DataGeneral

DIAGNOSTIC LISTING

LISTING

096-000446-00

PROGRAM

MICRO NOVA ASYNCHRONOUS
INTERFACE DIAGNOSTIC

TAPE

095-000446-00

ABSTRACT

THIS DIAGNOSTIC IS DESIGNED TO TEST THE MICRO NOVA ASYNCHRONOUS INTERFACE BOARD INCLUDING THE OPTIONAL CONSOLE DEBUG FEATURE IF INSTALLED.

```
0001 MNASY MACRO REV 04.00              13:44:54 12/03/76
01
02
03
04
05
06
07              ;*****************************************************************
08              ;
09              ; NAME: MNASYN.SR                          PART NUMBER: 094-000844
10              ;
11              ;
12              ; DESCRIPTION: MICRO NOVA ASYNCHRONOUS INTERFACE DIAGNOSTIC
13              ;
14              ;
15              ; REVISION HISTORY:
16              ;
17              ;       REV.            DATE
18              ;
19              ;       00              12/03/76
20              ;
21              ;
22              ; COPYRIGHT (C) DATA GENERAL CORPORATION, 1976
23              ; ALL RIGHTS RESERVED.
24              ;*****************************************************************
```

```
0002 MNASY
                        .TITL   MNASYN
32
33      000000          .DO     0
34              1.      ABSTRACT
35
36                      THIS DIAGNOSTIC IS DESIGNED TO TEST THE MICRO NOVA
37                      ASYNCHRONOUS INTERFACE BOARD INCLUDING THE OPTIONAL
38                      CONSOLE DEBUG FEATURE IF INSTALLED.
39
40              2.      MACHINE REQUIREMENTS
41
42              2.1     A MICRO NOVA PROCESSOR
43              2.2     2K OF READ/WRITE MEMORY
44              2.3     A MICRO NOVA ASYNCHRONOUS INTERFACE BOARD
45              2.4     LOOPBACK PATCH PLUG PN. XXXXXXX OR EQUIVALENT
46
47              3.      OPERATING PROCEDURE
48
49              3.1     HARDWARE CONNECTIONS
50
51                      DISCONNECT THE TERMINAL PLUG FROM THE BOARD TO BE
52                      TESTED AND INSTALL THE SPECIAL PATCH PLUG.  IF A
53                      PATCH PLUG IS NOT AVAILABLE, THE CONNECTIONS REQUIRED
54                      ARE:
55
56                      TRANSMIT DATA TO RECEIVE DATA                   A21-A1
57                      DATA TERMINAL READY TO CLEAR TO SEND            A10-A2
58                      DATA TERMINAL READY TO DATA SET READY           A10-A5
59                      REQUEST TO SEND TO CARRIER DETECT               A12-A4
60                      REQUEST TO SEND TO RING INDICATOR               A12-A8
61
62                      THE UNIT UNDER TEST MUST HAVE W27 REMOVED AND MUST BE
63                      PATCHED FOR 8-BIT CHARACTER LENGTH (W18&W19 REMOVED).
64                      ANY BAUD RATE MAY BE USED, AND TRANSMISSION MAY BE
65                      EITHER RS232 OR 20MA CURRENT LOOP.  THE BOARD DOES
66                      NOT PROVIDE ANY MEANS OF CHECKING PARITY OR STOP BITS.
67
68              3.2     LOADING
69
70                      PROGRAM MAY BE LOADED VIA THE BINARY LOADER OR THE DTOS
71                      OR DFOS SYSTEMS AND WILL START AT LOCATION 200.  IF IT'S
72                      DESIRED, "SWREG" AND "USREG" OPTIONS MAY BE CHANGED AT
73                      THIS TIME THROUGH THE HAND-HELD CONSOLE OR THE CONSOLE
74                      DEBUG OPTION.
75
76              4.      ERROR DESCRIPTION
77
78                      THIS PROGRAM IS DESIGNED TO PROVIDE A SNAPSHOT OF ALL
79                      REGISTER CONTENTS IF AN ERROR IS DETECTED.  THESE ARE
80                      SAVED IN A MEMORY STACK AND, DEPENDING ON THE "USREG"
81                      OPTIONS, REPORTED TO THE USER VIA SOME LISTING OUTPUT
82                      DEVICE.  A RUNNING COUNT OF ERRORS IS ALSO SAVED BY
83                      THE PROGRAM, AND FACILITIES ARE PROVIDED FOR LOOPING
84                      OR HALTING ON ERROR DETECTION.  IN ADDITION THE DEVICE
85                      BAUD RATE IS CALCULATED AND THE CONSOLE DEBUG ROMS
86                      AND RAMS ARE VERIFIED IF INSTALLED.  THE ERRORS ARE SAVE
87                      IN MEMORY AS FOLLOWS:
88
89                        LOCATION (OCTAL)      VARIABLE      INTERPRETATION
90
```

```
                    000201          HELP        CURRENT SUBTEST START
                    000203          PASS        TEST PASS COUNTER
                    000207          SWREG       SWITCH REGISTER
                    000210          USREG       USER REGISTER
                    000211          INTVL       SUBTEST LOGOUT INTVL
                    000212          ERCNT       TOTAL ERROR COUNT
                    000213          TSTNM       CURRENT SUBTEST NUMBER
                    000214          ERNUM       LATEST ERROR NUMBER
                    000215          STACK       ERROR STACK POINTER
                    000216          .BLK        AC0 SAVE LOCATION
                    000217                      AC1 SAVE LOCATION
                    000220                      AC2 SAVE LOCATION
                    000221                      AC3 SAVE LOCATION
                    000222                      CARRY & PCR SAVE

                DETAILED ERROR MESSAGES PRINT OUT THE REGISTER
                CONTENTS AT THE TIME OF THE FAILURE, AS WELL AS
                IDENTIFYING THE SUBTEST AND ERROR NUMBER CAUSING
                THE PROBLEM.  THE MESSAGE FORMAT IS:

                ERROR NUMBER XXX ENCOUNTERED SUBTEST XX
                CRY     ACM     AC1     AC2     AC3     PC
                X       XXXXXX  XXXXXX  XXXXXX  XXXXXX  XXXXXX

                THESE REGISTER CONTENTS SHOULD BE COMPARED TO THOSE
                DESIRED BY THE FAILING SUBTEST TO ISOLATE THE ERROR.


        5.      SWITCH SETTINGS

                LOCATION "SWREG" IS USED TO SELECT THE PROGRAM OPTIONS
                (NOT SYSTEM CONFIGURATION).  WHILE RUNNING UNDER DTOS/
                DFOS THIS LOCATION WILL BE LOADED BY THE MONITOR,
                HOWEVER UNDER STAND-ALONE AND PROGRAM LOAD MODES
                THIS LOCATION MAY BE SET BY THE USER USING EITHER
                THE HAND-HELD CONSOLE OR A TELETYPE WITH THE
                CONSOLE DEBUG FEATURE.  ANY OF THESE
                OPTIONS MAY BE OVERRIDDEN BY SETTING OF OPTIONS IN
                THE "USREG".

        5.1     SWITCH OPTIONS

                DIFFERENT BITS AND THEIR INTERPRETATION AT LOCATION
                "SWREG" ARE AS FOLLOWS:

                   BIT  OCTAL   BINARY          INTERPRETATION

                    1               0           LOOP ON ERROR
                        400000      1           SKIP LOOPING ON ERROR
                    2               0           PRINT TO CONSOLE
                        200000      1           ABORT CONSOLE PRINTOUT
                    3               0           PRINT DETAILED ERROR ON
                                                SELECTED DEVICE/DEVICES
                        100000      1           % ERROR PRINTOUT ONLY
                    4               0           ALLOW END OF PASS PRINT
                        040000      1           SUPPRESS PASS PRINTOUT
                    5               0           DON'T USE LINE PRINTER
                        020000      1           USE LINE PRINTER
                    6               0           DON'T HALT ON ERROR
                        010000      1           HALT ON ERROR
```



```
                    7               0           DON'T PRINT SUBTEST COMP
                        004000      1           PRINT SUBTEST COMPLETION
                  8-14                  RESERVED FOR FUTURE USE
                   15               0           REPORT CALCULATED BAUD R
                        000001      1           SUPPRESS BAUD RATE REPOR


        6.      USER REGISTER CONFIGURATION

                THIS DIAGNOSTIC USES BIT 0 OF THE USER REGISTER TO
                OVERRIDE THE SWITCH REGISTER OPTIONS.  THESE
                DIFFERENT BITS AND THEIR INTERPRETATION AT LOCATION
                "USREG" ARE AS FOLLOWS:

                   BIT  OCTAL   BINARY          INTERPRETATION

                    0               0           USE "SWREG"
                        100000      1           IGNORE "SWREG"
                  1-7,15                SAME SIGNIFICANCE AS "SWREG"
                    8               0           USE STANDARD ADDRESS FOR
                                                UNIT UNDER TEST
                        000200      1           USE ADDRESS FROM "UUTAD"
                    9               0           USE STANDARD CONSOLE ADD
                        000100      1           USE ADDRESS FROM "CONAD"
                  10-14                 RESERVED FOR FUTURE USE


                .END
                .EJECT
```

```
0005 MNASY
                        /*****************************************************************
                        /DTOS POINTERS
                        /*****************************************************************
        000000          .LOC    0
00000 000145            DIRT            /POINTER TO DIRT BLOCK

        000045          .LOC    45
00045 000164            EGGS            /POINTER TO EGGS BLOCK

        000050          .LOC    50
                        .ZREL
00050-000010            .BLK    8.

