTORE R0
1069  003542  000207                          RTS     PC              ;RETURN
1070                                  ;
1071                                  ;SUBROUTINE TO DELAY A SPECIFIED NUMBER OF MILLISECONDS
1072  003544  011637  003604          DLY:    MOV     @%6,DLCNT       ;GET DELAY COUNT ADDRESS.
```

```
 1073  003550  062716  000002                ADD     #2,@%6          ;SET UP EXIT ADDRESS
 1074  003554  017746  000024                MOV     @DLCNT,-(6)     ;DELAY COUNT TO STACK
 1075  003560  001407                        BEQ     DLYC
 1076  003562  012746  000226        DLYA:   MOV     #226,-(6)       ;1 MSEC COUNT TO STACK
 1077  003566  005316                DLYB:   DEC     @%6             ;DECREMENT 1 MSEC COUNT
 1078  003570  001376                        BNE     DLYB            ;BRANCH IF NOT 0.
 1079  003572  005726                        POPSP                   ;ZERO. UNCOVER MSECS. COUNT.
 1080  003574  005316                        DEC     @%6             ;DECREMENT IT
 1081  003576  001371                        BNE     DLYA            ;BR IF NOT DONE DELAYING
 1082  003600  005726                DLYC:   POPSP                   ;DONE
 1083  003602  000002                        RTI                     ;EXIT.
 1084  003604  000000                DLCNT:  OPEN                    ;CONTAINS MILLISECONDS COUNT ADDRESS.
 1085                                ;
 1086                                ;OCTAL TO ASCII CONVERT ROUTINE
 1087  003606  104011                OACNV:  SAVREG                  ;SAVE REGS.
 1088  003610  013500                        MOV     @(5)+,%0        ;GET OCTAL VALUE.
 1089  003612  012501                        MOV     (5)+,%1         ;GET DESTINATION ADDR.
 1090  003614  012502                        MOV     (5)+,%2         ;GET CONVERT COUNT.
 1091  003616  060201                        ADD     %2,%1           ;DEVELOP ADDR TO STORE 1ST CHAR.
 1092  003620  010003                OACNVA: MOV     %0,%3
 1093  003622  042703  177770                BIC     #177770,%3      ;ISOLATE LEAST SIGNIFICANT DIGIT.
 1094  003626  062703  000060                ADD     #60,%3          ;CONVERT DIGIT TO ASCII.
 1095  003632  110341                        MOVB    %3,-(1)         ;STORE ASCII CHARACTER.
 1096  003634  042700  000007                BIC     #7,%0
 1097  003640  006000                        ROR     %0
 1098  003642  006000                        ROR     %0
 1099  003644  006000                        ROR     %0
 1100  003646  005302                        DEC     %2              ;DONE ALL DIGITS?
 1101  003650  001363                        BNE     OACNVA          ;BRANCH IF NOT DONE.
 1102  003652  104012                        RSTREG                  ;RESTORE REGS.
 1103  003654  000205                        RTS     %5              ;DONE. EXIT.
 1104                                ;SUBROUTINE TO GENERATE PARITY ON DATA FOR 5,6,7,8 LEVEL CODE.
 1105                                ;PARITY BIT IS THE MSB OF THE CHARACTER PARITY CAN BE EITHER
 1106                                ;EVEN OR ODD
 1107                                ;GENERATES ODD/EVEN PARITY.
```

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1108                                        ;
1109  003656  032737  000200  001362  GENPAR: BIT     #BIT7,CARMSK    ;TEST LSB CHAR LENGTH
1110  003664  001411                          BEQ     EIGHT           ;CHAR IS 8
1111  003666  032737  000100  001362          BIT     #BIT6,CARMSK    ;TEST MSB CHAR LENGTH
1112  003674  001427                          BEQ     SEVEN           ;CHAR LENGTH IS 7
1113  003676  032737  000040  001362          BIT     #BIT5,CARMSK
1114  003704  001412                          BEQ     SIX
1115  003706  000433                          BR      FIVE
1116  003710  012737  000200  001322  EIGHT:  MOV     #BIT7,PARBIT    ;PLACE PARITY BIT IN PROPER POSITION
1117  003716  012737  000007  001324          MOV     #7,COUNT        ;SET UP ROTATE COUNTER=7
1118  003724  042701  177600                  BIC     #177600,%1      ;MASK OFF UNUSED BITS
1119  003730  000433                          BR      DOIT            ;GO AND GENERATE PARITY FOR 8
1120  003732  012737  000040  001322  SIX:    MOV     #BIT5,PARBIT    ;PLACE PARITY BIT IN PROPER POSITION
1121  003740  012737  000005  001324          MOV     #5,COUNT        ;SET UP ROTATE COUNTER=5
1122  003746  042701  177740                  BIC     #177740,%1      ;MASK OFF UNUSED BITS
1123  003752  000422                          BR      DOIT            ;GO AND GENERATE PARITY FOR
1124  003754  012737  000100  001322  SEVEN:  MOV     #BIT6,PARBIT    ;PLACE PARITY BIT IN PROPER POSITION
1125  003762  012737  000006  001324          MOV     #6,COUNT        ;SET UP ROTATE COUNTER=6
1126  003770  042701  177700                  BIC     #177700,%1      ;MASK OFF UNUSED BITS
1127  003774  000411                          BR      DOIT            ;GO AND GENERATE PARITY FOR 7
1128  003776  012737  000020  001322  FIVE:   MOV     #BIT4,PARBIT    ;PLACE PARITY BIT IN PROPER POSITION
1129  004004  012737  000004  001324          MOV     #4,COUNT        ;SET UP ROTATE COUNTER-4
1130  004012  042701  177760                  BIC     #177760,%1      ;MASK OFF UNUSED BITS
1131  004016  000400                          BR      DOIT            ;GO AND GENERATE PARITY FOR
1132  004020  010137  001326          DOIT:   MOV     %1,SAVE         ;SAVE DATA
1133  004024  006001                  AGAIN:  ROR     %1              ;ROTATE DATA
1134  004026  103415                          BCS     ADD1            ;IF CARRY SET ADD IN PARBIT
1135  004030  005337  001324          RTN:    DEC     COUNT           ;DECREMENT COUNTER
1136  004034  001373                          BNE     AGAIN           ;NOT DONE DO IT AGAIN
1137  004036  032737  000040  001374          BIT     #BIT5,SRT       ;DONE EVEN OR ODD PARITY?
1138  004044  001403                          BEQ     DONE            ;IF EVEN FINISHED
1139  004046  063737  001322  001326          ADD     PARBIT,SAVE     ;IF ODD ADD IN ANOTHER 1
1140  004054  013701  001326          DONE:   MOV     SAVE,%1         ;PLACE DATA + PARITY BACK IN R1
1141  004060  000207                          RTS     7               ;AND EXIT
1142  004062  063737  001322  001326  ADD1:   ADD     PARBIT,SAVE     ;ADD PARBIT TO DATA
1143  004070  000757                          BR      RTN             ;RETURN TO COUNTER
1144
1145                                        ;SUBROUTINE TO SELECT LINE AND LOAD VECTOR ASSIGNMENT
1146  004072  104000                  LINSEL: TYPE
1147  004074  015024                          LDLINE
1148  004076  004737  003372                  JSR     PC,RDOCT        ;GET INPUT
1149  004102  012601                          MOV     (SP)+,%1                ;LOAD R1
1150  004104  042701  177407                  BIC     #177407,%1      ;MASK OFF ALL BUT LINE BITS
1151  004110  006201                          ASR     %1
1152  004112  006201                          ASR     %1
1153  004114  010137  001372                  MOV     %1,TEMP         ;SAVE LINE #
1154  004120  012703  001200                  MOV     #RXCSR,%3       ;LOAD ADDRESS OF REGISTERS
1155  004124  012704  000004                  MOV     #4,%4           ;SET UP COUNTER
1156  004130  016102  011216                  MOV     RCSR(1),%2
1157  004134  010223                  LINSA:  MOV     %2,(3)+
1158  004136  062702  000002                  ADD     #2,%2
1159  004142  005304                          DEC     %4
1160  004144  001373                          BNE     LINSA
1161  004146  016101  011120                  MOV     VECTAB(1),%1    ;GET LINE VECTOR ADDRESS
1162  004152  010123                          MOV     %1,(3)+         ;LOAD INTO PROG. RXVTR
1163  004154  022121                          CMP     (1)+,(1)+       ;ADD +4 TO RXVTR TO = TXVTR
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 1164  004156  005723                          TST     (3)+            ;POINT TO PROG TXVTR
 1165  004160  010113                          MOV     %1,(3)          ;LOAD INTO PROG TXVTR
 1166  004162  022737  000005  001240          CMP     #5,PRGNUM       ;RUNNING PROGRAM # 5
 1167  004170  001001                          BNE     .+4
 1168  004172  000205                          RTS     5               ;RETURN TO PROG 5
 1169  004174  006237  001372                  ASR     TEMP            ;POSITION
 1170  004200                                  CNVOA   TEMP,TLINEX,2
 1171  004212  104000                          TYPE                    ;TYPE LINE # THAT
 1172  004214  014433                          ALINEX                  ;WAS CALLED
 1173  004216  000205                          RTS     5
 1174                                  ;
 1175                                  ;SUBROUTINE TO LOAD BINARY COUNT PATTERN INTO OUTPUT BUFFER
 1176  004220  105037  001334          INFIL:  CLRB    NUMBER          ;INITIALIZE BINARY COUNT
 1177  004224  012500                  FILL:   MOV     (5)+,%0         ;GET ADDRESS
 1178  004226  012537  001364                  MOV     (5)+,CTRD       ;GET COUNT
 1179  004232  113720  001334          FILLA:  MOVB    NUMBER,(0)+     ;LOAD ADDRESS WITH BINARY COUNT
 1180  004236  105237  001334                  INCB    NUMBER          ;INC. BINARY COUNT
 1181  004242  005337  001364                  DEC     CTRD            ;DEC. COUNT
 1182  004246  001371                          BNE     FILLA
 1183  004250  000205                          RTS     5               ;EXIT
 1184
 1185                                  ;SUBROUTINE TO MOVE A VARIABLE NUMBER OF BYTES.
 1186  004252  104011                  BMOVE:  SAVREG                  ;SAVE REGS.
 1187  004254  012501                          MOV     (5)+,%1         ;GET 'FROM' ADDRESS
 1188  004256  012502                          MOV     (5)+,%2         ;GET 'TO' ADDRESS
 1189  004260  012503                          MOV     (5)+,%3         ;GET COUNT
 1190  004262  112122                  BMOVA:  MOVB    (1)+,(2)+       ;MOVE BYTE
 1191  004264  005303                          DEC     %3              ;DECREMENT COUNT
 1192  004266  001375                          BNE     BMOVA           ;BRANCH IF NOT DONE.
 1193  004270  104012                          RSTREG                  ;RESTORE REGS.
 1194  004272  000205                          RTS     %5              ;DONE EXIT
 1195                                  ;
 1196                                  ;BINARY TO DECIMAL ASCII CONVERT SUBROUTINE.
 1197  004274  104011                  BDCNV:  SAVREG                  ;SAVE REGS.
 1198  004276  012700  004452                  MOV     #DECVAL,%0      ;SET UP ADDR TO STORE DECIMAL ASCII IN R0
 1199  004302  013501                          MOV     @(5)+,%1        ;BINARY VALUE TO R1.
 1200  004304  012537  004362                  MOV     (5)+,BDCNVC     ;DESTINATION ADDR TO BDCNVC.
 1201  004310  012537  004364                  MOV     (5)+,BDCNVD     ;COUNT TO BDCNVD.
 1202  004314  012702  004440                  MOV     #ADTENP,%2      ;ADDR OF TEN POWER STRING TO R2.
 1203  004320  012737  000005  004432          MOV     #5,CNVCTR       ;SET UP FOR 5 POWER CONVERSIONS.
 1204  004326  012237  004436          BDCNVA: MOV     (2)+,TENPWR     ;MOVE POWER OF TEN VALUE TO TENPWR.
 1205  004332  004737  004372                  JSR     %7,SUBTEN       ;PERFORM CONVERSION
 1206  004336  005337  004432                  DEC     CNVCTR          ;DONE 5 CONVERSIONS?
 1207  004342  001371                          BNE     BDCNVA          ;BRANCH IF NOT YET 5.
 1208  004344  163700  004364                  SUB     BDCNVD,%0       ;SET UP ADDR TO MOVE DECIMAL
 1209  004350  010037  004360                  MOV     %0,BDCNVB       ;DATA FROM.
 1210  004354  004537  004252                  JSR     %5,BMOVE        ;MOVE DECIMAL DATA TO DESTINATION.
 1211  004360  000000          BDCNVB: OPEN                            ;SRC ADDR.
 1212  004362  000000          BDCNVC: OPEN                            ;DEST ADDR.
 1213  004364  000000          BDCNVD: OPEN                            ;COUNT.
 1214  004366  104012                  RSTREG                          ;RESTORE REGS.
 1215  004370  000205                  RTS     %5                      ;YES, EXIT.
 1216  004372  005037  004434  SUBTEN: CLR     DIGIT                   ;CLEAR DIGIT
 1217  004376  163701  004436  SUBTNA: SUB     TENPWR,%1               ;SUBTRACT TEN POWER FROM BINARY VALUE.
 1218  004402  103403                  BCS     SUBTNB                  ;BRANCH IF UNSUCCESSFUL SUBTRACTION.
 1219  004404  005237  004434                  INC     DIGIT
```