        000100          .LOC    100

                        /*****************************************************************
                        /PAGE 0 CONSTANTS FOLLOW
                        /*****************************************************************
00100 000000 BAUD:      0               /CALCULATED BAUD RATE
00101 000000 UUTAD:     0
00102 000000 UTINT:     0
00103 000000 CUNAD:     0
00104 000004 C4:        000004
00105 000010 C10:       000010
00106 000016 C16:       000016
00107 000020 C20:       000020
00110 000050 C50:       000050
00111 000252 C252:      000252
00112 000144 D100:      100.
00113 000213 D135:      139.    /THIS FIGURE FUDGED TO GET CORRECT BAUD RATE
00114 001750 D1000:     1000.
00115 000001 MSWK:      000001
00116 103240 LSWK:      103240
00117 002765 MSWM:      002765
00120 160400 LSWM:      160400
00121 000000 SAVE:      000000  /SAVE LOCATION FOR TIMING LOOP COUNTER
00122 140000 TIMER:     140000  /TIME CONSTANT
00123 177774 ITMSK:     177774
00124 000050 UTMSK:     000050
00125 002772 ROMBUF:    ROM     /POINTER TO CODE FOR CONSOLE DEBUG
00126 077400 MODT3:     077400  /START OF DEBUG ROM
00127 077560 RAMA:      077560  /RAM POINTER
00130 000377 ROMSIZ:    377
00131 000000 LIMIT:     0
00132 177775 NEG3:      177775
00133 000027 CNT:       27
00134 000000 CNT1:      0
00135 000000 CNT2:      0
00136 002741 BUF:       BUFF-1
00137 002741 BUFA:      BUFF-1
00140 003371 EBUFA:     EBUF-1  /ERROR BUFFER ADDRESS
00141 000000 ECNT:      0
00142 000027 XCNT:      27
00143 000000 XORFG:     0
00144 001161 SERVIC:    INTSV
00145 047115 DIRT:      .TXTE   /MNASYN  0/
        051501
        047131
        120240
        030240
```

```
0006 MNASY
                        
00150 000000            0
00151 002200            200             /STARTING ADDRESS FOR DIAGNOSTIC
00152 172003            172003          /INHIBIT ALL CPU'S EXCEPT MICRO-NOVA
                                        /PERFORM THREE PASSES IN AUTO MODE
00153 000300            300             /REQUIRE CONSOLE FOR ERROR LIST
00154 000000            0
00155 002300            300             /REQUIRE SECOND ASYNC BOARD FOR TEST
00156 000000            0
00157 000050            50              /STANDARD UUT ADDRESS IS TTO1,TTI1
00160 000164 IEGGS:     EGGS
00161 000000 EGGS:      0               /DTOS SWITCH
00162 000050            50              /DEVICE CODE
00163 000000            0               /CAT SWITCH
00164 000000            0               /PASS COUNT
00165 002200            200             /RETURN= ADDRESS OF DTOS MONITOR
00166 140400            140400          /SWREG FROM DTOS
```

```
10007 MNASY
01
                        .TITL   MNPAC
03                  ;*****************************************************************
04                  ;MACRO DEFINITIONS FOLLOW
05                  ;*****************************************************************
06
07          061401  .DIAC   PSHA=061401
08          061501  .DIAC   POPA=061501
09          061001  .DIAC   MTSP=061001
10          060001  .DIAC   MTFP=060001
11          061201  .DIAC   MFSP=061201
12          060201  .DIAC   MFFP=060201
13          073301  .DUSR   MUL=073301
14          073101  .DUSR   DIV=073101
15          062401  .DUSR   SAV=062401
16          062601  .DUSR   RET=062601
17          100010  .DXOP   TRP=100010       ;STD MICRO-NOVA TRAP W/O BITS 10&11
18          000000   ?A=0
19          000000   ?B=0
20          000000   ?C=0
21          000000   ?D=0
22          000000   ?E=0
23                  .MACRO  SETUP
24                  **      ?E=?E+1
25                  **      ?F=(?E&700)/100+1
26                  **      ?G=(?E&70)/10+1
27                  **      ?H=(?E&7)+1
28                  **      SET?P 0,1,2,3,4,5,6,7
29                          A1
30                          NIOL    35      ;SYNC PULSE FOR XOR TESTER
31                  %
32                  .MACRO  SET?P
33                  TS&?FA?G&?H:    JSR @   ISETUP
34                  %
35                  .MACRO  EHALT
36                  **      ?D=?D+1
37                  **      ?C=?C+1
38                  **      .IFE    (?C-40)
39                  **      ?B=?B+1
40                  **      ?C=0
41                  **      .ENDC
42                  **      .IFE    (?B-4)
43                  **      ?A=?A+1
44                  **      ?B=0
45                  **      .ENDC
46                  **      ?X=(?D&700)/100+1
47                  **      ?Y=(?D&70)/10+1
48                  **      ?Z=(?D&7)+1
49                  **      A=?A+1
50                  **      B=?B+1
51                  **      C=(?C&70)/10+1
52                  **      D=(?C&7)+1
53                  **EHL?T 0,1,2,3,4,5,6,7
54                  %
55                  .MACRO  EHL?T
56                          TRP     AA,AB,ACAD      ;ERROR NUMBER A?XA?YA?Z
57                  %
58                  .MACRO  LOOP
59                          JSR @   ILOOP
60                  %
```

```
0008 MNASY
01
02                  ;*****************************************************************
03                  ;PROGRAM STARTS HERE- JUMP TO INITIALIZE ROUTINE
04                  ;*****************************************************************
05          0000200         .LOC    200
06 00200 002202             JMP @   ISTART
07
08
09                  ;*****************************************************************
10                  ;PAGE 0 CONSTANTS FOLLOW
11                  ;*****************************************************************
12 00201 000000 HELP:   0
13          0000201  LOOPH=HELP
14 00202 000500 ISTART: START
15 00203 000000 PASS:   0
16 00204 000700 REP?T:  STRT
17 00205 000000 RTN?1:  0
18 00206 000000 RTN?2:  0
19 00207 000000 SWREG:  0
20 00210 000000 USREG:  0
21 00211 000001 INTVL:  1
22 00212 000000 ERCNT:  0       ;TOTAL ERROR COUNT FOR ALL TESTS
23 00213 000000 TSTNM:  0       ;CURRENT SUBTEST NUMBER
24 00214 000000 ERNUM:  0       ;NUMBER OF LATEST ERROR
25 00215 000215 STACK:  .       ;REGISTER SAVE STACK HERE
26 00216 000005         .BLK    5
27 00223 100000 MSK0:   100000  ;MASK WORDS FOR BITS 0-15
28 00224 040000 MSK1:   040000
29 00225 020000 MSK2:   020000
30 00226 010000 MSK3:   010000
31 00227 004000 MSK4:   004000
32 00230 002000 MSK5:   002000
33 00231 001000 MSK6:   001000
34 00232 000400 MSK7:   000400
35 00233 000200 MSK8:   000200
36 00234 000100 MSK9:   000100
37 00235 000040 MSK10:  000040
38 00236 000020 MSK11:  000020
39 00237 000010 MSK12:  000010
40 00240 000004 MSK13:  000004
41 00241 000002 MSK14:  000002
42 00242 000001 MSK15:  000001
43 00243 001517 IEHALT: XEHALT
44 00244 001477 ISETUP: XSETUP
45 00245 001734 ILOOP:  XLOOP
46 00246 002261 ITYP?E: TYP?E
47 00247 002134 IPOC?T: POC?T
48 00250 002130 IZOC?T: ZOC?T
49 00251 002142 IPDC?S: PDC?S
50 00252 002152 IPDE?C: PDE?C
51 00253 002043 IMES?S: MES?S
52 00254 002120 ICHL?F: CHL?F
```

```
10009 MNASY

                        .TITL   MNPAC
02
03                      ;*****************************************************************
04                      ;INITILIZATION MODULE -INITIALIZES POINTERS AND
05                      ;ALL COUNTERS FOR START OF DIAGNOSTIC
06                      ;*****************************************************************
07              000500          .LOC    500
08 000500 020243 START: LDA     0,IEHALT
09 000501 040047        STA     0,47    ;STORE LINK TO ERROR IN TRAP ADDRESS.