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                                                BR      SUBTNA
                                SUBTNB: ADD     TENPWR,%1       ;RESTORE SUBTRACTED VALUE.
                                        ADD     #60,DIGIT       ;CONVERT (DIGIT) TO ASCII
                                        MOVB    DIGIT,(0)+      ;MOVE ASCII CHAR TO DECVAL FIELD.
                                        RTS     %7              ;EXIT.
                                CNVCTR: OPEN
                                DIGIT:  OPEN
                                TENPWR: OPEN
                                ADTENP: 10000.
                                        1000.
                                        100.
                                        10.
                                        1
                                DECVAL: .BYTE   040,040,040,040,040,040
                                ;SUBROUTINE TO SET  CHARACTER LENGTH PARAMETER
                                SETPAR: TYPE                    ;TYPE: SELECT PARAMETERS.
                                        SELPAR
                                        JSR     PC,RDOCT        ;GET INPUT
                                        MOV     (SP)+,SRT
                                        CNVOA   SRT,APARM,3
                                        TYPE
                                        PARMTS
                                TBIT1:  MOV     #177400,CAPMSK          ;SET CHARACTER MASK TO 8 BITS.
                                        BIT     #BIT1,SRT               ;SEE IF SR BIT 1 IS SET.
                                        BEQ     STPARA                  ;BRANCH IF NOT SET.
                                        MOV     #177700,CARMSK          ;CHANGE CHAR MASK TO 6 BITS.
                                        BIT     #BIT0,SRT               ;SEE IF SR BIT0 IS SET.
                                        BEQ     PAREX                   ;BRANCH IF NOT SET.
                                        MOV     #177740,CARMSK          ;CHANGE CHAR MASK TO 5 BITS.
                                PAREX:  RTS     %7                      ;EXIT.
                                STPARA: BIT     #BIT0,SRT               ;SEE IF SR BIT0 IS SET.
                                        BEQ     STPARA-2                ;BRANCH IF NOT SET.
                                        MOV     #177600,CARMSK          ;CHANGE CHAR MASK TO 7 BITS.
                                        BR      PAREX
                                ;
                                ;ERROR TRAP HANDLER - TYPE TO AND FROM WHERE ERROR TRAP OCCURS
                                ERTP:   MOV     PSW,OLDPS       ;SAVE OLDPS
                                        MOV     #PRTY7,PSW
                                        ASR     OLDPS
                                        ASR     OLDPS
                                        ASR     OLDPS
                                        BIC     #177740,OLDPS
                                        MOV     OLDPS,TOPC
                                        MOV     @%6,FROMPC
                                ERTPA:  JSR     %5,OACNV
                                        TOPC
                                        MTO
                                        6
                                        JSR     %5,OACNV
                                        FROMPC
                                        MFROM
                                        6
                                        TYPE
                                        MTERR
                                        HALT
```

```
 1276  004700  000137  001436                JMP     START
 1277
 1278                                ;
 1279                                ;MAPVEC - MAP VECTOR VECTOR OR REPORT ERROR DEPENDING ON FMAP FLAG
 1279  004704  011637  001340        MAPVEC: MOV     @%6,TOPC
 1280  004710  022626                POPSP2
 1281  004712  011637  001342                MOV     @%6,FROMPC
 1282  004716  162737  000004  001340        SUB     #4,TOPC
 1283  004724  005737  001350                TST     FMAP
 1284  004730  001746                        BEQ     ERTPA           ;NOT MAPPING, REPORT ERROR
 1285  004732  013737  001340  001214        MOV     TOPC,TXVTR      ;STORE VECTOR
 1286  004740  162737  000004  001340        SUB     #4,TOPC
 1287  004746  013737  001340  001210        MOV     TOPC,RXVTR
 1288  004754  005037  001350                CLR     FMAP
 1289  004760  000002                        RTI
 1290
 1291                                ;
 1291                                ;FORMAD - FORM DEVICE AT ADDRESS
 1292  004762  010137  001200        FORMAD: MOV     %1,RXCSR
 1293  004766  062701  000002                ADD     #2,%1
 1294  004772  010137  001202                MOV     %1,RXBUF
 1295  004776  062701  000002                ADD     #2,%1
 1296  005002  010137  001204                MOV     %1,TXCSR
 1297  005006  062701  000002                ADD     #2,%1
 1298  005012  010137  001206                MOV     %1,TXBUF
 1299  005016  000207                        RTS     %7
 1300
 1301                                ;
 1301                                ;SUBROUTINE TO MAKE LINE CONNECTION.
 1302  005020  017737  174154  001370 LINCON: MOV     @RXCSR,RXCSRT
 1303  005026  032737  020000  001370        BIT     #BIT13,RXCSRT   ;YES, IS CLEAR TO SEND UP
 1304  005034  001046                        BNE     LINEUP          ;YES CONNECTION IS MADE.
 1305  005036  042777  000146  174134 LINCA:  BIC     #146,@RXCSR     ;CLEAR IE BIT AND DTR, RQ TO SND
 1306  005044  005777  174132                TST     @RXBUF          ;CLEAR DONE FLAG
 1307  005050  104000                        TYPE                    ;TYPE
 1308  005052  014020                        MAKCON                  ;'MAKE LINE CONNECTION'
 1309  005054  017737  174120  001370 LINCB:  MOV     @RXCSR,RXCSRT
 1310  005062  032737  040000  001370        BIT     #BIT14,RXCSRT   ;DID YOU RING
 1311  005070  001771                        BEQ     LINCB           ;GO WAIT FOR RING
 1312  005072  052777  000006  174100        BIS     #6,@RXCSR       ;SET DTR, RQ TO SND
 1313  005100  104016                        DELAY                   ;WAIT 10 SECONDS FOR
 1314  005102  023420                        10000.                  ;CLEAR TO SEND
 1315  005104  017737  174070  001370        MOV     @RXCSR,RXCSRT
 1316  005112  005777  174064                TST     @RXBUF          ;CLEAR DONE
 1317  005116  032737  020000  001370        BIT     #BIT13,RXCSRT   ;IS CLEAR TO SEND UP?
 1318  005124  001003                        BNE     LINCF           ;YES.  GO TO LINCF
 1319  005126  104015                        ERRRX                   ;NO.  PRINT ERROR MESSAGE
 1320  005130  014146                        LINCHM                  ;'CLEAR TO SEND NOT SET'
 1321  005132  000741                        BR      LINCA           ;START OVER AGAIN
 1322  005134  017737  174040  001370 LINCF:  MOV     @RXCSR,RXCSRT   ;CLEAR ALL FLAGS
 1323  005142  005777  174034                TST     @RXBUF          ;AND DONE
 1324  005146  104000                        TYPE                    ;TYPE MESSAGE
 1325  005150  014176                        LINMAD                  ;CONNECTION IS MADE'
 1326  005152  000205                LINEUP: RTS     5               ;EXIT LINE CONNECTION ROUTINE WITH
 1327                                ;SUBROUTINE TO OVERLAY <CRLF> IN DATA PATTERN (EVERY 72.ND CHAR)
 1328  005154  012701  015512        OVRLAY: MOV     #OUTBUF,%1      ;GET OUTBUF ADDRESS
 1329  005160  012702  000016                MOV     #14.,%2         ;GET COUNTER
 1330  005164  012711  105215        OVRLYA: MOV     #105215,(1)     ;INSERT CR&LF
 1331  005170  062701  000110                ADD     #72.,%1         ;ADD OFFSET
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 1332  005174  005302                          DEC     %2              ;DONE?
 1333  005176  001372                          BNE     OVRLYA
 1334  005200  000207                          RTS     7               ;EXIT
 1335                                  ;
 1336                                  ;RECEIVER INTERRUPTS COMMON HANDLER
 1337  005202  000240                  RISR:   NOP
 1338  005204  010037  001330                  MOV     %0,LINE
 1339  005210  006300                          ASL     %0
 1340  005212  016037  011216  001200          MOV     RCSR(0),RXCSR   ;GET ADDRESS OF INTERRUPTING DL11-E'S RCSR
 1341  005220  017737  173754  001370          MOV     @RXCSR,RXCSRT   ;GET CSR CONTENTS
 1342  005226  100570                          BMI     DCERR           ;CHECK INT
 1343  005230  105737  001370                  TSTB    RXCSRT          ;TEST DONE
 1344  005234  001002                          BNE     RISRA
 1345  005236  104003                          ERROR                   ;FALSE INTERRUPT
 1346  005240  000002                          RTI                     ;EXIT
 1347  005242  020037  001404          RISRA:  CMP     %0,CALLED       ;DID CALLED LINE INTERRUPT?
 1348  005246  001020                          BNE     RISRB           ;BRANCH IF CALLER INTERRUPTED
 1349  005250  005737  001412                  TST     MODEM           ;CHECK MODEM TYPE
 1350  005254  001403                          BEQ     RISRAA          ;BRANCH IF 103
 1351  005256  005770  011314                  TST     @RBUF(0)        ;READ CALLED LINES DATA
 1352  005262  000002                          RTI
 1353  005264  117077  011314  174104  RISRAA: MOVB    @RBUF(0),@INBUFP;STORE CHARACTER IN INPUT BUFFER
 1354  005272  005237  001376                  INC     INBUFP          ;INCREMENT POINTER
 1355  005276  022737  017626  001376          CMP     #INBUF+100.,INBUFP;HAVE 100. CHARACTERS BEEN RECEIVED?
 1356  005304  001430                          BEQ     RISRC           ;GO CHECK DATA IF YES
 1357  005306  000002                          RTI                     ;EXIT IF NO
 1358  005310  117077  011314  174062  RISRB:  MOVB    @RBUF(0),@BUFFP ;STORE CHARACTER IN INTERMEDIATE DATA BUFFER
 1359  005316  005237  001400                  INC     BUFFP           ;INCREMENT POINTER
 1360  005322  022737  015670  001400          CMP     #BUFF+10.,BUFFP ;HAVE 10 CHARACTERS BEEN RECEIVED
 1361  005330  002401                          BLT     .+4
 1362  005332  000002                          RTI                     ;EXIT
 1363  005334  022737  000002  001332          CMP     #2,CONFIG       ;RUNNING CONFIGURATION 2?
 1364  005342  001405                          BEQ     RISRBB
 1365  005344  022737  016022  001400          CMP     #BUFF+100.,BUFFP;HAVE 100. CHARACTERS BEEN RECEIVED?
 1366  005352  001405                          BEQ     RISRC           ;GO CHECK DATA IF YES,OTHERWISE
 1367  005354  000002                          RTI                     ;EXIT
 1368  005356  052770  000100  011412  RISRBB: BIS     #BIT6,@TCSR(0)  ;START CALLERS TRANSMITTER
 1369  005364  000002                          RTI                     ;EXIT
 1370                                  ;CHECK DATA CONFIGURATION #1
 1371  005366  000240                  RISRC:  NOP
 1372  005370  012737  000001  001364          MOV     #1,CTRD         ;INITIALIZE CHARACTER COUNT
 1373  005376  012702  015656                  MOV     #BUFF,%2        ;POINT R2 TO CALLERS RECEIVED DATA BUFFER
 1374  005402  012703  015512                  MOV     #OUTBUF,%3      ;R3 = FIRST ADDRESS OF OUTPUT DATA BUFFER
 1375  005406  010237  001400                  MOV     %2,BUFFP        ;RESTORE CALLERS RCVD DATA BUFFER PTR
 1376  005412  022737  000001  001332          CMP     #1,CONFIG       ;CHECK CONFIGURATION
 1377  005420  001015                          BNE     RISRD
 1378  005422  112337  001360          RISRCA: MOVB    (3)+,XMTDAT     ;GET TRANSMITTED CHARACTER
 1379  005426  112237  001356                  MOVB    (2)+,RECDAT     ;GET RECEIVED CHARACTER
 1380  005432  104004                          DATCHK                  ;CHECK DATA
 1381  005434  005237  001364                  INC     CTRD            ;INCREMENT CHARACTER COUNT
 1382  005440  022737  000101  001364          CMP     #101,CTRD       ;HAS ALL DATA BEEN CHECKED
 1383  005446  001365                          BNE     RISRCA
 1384  005450  000137  005554                  JMP     FINISH
 1385                                  ;
 1386                                  ;CHECK DATA CONFIGURATION #2
 1387  005454  000240                  RISRD:  NOP
```

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1388  005456  012704  017462                MOV     #INBUF,%4       ;POINT R4 TO CALLED LINES RECEIVER
1389  005462  010437  001376                MOV     %4,INBUFP       ;DATA BUFFER & INIT. POINTER
1390  005466  012737  015656  001410        MOV     #BUFF,TBUFFP
1391  005474  013701  001404        RISRDA: MOV     CALLED,%1
1392  005500  016137  011216  001200        MOV     RCSR(1),RXCSR
1393  005506  112337  001360                MOVB    (3)+,XMTDAT
1394  005512  112237  001356                MOVB    (2)+,RECDAT     ;COMPARE TRANSMITTED DATA WITH DATA
1395  005516  104004                        DATCHK                  ;RECEIVED BY CALLED LINE
1396  005520  013701  001402                MOV     CALLER,%1
1397  005524  016137  011216  001200        MOV     RCSR(1),RXCSR
1398  005532  112437  001356                MOVB    (4)+,RECDAT     ;COMPARE TRANSMITTED DATA WITH DATA
1399  005536  104004                        DATCHK                  ;RECEIVED BY CALLER
1400  005540  005237  001364                INC     CTRD
1401  005544  022737  000101  001364        CMP     #101,CTRD
1402  005552  001350                        BNE     RISRDA
1403  005554  000240                FINISH: NOP
1404  005556  013701  001404                MOV     CALLED,%1
1405  005562  004537  004224                JSR     5,FILL
1406  005566  015512                        OUTBUF
1407  005570  000144                        100.
1408  005572  104000                        TYPE
1409  005574  014117                        ENDPAS
1410  005576  052771  000100  011412        BIS     #BIT6,@TCSR(1)
1411  005604  000240                        NOP
1412  005606  000002                        RTI
1413                                ;ERROR SERVICE ROUTINE
1414  005610  032770  100000  011314  DCERR: BIT     #BIT15,@RBUF(0) ;TEST ERROR
1415  005616  001402                        BEQ     RISRF
1416  005620  104015                        ERRRX
1417  005622  013126                        CSRADD
1418  005624  012737  015512  001406  RISRF: MOV     #OUTBUF,OTBUFP  ;SET OUTPUT BUFFER POINTER
1419  005632  012737  017462  001376        MOV     #INBUF,INBUFP   ;SET INPUT BUFFER POINTER
1420  005640  012737  015656  001400        MOV     #BUFF,BUFFP     ;SET INTERMEDIATE BUFFER POINTER
1421  005646  012737  015656  001410        MOV     #BUFF,TBUFFP    ;SET POINTER FOR CONFIG #2 TRANSMITTER
1422  005654  032737  040000  001370        BIT     #BIT14,RXCSRT   ;CHECK RING INDICATOR
1423  005662  001005                        BNE     RISREX          ;BRANCH IF RING
1424  005664  004737  006312                JSR     7,DISCON        ;ERROR SET - NO RING
1425  005670  104015                        ERRRX
1426  005672  013126                        CSRADD
1427  005674  000002                        RTI
1428  005676                        RISREX: CNVOA   LINE,TLINE,2
1429  005710  104000                        TYPE
1430  005712  014463                        ALINE
1431  005714  010037  001404                MOV     %0,CALLED
1432  005720  004737  003372                JSR     PC,RDOCT        ;GET INPUT
1433  005724  011637  001412                MOV     (SP),MODEM      ;GET MODEM TYPE
1434  005730  042737  177773  001412        BIC     #177773,MODEM   ;0=103,4=202
1435  005736  012637  001332                MOV     (SP)+,CONFIG
1436  005742  042737  177774  001332        BIC     #177774,CONFIG
1437  005750  001042                        BNE     RISRFC          ;GO TO SERVICE FOR CONFIG 1 OR 2
1438  005752  004737  006326                JSR     7,CONN          ;CONNECT LINE IF CONFIGURATION 0
1439  005756  104000                        TYPE                    ;TYPE MESSAGE TO PRESS DATA
1440  005760  014763                        BUTTON                  ;BUTTON ON DATA PHONE
1441  005762  104016                        DELAY                   ;WAIT FOR CARRIER
1442  005764  023420                        10000.                  ;10 SECONDS
1443  005766  005770  011314                TST     @RBUF(0)        ;READ BUFFER TO CLEAR DONE
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1444  005772  032770  020000  011216          BIT     #BIT13,@RCSR(0) ;TEST FOR CLEAR TO SEND
1445  006000  001004                          BNE     RISRFB
1446  006002  104003                          ERROR                   ;ERROR! DID NOT RECEIVE CLEAR TO SEND
1447                                                                  ;WITHIN TIME ALLOTTED (10 SEC.)
1448  006004  004737  006312                  JSR     7,DISCON        ;DISCONNECT LINE
1449  006010  000002                          RTI                     ;AND EXIT
1450  006012  016037  011412  001204  RISRFB: MOV     TCSR(0),TXCSR   ;GET CALLED LINES TXCSR ADDRESS
1451  006020  004737  004460                  JSR     7,SETPAR        ;LOAD USER PARAMETERS
1452  006024  104000                          TYPE                    ;TYPE 'LINE CONNECTION
1453  006026  014176                          LINMAD                  ;MADE'
1454  006030                                   CNVOA   CONFIG,TCONFIG,2
1455  006042  104000                          TYPE
1456  006044  014225                          ACONFIG
1457  006046  052770  000100  011412          BIS     #BIT6,@TCSR(0)
1458  006054  000002                          RTI                     ;AND EXIT
1459                                   ;
1460                                   ;HERE IF CONFIGURATION 1 OR 2
1461  006056  104000                  RISRFC: TYPE                    ;ASK USER WHICH LINE HE IS
1462  006060  014633                          WRU                     ;DIALING ON
1463  006062  004737  003372                  JSR     PC,RDOCT        ;GET INPUT
1464  006066  012601                          MOV     (SP)+,%1                ;GET LINE #
1465  006070  042701  177740                  BIC     #177740,%1      ;MASK UNUSED BITS
1466  006074  010137  001330                  MOV     %1,LINE
1467  006100                                   CNVOA   LINE,URA,2
1468  006112  104000                          TYPE                    ;REPORT LINE # ON TTY
1469  006114  014730                          UR
1470  006116  006301                          ASL     %1
1471  006120  010137  001402                  MOV     %1,CALLER       ;SAVE CALLERS LINE #
1472  006124  004737  006326                  JSR     7,CONN          ;CONNECT CALLED LINE
1473  006130  052771  000002  011216          BIS     #BIT1,@RCSR(1)  ;SET DTR ON CALLERS LINE
1474  006136  104000                          TYPE                    ;TYPE MESSAGE TO PRESS DATA
1475  006140  014763                          BUTTON                  ;ON DATA PHONE
1476  006142  104016                          DELAY                   ;WAIT 10 SECONDS FOR CLEAR TO SEND
1477  006144  023420                          10000.                  ;SET AT CALLED LINE
1478  006146  027071  011314  011314          CMP     @RBUF(0),@RBUF(1)       ;READ BUFFERS
1479  006154  032770  020000  011216          BIT     #BIT13,@RCSR(0) ;TEST FOR CLEAR TO SEND AT CALLED LINE
1480  006162  001007                          BNE     RISRFF
1481  006164  104003                          ERROR                   ;ERROR! CLEAR TO SEND NOT SET AT CALLED LINE
1482  006166  004737  006312          RISRFD: JSR     7,DISCON        ;DISCONNECT
1483  006172  042771  000006  011216          BIC     #6,@RCSR(1)     ;LINE
1484  006200  000002                          RTI                     ;AND EXIT
1485  006202  022737  000002  001332  RISRFF: CMP     #2,CONFIG
1486  006210  001414                          BEQ     RISRFG
1487  006212  022771  010000  011216          CMP     #BIT12,@RCSR(1) ;CHECK CARRIER AT CALLERS LINE
1488  006220  001003                          BNE     RISRFE
1489  006222  104003                          ERROR                   ;ERROR! NO CARRIER AT CALLERS LINE
1490  006224  000137  006166                  JMP     RISRFD          ;GO DISCONNECT LINES
1491  006230  016137  011216  001200  RISRFE: MOV     RCSR(1),RXCSR
1492  006236  000137  006012                  JMP     RISRFB          ;GO GET PAREMETERS AND ENABLE
1493                                                                  ;CALLED TRANSMITTER AND EXIT
1494                                   ;
1495                                   ;HERE IF CONFIGURATION 2
1496  006242  032771  020000  011216  RISRFG: BIT     #BIT13,@RCSR(1) ;TEST CALLERS CLEAR TO SEND
1497  006250  001003                          BNE     RISRFH
1498  006252  104003                          ERROR                   ;ERROR! NO CTS AT CALLERS LINE
1499  006254  000137  006166                  JMP     RISRFD          ;GO DISCONNECT LINE AND EXIT
```

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1500  006260  016037  011216  001200  RISRFH: MOV     RCSR(0),RXCSR
1501  006266  016137  011412  001204          MOV     TCSR(1),TXCSR
1502  006274  004737  004460                  JSR     7,SETPAR        ;GO GET PARAMETERS FOR CALLERS
1503                                                                  ;TRANSMITTER AND CALLED RECEIVER
1504  006300  016137  011216  001200          MOV     RCSR(1),RXCSR
1505  006306  000137  006012                  JMP     RISRFB
1506                                  ;
1507                                  ;SUBROUTINE TO DISCONNECT LINE R0 HAS LINE #
1508  006312  042770  000006  011216  DISCON: BIC     #6,@RCSR(0)
1509  006320  005770  011216                  TST     @RCSR(0)
1510  006324  000207                          RTS     7
1511                                  ;
1512                                  ;SUBROUTINE TO CONNECT LINE R0 HAS LINE #
1513  006326  052770  000006  011216  CONN:   BIS     #6,@RCSR(0)     ;SET DTR, RQ TO SND
1514  006334  000207                          RTS     7
1515                                  ;TRANSMITTER INTERRUPT COMMON HANDLER
1516  006336  000240                  TISR:   NOP
1517  006340  006300                          ASL     %0              ;R0 HAS LINE #
1518  006342  105770  011412                  TSTB    @TCSR(0)        ;CHECK FOR DONE
1519  006346  100402                          BMI     TISRA           ;BRANCH IF DONE
1520  006350  104003                          ERROR                   ;ERROR! FALSE INTERRUPT
1521  006352  000002                  TISRAA: RTI                     ;EXIT
1522  006354  005737  001332          TISRA:  TST     CONFIG          ;THIS CONFIGURATIO 0?
1523  006360  001420                          BEQ     TISRC           ;BRANCH IF YES
1524  006362  020037  001402                  CMP     %0,CALLER       ;DID CALLER INTERRUPT
1525  006366  001015                          BNE     TISRC
1526  006370  117770  173014  011510          MOVB    @TBUFFP,@TBUF(0)        ;TRANSMIT
1527  006376  005237  001410                  INC     TBUFFP          ;STEP POINTER
1528  006402  022737  016022  001410          CMP     #BUFF+100.,TBUFFP
1529  006410  001003                          BNE     .+10
1530  006412  042770  000100  011412          BIC     #BIT6,@TCSR(0)
1531  006420  000002                          RTI
1532  006422  117770  172760  011510  TISRC:  MOVB    @OTBUFP,@TBUF(0)        ;TRANSMIT THE NEXT CHARACTER
1533  006430  005237  001406                  INC     OTBUFP          ;STEP POINTER TO NEXT CHAR.
1534  006434  005737  001332                  TST     CONFIG          ;WAS CONFIGURATION 0 SELECTED
1535  006440  001010                          BNE     TISRB           ;BRANCH IF CONFIG #1 OR #2
1536  006442  022737  017462  001406          CMP     #OUTBUF+1000.,OTBUFP;HAVE 1000. CHARS. BEEN SENT
1537  006450  001340                          BNE     TISRAA          ;EXIT IF NOT
1538  006452  012737  015512  001406  TISRBB: MOV     #OUTBUF,OTBUFP  ;RESET POINTER
1539  006460  000002                          RTI                     ;AND EXIT
1540
1541  006462  022737  015656  001406  TISRB:  CMP     #OUTBUF+100.,OTBUFP;HAVE 100. CHARS. BEEN SENT?
1542  006470  001330                          BNE     TISRAA          ;EXIT IF NOT
1543  006472  042770  000100  011412          BIC     #BIT6,@TCSR(0)  ;DISABLE TRANSMITTER INTERRUPT
1544  006500  000764                          BR      TISRBB          ;RESET POINTER AND EXIT
1545
1546                                  ;**********
1547                                  ;PRG0 - SINGLE CHARACTER LINE MODE TEST.
1548                                  ;**********
1549  006502  000240                  PRG0:   NOP                     ;BEGIN PRG0
1550  006504  104000                          TYPE                    ;TYPE
1551  006506  013256                          POTIT                   ;PROGRAM TITLE
1552  006510  104000                          TYPE
1553  006512  013712                          SELCAR
1554  006514  004737  003372                  JSR     P(,RDOCT        ;GET INPUT
1555  006520  112601                          MOVB    (SP)+,%1                ;GET USER SPECIFIED  DATA
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1556  006522  010137  015512                MOV     %1,OUTBUF       ;AND
1557  006526  004537  004252                JSR     5,BMOVE         ;LOAD
1558  006532  015512                        OUTBUF                  ;INTO
1559  006534  015513                        OUTBUF+1                ;OUTPUT
1560  006536  001747                        999.                    ;BUFFER
1561  006540  004737  005154                JSR     7,OVRLAY        ;OVER LAY CR,LF'S IN DATA
1562  006544  004737  010352                JSR     7,LDPRI         ;LOAD PRIORITY LEVEL IN VECTOR+2
1563  006550  004737  010304                JSR     7,LDTVEC        ;LOAD TRANSMITTER VECTORS
1564  006554  004737  010240                JSR     7,LDVECS        ;LOAD RECEIVER VECTORS
1565  006560  012737  000340  177776        MOV     #PRTY7,PSW      ;SET PROCESSOR PRIORITY=7
1566  006566  012702  000140                MOV     #140,%2         ;SET IE
1567  006572  012701  011216                MOV     #RCSR,%1                ;BIT IN
1568  006576  004537  010174                JSR     5,MOVIT         ;ALL RECEIVERS
1569  006602  104000                        TYPE                    ;TYPE
1570  006604  014020                        MAKCON                  ;'MAKE LINE CONNECTION'
1571  006606  005037  177776                CLR     PSW             ;SET PROCESSOR PRIORITY=0
1572  006612  000001            PRG0A:      WAIT                    ;WAIT
1573  006614  000776                        BR      PRG0A           ;HERE
1574                            ;**********
1575                            ;PRG1 - SPECIAL BINARY COUNT PATTERN LINE MODE TEST.
1576                            ;**********
1577  006616  104000            PRG1:       TYPE                    ;TYPE PROGRAM TITLE.
1578  006620  013322                        P1TIT
1579  006622  012737  105215  015512        MOV     #105215,OUTBUF  ;LOAD CRLF
1580  006630  004537  004220                JSR     5,INFIL         ;LOAD OUTPUT
1581  006634  015514                        OUTBUF+2                ;WITH BINARY
1582  006636  001750                        1000.                   ;COUNT PATTERN
1583  006640  012737  000100  001334        MOV     #100,NUMBER
1584  006646  004737  010352                JSR     7,LDPRI         ;LOAD PRIORITY LEVEL IN VECTOR +2
1585  006652  004737  010304                JSR     7,LDTVEC        ;LOAD TRANSMITTER VECTORS
1586  006656  004737  010240                JSR     7,LDVECS        ;LOAD RECEIVER VECTORS
1587  006662  012737  000340  177776        MOV     #PRTY7,PSW      ;SET PROCESSOR PRIORITY=7
1588  006670  012702  000140                MOV     #140,%2         ;GET IE BIT
1589  006674  012701  011216                MOV     #RCSR,%1                ;GET FIRST CSR ADDRESS
1590  006700  004537  010174                JSR     5,MOVIT         ;AND MOVE IT
1591  006704  104000                        TYPE                    ;TYPE
1592  006706  014020                        MAKCON                  ;'MAKE LINE CONNECTION'
1593  006710  005037  177776                CLR     PSW             ;SET PROCESSOR PRIORITY=0
1594  006714  000001            PRG1C:      WAIT                    ;WAIT
1595  006716  000776                        BR      PRG1C           ;HERE
1596                            ;**********
1597                            ;PRG2-SPECIAL MESSAGE TRANSMIT ONLY THIS PROGRAM TRANSMITS
1598                            ;**********
1599                            ;THE MESSAGE 'A QUICK BROWN FOX JUMPED OVER THE LAZY DOGS
1600                            ;BACK  1234567890.'
1601                            ;
1602  006720  104000            PRG2:       TYPE                    ;TYPE PROGRAM
1603  006722  013371                        P2TIT                   ;TITLE
1604  006724  004537  004072                JSR     5,LINSEL
1605  006730  004737  004460                JSR     7,SETPAR        ;GO SET PARAMETERS
1606  006734  052777  000004  172236        BIS     #BIT2,@RXCSR    ;SET REQUEST TO SEND
1607  006742  004537  005020    PRG2A:      JSR     5,LINCON        ;GO MAKE LINE CONNECTION
1608  006746  012702  014252    PRG2B:      MOV     #PRG2M,%2       ;GET ADDRESS OF MESSAGE
1609  006752  112201    PRG2C:      MOVB    (2)+,%1         ;GET FIRST CHARACTER
1610  006754  020127  000045                CMP     %1,#'%          ;TERMINATOR CHARACTER
1611  006760  001772                        BEQ     PRG2B           ;RESEND MESSAGE
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1612  006762  032737  000100  001374          BIT     #BIT6,SRT       ;PARITY ENABLED
1613  006770  001402                          BEQ     .+6
1614  006772  004737  003656                  JSR     7,GENPAR        ;GENERATE PARITY
1615  006776  004537  005020                  JSR     5,LINCON        ;CHECK LINE CONNECTION
1616  007002  010177  172200                  MOV     %1,@TXBUF       ;LOAD BUFFER
1617  007006  105777  172172                  TSTB    @TXCSR          ;AND WAIT FOR CHARACTER
1618  007012  100375                          BPL     .-4             ;TO BE TRANSMITTED
1619  007014  000756                          BR      PRG2C           ;GET NEXT CHARACTER.
1620                                  ;**********
1621                                  ;PRG3-PROGRAM TO RECEIVE A MESSAGE.
1622                                  ;**********
1623  007016  104000                  PRG3:   TYPE                    ;TYPE PROGRAM
1624  007020  013441                          P3TIT                   ;TITLE
1625  007022  004537  004072                  JSR     5,LINSEL
1626  007026  004737  004460                  JSR     7,SETPAR        ;GET PARAMETERS
1627  007032  012706  001176          PRG3A:  MOV     #STKPTR-2,%6    ;REPOSITION STACK POINTER
1628  007036  052777  000004  172?34          BIS     #BIT2,@RXCSR    ;SET REQUEST TO SEND
1629  007044  004537  005020                  JSR     5,LINCON        ;MAKE LINE CONNECTION
1630  007050  104006                          STRXV                   ;SET RECEIVER INTERUPT
1631  007052  007134                          RINT3                   ;TO THIS ADDRESS
1632  007054  104007                          STTXV                   ;SET TRANSMITTER INTERRUPT
1633  007056  007346                          TINT3                   ;TO THIS ADDRESS
1634  007060  005037  007546                  CLR     WORDS
1635  007064  013700  001234                  MOV     TPVTR,%0
1636  007070  012720  007500                  MOV     #TPINT,(0)+     ;LOAD TELEPRINTER VECTOR
1637  007074  013710  001236                  MOV     TPLVL,(0)       ;AND PRIORITY
1638  007100  012701  015512                  MOV     #OUTBUF,%1      ;GET BUF ADD
1639  007104  052737  100000  007544          BIS     #BIT15,TFLAG    ;SET BIT 15
1640  007112  004737  007732                  JSR     7,TCRLF         ;SEND CRLF
1641  007116  052777  000140  172054          BIS     #140,@RXCSR     ;ENABLE RECEIVER INTERRUPTS
1642  007124  005037  177776                  CLR     PSW
1643  007130  000001                          WAIT                    ;DO
1644  007132  000776                          BR      .-2             ;NOTHING
1645  007134  017737  172040  001370  RINT3:  MOV     @RXCSR,RXCSRT   ;GET RXCSR DATA
1646  007142  100461                          BMI     ERR3A           ;BRANCH IF ERROR
1647  007144  105737  001370                  TSTB    RXCSRT          ;TEST
1648  007150  100064                          BPL     ERR3B
1649  007152  005237  007546                  INC     WORDS
1650  007156  017737  172020  007550          MOV     @RXBUF,RXBUFT   ;GET DATA
1651  007164  113711  007550                  MOVB    RXBUFT,(1)
1652  007170  005737  007550                  TST     RXBUFT
1653  007174  100455                          BMI     ERR3C
1654  007176  105777  170766                  TSTB    @SRPTR          ;ECHO OPTION SELECTED
1655  007202  100405                          BMI     RINT3A
1656  007204  105777  171774                  TSTB    @TXCSR
1657  007210  100375                          BPL     .-4
1658  007212  111177  171770                  MOVB    (1),@TXBUF      ;ECHO CHARACTER
1659  007216  023727  007546  001604  RINT3A: CMP     WORDS,#900.     ;END OF BUFFER ALLOWED
1660  007224  001411                          BEQ     RINT3B          ;YES EXIT
1661  007226  005737  007544                  TST     TFLAG           ;IS THIS THE FIRST
1662  007232  100441                          BMI     RINT3C          ;CHARACTER BRANCH IF YES.
1663  007234  121103                          CMPB    (1),%3          ;LAST CHARACTER RECEIVED
1664  007236  001404                          BEQ     RINT3B
1665  007240  122127  000203                  CMPB    (1)+,#203       ;CONTROL C
1666  007244  001401                          BEQ     RINT3B
1667  007246  000002                          RTI                     ;EXIT
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1668  007250  005037  007546          RINT3B: CLR     WORDS
1669  007254  042777  000140  171716          BIC     #140,@RXCSR     ;DISABLE RECEIVER
1670  007262  012701  015513                  MOV     #OUTBUF+1,%1    ;INITIALIZE BUFFER POINTER
1671  007266  010102                          MOV     %1,%2
1672  007270  052777  000100  171706          BIS     #BIT6,@TXCSR    ;ENABLE TRANSMITTER
1673  007276  052777  000100  171720          BIS     #BIT6,@TPS      ; ENABLE TELEPRINTER
1674  007304  000002                          RTI                     ;EXIT
1675  007306  104015                  ERR3A:  ERRRX                   ;TYPE ERROR MESSAGE
1676  007310  014353                          LFAIL                   ;
1677  007312  042777  000140  171660          BIC     #140,@RXCSR     ;DISABLE RECEIVER
1678  007320  000644                          BR      PRG3A
1679  007322  104015                  ERR3B:  ERRRX                   ;TYPE
1680  007324  013135                          RINTM                   ;ERROR MESSAGE
1681  007326  000002                          RTI                     ;EXIT
1682  007330  104015                  ERR3C:  ERRRX
1683  007332  014371                          ROVER
1684  007334  000002                          RTI
1685                                  ;
1686  007336  005037  007544          RINT3E: CLR     TFLAG
1687  007342  112103                          MOVB    (1)+,%3
1688  007344  000002                          RTI
1689                                  ;
1690  007346  017737  171632  001366  TINT3:  MOV     @TXCSR,TXCSRT   ;GET TXCSR DATA
1691  007354  105737  001366                  TSTB    TXCSRT          ;TEST
1692  007360  100016                          BPL     TINT3B
1693  007362  112177  171620                  MOVB    (1)+,@TXBUF     ;TRANSMIT CHARACTER
1694  007366  005237  007546                  INC     WORDS
1695  007372  121103                          CMPB    (1),%3          ;ALL CHARACTERS TRANSMITTED
1696  007374  001431                          BEQ     TINT3C
1697  007376  023727  007546  001604          CMP     WORDS,#900.
1698  007404  001425                          BEQ     TINT3C
1699  007406  121127  000203                  CMPB    (1),#203        ;= CONTROL C
1700  007412  001422                          BEQ     TINT3C
1701  007414  000002                          RTI                     ;RETURN TO MAIN PROGRAM
1702  007416  017737  171602  001372  TINT3B: MOV     @TPS,TEMP       ;SAVE TELEPRINTER STATUS
1703  007424  005077  171574                  CLR     @TPS            ;DISABLE INTERRUPT
1704  007430  105777  171570                  TSTB    @TPS            ;WAIT FOR
1705  007434  100375                          BPL     .-4             ;TELEPRINTER TO FINISH
1706  007436  104014                          ERRTX                   ;TYPE
1707  007440  013156                          TINTM                   ;ERROR MESSAGE
1708  007442  105777  171556                  TSTB    @TPS            ;WAIT FOR TELEPRINTER
1709  007446  100375                          BPL     .-4             ;TO FINISH
1710  007450  013777  001372  171546          MOV     TEMP,@TPS       ;RESTORE TELEPRINTER STATUS
1711  007456  000002                          RTI                     ;EXIT
1712                                  ;
1713  007460  042777  000100  171516  TINT3C: BIC     #BIT6,@TXCSR    ;DISABLE INTERRUPT
1714  007466  032777  000100  171530          BIT     #BIT6,@TPS      ;IS TTY ACTIVE
1715  007474  001421                          BEQ     PRG3EX
1716  007476  000002                          RTI
1717                                  ;
1718                                  ;
1719  007500  112277  171522          TPINT:  MOVB    (2)+,@TPB       ;TYPE CHARACTER
1720  007504  121203                          CMPB    (2),%3          ;WAS THIS THE LAST CHAR.
1721  007506  001404                          BEQ     TPINTA
1722  007510  121227  000203                  CMPB    (2),#203        ;= CONTROL C
1723  007514  001401                          BEQ     TPINTA
```