10 000502 020215        LDA     0,STACK
11 000503 061001        MTSP    0       ;INITIALIZE STACK AND FRAME POINTERS.
12 000504 060001        MTFP    0
13 000505 102400        SUB     0,0
14 000506 040212        STA     0,ERCNT ;RESET ERROR COUNTER
15 000507 040213        STA     0,TSTNM ;CLEAR SUBTEST COUNTER
16 000510 040263        STA     0,PASS  ;CLEAR PASS COUNTER
17
18                      ;*****************************************************************
19                      ;*****************************************************************
20                      ;
21                      ;  INSERT DIAGNOSTIC PROGRAM HERE !!
22                      ;
23                      ;*****************************************************************
24                      ;*****************************************************************
25
```

```
10010 MNASY

                        .TITL   MNASYN
02
03 000511 020210 INIT:  LDA     0,USREG
04 000512 101113        MOVL#   0,0,SNC ;IGNORE SWREG?
05 000513 020207        LDA     0,SWREG ;NO, USE SWREG
06 000514 040207        STA     0,SWREG ;SET UP SWREG FOR TEST
07 000515 034163        LDA     3,IEGGS ;GET EGGS BLOCK POINTER
08 000516 021400        LDA     0,0,3
09 000517 101005        MOV     0,0,SNR ;AUTO MODE?
10 000520 000405        JMP     .+5
11 000521 021405        LDA     0,5,3   ;YES, SET UP FROM EGGS
12 000522 040207        STA     0,SWREG
13 000523 021401        LDA     0,1,3   ;GET DTOS UUT DEVICE
14 000524 040101        STA     0,UUTAD ;STUFF IN UUT ADDRESS SAVE
15 000525 020210        LDA     0,USREG
16 000526 024233        LDA     1,MSK8
17 000527 107404        AND     0,1,SZR ;CHANGE UUT ADDRESS?
18 000530 004434        JSR     UUTUP   ;YES
19 000531 024234        LDA     1,MSK9
20 000532 107404        AND     0,1,SZR ;CHANGE CONSOLE ADDRESS?
21 000533 004501        JSR     CONUP   ;YES
22 000534 006254        JSR @   ICRL?F
23 000535 006253        JSR @   IMES?S
24 000536 002604        HDG1            ;OUTPUT START OF DIAGNOSTIC HEADINGS
25 000537 006254        JSR @   ICRL?F
26 000540 006253        JSR @   IMES?S
27 000541 002640        HDG2
28 000542 006254        JSR @   ICRL?F
29 000543 006254        JSR @   ICRL?F
30                  ;CHECK FOR DEVICE ON BUS
31 000544 060151        NIOS    TTO1    ;TURN ON BUSY
32 000545 063551        SKPBZ   TTO1    ;IS BUSY ON?
33 000546 000415        JMP     OK      ;YES
34 000547 063751        SKPDZ   TTO1    ;WELL, HOW ABOUT DONE?
35 000550 000413        JMP     OK      ;YES
36 000551 006253        JSR @   IMES?S  ;PRINT "DEVICE NOT FOUND"
37 000552 002721        HDG4
38 000553 006254        JSR @   ICRL?F
39 000554 161000        MOV     3,0     ;GET FAILING PC
40 000555 034163        LDA     3,IEGGS ;GET EGGS BLOCK POINTER
41 000556 025402        LDA     1,0,3   ;GET DTOS AUTO MODE FLAG
42 000557 125005        MOV     1,1,SNR ;ARE WE IN AUTO MODE?
43 000560 000403        JMP     OK      ;NO, CONTINUE TEST
44 000561 002401        JMP @   .+1
45 000562 001473        RTRN
46 000563 000515 OK:    JMP     START   ;GO TO START OF TEST
47
48                      ;*****************************************************************
49                      ;THE FOLLOWING SUBROUTINE WILL UPDATE ALL I/O REFERENCES
50                      ;TO THE UNIT UNDER TEST
51                      ;*****************************************************************
52 000564 042205 UUTUP: STA     3,RTN?1
53 000565 024253        LDA     0,IMES?S ;GET PROGRAM UPPER LIMIT
54 000566 024202        LDA     1,ISTART ;GET LOWER LIMIT
55 000567 122400        SUB     1,0     ;LENGTH
56 000570 040443        STA     0,CNT?  ;SET COUNTER
57 000571 044020        STA     1,20    ;SET AUTO INCREMENT POINTER
58 000572 020101        LDA     0,UUTAD
59 000573 040124        STA     0,UTMSK ;SET MASK FOR UUT
60 000574 020102        LDA     0,UTINT
```

```
 0011 MNASY
01 000575 100000          COM     0,0
02 000576 040123          STA     0,ITMSK ;SET UP OUT INTERRUPT MASK
03 000577 024431 CHECK:   LDA     1,IOMSK
04 000600 022020          LDA     0,@20   ;GET INSTRUCTION
05 000601 107400          AND     0,1     ;CHECK FOR I/O
06 000602 030427          LDA     2,IOINS ;INSTRUCTION TYPE
07 000603 146414          SUB#    2,1,SZR
08 000604 000411          JMP     CONT    ;NOT I/O
09 000605 024425          LDA     1,ADMSK
10 000606 107400          AND     0,1     ;CHECK FOR
11 000607 030110          LDA     2,C50   ;TTI1 OR
12 000610 146415          SUB#    2,1,SNR ;TTO1 ADDRESSES
13 000611 000410          JMP     DOIT
14 000612 151400          INC     2,2
15 000613 146415          SUB#    2,1,SNR
16 000614 000405          JMP     DOIT
17 000615 014416 CONT:    DSZ     CNTR
18 000616 000761          JMP     CHECK   ;CHECK NEXT LOCATION
19 000617 034205          LDA     3,RTN?1
20 000620 001400          JMP     0,3     ;RETURN TO TEST
21 000621 024101 DOIT:    LDA     1,OUTAD
22 000622 030110          LDA     2,C50
23 000623 142400          SUB     2,0     ;ZERO OUT OLD ADDRESS
24 000624 120000          ADD     1,0     ;ADD IN NEW ADDRESS
25 000625 014020          DSZ     20
26 000626 042020          STA     0,@20   ;STORE UPDATED INSTRUCTION
27 000627 000766          JMP     CONT    ;GET NEXT INSTRUCTION
28 000630 160000 IOMSK:   160000
29 000631 060000 IOINS:   060000
30 000632 000077 ADMSK:   000077
31 000633 000000 CNTR:    0
32
33                        ;*****************************************************************
34                        ;THE FOLLOWING SUBROUTINE WILL UPDATE CONSOLE I/O
35                        ;ADDRESSES USED IN THE TTYIO PACKAGE
36                        ;*****************************************************************
37 000634 054205 CONUP:   STA     3,RTN?1
38                        ;DO INPUT INSTRUCTIONS FIRST
39 000635 024103          LDA     1,C10
40 000636 030103          LDA     2,CONAD
41 000637 034437          LDA     3,TTIAD
42 000640 021400          LDA     0,0,3   ;GET FIRST WORD
43 000641 122400          SUB     1,0     ;SUBTRACT OLD ADDRESS
44 000642 143000          ADD     2,0     ;ADD NEW ADDRESS
45 000643 041400          STA     0,0,3   ;RESTORE
46 000644 175400          INC     3,3     ;MOVE UP POINTER
47 000645 175400          INC     3,3
48 000646 021400          LDA     0,0,3   ;GET SECOND WORD
49 000647 122400          SUB     1,0
50 000650 143000          ADD     2,0
51 000651 041400          STA     0,0,3   ;RESTORE
52                        ;NOW DO OUTPUT INSTRUCTIONS
53 000652 125400          INC     1,1
54 000653 151400          INC     2,2
55 000654 034423          LDA     3,TTOAD
56 000655 021400          LDA     0,0,3   ;GET FIRST WORD
57 000656 122400          SUB     1,0
58 000657 143000          ADD     2,0
59 000660 041400          STA     0,0,3   ;RESTORE
60 000661 175400          INC     3,3
```

```
 0012 MNASY
01 000662 021400          LDA     0,0,3   ;GET SECOND WORD
02 000663 122400          SUB     1,0
03 000664 143000          ADD     2,0
04 000665 041400          STA     0,0,3   ;RESTORE
05 000666 175400          INC     3,3
06 000667 175400          INC     3,3
07 000670 021400          LDA     0,0,3   ;GET THIRD WORD
08 000671 122400          SUB     1,0
09 000672 143000          ADD     2,0
10 000673 041400          STA     0,0,3   ;RESTORE
11 000674 034205          LDA     3,RTN?1
12 000675 001400          JMP     0,3     ;RETURN TO TEST
13 000676 002400 TTIAD:   TIN?W   ;INPUT ROUTINE POINTER
14 000677 002272 TTOAD:   TIY?    ;OUTPUT ROUTINE POINTER
15
16                        ;*****************************************************************
17                        ;   RESET AND CHECK STATUS
18                        ;*****************************************************************
19                        STRT:   SETUP   100.
20 000700 006244 TS001:   JSR #   ISETUP
21 000701 000144          100.