```
1724  007516  000002                          RTI
1725  007520  042777  000100  171476  TPINTA: BIC     #BIT6,@TPS      ;DISABLE INTERRUPT
1726  007526  032777  000100  171450          BIT     #BIT6,@TXCSR    ;IS TRANSMITTER ACTIVE
1727  007534  001401                          BEQ     .+4
1728  007536  000002                          RTI                     ;EXIT
1729  007540  000137  007032          PRG3EX: JMP     PRG3A
1730  007544  000000                  TFLAG:  0
1731  007546  000000                  WORDS:  0
1732  007550  000000                  RXBUFT: 0
1733                                  ;**********
1734                                  ;PRG4-SPECIAL MESSAGE TRANSMIT ONLY THIS PROGRAM TRANSMITS
1735                                  ;**********
1736                                  ;MESSAGE SPIRAL PATTERN
1737                                  ;
1738  007552  104000                  PRG4:   TYPE                    ;TYPE PROGRAM
1739  007554  013477                          P4TIT                   ;TITLE
1740  007556  004537  004072                  JSR     5,LINSEL
1741  007562  004737  004460                  JSR     7,SETPAR        ;GO SET PARAMETERS
1742  007566  052777  000004  171404          BIS     #BIT2,@RXCSR    ;SET REQUEST TO SEND
1743  007574  012737  000110  007730          MOV     #72.,COLMN      ;INIT PAGE WIDTH
1744  007602  012703  000040                  MOV     #40,%3          ;SET LINE START CHAR
1745  007606  004537  005020          PRG4A:  JSR     5,LINCON        ;GO MAKE LINE CONNECTION
1746  007612  004737  007732                  JSR     7,TCRLF
1747  007616  010302                  PRG4B:  MOV     %3,%2           ;GET FIRST CHARACTER
1748  007620  110201                  PRG4C:  MOVB    %2,%1           ;GET CHARACTER
1749  007622  120127  000136                  CMPB    %1,#136         ;TERMINATOR CHARACTER
1750  007626  001003                          BNE     PRG4D           ;RESEND MESSAGE
1751  007630  012702  000040                  MOV     #40,%2
1752  007634  000771                          BR      PRG4C
1753  007636  032737  000100  001374  PRG4D:  BIT     #BIT6,SRT       ;PARITY ENABLED
1754  007644  001402                          BEQ     .+6
1755  007646  004737  003656                  JSR     7,GENPAR        ;GENERATE PARITY
1756  007652  004537  005020                  JSR     5,LINCON        ;CHECK LINE CONNECTION
1757  007656  010177  171324                  MOV     %1,@TXBUF       ;LOAD BUFFER
1758  007662  105777  171316                  TSTB    @TXCSR          ;AND WAIT FOR CHARACTER
1759  007666  100375                          BPL     .-4             ;TO BE TRANSMITTED
1760  007670  005202                          INC     %2              ;SET FOR NEXT CHAR
1761  007672  005337  007730                  DEC     COLMN           ;ALL COLUMNS PRINTED?
1762  007676  001350                          BNE     PRG4C           ;NO, GET NEXT CHAR
1763  007700  012737  000110  007730          MOV     #72.,COLMN      ;RESET COLUMN COUNTER
1764  007706  004737  007732                  JSR     7,TCRLF
1765  007712  005203                          INC     %3              ;UPDATE LINE START CHAR
1766  007714  120327  000136                  CMPB    %3,#136         ;LAST IN SET
1767  007720  001336                          BNE     PRG4B           ;NO
1768  007722  012703  000040                  MOV     #40,%3          ;YES, RESET
1769  007726  000733                          BR      PRG4B           ;GET NEXT CHARACTER.
1770  007730  000000                  COLMN:  0
1771                                  ;
1772                                  ;SEND CR LF
1773                                  ;
1774  007732  112777  000015  171246  TCRLF:  MOVB    #15,@TXBUF      ;SEND CR,LF
1775  007740  105777  171240                  TSTB    @TXCSR
1776  007744  100375                          BPL     .-4
1777  007746  112777  000012  171232          MOVB    #12,@TXBUF
1778  007754  105777  171224                  TSTB    @TXCSR
1779  007760  100375                          BPL     .-4
```