22 000702 060235          NIOC    35      ;SYNC PULSE FOR XOR TESTER
23 000703 060250          NIOC    TTI1    ;IDLE TELETYPE INPUT
24 000704 063550          SKPBZ   TTI1
25                        EHALT             ;BUSY BIT NOT RESET
26 000705 100110          TRP     0,0,01  ;ERROR NUMBER 001
27 000706 063750          SKPDZ   TTI1
28                        EHALT             ;DONE BIT NOT RESET
29 000707 100210          TRP     0,0,02  ;ERROR NUMBER 002
30                        LOOP
31 000710 000245          JSR #   ILOOP
32
33                        SETUP   100.
34 000711 006244 TS002:   JSR #   ISETUP
35 000712 000144          100.
36 000713 060235          NIOC    35      ;SYNC PULSE FOR XOR TESTER
37 000714 060251          NIOC    TTO1    ;IDLE TELETYPE OUTPUT
38 000715 063551          SKPBZ   TTO1
39                        EHALT             ;BUSY BIT NOT RESET
40 000716 100310          TRP     0,0,03  ;ERROR NUMBER 003
41 000717 063751          SKPDZ   TTO1
42                        EHALT             ;DONE BIT NOT RESET
43 000720 100410          TRP     0,0,04  ;ERROR NUMBER 004
44                        LOOP
45 000721 000245          JSR #   ILOOP
46
47                        ;*****************************************************************
48                        ;   CHECK MODEM STATUS BITS
49                        ;*****************************************************************
50                        SETUP   100.
51 000722 006244 TS003:   JSR #   ISETUP
52 000723 000144          100.
53 000724 060235          NIOC    35      ;SYNC PULSE FOR XOR TESTER
54 000725 061450          DIB     0,TTI1  ;INPUT MODEM STATUS
55 000726 101014          MOV#    0,0,SZR
56                        EHALT             ;MODEM STATUS NOT ZERO
57 000727 100510          TRP     0,0,05  ;ERROR NUMBER 005
58                        LOOP
59 000730 000245          JSR #   ILOOP
60
```

```
 0013 MNASY
01                      SETUP   100.
02 00731 006244 TS004:  JSR @   ISETUP
03 00732 000144         100.
04 00733 060235         NIOC    35      ;SYNC PULSE FOR XOR TESTER
05 00734 102520         SUBZL   0,0     ;GENERATE +1
06 00735 062050         DOB     0,TTI1  ;TURN ON DATA TERMINAL READY
07 00736 061450         DIB     0,TTI1  ;INPUT MODEM STATUS
08 00737 024104         LDA     1,C4
09 00740 122414         SUB#    1,0,SZR ;TEST FOR DATA SET READY
10                      EMALT           ;ONE OR MORE BITS NOT SET
11 00741 101610         TRP     0,0,06  ;ERROR NUMBER 006
12                      LOOP
13 00742 006245         JSR @   ILOOP
14
15              ;****************************************************************
16              ;BEGIN TRANSMIT RECEIVE TESTS.  THESE TESTS WILL EXERCISE
17              ;THE INTERFACE BOARD WITH A VARIETY OF DATA PATTERNS AND
18              ;WILL TEST INTERRUPT AND STATUS OPERATION.
19              ;****************************************************************
20                      SETUP   100.
21 00743 006244 TS005:  JSR @   ISETUP
22 00744 000144         100.
23 00745 060235         NIOC    35      ;SYNC PULSE FOR XOR TESTER
24
25              ;FIRST, OUTPUT A CHARACTER WITHOUT CLEAR TO SEND
26              ;ENABLED AND MAKE SURE TRANSMIT GOES BUSY.
27
28 00746 020111         LDA     0,C252  ;LOAD ALTERNATING BIT PATTERN
29 00747 061151         DOAS    0,TTO1  ;OUTPUT CHARACTER
30 00750 063451         SKPBN   TTO1
31                      EMALT           ;TRANSMIT BUSY DID NOT TURN ON
32 00751 100710         TRP     0,0,07  ;ERROR NUMBER 007
33
34              ;SECOND, CHECK THAT RECEIVE DOES NOT GO BUSY UNTIL CTS IS ENABLE
35
36 00752 024122         LDA     1,TIMER ;LOAD TIMER CONSTANT
37 00753 125405 LOOP1:  INC     1,1,SNR
38 00754 000404         JMP     TURNON  ;TURN ON CLEAR TO SEND
39 00755 063450         SKPBN   TTI1
40 00756 000775         JMP     LOOP1   ;RECEIVER NOT BUSY
41                      EMALT           ;RECEIVER WENT BUSY WITHOUT CTS
42 00757 101010         TRP     0,0,10  ;ERROR NUMBER 010
43
44              ;THIRD, ENABLE CTS AND CHECK THAT RECEIVE DOES GO BUSY.
45
46 00760 102520 TURNON: SUBZL   0,0     ;TURN ON DTR
47 00761 062150         DOBS    0,TTI1  ;TO ENABLE CTS
48 00762 063450         SKPBN   TTI1
49                      EMALT           ;NO RECEIVER BUSY AFTER DOBS
50 00763 101110         TRP     0,0,11  ;ERROR NUMBER 011
51
52              ;FOURTH, CHECK STATUS FOR CARRIER AND RING DURING PERIOD
53              ;WHEN REQUEST TO SEND SHOULD BE ACTIVE.
54
55 00764 030106         LDA     2,C16   ;LOAD BITS FOR CARRIER, DSR, AND RING
56 00765 061450         DIB     0,TTI1  ;INPUT STATUS
57 00766 112414         SUB#    0,2,SZR ;COMPARE
58                      EMALT           ;CARRIER, RING OR REQUEST TO SEND N.G.
59 00767 101210         TRP     0,0,12  ;ERROR NUMBER 012
60
```

```
 0014 MNASY
01              ;FIFTH, CHECK THAT RECEIVE AND TRANSMIT ARE COMPLETED WITHIN A
02              ;REASONABLE LENGTH OF TIME.
03
04 00770 024122         LDA     1,TIMER
05 00771 063750 LOOP2:  SKPDZ   TTI1
06 00772 000404         JMP     .+4
07 00773 125404         INC     1,1,SZR
08 00774 000775         JMP     LOOP2   ;RECEIVER NOT DONE
09                      EMALT           ;RECEIVER NOT DONE WITHIN     MSECS
10 00775 101310         TRP     0,0,13  ;ERROR NUMBER 013
11 00776 063651         SKPDN   TTO1
12                      EMALT           ;TRANSMIT NOT DONE
13 00777 101410         TRP     0,0,14  ;ERROR NUMBER 014
14
15              ;FINALLY, CHECK THAT RECEIVED DATA IS CORRECT
16
17 01000 020111         LDA     0,C252
18 01001 070650         DIAC    2,TTI1  ;INPUT RECEIVED CHARACTER
19 01002 112414         SUB#    0,2,SZR
20                      EMALT           ;INPUT DATA NOT EQUAL TO OUTPUT DATA
21 01003 101510         TRP     0,0,15  ;ERROR NUMBER 015
22 01004 061277         DOAC    0,CPU   ;PERFORM I/O RESET
23                      LOOP
24 01005 006245         JSR @   ILOOP
25
26
27              ;****************************************************************
28              ;TEST ALL PATTERNS ONE AT A TIME USING INTERRUPTS
29              ;****************************************************************
30 01006 020207         LDA     0,SWREG ;GET SWITCH REGISTER
31 01007 044121         STA     0,SAVE  ;SAVE IT
32 01010 024232         LDA     1,MSK7  ;GET MASK FOR TEST NUMBER PRINTOUT
33 01011 124000         COM     1,1     ;INVERT
34 01012 123400         AND     1,0     ;MASK OUT BIT 7
35 01013 040207         STA     0,SWREG ;PUT BACK
36 01014 030130         LDA     2,ROMSIZ  ;AC2=377
37 01015 050455 PATST:  STA     2,PATRN ;SET UP INITIAL TEST PATTERN
38                      SETUP   1
39 01016 006244 TS006:  JSR @   ISETUP
40 01017 000001         1
41 01020 060235         NIOC    35      ;SYNC PULSE FOR XOR TESTER
42 01021 102520         SUBZL   0,0     ;TURN ON DTR
43 01022 062250         DOBC    0,TTI1  ;TO ENABLE CTS
44 01023 020123         LDA     0,ITMSK ;UUT INTERRUPT MASK
45 01024 062077         MSKO    0       ;MASK ALL BUT UUT INTERRUPTS
46 01025 020446         LDA     0,PINT  ;GET INTERRUPT SERVICE POINTER
47 01026 040001         STA     0,1     ;STUFF IT
48 01027 020104         LDA     0,C4    ;GET ITERATION COUNT
49 01030 040134         STA     0,CNT1  ;SET UP COUNTERS
50 01031 040135         STA     0,CNT2
51 01032 030440 SNDPT:  LDA     2,PATRN ;AC2= PATTERN TO BE TRANSMITTED
52 01033 071151         DOAS    2,TTO1  ;OUTPUT CHARACTER
53 01034 024122 RTNPT:  LDA     1,TIMER ;GET INTERRUPT DELAY COUNTER
54 01035 060177         INTEN           ;TURN ON INTERRUPT ENABLE
55 01036 000401 LOOPT:  JMP     .+1     ;NOP
56 01037 125404         INC     1,1,SZR ;WAIT HERE FOR INTERRUPT
57 01040 000776         JMP     LOOPT
58                      EMALT           ;INTERRUPT NOT RECEIVED IN TIME
59 01041 101610         TRP     0,0,16  ;ERROR NUMBER 016
60 01042 000446         JMP     LOPTR
```

```
0015 MNASY
01 01043 060251 TOSND:  NIOC    TTO1    ;CLEAR TTO1 INTERRUPT
02 01044 162014         AUC#    3,0,SZR ;DEVICE TTO1?