```
 1780  007762  000207                          RTS     %7
 1781                                ;**********
 1782                                ;PROGRAM 5
 1783                                ;**********
 1784  007764  104000                PRG5:   TYPE
 1785  007766  013546                        PSTIT
 1786  007770  004537  004072                JSR     5,LINSEL
 1787  007774  000005                        RESET
 1788  007776  004737  004460                JSR     7,SETPAR
 1789  010002  052777  000006  171170        BIS     #6,@RXCSR       ;SET DTR RQ TO SND
 1790  010010  104000                PRG5A:  TYPE                    ;TYPE MESSAGE TO MAKE
 1791  010012  014020                        MAKCON                  ;LINE CONNECTION
 1792  010014  000000                        HALT                    ;WAIT FOR USER TO MAKE LINE CONNECTION
 1793  010016  005777  171160                TST     @RXBUF          ;READ BUFFER
 1794  010022  032777  020000  171150        BIT     #BIT13,@RXCSR   ;TEST FOR CLEAR TO SEND
 1795  010030  001003                        BNE     PRG5B
 1796  010032  104000                PRG5AA: TYPE                    ;TYPE ERROR MESSAGE
 1797  010034  014146                        LINCHM
 1798  010036  000764                        BR      PRG5A           ;AND TRY AGAIN
 1799  010040  104000                PRG5B:  TYPE
 1800  010042  014176                        LINMAD
 1801  010044  005037  010172                CLR     ERRCNT
 1802  010050  012702  014252        PRG5BB: MOV     #PRG2M,%2       ;GET BASE ADDRESS OF DATA TO BE TRANSMITTED
 1803  010054  112201                PRG5C:  MOVB    (2)+,%1         ;GET A CHARACTER
 1804  010056  020127  000045                CMP     %1,#'%          ;WAS IT THE TERMINATOR?
 1805  010062  001440                        BEQ     PRG5E
 1806  010064  032737  000100  001374        BIT     #BIT6,SRT       ;WAS PARITY OPTION SELECTED?
 1807  010072  001402                        BEQ     .+6             ;BRANCH IF NO PARITY DESIRED
 1808  010074  004737  003656                JSR     7,GENPAR        ;GENERATE PARITY ON CHAR. IN R1
 1809  010100  032777  020000  171072        BIT     #BIT13,@RXCSR   ;CHECK CLEAR TO SEND
 1810  010106  001751                        BEQ     PRG5AA          ;TYPE ERROR MSG. IF NOT SET
 1811  010110  010177  171072                MOV     %1,@TXBUF       ;TRANSMIT THE CHARACTER
 1812  010114  005777  171062                TST     @RXBUF          ;ANY ERROR FLAGS?
 1813  010120  100001                        BPL     .+4             ;BRANCH IF NO ERROR FLAGS
 1814  010122  104003                        ERROR                   ;ERROR! SOME ERROR FLAG IS SET
 1815  010124  105777  171050                TSTB    @RXCSR          ;WAIT FOR THE RECEIVER TO RECEIVE
 1816  010130  100375                        BPL     .-4             ;THE TRANSMITTED CHARACTER
 1817  010132  117703  171044                MOVB    @RXBUF,%3       ;SAVE IT IN R3
 1818  010136  043701  001362                BIC     CARMSK,%1       ;CLEAR NON- TRANSMITTED BITS
 1819  010142  120103                        CMPB    %1,%3           ;WAS RECEIVED & TRANSMITTED DATA THE SAME
 1820  010144  001403                        BEQ     PRG5D
 1821  010146  104003                        ERROR                   ;ERROR! DATA ERROR
 1822  010150  005237  010172                INC     ERRCNT
 1823  010154  105777  171024        PRG5D:  TSTB    @TXCSR          ;WAIT FOR TRANSMITTER TO FINISH
 1824  010160  100375                        BPL     .-4
 1825  010162  000734                        BR      PRG5C
 1826  010164  104000                PRG5E:  TYPE
 1827  010166  014117                        ENDPAS
 1828  010170  000727                        BR      PRG5BB
 1829  010172  000000                ERRCNT: OPEN
 1830                                ;THIS ROUTINE MOVES THE CONTENTS OF R2 TO THE ADDRESS SPECIFIED
 1831                                ;BY R1
 1832  010174  012737  000006  000004 MOVIT:  MOV     #6,4            ;SET UP FOR RETURN
 1833  010202  012737  000002  000006        MOV     #2,6
 1834  010210  012700  000037                MOV     #31.,%0         ;GET COUNTER
 1835  010214  010231                MOVITA: MOV     %2,@(1)+                ;MOVE THE DATA
```

```
1836  010216  005300                        DEC     %0              ;ALL DATA MOVED?
1837  010220  001375                        BNE     MOVITA          ;NO.  RETURN
1838  010222  012737  004576  000004        MOV     #ERTP,MACHER
1839  010230  012737  000040  000006        MOV     #40,MACHER+2
1840  010236  000205                        RTS     5               ;RETURN
1841                                  ;
1842                                  ;SUBROUTINE TO LOAD ALL VECTORS
1843  010240  012701  011606        LDVECS: MOV     #RISR0,%1
1844  010244  012702  011120                MOV     #VECTAB,%2
1845  010250  012703  000010                MOV     #10,%3
1846  010254  012704  000037                MOV     #31.,%4
1847  010260  032712  000001        LDVECB: BIT     #BIT0,(2)               ;DOES THIS VECTOR EXIST
1848  010264  001002                        BNE     LDVEC1          ;NO, SKIP LOADING
1849  010266  010172  000000                MOV     %1,@(2)         ;LOAD VECTOR
1850  010272  060301                LDVEC1: ADD     %3,%1
1851  010274  005722                        TST     (2)+
1852  010276  005304                        DEC     %4
1853  010300  001367                        BNE     LDVECB
1854  010302  000207                        RTS     7
1855                                  ;
1856  010304  012701  012176        LDTVEC: MOV     #TISR0,%1
1857  010310  012702  011120                MOV     #VECTAB,%2
1858  010314  012703  000010                MOV     #10,%3
1859  010320  012704  000037                MOV     #31.,%4
1860  010324  032712  000001        LDTVED: BIT     #BIT0,(2)               ;DOES THIS VECTOR EXIST
1861  010330  001003                        BNE     LDVEC2          ;NO, SKIP LOADING
1862  010332  011200                        MOV     (2),%0
1863  010334  010160  000004                MOV     %1,4(0)
1864  010340  060301                LDVEC2: ADD     %3,%1
1865  010342  005722                        TST     (2)+
1866  010344  005304                        DEC     %4
1867  010346  001366                        BNE     LDTVED
1868  010350  000207                        RTS     7
1869                                  ;
1870                                  ;ROUTINE TO LOAD PRIORITY LEVEL 7 IN VECTOR +2
1871  010352  012701  011120        LDPRI:  MOV     #VECTAB,%1      ;GET BASE VECTOR
1872  010356  012702  000340                MOV     #340,%2         ;GET LEVEL 7
1873  010362  012703  000037                MOV     #31.,%3         ;LOAD COUNTER
1874  010366  032711  000001        LDPRIA: BIT     #BIT0,(1)               ;DOES THIS VECTOR EXIST
1875  010372  001003                        BNE     LDPRIX          ;NO SKIP LOADING
1876  010374  011104                        MOV     (1),%4          ;LOAD VECTOR +2
1877  010376  010264  000002                MOV     %2,2(4)
1878  010402  005721                LDPRIX: TST     (1)+            ;POINT TO NEXT VECTOR
1879  010404  005303                        DEC     %3              ;DECREMENT COUNTER
1880  010406  001367                        BNE     LDPRIA
1881  010410  000207                        RTS     7
1882
1883
1884
1885
1886                                  ;**********
1887                                  ;
1888                                  ;CHECK SWITCH REGISTER ROUTINE.  CHECKS FOR ^G TO ALLOW CHANGING
1889                                  ;OF LOC 176.  ROUTINE IS ENTERED AT CNTLU FOR START UP PURPOSES.
1890                                  ;WHEN A ^G IS GIVEN, THE PROGRAM ENTERS AT CKSWR.  THE PROGRAM
1891                                  ;GETS CONTENTS OF SOFT. SWITCH REG., TYPES IT OUT, AND THEN SEEKS
```

```
1892                                    ;NEW DATA FROM OPERATOR.  ONCE DATA IS SUPPLIED, IT INSERTS THIS
1893                                    ;DATA INTO THE SOFT. SWITCH REG. AND RESUMES OPERATION IN THE
1894                                    ;MAIN PROGRAM.  INCORRECT ENTRIES (SUCH AS 8,9,LETTERS) ARE DELETED
1895                                    ;AND THE PROCESS RESTARTED.  TYPING ^U ALLOWS THE PRESENT ENTRY
1896                                    ;TO BE DELETED AND THE PROCESS RESTARTED.
1897                                    ;
1898                                    ;
1899                                    ;**********
1900
1901
1902
1903  010412                            CHGC4:
1904  010412  022737  000176  000170    CKSWR:  CMP     #SWREG,SRPTR    ;SOFTWARE SW REG PRES?
1905  010420  001133                            BNE     OUT             ;NO, GET OUT
1906  010422  105777  170572                    TSTB    @TKS            ;YES, IS CHARACTER READY?
1907  010426  100130                            BPL     OUT             ;IF NOT, GET OUT
1908  010430  017737  170566  001430            MOV     @TKB,TIB        ;STORE BUFFER
1909  010436  042737  177600  001430            BIC     #177600,TIB     ;STRIP OFF GARBAGE
1910  010444  022737  000007  001430            CMP     #7,TIB          ;IS IT A ^G
1911  010452  001116                            BNE     OUT             ;IF NOT GET OUT
1912  010454  104000                            TYPE                    ;ECHO ^G
1913  010456  015455                            CNTG
1914  010460  005077  170542                    CLR     @TPB
1915  010464  104000                    CNTLU:  TYPE                    ;ALLOW SWR  TO BE TYPED
1916  010466  015463                            SWR
1917  010470  017746  167474                    MOV     @SRPTR,-(SP)    ;MOV CONTENTS OF SWR
1918  010474  004737  010730                    JSR     PC,TYPOC        ;OCTAL TYPE OUT ROUTINE
1919  010500  022600                            CMP     (SP)+,R0        ;CORRECT STACK POINTER
1920  010502  104000                            TYPE                    ;ALLOW NEW= TO BE TYPED
1921  010504  015473                            NEW
1922  010506  005037  001426                    CLR     TEMPST          ;CLEAR TEMP STORAGE LOC
1923  010512  012737  000007  001416            MOV     #7,COUNT1       ;SET UP TO ACCEPT 7 CHAR
1924  010520  105777  170474            1$:     TSTB    @TKS            ;IS CHARACTER THERE?
1925  010524  100375                            BPL     1$              ;IF NOT, TRY AGAIN
1926  010526  117737  170470  001430            MOVB    @TKB,TIB        ;PICKUP CHARACTER
1927  010534  105777  170464            8$:     TSTB    @TPS            ;CHECK PRINTER STATUS
1928  010540  100375                            BPL     8$              ;NOT READY, TRY AGAIN
1929  010542  113777  001430  170456            MOVB    TIB,@TPB        ;PRINT IT
1930  010550  042737  177600  001430            BIC     #177600,TIB     ;STRIP OFF GARBAGE
1931  010556  122737  000025  001430            CMPB    #25,TIB         ;IS IT A ^U
1932  010564  001001                            BNE     2$              ;BRANCH IF NOT
1933  010566  000736                    3$:     BR      CNTLU           ;START OVER
1934  010570  122737  000015  001430    2$:     CMPB    #15,TIB         ;IS IT A <CR>
1935  010576  001006                            BNE     4$              ;BRANCH IF NOT
1936  010600  104000                            TYPE                    ;TYPEOUT <CR> AND <LF>
1937  010602  015510                            SCRLF
1938  010604  022737  000007  001416            CMP     #7,COUNT1       ;WAS <CR> FIRST CHAR
1939  010612  001033                            BNE     7$              ;CHANGE SWREG IF NOT FIRST <CR>
1940  010614  122737  000060  001430    4$:     CMPB    #60,TIB         ;IS IT LESS THAN 0
1941  010622  003004                            BGT     5$              ;GO TO ? ROUTINE IF SO
1942  010624  122737  000067  001430            CMPB    #67,TIB         ;IS IT GREATER THAN 7
1943  010632  002003                            BGE     6$              ;GO TO ? ROUTINE IS SO
1944  010634  104000                    5$:     TYPE                    ;SET UP FOR ? TYPEOUT
1945  010636  015503                            QUEST
1946  010640  000752                            BR      3$              ;START INPUT STRING OVER
1947  010642  006337  001426            6$:     ASL     TEMPST          ;MULTIPLY BY TEN
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```
 1948  010646  006337  001426                ASL     TEMPST
 1949  010652  006337  001426                ASL     TEMPST
 1950  010656  142737  000060  001430        BICB    #60,TIB         ;CLEAR OF ASCII
 1951  010664  153737  001430  001426        BISB    TIB,TEMPST      ;MOV CHAR TO TEMPST
 1952  010672  005337  001416                DEC     COUNT1          ;ONLY WANT 6 NUMBERS AND <CR>
 1953  010676  001756                        BEQ     5$              ;IF = 7 TOO MANY NUMBERS
 1954  010700  000707                        BR      1$              ;GET NEXT CHAR
 1955  010702  013777  001426  167260  7$:   MOV     TEMPST, @SRPTR  ;CHANGE SWR CONTENTS
 1956  010710  000207                OUT:    RTS     PC              ;RETURN TO PROGRAM
 1957
 1958
 1959
 1960  010712  010046                TTINTS: MOV     R0,-(SP)        ;INTERRUPT SERVICE ROUTINE
 1961  010714  010146                        MOV     R1,-(SP)        ;SAVE R0 AND R1
 1962  010716  004737  010412                JSR     PC,CKSWR        ;GO TO SUBR TO SERVICE TTY INTERRUPT
 1963  010722  012601                        MOV     (SP)+,R1        ;RESTORE R1 AND R0
 1964  010724  012600                        MOV     (SP)+,R0
 1965  010726  000002                        RTI                     ;RETURN FROM INTERRUPT
 1966
 1967
 1968
 1969  010730  112737  000001  001422  TYPOC:  MOVB    #1,FILL1        ;SET THE ZERO FILL SWITCH
 1970  010736  112737  000006  001425        MOVB    #6,MODE+1       ;SET FOR SIX (6) DIGITS
 1971  010744  112737  000005  001420  TYPON:  MOVB    #5,CNT          ;SET THE ITERATION COUNT
 1972  010752  010346                        MOV     R3,-(SP)        ;SAVE R3
 1973  010754  010446                        MOV     R4,-(SP)        ;SAVE R4
 1974  010756  010546                        MOV     R5,-(SP)        ;SAVE R5
 1975  010760  113704  001425                MOVB    MODE+1,R4       ;GET THE NUMBER OF DIGITS TO TYPE
 1976  010764  005404                        NEG     R4
 1977  010766  062704  000006                ADD     #6,R4           ;SUBTRACT IT FOR MAX. ALLOWED
 1978  010772  110437  001424                MOVB    R4,MODE         ;SAVE IT FOR USE
 1979  010776  113704  001422                MOVB    FILL1,R4        ;GET THE ZERO FILL SWITCH
 1980  011002  016605  000010                MOV     10(SP),R5       ;PICKUP THE INPUT NUMBER
 1981  011006  005003                        CLR     R3              ;CLEAR THE OUTPUT WORD
 1982  011010  006105                1$:     ROL     R5              ;ROTATE MSB INTO "C"
 1983  011012  000404                        BR      3$              ;GO DO MSB
 1984  011014  006105                2$:     ROL     R5              ;FORM THIS DIGIT
 1985  011016  006105                        ROL     R5
 1986  011020  006105                        ROL     R5
 1987  011022  010503                        MOV     R5,R3
 1988  011024  006103                3$:     ROL     R3              ;GET LSB OF THIS DIGIT
 1989  011026  105337  001424                DECB    MODE            ;TYPE THIS DIGIT?
 1990  011032  100020                        BPL     7$              ;BR IF NO
 1991  011034  042703  177770                BIC     #177770,R3      ;GET RID OF JUNK
 1992  011040  001002                        BNE     4$              ;TEST FOR 0
 1993  011042  005704                        TST     R4              ;SUPPRESS THIS 0
 1994  011044  001403                        BEQ     5$              ;BR IF YES
 1995  011046  005204                4$:     INC     R4              ;DON'T SUPPRESS ANYMORE 0'S
 1996  011050  052703  000060                BIS     #60,R3          ;MAKE THIS DIGIT ASCII
 1997  011054  105777  170144                TSTB    @TPS            ;IS PRINTER READY FOR CHARACTER?
 1998  011060  100375                5$:     BPL     5$              ;IF NOT, TRY AGAIN
 1999  011062  110377  170140                MOVB    R3,@TPB         ;TYPE OUT NUMBER
 2000  011066  105777  170132                TSTB    @TPS            ;MAKE SURE LAST DIGIT TYPES
 2001  011072  100375                8$:     BPL     8$
 2002  011074  105337  001420                DECB    CNT             ;COUNT BY 1
 2003  011100  003345                7$:     BGT     2$              ;BR IF MORE TO DO
```

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 2004  011102  002402                    BLT     6$              ;BR IF DONE
 2005  011104  005204                    INC     R4              ;INSURE LAST DIGIT ISN'T A BLANK
 2006  011106  000742                    BR      2$              ;GO DO THE LAST DIGIT
 2007  011110  012605            6$:     MOV     (SP)+,R5        ;RESTORE R5
 2008  011112  012604                    MOV     (SP)+,R4        ;RESTORE R4
 2009  011114  012603                    MOV     (SP)+,R3        ;RESTORE R3
 2010  011116  000207                    RTS     PC              ;RETURN FROM INTERRUPT PC
 2011                            ;**********
 2012
 2013
 2014                            ;VECTOR ASSIGNMENT TABLE
 2015  011120  000301            VECTAB: 301                     ;LINE 0 VECTOR
 2016  011122  000311                    311                     ;LINE 1 VECTOR
 2017  011124  000321                    321                     ;LINE 2 VECTOR
 2018  011126  000331                    331                     ;LINE 3 VECTOR
 2019  011130  000341                    341                     ;LINE 4 VECTOR
 2020  011132  000351                    351                     ;LINE 5 VECTOR
 2021  011134  000361                    361                     ;LINE 6 VECTOR
 2022  011136  000371                    371                     ;LINE 7 VECTOR
 2023  011140  000401                    401                     ;LINE 10 VECTOR
 2024  011142  000411                    411                     ;LINE 11 VECTOR
 2025  011144  000421                    421                     ;LINE 12 VECTOR
 2026  011146  000431                    431                     ;LINE 13 VECTOR
 2027  011150  000441                    441                     ;LINE 14 VECTOR
 2028  011152  000451                    451                     ;LINE 15 VECTOR
 2029  011154  000461                    461                     ;LINE 16 VECTOR
 2030  011156  000471                    471                     ;LINE 17 VECTOR
 2031  011160  000501                    501                     ;LINE 20 VECTOR
 2032  011162  000511                    511                     ;LINE 21 VECTOR
 2033  011164  000521                    521                     ;LINE 22 VECTOR
 2034  011166  000531                    531                     ;LINE 23 VECTOR
 2035  011170  000541                    541                     ;LINE 24 VECTOR
 2036  011172  000551                    551                     ;LINE 25 VECTOR
 2037  011174  000561                    561                     ;LINE 26 VECTOR
 2038  011176  000571                    571                     ;LINE 27 VECTOR
 2039  011200  000601                    601                     ;LINE 30 VECTOR
 2040  011202  000611                    611                     ;LINE 31 VECTOR
 2041  011204  000621                    621                     ;LINE 32 VECTOR
 2042  011206  000631                    631                     ;LINE 33 VECTOR
 2043  011210  000641                    641                     ;LINE 34 VECTOR
 2044  011212  000651                    651                     ;LINE 35 VECTOR
 2045  011214  000661                    661                     ;LINE 36 VECTOR
 2046                            ;DL11-E REGISTER ADDRESSES
 2047          000000                    N=0
 2048          000000                    A=0
 2049  011216  000037            RCSR:   .REPT   31.
 2050                                    RRCV    \N,\A
 2051                                    N=N+10
 2052                                    A=A+1
 2053                                    .ENDR
 2054          000000                    N=0
 2055          000000                    A=0
 2056  011314  000037            RBUF:   .REPT   31.
 2057                                    RBUFF   \N,\A
 2058                                    N=N+10
 2059                                    A=A+1
```

```
2060                                        .ENDR
2061            000000                      N=0
2062            000000                      A=0
2063  011412    000037              TCSR:   .REPT   31.
2064                                        TXMT    \N,\A
2065                                        N=N+10
2066                                        A=A+1
2067                                        .ENDR
2068            000000                      N=0
2069            000000                      A=0
2070  011510    000037              TBUF:   .REPT   31.
2071                                        TBUFF   \N,\A
2072                                        N=N+10
2073                                        A=A+1
2074                                        .ENDR
2075            000000                      N=0
2076            000037                      .REPT   31.
2077                                        ISP     \N
2078                                        N=N+1
2079                                        .ENDR
2080            000000                      N=0
2081            000040                      .REPT   32.
2082                                        ISRT    \N
2083                                        N=N+1
2084                                        .ENDR
2085                                ;MESSAGES
2086  012576    041445  042132  041114  MTITLE: .ASCII  '%CZDLBCO DL11-E ON LINE TEST%'
2087  012604    030103  042040  030514
2088  012612    026461  020105  047117
2089  012620    046040  047111  020105
2090  012626    042524  052123     045
2091  012633       045  040515  020120          .ASCII  '%MAP OF DEVICES PRESENT%'
2092  012640    043117  042040  053105
2093  012646    041511  051505  050040
2094  012654    042522  042523  052116
2095  012662       045
2096  012663       045  044514  042516          .ASCII  '%LINE  D-ADR     TRAP AT%@'
2097  012670    020040  026504  042101
2098  012676    020122  020040  020040
2099  012704    051124  050101  040440
2100  012712    022524     100
2101  012715       040  020040  020040  MLINE:  .ASCII  '       '
2102  012722       040
2103  012723       040  020040  020040  MDADR:  .ASCII  '           '
2104  012730    020040  020040     040
2105  012735       040  020040  020040  MTRAP:  .ASCII  '      %@'
2106  012742    022440     100
2107  012745       045  047516  042516  MNONE:  .ASCII  '%NONE FOUND%@'
2108  012752    043040  052517  042116
2109  012760    040045
2110  012762    052045  050131  020105  MSWSEL: .ASCII  '%TYPE IN PROGRAM NUMBER    @'
2111  012770    047111  050040  047522
2112  012776    051107  046501  047040
2113  013004    046525  042502  020122
2114  013012    020040  040040
2115  013016    042445  051122  051117  MTERR:  .ASCII  '%ERROR - UNEXPECTED TRAP'
```