03 01045 000407         JMP     ILGDV   ;NO, ILLEGAL DEVICE INTERRUPTED
04 01046 020134         LDA     0,CNT1  ;GET COUNT OF TRANSMITTED CHARS.
05 01047 101005         MOV     0,0,SNR ;DONE WITH THIS PATTERN?
06 01050 000764         JMP     RTNPT   ;YES, FINISH RECEIVING
07 01051 014134         DSZ     CNT1    ;DECREMENT ITERATION COUNTER
08 01052 000760         JMP     SNDPT   ;SEND NEXT CHARACTER
09 01053 000761         JMP     RTNPT   ;GO TO RECEIVE ROUTINE
10 01054 020122 ILGDV:  LDA     0,TIMER ;WAIT FOR RECEIVER TO CLEAR
11 01055 063510         SKPBZ   TTI     ;STILL BUSY?
12 01056 000777         JMP     .-1     ;YES
13 01057 101404         INC     0,0,SZR ;NO, BUT WAIT A WHILE
14 01060 000775         JMP     .-3
15                      EMALT           ;ILLEGAL DEVICE INTERRUPTED
16 01061 101710         TRP     0,0,17  ;ERROR NUMBER 017
17 01062 000427         JMP     LOPTR+1 ;EXIT
18 01063 020122 FALPT:  LDA     0,TIMER ;WAIT FOR RECEIVER TO CLEAR
19 01064 063510         SKPBZ   TTI     ;STILL BUSY?
20 01065 000777         JMP     .-1     ;YES
21 01066 101404         INC     0,0,SZR ;NO, BUT WAIT A WHILE
22 01067 000775         JMP     .-3
23              ;DATA S/B AC2 = DATA IS AC3
24                      EMALT           ;INPUT CHARACTER DOES NOT = OUTPUT CHAR
25 01070 102010         TRP     0,0,20  ;ERROR NUMBER 020
26 01071 000420         JMP     LOPTR+1 ;EXIT
27 01072 000000 PATRN:  0               ;CURRENT PATTERN STORED HERE
28 01073 001074 PINT:   INTPT
29 01074 061477 INTPT:  INTA    0       ;AC0= INTERRUPTING DEVICE
30 01075 034124         LDA     3,UTMSK ;GET THE DEVICE MASK
31 01076 162414         SUB#    3,0,SZR ;IS IT TTI?
32 01077 000744         JMP     TOSND   ;NO, TRY TRANSMITTER
33 01100 074650         DIAC    3,TTI1  ;READ THE CHARACTER RECEIVED
34 01101 172414         SUB#    3,2,SZR ;IS IT CORRECT?
35 01102 000761         JMP     FALPT   ;NO, INPUT CHAR NOT = TO OUTPUT CHAR
36 01103 014135         DSZ     CNT2    ;SKIP WHEN ALL CHARS RECEIVED
37 01104 000730         JMP     RTNPT   ;CONTINUE
38 01105 034121         LDA     3,SAVE  ;GET ORIGINAL SWREG
39 01106 151005         MOV     2,2,SNR ;LAST PASS?
40 01107 054207         STA     3,SWREG ;YES, RESTORE SWREG
41              LOPTR:  LOOP
42 01110 000245         JSR @   ILOOP
43 01111 034151         LDA     2,PATRN ;GET CURRENT DATA PATTERN
44 01112 102400         SUB     0,0     ;CLEAR AC0
45 01113 112042         ADCO    0,2,SZC ;AC2= NEW PATTERN, SKIP IF NOT DONE
46 01114 000403         JMP     .+3     ;GO TO NEXT TEST
47 01115 014213         DSZ     TSTNM   ;RESTORE TEST NUMBER COUNT
48 01116 000677         JMP     PATST   ;DO TEST AGAIN
49
50              ;*****************************************************************
51              ;TRY MULTI-WORD WORST CASE PATTERN TRANSFERS USING INTERRUPTS
52              ;*****************************************************************
53 01117 102440         SUBO    0,0     ;CLEAR XOR FLAG
54 01120 040143         STA     0,XORFG
55 01121 020136         LDA     0,BUF   ;INITIALIZE BUFFER ADDRESS
56 01122 040137         STA     0,BUFA
57 01123 020142         LDA     0,XCNT  ;AND COUNTER
58 01124 040133         STA     0,CNT
59                      SETUP   100.
60 01125 000244 TS007:  JSR @   ISETUP
```

```
0016 MNASY
01 01126 000144         100.
02 01127 060235         NIOC    35      ;SYNC PULSE FOR XOR TESTER
03 01130 020140         LDA     0,EBUFA ;GET ERROR BUFFER ADDRESS
04 01131 040022         STA     0,22    ;SET UP POINTER
05 01132 102440         SUBO    0,0
06 01133 040141         STA     0,ECNT  ;CLEAR ERROR COUNT
07 01134 102520         SUBZL   0,0     ;TURN ON DTR
08 01135 062250         DOBC    0,TTI1  ;TO ENABLE CTS
09 01136 020123         LDA     0,ITMSK ;UUT INTERRUPT MASK
10 01137 062077         MSKO    0       ;MASK ALL BUT UUT INTERRUPTS
11 01140 020144         LDA     0,SERVIC
12 01141 040001         STA     0,1     ;SET INTERRUPT LINKAGE ADDRESS
13 01142 020137         LDA     0,BUFA  ;LOAD BUFFER ADDRESS
14 01143 040020         STA     0,20    ;SET UP TRANSMIT AND RECEIVE POINTERS
15 01144 040021         STA     0,21
16 01145 020133         LDA     0,CNT   ;SET UP COUNTERS
17 01146 040134         STA     0,CNT1
18 01147 040135         STA     0,CNT2
19 01150 024122 TRNSMT: LDA     1,TIMER
20 01151 022020         LDA     0,@20   ;LOAD BUFFER CHARACTER
21 01152 061151         DOAS    0,TTO1  ;OUTPUT CHARACTER
22 01153 060177         INTEN           ;ENABLE INTERRUPTS
23 01154 000401 LOOP3:  JMP     .+1
24 01155 125404         INC     1,1,SZR
25 01156 000776         JMP     LOOP3
26                      EMALT           ;INTERRUPT NOT RECEIVED
27 01157 102110         TRP     0,0,21  ;ERROR NUMBER 021
28 01160 000415         JMP     NXT     ;SKIP TO END OF TEST
29              ;INTERRUPT SERVICE ROUTINE
30 01161 071477 INTSV:  INTA    2
31 01162 063735         SKPDZ   35      ;XOR ERROR?
32 01163 000461         JMP     XORER   ;YES
33 01164 034124         LDA     3,UTMSK
34 01165 172414         SUB#    3,2,SZR ;TEST FOR TTI
35 01166 000417         JMP     XMIT
36 01167 074550         DIAS    3,TTI1  ;INPUT CHARACTER
37 01170 032021         LDA     2,@21
38 01171 156414         SUB#    2,3,SZR
39 01172 000421         JMP     DATER   ;INPUT CHAR DOESN'T EQUAL OUTPUT CHAR
40 01173 014135 CON:    DSZ     CNT2
41 01174 000406         JMP     RTN
42 01175 020141 NXT:    LDA     0,ECNT  ;GET ERROR COUNT
43 01176 101404         MOV     0,0,SZR ;ANYTHING TO REPORT?