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 2116  013024  026440  052440  042516
 2117  013032  050130  041505  042524
 2118  013040  020104  051124  050101
 2119  013046  052045  040522  050120          .ASCII  '%TRAPPED TO  '
 2120  013054  042105  052040  020117
 2121  013062     040
 2122  013063     040  020040  020040  MTO:    .ASCII  '        '
 2123  013070  020040     040
 2124  013073     045  051124  050101          .ASCII  '%TRAPPED FROM PC  '
 2125  013100  042520  020104  051106
 2126  013106  046517  050040  020103
 2127  013114     040
 2128  013115     040  020040  020040  MFROM:  .ASCII  '        @'
 2129  013122  020040  040040
 2130  013126  020040  020040  020040  CSRADD: .ASCII  '      @'
 2131  013134     100
 2132  013135     045  040506  051514  RINTM:  .ASCII  '%FALSE INT. RCVR@'
 2133  013142  020105  047111  027124
 2134  013150  051040  053103  040122
 2135  013156  043045  046101  042523  TINTM:  .ASCII  '%FALSE INT XMIT@'
 2136  013164  044440  052116  054040
 2137  013172  044515  040124
 2138  013176  050045  036503     040  EMO:    .ASCII  '%PC= '
 2139  013203     040  020040  020040  APC:    .ASCII  '        @'
 2140  013210  020040  040040
 2141  013214  020040  054124  051503  ATXCSR: .ASCII  '  TXCSR = '
 2142  013222  020122  020075
 2143  013226  020040  020040  020040  ATXWAS: .ASCII  '      @'
 2144  013234     100
 2145  013235     040  051040  041530  ARXCSR: .ASCII  '  RXCSR = '
 2146  013242  051123  036440     040
 2147  013247     040  020040  020040  ARXWAS: .ASCII  '      @'
 2148  013254  040040
 2149  013256  022445  051120  030107  POTIT:  .ASCII  '%%PRG0 - SINGLE CHAR LINE MODE TEST@'
 2150  013264  026440  051440  047111
 2151  013272  046107  020105  044103
 2152  013300  051101  046040  047111
 2153  013306  020105  047515  042504
 2154  013314  052040  051505  040124
 2155  013322  022445  051120  030507  P1TIT:  .ASCII  '%%PRG1 - SPEC BIN COUNT LINE MODE TEST@'
 2156  013330  026440  051440  042520
 2157  013336  020103  044502  020116
 2158  013344  047503  047125  020124
 2159  013352  044514  042516  046440
 2160  013360  042117  020105  042524
 2161  013366  052123     100
 2162  013371     045  050045  043522  P2TIT:  .ASCII  '%%PRG2 - SPECIAL MESSAGE LINE MODE TEST@'
 2163  013376  020062  020055  050123
 2164  013404  041505  040511  020114
 2165  013412  042515  051523  043501
 2166  013420  020105  044514  042516
 2167  013426  046440  042117  020105
 2168  013434  042524  052123     100
 2169  013441     045  050045  043522  P3TIT:  .ASCII  '%%PRG3 - RECEIVE MESSAGE TEST@'
 2170  013446  020063  020055  042522
 2171  013454  042503  053111  020105
```

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 2172  013462  042515  051523  043501
 2173  013470  020105  042524  052123
 2174  013476     100
 2175  013477     045  050045  043522  P4TIT:  .ASCII  '%%PRG4 - SPECIAL MESSAGE TEST (SPIRAL)@'
 2176  013504  020064  020055  050123
 2177  013512  041505  040511  020114
 2178  013520  042515  051523  043501
 2179  013526  020105  042524  052123
 2180  013534  024040  050123  051111
 2181  013542  046101  040051
 2182  013546  050045  043522  020065  P5TIT:  .ASCII  '%PRG5 - DATA ECHO TEST USING MAYNARD FACILITY@'
 2183  013554  020055  040504  040524
 2184  013562  042440  044103  020117
 2185  013570  042524  052123  052440
 2186  013576  044523  043516  046440
 2187  013604  054501  040516  042122
 2188  013612  043040  041501  046111
 2189  013620  052111  040131
 2190  013624  052045  050131  020105  SELPAR: .ASCII  '%TYPE IN PARAMETERS AS FOLLOWS:'
 2191  013632  047111  050040  051101
 2192  013640  046501  052105  051105
 2193  013646  020123  051501  043040
 2194  013654  046117  047514  051527
 2195  013662     072
 2196  013663     045  044502  030524          .ASCII  '%BIT1-0 = CHAR LENGTH%@'
 2197  013670  030055  036440  041440
 2198  013676  040510  020122  042514
 2199  013704  043516  044124  040045
 2200  013712  052045  050131  020105  SELCAR: .ASCII  '%TYPE TEST CHAR CODE IN BIT7-BIT0 OF AN OCTAL BYTE    @'
 2201  013720  042524  052123  041440
 2202  013726  040510  020122  047503
 2203  013734  042504  044440  020116
 2204  013742  044502  033524  041055
 2205  013750  052111  020060  043117
 2206  013756  040440  020116  041517
 2207  013764  040524  020114  054502
 2208  013772  042524  020040  020040
 2209  014000     100
 2210  014001     045  046111  042514  DTERR:  .ASCII  '%ILLEGAL DATA%@'
 2211  014006  040507  020114  040504
 2212  014014  040524  040045
 2213  014020  046445  045501  020105  MAKCON: .ASCII  '%MAKE LINE CONNECTION.@'
 2214  014026  044514  042516  041440
 2215  014034  047117  042516  052103
 2216  014042  047511  027116     100
 2217  014047     040  040504  040524  CERDAT: .ASCII  ' DATA S/B: '
 2218  014054  051440  041057  020072
 2219  014062  020040  020040  053440  CSB:    .ASCII  '     WAS: '
 2220  014070  051501  020072
 2221  014074  020040  020040  041440  CWAS:   .ASCII  '     CHAR NO. '
 2222  014102  040510  020122  047516
 2223  014110  020056
 2224  014112  020040  020040     100  CRNUM:  .ASCII  '    @'
 2225  014117     007                  ENDPAS: .BYTE   007
 2226  014120     100                          .ASCII  '@'
 2227  014121     045  040077          AINPRC: .ASCII  '%?@'
```

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 2228  014124  050045  051101  046501  PARMTS: .ASCII  '%PARAMETERS - '
 2229  014132  052105  051105  020123
 2230  014140  020075
 2231  014142  020040  040040          APARM:  .ASCII  '   @'
 2232  014146  041440  042514  051101  LINCHM: .ASCII  ' CLEAR TO SEND NOT SET.@'
 2233  014154  052040  020117  042523
 2234  014162  042116  047040  052117
 2235  014170  051440  052105  040056
 2236  014176  046045  047111  020105  LINMAD: .ASCII  '%LINE CONNECTION MADE.@'
 2237  014204  047503  047116  041505
 2238  014212  044524  047117  046440
 2239  014220  042101  027105     100
 2240  014225     045  047503  043116  ACONFIG:        .ASCII  '%CONFIGURATION # '
 2241  014232  043511  051125  052101
 2242  014240  047511  020116  020043
 2243  014246  020040  040040          TCONFIG:        .ASCII  '   @'
 2244                                                  .EVEN
 2245  014252     015     012          PRG2M:  .BYTE   015,012
 2246  014254  044124  020105  052521          .ASCII  'THE QUICK BROWN FOX JUMPED OVER THE LAZY DOGS BACK'
 2247  014262  041511  020113  051102
 2248  014270  053517  020116  047506
 2249  014276  020130  052512  050115
 2250  014304  042105  047440  042526
 2251  014312  020122  044124  020105
 2252  014320  040514  054532  042040
 2253  014326  043517  020123  040502
 2254  014334  045503
 2255  014336  030040  031061  032063          .ASCII  ' 0123456789.%'
 2256  014344  033065  034067  027071
 2257  014352     045
 2258  014353     045  044514  042516  LFAIL:  .ASCII  '%LINE FAILED%@'
 2259  014360  043040  044501  042514
 2260  014366  022504     100
 2261  014371     045  053117  051105  ROVER:  .ASCII  '%OVERRUN, FRAME, OR PARITY ERROR%@'
 2262  014376  052522  026116  043040
 2263  014404  040522  042515  020054
 2264  014412  051117  050040  051101
 2265  014420  052111  020131  051105
 2266  014426  047522  022522     100
 2267  014433     045  044514  042516  ALINEX: .ASCII  '%LINE # '
 2268  014440  021440     040
 2269  014443     040  020040  040527  TLINEX: .ASCII  '   WAS SELECTED@'
 2270  014450  020123  042523  042514
 2271  014456  052103  042105     100
 2272  014463     045  044514  042516  ALINE:  .ASCII  '%LINE # '
 2273  014470  021440     040
 2274  014473     040  020040  040527  TLINE:  .ASCII  '   WAS CALLED'
 2275  014500  020123  040503  046114
 2276  014506  042105
 2277  014510  052045  050131  020105          .ASCII  '%TYPE IN OCTAL: CONFIGURATION IN BITO-1 & MODEM TYPE'
 2278  014516  047111  047440  052103
 2279  014524  046101  020072  047503
 2280  014532  043116  043511  051125
 2281  014540  052101  047511  020116
 2282  014546  047111  041040  052111
 2283  014554  026460  020061  020046
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 2284  014562  047515  042504  020115
 2285  014570  054524  042520
 2286  014574  044445  020116  044502          .ASCII  '%IN BIT2  (0=103, 1=202)      @'
 2287  014602  031124  020040  030050
 2288  014610  030475  031460  020054
 2289  014616  036461  030062  024462
 2290  014624  020040  020040  020040
 2291  014632     100
 2292  014633     045  054524  042520  WRU:    .ASCII  '%TYPE IN OCTAL IN BIT0-4 THE LINE # YOU ARE CALLING FROM    @'
 2293  014640  044440  020116  041517
 2294  014646  040524  020114  047111
 2295  014654  041040  052111  026460
 2296  014662  020064  044124  020105
 2297  014670  044514  042516  021440
 2298  014676  054440  052517  040440
 2299  014704  042522  041440  046101
 2300  014712  044514  043516  043040
 2301  014720  047522  020115  020040
 2302  014726  040040
 2303  014730  054445  052517  041440  UR:     .ASCII  '%YOU CALLED FROM LINE # '
 2304  014736  046101  042514  020104
 2305  014744  051106  046517  046040
 2306  014752  047111  020105  020043
 2307  014760  020040     100          URA:    .ASCII  '  @'
 2308  014763     045  051120  051505  BUTTON: .ASCII  '%PRESS DATA BUTTON ON DATA PHONE@'
 2309  014770  020123  040504  040524
 2310  014776  041040  052125  047524
 2311  015004  020116  047117  042040
 2312  015012  052101  020101  044120
 2313  015020  047117  040105
 2314  015024  052045  050131  020105  LDLINE: .ASCII  '%TYPE LINE NO. IN OCTAL IN BIT 3-7    @'
 2315  015032  044514  042516  047040
 2316  015040  027117  044440  020116
 2317  015046  041517  040524  020114
 2318  015054  047111  041040  052111
 2319  015062  031440  033455  020040
 2320  015070  020040     100
 2321  015073     045  042522  047503  MPWRF:  .ASCII  '%RECOVERED FROM POWER FAILURE@'
 2322  015100  042526  042522  020104
 2323  015106  051106  046517  050040
 2324  015114  053517  051105  043040
 2325  015122  044501  052514  042522
 2326  015130     100
 2327  015131     045  046111  042514  MMODX:  .ASCII  '%ILLEGAL LINE NO.@'
 2328  015136  040507  020114  044514
 2329  015144  042516  047040  027117
 2330  015152     100
 2331  015153     045  046111  042514  MMODD:  .ASCII  '%ILLEGAL DEVICE ADDRESS@'
 2332  015160  040507  020114  042504
 2333  015166  044526  042503  040440
 2334  015174  042104  042522  051523
 2335  015202     100
 2336  015203     045  054524  042520  MMOD1:  .ASCII  '%TYPE IN OCTAL : BIT 0-5 THE LINE NUMBER OF DEVICE ADDRESS TO BE'
 2337  015210  044440  020116  041517
 2338  015216  040524  020114  020072
 2339  015224  044502  020124  026460
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 2340  015232  020065  044124  020105
 2341  015240  044514  042516  047040
 2342  015246  046525  042502  020122
 2343  015254  043117  042040  053105
 2344  015262  041511  020105  042101
 2345  015270  051104  051505  020123
 2346  015276  047524  041040     105
 2347  015303     040  047515  044504          .ASCII  ' MODIFIED    @'
 2348  015310  044506  042105  020040
 2349  015316  020040     100
 2350  015321     045  054524  042520  MMOD2:  .ASCII  '%TYPE IN NEW RXCSR DEVICE ADDRESS    @'
 2351  015326  044440  020116  042516
 2352  015334  020127  054122  051503
 2353  015342  020122  042504  044526
 2354  015350  042503  040440  042104
 2355  015356  042522  051523  020040
 2356  015364  020040     100
 2357  015367     045  054524  042520  MMOD3:  .ASCII  '%TYPE IN 177777  TO CHANGE ANOTHER'
 2358  015374  044440  020116  033461
 2359  015402  033467  033467  020040
 2360  015410  047524  041440  040510
 2361  015416  043516  020105  047101
 2362  015424  052117  042510     122
 2363  015431     040  042504  044526          .ASCII  ' DEVICE ADDRESS    @'
 2364  015436  042503  040440  042104
 2365  015444  042522  051523  020040
 2366  015452  020040     100
 2367                                          ;******  CHGCS  ******
 2368  015455     040  057040  020107  CNTG:   .ASCII  /  ^G @/
 2369  015462     100
 2370  015463     040  051440  051127  SWR:    .ASCII  /  SWR= @/
 2371  015470  020075     100
 2372  015473     040  047040  053505  NEW:    .ASCII  /  NEW= @/
 2373  015500  020075     100
 2374  015503     040  037440  040040  QUEST:  .ASCII  /  ? @/
 2375  015510  040045                   SCRLF:  .ASCII  /%@/
 2376                                          ;**********************
 2377                                          .EVEN
 2378  015512  000000                   OUTBUF: OPEN
 2379          017462                          .=OUTBUF+1000.
 2380  017462  000000                   INBUF:  OPEN
 2381          021432                          .=INBUF+1000.
 2382          015656                          BUFF=OUTBUF+100.
 2383  021432  000001                   DEND:   .END
```

```
A      = 000037   552#  2048#  2054#  2055#  2061#  2062#  2068#  2069#  2075#
ACONFI   014225  1456  2240#
ADD1     004062  1134  1142#
ADTENP   004440  1202  1228#
AGAIN    004024  1133#  1136
AINPRG   014121   886  2227#
ALINE    014463  1430  2272#
ALINEX   014433  1172  2267#
APARM    014142  1241  2231#
APC      013203   931   967  2139#
ARXCSR   013235   959  2145#
ARXWAS   013247   959  2147#
ATXCSR   013214   956  2141#
ATXWAS   013226   956  2143#
BDCNV    004274   910  1197#
BDCNVA   004326  1204#  1207
BDCNVB   004360  1209*  1211#
BDCNVC   004362  1200*  1212#
BDCNVD   004364  1201*  1208  1213#
BIT0   = 000001   525#   752   819  1247  1251  1847  1860  1874
BIT1   = 000002   524#  1244  1473
BIT10  = 002000   515#
BIT11  = 004000   514#
BIT12  - 010000   513#  1487
BIT13    020000   512#   926   962  1303  1317  1444  1479  1496  1794  1809
BIT14  - 040000   511#  1310  1422
BIT15  = 100000   509   510#  1414  1639
BIT2   = 000004   523#  1606  1628  1742
BIT3   - 000010   522#
BIT4     000020   521#  1128
BIT5   - 000040   520#  1113  1120  1137
BIT6   - 000100   519#   753   754   762  1111  1124  1368  1410  1457  1530  1543  1612  1672
                 1673  1713  1714  1725  1726  1753  1806
BIT7   = 000200   518#  1040  1109  1116
BIT8   - 000400   517#
BIT9   - 001000   516#
BMOVA    004262  1190#  1192
BMOVE    004252  1186#  1210  1557
BUFF     015656  1360  1365  1373  1390  1420  1421  1528  2382#
BUFFP    001400   694#  1358*  1359*  1360  1365  1375*  1420*
BUTTON   014763  1440  1475  2308#
CALLED   001404   696#  1347  1391  1404  1431*
CALLER   001402   695#  1396  1471*  1524
CARMSK   001362   687#   902  1109  1111  1113  1243*  1246*  1249*  1253*  1818
CERDAT   014047   915  2217#
CHALT  = 104005   541#
CHGC2    000232   613#
CHGC4    010412  1903#
CHGC6    002004   782#
CHLT     002444   660   890#
CKSWR    010412  1904#  1962
CNT      001420   705#  1971*  2002*
CNTG     015455  1913  2368#
CNTLU    010464   785  1915#  1933
CNVCTR   004432  1203*  1206*  1225#
COLMN    007730  1743*  1761*  1763*  1770#
```

```
CONFIG  001332   674# 1363  1376  1435* 1436* 1455  1485  1522  1534
CONN    006326  1438  1472  1513#
COUNT   001324   671# 1036* 1052* 1053  1117* 1121* 1125* 1129* 1135*
COUNT1  001416   704# 1923* 1938  1952*
CRNUM   014112   912  2224#
CRXTX   003030   957   960#
CRXTXA  003102   960*  961*  969#
CRXTXB  003104   956*  959*  970#
CRXTXC  003110   963   972#
CSB     014062   907  2219#
CSRADD  013126   908   909  1417  1426  2130#
CTRD    001364   688# 911   1178* 1181* 1372* 1381* 1382  1400* 1401
CWAS    014074   906  2221#
DATCHK= 104004   540# 1380  1395  1399
DCERR   005610  1342  1414#
DECVAL  004452  1198  1233#
DELAY = 104016   550# 1313  1441  1476
DEND    021432  2383#
DIGIT   004434  1216* 1219* 1222* 1223  1226#
DISCON  006312  1424  1448  1482  1508#
DISPLA  000174   597#  622
DISPRE  000172   596#  622*
DLCNT   003604  1072* 1074  1084#
DLY     003544   669  1072#
DLYA    003562  1076# 1081
DLYB    003566  1077# 1078
DLYC    003600  1075  1082#
DOIT    004020  1119  1123  1127  1131  1132#
DONE    004054  1138  1140#
DTCHK   002470   659   902#
DTCHKA  002566   904   916#
DTERR   014001  1062  2210#
ECDAT   003424  1041# 1042
EHALT = 104010   544#  937   972
EHLT    002456   663   896#
EHLTA   002466   897   899#
EIGHT   003710  1110  1116#
EMTA    002312   852#
EMTINT  002300   494   849#
EMTTAB  001264   655#  854
EMO     013176   933   968  2138#
ENDPAS  014117  1409  1827  2225#
ERR     002570   658   918#
ERRA    002640   921   926#
ERRB    002702   918*  919*  922*  923*  924*  934#
ERRC    002710   927   937#
ERRCNT  010172  1801* 1822* 1829#
ERRD    002720   928*  929*  931   940#  964*  965*  967
ERRE    002722   920*  925*  938   941#
ERROR = 104003   539# 1345  1446  1481  1489  1498  1520  1814  1821
ERROR1- 104013   547#  908   914
ERRRX = 104015   549# 1319  1416  1425  1675  1679  1682
ERRTX = 104014   548# 1706
ERR1    002612   666   922#
ERR3A   007306  1646  1675#
ERR3B   007322  1648  1679#
```

ERR3C	007330	1653	1682#							
ERTP	004576	482	484	486	488	496	718	772	1257#	1838
ERTPA	004646	1265#	1284							
FILL	004224	1177#	1405							
FILLA	004232	1179#	1182							
FILL1	001422	706#	1969*	1979						
FINISH	005554	1384	1403#							
FIVE	003776	1115	1128#							
FMAP	001350	682#	752*	1283	1288*					
FNONE	001346	681#	725*	769*	774					
FORMAD	004762	751	1292#							
FROMPC	001342	679#	1264*	1270	1281*					
FTITLE	001344	680#	714*	720	724*	778*	845*			
GENPAR	003656	1109#	1614	1755	1808					
INBUF	017462	1355	1388	1419	2380#	2381				
INBUFP	001376	693#	1353*	1354*	1355	1389*	1419*			
INCPRG	002432	653	654	885#						
INDAT	003400	1035#	1064							
INFIL	004220	1176#	1580							
LDLINE	015024	1147	2314#							
LDPRI	010352	1562	1584	1871#						
LDPRIA	010366	1874#	1880							
LDPRIX	010402	1875	1878#							
LDTVEC	010304	1563	1585	1856#						
LDTVED	010324	1860#	1867							
LDVECB	010260	1847#	1853							
LDVECS	010240	1564	1586	1843#						
LDVEC1	010272	1848	1850#							
LDVEC2	010340	1861	1864#							
LFAIL	014353	1676	2258#							
LINCA	005036	1305#	1321							
LINCB	005054	1309#	1311							
LINCF	005134	1318	1322#							
LINCHM	014146	1320	1797	2232#						
LINCON	005020	1302#	1607	1615	1629	1745	1756			
LINE	001330	673#	1338*	1429	1466*	1468				
LINENO	001354	684#	726*	730*	747	759				
LINEUP	005152	1304	1326#							
LINMAD	014176	1325	1453	1800	2236#					
LINSA	004134	1157#	1160							
LINSEL	004072	1146#	1604	1625	1740	1786				
MACHER	000004	484#	718*	719*	727*	728*	772*	773*	1838*	1839*
MAKCON	014020	1308	1570	1592	1791	2213#				
MANUAL	100000	509#								
MAPA	001534	730#	740	771						
MAPEND	001744	732	772#							
MAPERR	001766	776#								
MAPNE	001564	727	738#							
MAPOK	001574	737	741#							
MAPOKA	001706	758	762#							
MAPVEC	004704	490	1279#							
MDADR	012723	744	2103#							
MFROM	013115	1271	2128#							
MLINE	012715	748	768	2101#						
MMODD	015153	822	2331#							
MMODX	015131	814	2327#							