44 01177 000453         JMP     ERPT    ;YES, TELL THE WORLD
45                      LOOP
46 01200 000245         JSR @   ILOOP
47 01201 000404         JMP     BDTST   ;ENTIRE BUFFER CHECKED
48 01202 024122 RTN:    LDA     1,TIMER
49 01203 060177         INTEN
50 01204 000750         JMP     LOOP3
51 01205 060251 XMIT:   NIOC    TTO1
52 01206 172014         AUC#    3,2,SZR ;TEST FOR TTO ADDRESS
53                      EMALT           ;INVALID ADDRESS RECEIVED
54 01207 102210         TRP     0,0,22  ;ERROR NUMBER 022
55 01210 014134         DSZ     CNT1
56 01211 000737         JMP     TRNSMT
57 01212 000770         JMP     RTN
58 01213 052022 DATER:  STA     2,@22   ;SAVE GOOD DATA
59 01214 056022         STA     3,@22   ;SAVE FAILING DATA
60 01215 024021         LDA     1,21    ;GET READ BUFFER ADDRESS
```

```
 0017 MNASY
01 01216 046022          STA     1,022   ;SAVE ADDRESS
02 01217 010141          ISZ     ECNT    ;INCREMENT ERROR COUNT
03 01220 020007          LDA     0,SWREG ;GET SWITCH REGISTER
04 01221 024024          LDA     1,MSK1  ;AND BIT 1 MASK
05 01222 107415          AND#    0,1,SNR ;LOOP ON ERROR?
06 01223 000750          JMP     CON     ;NO, CONTINUE TEST
07 01224 014021 ELOOP:   DSZ     21      ;GET NEW BEGINNING ADDRESS OF
08 01225 014021          DSZ     21      ;TEST DATA BUFFER
09 01226 020021          LDA     0,21
10 01227 040137          STA     0,BUFA  ;STUFF IT IN BUFFER ADDRESS
11 01230 020104          LDA     0,C4    ;GET NEW COUNT
12 01231 040133          STA     0,CNT   ;STUFF IN COUNTER
13 01232 020122          LDA     0,TIMER ;WAIT FOR RECEIVER TO CLEAR
14 01233 063510          SKPBZ   TTI     ;STILL BUSY?
15 01234 000777          JMP     .-1     ;YES
16 01235 101404          INC     0,0,SZR ;NO, WAIT A WHILE
17 01236 000775          JMP     .-3
18 01237 020143          LDA     0,XORFG ;CHECK FOR XOR CALL
19 01240 101004          MOV     0,0,SZR ;WAS IT XOR?
20 01241 000732          JMP     CON     ;YES, CONTINUE
21                ;DATA S/B AC2 = DATA IS AC3 = BUFFER ADDRESS AC1
22                       EHALT           ;REPORT FAILURE
23 01242 102310          TRP     0,0,23  ;ERROR NUMBER 023
24 01243 000732          JMP     NXT     ;SHOULD NOT GET HERE IF LOOPING
25 01244 020143 XUREK:   LDA     0,XORFG ;FIRST XOR FAIL?
26 01245 101004          MOV     0,0,SZR
27 01246 000716          JMP     INTSV+3 ;NO, CONTINUE TEST
28 01247 102000          ADC     0,0     ;YES
29 01250 040143          STA     0,XORFG ;TURN ON XOR FLAG
30 01251 000753          JMP     ELOOP   ;GO TO ERROR LOOP
31 01252 020140 ERPT:    LDA     0,EBUFA ;GET ERROR BUFFER START
32 01253 040022          STA     0,22
33 01254 032022 AGIN:    LDA     2,@22   ;GET GOOD DATA
34 01255 036022          LDA     3,@22   ;GET FAILURE DATA
35 01256 026022          LDA     1,@22   ;GET DATA BUFFER ADDRESS
36 01257 014141          DSZ     ECNT    ;ALL DONE?
37 01260 000401          JMP     .+1     ;NO, CONTINUE
38 01261 000717          JMP     NXT+3   ;YES, RETURN
39                ;DATA S/B AC2 = DATA IS AC3 = BUFFER ADDRESS AC1
40                       EHALT           ;REPORT FAILURE
41 01262 102410          TRP     0,0,24  ;ERROR NUMBER 024
42 01263 000771          JMP     AGIN
43
44                ;*****************************************************************
45                ;DETERMINE APPROXIMATE BAUD RATE OF ASYNCH INTERFACE
46                ;*****************************************************************
47
48 01264 001771 INOERR:  NOERR
49                BDTST:  SETUP   1
50 01265 006244 TS010:   JSR @   ISETUP
51 01266 000001          1
52 01267 060235          NIOC    35      ;SYNC PULSE FOR XOR TESTER
53 01270 020111          LDA     0,C252  ;LOAD DATA PATTERN
54 01271 120520          SUBZL   1,1     ;GENERATE +1
55 01272 152400          SUB     2,2     ;CLEAR AC2
56 01273 061151          DOAS    0,TTO1  ;OUTPUT DATA
57 01274 060250          DOBC    1,TTI1  ;TURN ON CTS
58
59                ;COUNT TIME REQUIRED FOR COMPLETION, 13.5 USEC. PER PASS
60 01275 063750 CTIME:   SKPDZ   TTI1    ;TAKES 7.2 USEC + 1.0 USEC FOR SKIP
```

```
 0018 MNASY
01 01276 000404          JMP     .+4
02 01277 151404          INC     2,2,SZR ;TAKES 2.4 USEC
03 01300 000775          JMP     CTIME   ;TAKES 2.9 USEC
04                       EHALT           ;INTERFACE HUNG UP ON TRANSMIT
05 01301 102510          TRP     0,0,25  ;ERROR NUMBER 025
06
07                ;CALCULATE BAUD RATE FROM LOOP COUNT
08 01302 050121          STA     2,SAVE  ;SAVE AC2
09 01303 102400          SUB     0,0     ;CLEAR AC0
10
11                ;BAUD RATE= (10BITS/CHAR)/(SAVE*13.5*10**-6)SEC/CHAR
12 01304 024113          LDA     1,D135  ;LOAD 135 DECIMAL
13 01305 073301          MUL             ;MULTIPLY LOOP CNT BY 135
14 01306 101005          MOV     0,0,SNR
15 01307 000410          JMP     HISPD   ;GO TO CALCULATIONS FOR HIGH BAUD RATE
16 01310 034114          LDA     2,D1000 ;LOAD 1000 DECIMAL
17 01311 073101          DIV             ;SCALE VALUE TO EASE CALCULATIONS
18 01312 131000          MOV     1,2     ;MOVE QUOTIENT TO AC2
19 01313 020115          LDA     0,MSWK  ;100,000 DECIMAL, MSW
20 01314 024116          LDA     1,LSWK  ;100,000 DECIMAL, LSW
21 01315 073101          DIV             ;BAUD RATE IN BINARY NOW IN AC1
22 01316 000405          JMP     BDOUT   ;OUTPUT BAUD RATE
23 01317 131000 HISPD:   MOV     1,2
24 01320 020117          LDA     0,MSWM  ;100,000,000 DECIMAL, MSW
25 01321 024120          LDA     1,LSWM  ;100,000,000 DECIMAL, LSW
26 01322 073101          DIV             ;COMPUTE BAUD RATE
27 01323 044100 BDOUT:   STA     1,BAUD
28 01324 020207          LDA     0,SWREG
29 01325 101222          MOVZR   0,0,SZC ;CHECK FOR BIT 15
30 01326 000405          JMP     .+5
31 01327 006253          JSR @   IMES?S
32 01330 002704          HUG3
33 01331 006252          JSR @   IPDE?C
34 01332 006254          JSR @   ICRL?F
35                       LOOP
36 01333 006245          JSR @   ILOOP
37
38                ;TEST BREAK FUNCTION
39                       SETUP   100.
40 01334 006244 TS011:   JSR @   ISETUP
41 01335 000144          100.