```
MMOD1   015203            806   2336#
MMOD2   015321            817   2350#
MMOD3   015367            841   2357#
MNONE   012745            777   2107#
MODE    001424            707#  1970*  1975   1978*  1989*
MODEM   001412            700#  1349   1433*  1434*
MODEV   002102            610    802#
MODEV1  002114            805#   815    844
MODEV2  002150            812    816#   823
MODEV3  002174            820    824#
MOVIT   010174           1568   1590   1832#
MOVITA  010214           1835#  1837
MPWRF   015073            950   2321#
MSWSEL  012762            794   2110#
MTERR   013016           1274   2115#
MTITLE  012576            723   2086#
MTO     013063           1267   2122#
MTRAP   012735            765   2105#
N     - 000040            551#  2047#  2054#  2061#  2068#  2075#  2080#  2085#
NEW     015473           1921   2372#
NUMBER  001334            675#  1176*  1179   1180*  1583*
OACNV   003606            742    746    763    906    907    908    931    956    959    967   1087#  1171  1241
                         1265   1269   1429   1455   1468
OACNVA  003620           1092#  1101
OLDPS   001336            677#  1257*  1259*  1260*  1261*  1262*  1263
OPEN    000000            508#   597    598    633    635    645    646    657    670    671    672    673   674
                          675    685    686    687    688    689    690    691    692    693    694    695   696
                          697    699    700    701    704    705    706    707    708    709    869    870   883
                          884    934    940    941    969    970    980    988   1015   1027   1029   1084  1211
                         1212   1213   1225   1226   1227   1829   2378   2380
OTBUFP  001406            697#  1418*  1532   1533*  1536   1538*  1541
OUT     010710           1905   1907   1911   1956#
OUTBUF  015512           1328   1374   1406   1418   1536   1538   1541   1556*  1558   1559   1579*  1581  1638
                         1670   2378#  2379   2382
OVRLAY  005154           1328#  1561
OVRLYA  005164           1330#  1333
PARBIT  001322            670#  1116*  1120*  1124*  1128*  1139   1142
PAREX   004554           1248   1250#  1254
PARMTS  014124           1242   2228#
PFAIL   002724            492    944#   946
POPSP   = 005726          526#  1079   1082
POPSP2= 022626            527#   739   1280
PRGID   001242            646#
PRGNUM  001240            645#   798*   951   1166
PRGTAB  001244            647#   800    953
PRG0    006502            647   1549#
PRG0A   006612           1572#  1573
PRG1    006616            648   1577#
PRG1C   006714           1594#  1595
PRG2    006720            649   1602#
PRG2A   006742           1607#
PRG2B   006746           1608#  1611
PRG2C   006752           1609#  1619
PRG2M   014252           1608   1802   2245#
PRG3    007016            650   1623#
PRG3A   007032           1627#  1678   1729
```

```
PRG3EX  007540            1715  1729#
PRG4    007552             651  1738#
PRG4A   007606            1745#
PRG4B   007616            1747#  1767  1769
PRG4C   007620            1748#  1752  1762
PRG4D   007636            1750  1753#
PRG5    007764             652  1784#
PRG5A   010010            1790#  1798
PRG5AA  010032            1796#  1810
PRG5B   010040            1795  1799#
PRG5BB  010050            1802#  1828
PRG5C   010054            1803#  1825
PRG5D   010154            1820  1823#
PRG5E   010164            1805  1826#
PRTY0 = 000000             535#
PRTY1 = 000040             534#
PRTY2 = 000100             533#
PRTY3 = 000140             532#
PRTY4 = 000200             531#  634  636  642  644
PRTY5 = 000240             530#
PRTY6 = 000300             529#
PRTY7 = 000340             491  493  495  528#  728  756  1258  1565  1587
PSW   = 177776             506#  717*  733*  756*  792*  804*  1257  1258*  1565*  1571*  1587*  1593*  1642*
PWRUP   002734             944  946#
POTIT   013256            1551  2149#
P1TIT   013322            1578  2155#
P2TIT   013371            1603  2162#
P3TIT   013441            1624  2169#
P4TIT   013477            1739  2175#
P5TIT   013546            1785  2182#
QUEST   015503            1945  2374#
RBUF    011314             731  830  1351  1353  1358  1414  1443  1478  2056#
RCSR    011216             729  826  1156  1340  1392  1397  1444  1473*  1479  1483*  1487  1491  1496
                          1500  1504  1508*  1509  1513*  1567  1589  2049#
RDDAT   003406            1037#  1038  1060
RDOCT   003372             795  807  818  842  1032#  1148  1238  1432  1463  1554
RECDAT  001356             685#  903  906  1379*  1394*  1398*
REMAP   001432             608  714#
RESTRT  002754             951#
RETRN   003530            1045  1065#
RINTM   013135            1680  2132#
RINT3   007134            1631  1645#
RINT3A  007216            1655  1659#
RINT3B  007250            1660  1664  1666  1668#
RINT3E  007336            1662  1686#
RISR    005202            1337#  2080
RISRA   005242            1344  1347#
RISRAA  005264            1350  1353#
RISRB   005310            1348  1358#
RISRBB  005356            1364  1368#
RISRC   005366            1356  1366  1371#
RISRCA  005422            1378#  1383
RISRD   005454            1377  1387#
RISRDA  005474            1391#  1402
RISREX  005676            1423  1428#
RISRF   005624            1415  1418#
```

```
RISRFB  006012  1445  1450#  1492  1505
RISRFC  006056  1437  1461#
RISRFD  006166  1482#  1490  1499
RISRFE  006230  1488  1491#
RISRFF  006202  1480  1485#
RISRFG  006242  1486  1496#
RISRFH  006260  1497  1500#
RISR0  011606  1843  2080#
RISR1  011616  2080#
RISR10  011706  2080#
RISR11  011716  2080#
RISR12  011726  2080#
RISR13  011736  2080#
RISR14  011746  2080#
RISR15  011756  2080#
RISR16  011766  2080#
RISR17  011776  2080#
RISR2  011626  2080#
RISR20  012006  2080#
RISR21  012016  2080#
RISR22  012026  2080#
RISR23  012036  2080#
RISR24  012046  2080#
RISR25  012056  2080#
RISR26  012066  2080#
RISR27  012076  2080#
RISR3  011636  2080#
RISR30  012106  2080#
RISR31  012116  2080#
RISR32  012126  2080#
RISR33  012136  2080#
RISR34  012146  2080#
RISR35  012156  2080#
RISR36  012166  2080#
RISR4  011646  2080#
RISR5  011656  2080#
RISR6  011666  2080#
RISR7  011676  2080#
ROVER  014371  1683  2261#
RREAD  003520  1047  1049  1051  1054  1061#
RSTPC  002426  873*  881  883#
RSTPSW  002430  874*  880  884#
RSTREG=  104012  546#  936  1102  1193  1214
RSTRG  002372  665  873#
RTN  004030  1135#  1143
RXBUF  001202  630#  1294*  1306  1316  1323  1650  1793  1812  1817
RXBUFT  007550  1650*  1651  1652  1732#
RXCSR  001200  629#  908  1154  1292*  1302  1305*  1309  1312*  1315  1322  1340*  1341  1392*
               1397*  1491*  1500*  1504*  1606*  1628*  1641*  1645  1669*  1677*  1742*  1789*  1794
               1809  1815
RXCSRT  001370  690#  959  1302*  1303  1309*  1310  1315*  1317  1322*  1341*  1343  1422  1645*
               1647
RXERR  003010  668  958#
RXLVL  001212  634#  981
RXVTR  001210  633#  757  761  764  979  1287*
SAVE  001326  672#  1132*  1139*  1140  1142*
```

```
SAVREG= 104011  545#  93'  1087  1186  1197
SAVRG   002332  664   859#
SAVR0   003370  993*  1000  1017*  1023  1025  1029#
SCRLF   015510  1937  2375#
SELCAR  013712  1553  2200#
SELPAR  013624  1237  2190#
SETPAR  004460  1236#  1451  1502  1605  1626  1741  1788
SEVEN   003754  1112  1124#
SIX     003732  1114  1120#
SRPTR   000170  595#  617  621*  783  896  926  962  1654  1904  1917  1955*
SRT     001374  692#  1137  1239*  1241  1244  1247  1251  1612  1753  1806
STAD    000312  606*  608*  610*  627#
STALL = 104002  538#
START   001436  606  715#  780  846  888  1276
START1  002004  721  775  783#
STCONT  000226  607  609  611#
STKPTR= 001200  507#  611  715  802  948  1627
STPARA  004556  1245  1251#  1252
STPPA   003166  985*  988#
STPRA   003136  977*  980#
STRVRV  003120  661  977#
STRXV = 104006  542#  1630
STTXV = 104007  543#  1632
STXMTV  003150  662  985#
SUBTEN  004372  1205  1216#
SUBTNA  004376  1217#  1220
SUBTNB  004412  1218  1221#
SVRPC   002366  859*  867  869#
SVRPSW  002370  860*  866  870#
SWR     015463  1916  2370#
SWREG   000176  598#  621  783  1904
TBIT1   004512  1243#
TBUF    011510  838  1526*  1532*  2070#
TBUFFP  001410  699#  1390*  1421*  1526  1527*  1528
TCONFI  014246  1455  2243#
TCRLF   007732  1640  1746  1764  1774#
TCSR    011412  834  1368*  1410*  1450  1457*  1501  1518  1530*  1543*  2063#
TEMP    001372  691#  1153*  1169*  1171  1702*  1710
TEMPST  001426  708#  1922*  1947*  1948*  1949*  1951*  1955
TEMP1   001352  683#  741*  743
TENPWR  004436  1204*  1217  1221  1227#
TFLAG   007544  1639*  1661  1686*  1730#
TIB     001430  709#  1908*  1909*  1910  1926*  1929  1930*  1931  1934  1940  1942  1950*  1951
TINTM   013156  1707  2135#
TINT3   007346  1633  1690#
TINT3B  007416  1692  1702#
TINT3C  007460  1696  1698  1700  1713#
TISR    006336  1516#  2085
TISRA   006354  1519  1522#
TISRAA  006352  1521#  1537  1542
TISRB   006462  1535  1541#
TISRBB  006452  1538#  1544
TISRC   006422  1523  1525  1532#
TISR0   012176  1856  2085#
TISR1   012206  2085#
TISR10  012276  2085#
```

```
TISR11  012306  2085#
TISR12  012316  2085#
TISR13  012326  2085#
TISR14  012336  2085#
TISR15  012346  2085#
TISR16  012356  2085#
TISR17  012366  2085#
TISR2   012216  2085#
TISR20  012376  2085#
TISR21  012406  2085#
TISR22  012416  2085#
TISR23  012426  2085#
TISR24  012436  2085#
TISR25  012446  2085#
TISR26  012456  2085#
TISR27  012466  2085#
TISR3   012226  2085#
TISR30  012476  2085#
TISR31  012506  2085#
TISR32  012516  2085#
TISR33  012526  2085#
TISR34  012536  2085#
TISR35  012546  2085#
TISR36  012556  2085#
TISR37  012566  2085#
TISR4   012236  2085#
TISR5   012246  2085#
TISR6   012256  2085#
TISR7   012266  2085#
TKB     001222   638#   789   1039  1908  1926
TKLVL   001232   642#   788
TKS     001220   637#   790*  1037  1906  1924
TKVTR   001230   641#   786
TLINE   014473  1429  2274#
TLINEX  014443  1171  2269#
TOPC    001340   678#  1263*  1266  1279* 1282* 1285  1286* 1287
TPB     001226   640#  1006*  1043* 1719* 1914* 1929* 1999*
TPINT   007500  1636  1719#
TPINTA  007520  1721  1723   1725#
TPLVL   001236   644#  1637
TPS     001224   639#  1007   1041  1673* 1702  1703* 1704  1708  1710* 1714  1725* 1927  1997
                2000
TPVTR   001234   643#  1635
TTINTS  010712   787   1960#
TXBUF   001206   632#  1298*  1616* 1658* 1693* 1757* 1774* 1777* 1811*
TXCSR   001204   631#   753*   754*  762*  1296* 1450* 1501* 1617  1656  1672* 1690  1713* 1726
                1758  1775   1778  1823
TXCSRT  001366   689#   956   1690* 1691
TXERR   002766   667   955#
TXLVL   001216   636#  989
TXVTR   001214   635#  987   1285*
TYP     003200   655   993#
TYPA    003214   997#  1005  1014
TYPC    003236   999   1002#
TYPD    003254  1004  1006#  1011  1013
TYPDAT  003320   997*  998   1002  1006  1010* 1012* 1015#
```

```
TYPE   = 104000          536#  722   767   776   793   805   813   816   821   840   885   949   1026
                        1061  1146  1171  1236  1241  1273  1307  1324  1408  1429  1439  1452  1455
                        1461  1468  1474  1550  1552  1569  1577  1591  1602  1623  1738  1784  1790
                        1796  1799  1826  1912  1915  1920  1936  1944
TYPES  = 104001          537#  932   967
TYPF     003272         1003  1010#
TYPOC    010730         1918  1969#
TYPON    010744         1971#
TYPS     003322          656  1017#
TYPSA    003356         1022  1025#
TYPSAA   003326         1018#  1028
TYPSB    003364         1020*  1021  1027#
UR       014730         1469  2303#
URA      014760         1468  2307#
VECTAB   011120          761*  1161  1844  1857  1871  2015#
WORDS    007546         1634*  1649* 1659  1668* 1694* 1697  1731#
WRU      014633         1462  2292#
XMTDAT   001360          686#  902*  903   907   1378* 1393*
.      - 021432          481#  498   504   594#  605#  628#  1008  1167  1361  1529  1613  1618  1644
                        1657  1705  1709  1727  1754  1759  1776  1779  1807  1813  1816  1824  2379#
                        2381#
```

```
CNVQA     554#   905   906   907   930   955   958   966  1170  1240  1428  1454  1467
ISR       561#  2080
ISRT      567#  2085
RBUFF     577#  2061
RRCV      573#  2054
TBUFF     585#  2075
TXMT      581#  2068


. ABS.  021432     000


ERRORS DETECTED:  0

,CZDLBC.LST/CRF/SOL/NL:TOC=CZDLBC.P11
RUN-TIME.  10 17  3 SECONDS
RUN-TIME RATIO: 91/31=2.9
CORE USED:  10K  (19 PAGES)
```