42 01336 060235          NIOC    35      ;SYNC PULSE FOR XOR TESTER
43 01337 102400          SUB     0,0     ;LOAD DATA = ALL ZEROS
44 01340 126520          SUBZL   1,1     ;GENERATE +1
45 01341 030121          LDA     2,SAVE  ;LOAD COUNT
46 01342 150640          NEGOR   2,2     ;CHANGE SIGN AND DIVIDE BY 2
47 01343 061151          DOAS    0,TTO1  ;OUTPUT DATA
48 01344 060050          DOB     1,TTI1  ;TURN ON CTS
49 01345 151405 COUNT:   INC     2,2,SNR ;TIMING LOOP = SHOULD WAIT
50 01346 000404          JMP     BREAK   ;UNTIL 1/2 OF CHARACTER
51 01347 063650          SKPDN   TTI1    ;IS TRANSMITTED AND THEN
52 01350 000775          JMP     COUNT   ;TURN OFF CLEAR TO SEND
53                       EHALT           ;RECEIVE COMPLETED TOO SOON
54 01351 102610          TRP     0,0,26  ;ERROR NUMBER 026
55 01352 062050 BREAK:   DOB     0,TTI1  ;TURN OFF CTS
56 01353 101404          INC     0,0,SZR ;WAIT FOR A WHILE
57 01354 000777          JMP     .-1
58 01355 061450          DIB     0,TTI1  ;INPUT STATUS
59 01356 123405          AND     1,0,SNR ;MASK ALL BUT BREAK BIT
60                       EHALT           ;BREAK BIT NOT ON
```

```
 0019 MNASY
01 01357 102710          TRP     0,0,27  ;ERROR NUMBER 027
02 01360 066250          DOBC    1,TTI1  ;TURN ON DTR TO EMPTY TRANSMIT BUFFER
03 01361 020122          LDA     0,TIMER
04 01362 101404          INC     0,0,SZR ;MAKE SURE BUFFER IS MT BEFORE IORST
05 01363 000777          JMP     .-1
06                       LOOP
07 01364 006245          JSR @   ILOOP
08
09                ;*****************************************************************
10                ;THIS SECTION WILL TEST THE OPTIONAL CONSOLE DEBUG FEATURE
11                ;*****************************************************************
12                ;CHECK FOR ROM
13                       SETUP   5
14 01365 006244 TS012:   JSR @   ISETUP
15 01366 000005          5
16 01367 062235          NIOC    35      ;SYNC PULSE FOR XOR TESTER
17 01370 030126          LDA     2,MODT3 ;LOAD ROM START ADDRESS
18 01371 021000          LDA     0,0,2   ;LOAD FIRST WORD OF ROM
19 01372 011000          ISZ     0,2     ;INCREMENT MEMORY
20 01373 101000          MOV     0,0     ;NOP
21 01374 101400          INC     0,0     ;INCREMENT REGISTER
22 01375 025000          LDA     1,0,2   ;LOAD INCREMENTED WORDS
23 01376 106415          SUB#    0,1,SNR
24 01377 000450          JMP     DONE    ;MEMORY IS RAM- BYPASS TEST
25 01400 124005          COM     1,1,SNR
26 01401 000446          JMP     DONE    ;MEMORY NOT INSTALLED- BYPASS TEST
27 01402 050020          STA     2,20    ;SET ROM START ADDRESS
28 01403 020125          LDA     0,ROMBUF
29 01404 040021          STA     0,21    ;SET TEST BUFFER START ADDRESS
30 01405 020130          LDA     0,ROMSIZ
31 01406 040131          STA     0,LIMIT ;SET LIMIT COUNTER
32
33                ;TEST RAM LOCATIONS OF CONSOLE DEBUG OPTION
34 01407 102520          SUBZL   0,0     ;GENERATE +1
35 01410 030127 LOOP4:   LDA     2,RAMA  ;RAM STARTING ADDRESS
36 01411 034107          LDA     3,C20
37 01412 157000          ADD     2,3     ;UPPER LIMIT OF RAM
38 01413 041000 NEXT:    STA     0,0,2   ;STORE DATA IN MEMORY
39 01414 025000          LDA     1,0,2   ;READ MEMORY DATA
40 01415 122414          SUB#    1,0,SZR
41                       EMALT           ;RAM OR ROM DROPPED OR PICKED UP BIT
42 01416 103010          TRP     0,0,30  ;ERROR NUMBER 030
43 01417 151400          INC     2,2
44 01420 172414          SUB#    3,2,SZR
45 01421 000772          JMP     NEXT    ;GO TO NEXT MEMORY LOCATION
46 01422 101423          INCZ    0,0,SNC
47 01423 000765          JMP     LOOP4   ;TEST NEXT DATA PATTERN
48
49                ;SET RAM LOCATIONS TO "ALL ONES"
50 01424 102000          ADC     0,0     ;GENERATE '177777'
51 01425 030127          LDA     2,RAMA
52 01426 041000 ONES:    STA     0,0,2   ;STORE DATA
53 01427 025000          LDA     1,0,2   ;CHECK DATA
54 01430 122414          SUB#    1,0,SZR
55                       EMALT           ;BIT DROPPED IN RAM OR ROM
56 01431 103110          TRP     0,0,31  ;ERROR NUMBER 031
57 01432 151400          INC     2,2
58 01433 172414          SUB#    3,2,SZR
59 01434 000772          JMP     ONES
60
```

```
 0020 MNASY
01                ;CHECK ALL LOCATIONS OF PROGRAM FOR CORRECT VALUES
02 01435 022020 LOOP5:   LDA     0,@20   ;LOAD ROM DATA
03 01436 026021          LDA     1,@21   ;LOAD CORRECT DATA
04 01437 106415          SUB#    0,1,SNR
05 01440 000404          JMP     .+4
06 01441 030020          LDA     2,20    ;GET FAILING ADDRESSES - ROM
07 01442 034021          LDA     3,21    ;AND DATA BUFFER
08                       EMALT           ;INSTRUCTION DOES NOT COMPARE
09 01443 103210          TRP     0,0,32  ;ERROR NUMBER 032
10 01444 014131          DSZ     LIMIT
11 01445 000770          JMP     LOOP5
12                       LOOP            ;END OF ROM TEST
13 01446 006245          JSR @   ILOOP
```

```
0021 MNASY

                        .TITL   MNPAC
02
03                  ;*****************************************************************
04                  ;TERMINATION MODULE - INITIALIZES SUBTEST COUNTER, UPDATES
05                  ;PASS NUMBER, AND OUTPUTS PASS COMPLETE MESSAGE
06                  ;*****************************************************************
07
08 01447 010203 DONE:   ISZ     PASS    ;INCREMENT PASS COUNTER
09 01450 000401         JMP     .+1     ;NOP
10 01451 020207         LDA     0,SWREG
11 01452 024227         LDA     1,MSK4
12 01453 107404         AND     0,1,SZR
13 01454 000406         JMP     .+6
14 01455 006253         JSR @   IMES?S
15 01456 002575         MSG?2           ;OUTPUT TEST COMPLETED MESSAGE
16 01457 024203         LDA     1,PASS  ;GET PASS NUMBER
17 01460 006250         JSR @   I2OC?I  ;OUTPUT
18 01461 006254         JSR @   ICRLF
19 01462 102400         SUB     0,0
20 01463 040213         STA     0,TSTNM ;CLEAR SUBTEST COUNTER
21 01464 034163         LDA     3,IEGGS ;GET DTOS MODE
22 01465 021400         LDA     0,0,3
23 01466 101005         MOV     0,0,SNR ;MANUAL OR AUTO?
24 01467 002204         JMP @   REP?T   ;MANUAL MODE
25 01470 015403         DSZ     3,3     ;AUTO- DECREMENT PASS COUNT
26 01471 002204         JMP @   REP?T   ;NOT COMPLETED
27 01472 021403         LDA     0,3,3   ;GET PASS CNT
28 01473 031404 RTRN:   LDA     2,4,3   ;ALL DONE, RETURN TO DTOS
29 01474 041376         STA     0,-2,2
30 01475 061277         DOAC    0,CPU   ;PERFORM IO RESET
31 01476 001000         JMP     0,2     ;RETURN TO DTOS
32
33
34
35
36                  ;*****************************************************************
37                  ;FOLLOWING IS A PACKAGE OF SUBROUTINES TO HANDLE THE SETUP,
38                  ;EHALT, AND LOOP FUNCTIONS.  THEY ARE INTENDED TO FORM A
39                  ;STANDARD PACKAGE USABLE BY ANY MICRO-NOVA DIAGNOSTIC.
40                  ;*****************************************************************
41
42
43                  ;*****************************************************************
44                  ;THE SETUP SUBROUTINE CLEARS SUBTEST ERROR COUNTS, INCREMENTS
45                  ;THE SUBTEST POINTER, PERFORMS AN I/O RESET, INITIALIZES THE
46                  ;ITERATION COUNTS, AND CLEARS ALL THE REGISTERS.
47                  ;*****************************************************************
48 01477 021400 XSETUP: LDA     0,0,3   ;GET NO. OF PASSES
49 01500 040566         STA     0,ITR   ;INITIALIZE PASS COUNTER.
50 01501 040566         STA     0,ITRCT
51 01502 175400         INC     3,3
52 01503 054201         STA     3,LOOPR ;SAVE SUBTEST START ADDRESS.
53 01504 020204         LDA     0,REP?T
54 01505 101005         MOV     0,0,SNR ;IS THIS THE FIRST SUBTEST?
55 01506 040204         STA     0,REP?T ;YES, SAVE IT
56 01507 010213         ISZ     TSTNM   ;INCREMENT TEST COUNTER
57 01510 102400         SUB     0,0
58 01511 040561         STA     0,ERRCT ;CLEAR SUBROUTINE ERROR COUNT
59 01512 105000         MOV     0,1     ;CLEAR REGISTERS
60 01513 131000         MOV     1,2
```

```
0022 MNASY
01 01514 155000         MOV     2,3
02 01515 061277         DOAC    0,CPU   ;PERFORM IO RESET
03 01516 002201         JMP @   LOOPR   ;START SUBTEST
04
05                  ;*****************************************************************
06                  ;THE EHALT SERVICE ROUTINE IS ACCESSED THROUGH A HARDWARE TRAP
07                  ;INSTRUCTION.  IT PERFORMS VARIOUS FUNCTIONS DEPENDING ON THE
08                  ;CONTENTS OF "SWREG", INCLUDING DETAILED ERROR PRINTOUTS AND
09                  ;LOOPING OR HALTING ON ERRORS.  ALL REGISTERS ARE SAVED IN
10                  ;A MEMORY STACK AND, IF LOOP ON ERROR IS NOT SELECTED, THEY
11                  ;ARE RESTORED PRIOR TO RETURNING TO THE SUB-TEST.
12                  ;*****************************************************************
13 01517 074001 XEHALT: MTFP    3       ;SAVE REGISTER 3
14 01520 034046         LDA     3,46    ;LOAD ADDRESS OF ERROR
15 01521 062401         SAV             ;SAVE EVERYTHING IN STACK
16 01522 102400         SUB     0,0
17 01523 026046         LDA     1,@46   ;GET TRAP INSTRUCTION
18 01524 030537         LDA     2,TRP0  ;GET TRAP 0 MASK
19 01525 146405         SUB     2,1,SNR ;IS IT A USER TRAP?
20 01526 004534         JSR     USER    ;YES
21 01527 030535         LDA     2,C?100
22 01530 073101         DIV             ;SHIFT RIGHT 6 BITS
23 01531 044214         STA     1,ERNUM ;SAVE ERROR NUMBER
24 01532 102400         SUB     0,0
25 01533 040540         STA     0,EFWRD ;CLEAR ERROR FLAG WORD POINTER
26 01534 063477         SKPBN   CPU     ;TEST FOR INTERRUPTS ENABLED
27 01535 102000         ADC     0,0
28 01536 040527         STA     0,INTFLG ;SET FLAG
29 01537 060277         INTDS
30 01540 010212         ISZ     ERCNT
31 01541 000402         JMP     .+2
32 01542 014212         DSZ     ERCNT   ;AVOID ZERO ERROR CNT FROM WRAP-AROUND
33 01543 000401         JMP     .+1
34 01544 010526         ISZ     ERRCT   ;INCREMENT SUBTEST ERROR COUNT
35 01545 020224         LDA     0,MSK1  ;GET BIT 1
36 01546 061035         DOA     0,35    ;NOTIFY XOR TESTER OF MASTER FAIL
37 01547 020107         LDA     0,C20
38 01550 030214         LDA     2,ERNUM ;GET ERROR NUMBER
39 01551 112423 DECR:   SUBZ    0,2,SNC ;INDEX EFWRD AGAIN?
40 01552 000403         JMP     FWORD   ;NO
41 01553 010520         ISZ     EFWRD   ;YES
42 01554 000775         JMP     DECR    ;TRY AGAIN
43 01555 034516 FWORD:  LDA     3,EFWRD ;GET FLAG WORD POINTER
44 01556 113000         ADD     0,2     ;MAKE POINTER POSITIVE AGAIN
45 01557 024511         LDA     1,MASK  ;GET MASK TABLE BASE ADDRESS
46 01560 133000         ADD     1,2     ;ADD TO INDEX VALUE
47 01561 024510         LDA     1,FLAG  ;GET ERROR FLAG TABLE BASE ADDRESS
48 01562 137000         ADD     1,3     ;ADD TO INDEX VALUE
49 01563 025000         LDA     1,0,2   ;GET ERROR MASK BIT
50 01564 021400         LDA     0,0,3   ;GET FLAG TABLE WORD
51 01565 107415         AND#    0,1,SNR ;FIRST TIME FOR THIS ERROR?
52 01566 000406         JMP     BITON   ;YES- PRINT IT
53 01567 034500         LDA     3,ITRCT
54 01570 030476         LDA     2,ITR   ;TEST FOR FIRST PASS
55 01571 156404         SUB     2,3,SZR ;OF THIS SUBTEST
56 01572 000450         JMP     MULTI   ;MULTIPLE ERRORS
57 01573 000403         JMP     PRINT
58 01574 123000 BITON:  ADD     1,0     ;OR IN BIT FOR THIS FAILURE
59 01575 041400         STA     0,0,3
60 01576 020207 PRINT:  LDA     0,SWREG ;CHECK BITS 0-6
```

```
0023 MNASY
01 01577 024226          LDA     1,MSK3
02 01600 107404          AND     0,1,SZR ;TEST FOR DETAILED ERROR LOG
03 01601 000441          JMP     MULTI   ;% ERROR PRINTOUT ONLY
04 01602 006253          JSR @   IMES?S  ;PRINT OUT DETAILED ERROR MESSAGE
05 01603 002460          EMS1
06 01604 024214          LDA     1,ERNUM
07 01605 006250          JSR @   IZOC?T  ;INCLUDING ERROR NUMBER,
08 01606 006253          JSR @   IMES?S
09 01607 002467          EMS1A
10 01610 024213          LDA     1,TSTNM
11 01611 006250          JSR @   IZOC?T  ;FAILING TEST NUMBER,
12 01612 006254          JSR @   ICRL?F
13 01613 006253          JSR @   IMES?S
14 01614 002502          EMS2            ;AND CONTENTS OF ALL REGISTERS
15 01615 006254          JSR @   ICRL?F
16 01616 020222          LDA     0,STACK+5       ;GET CRY AND PC
17 01617 101120          MOVZL   0,0     ;MOVE CRY TO CARRY BIT
18 01620 126560          SUBCL   1,1     ;MOVE CRY TO AC1 BIT 15
19 01621 006250          JSR @   IZOC?T  ;CARRY BIT
20 01622 024216          LDA     1,STACK+1
21 01623 006247          JSR @   IPOC?T  ;AC0
22 01624 024217          LDA     1,STACK+2
23 01625 006247          JSR @   IPOC?T  ;AC1
24 01626 024220          LDA     1,STACK+3
25 01627 006247          JSR @   IPOC?T  ;AC2
26 01630 024221          LDA     1,STACK+4
27 01631 006247          JSR @   IPOC?T  ;AC3
28 01632 105220          MOVZP   0,1     ;GET FAILING PC
29 01633 006247          JSR @   IPOC?T  ;PROGRAM COUNTER
30 01634 006254          JSR @   ICRL?F
31 01635 034163          LDA     3,IEGGS ;GET EGGS BLOCK POINTER
32 01636 020222          LDA     0,STACK+5  ;GET FAILING PC
33 01637 025400          LDA     1,0,3   ;GET DTOS AUTO MODE FLAG
34 01640 125004          MOV     1,1,SZR ;ARE WE IN AUTO MODE?
35 01641 000632          JMP     RTRN    ;YES, EXIT TEST
36 01642 020207 MULTI:   LDA     0,SWREG
37 01643 024231          LDA     1,MSK6
38 01644 107405          AND     0,1,SNR ;HALT ON ERROR?
39 01645 000405          JMP     .+5     ;NO
40 01646 006253          JSR @   IMES?S  ;YES- OUTPUT MESSAGE
41 01647 002542          EMS4
42 01650 006254          JSR @   ICRL?F
43 01651 063077          HALT            ;ERROR HALT IS HERE
44 01652 020207          LDA     0,SWREG
45 01653 024224          LDA     1,MSK1
46 01654 107405          AND     0,1,SNR ;LOOP ON ERROR?
47 01655 000245          JSR @   ILOOP   ;YES
48 01656 010222          ISZ     STACK+5
49 01657 010406          ISZ     INTFLG  ;WERE INTERRUPTS ENABLED?
50 01660 060177          INTEN           ;YES
51 01661 062601          RET             ;RETURN TO TEST
52 01662 001400 USER:    JMP     0,3     ;USER MAY CHANGE THIS TO USE TRAP 0
53 01663 100010 TRP0:    100010
54 01664 000100 C?100:   100
55 01665 000000 INTFLG:  0
56 01666 000144 ITR:     144
57 01667 000000 ITRCT:   0
58 01670 000223 MASK:    MSKM
59 01671 001674 FLAG:    ERFLG
60 01672 000000 ERRCT:   0
```

```
0024 MNASY
01 01673 000000 ERWRD:   0               ;ERROR FLAG WORD POINTER
02 01674 000040 ERFLG:   .BLK    40      ;ERROR FLAG WORDS, 1 BIT FOR EACH ERNUM
03
04               ;*****************************************************************
05               ;THE LOOP SUBROUTINE KEEPS TRACK OF THE NUMBER OF SUBTEST
06               ;ITERATIONS AND ERROR LOOPS, AND PRINTS OUT ERROR PERCENT
07               ;AND SUBTEST COMPLETION HEADINGS IF SO DIRECTED BY
08               ;THE "SWREG" CONTENTS.
09               ;*****************************************************************
10 01734 054205 XLOOP:   STA     3,RTN?1
11 01735 014732          DSZ     ITRCT   ;DECREMENT ITERATION COUNT
12 01736 000447          JMP     RLOOP
13 01737 024733 NXTST:   LDA     1,ERRCT
14 01740 125005          MOV     1,1,SNR ;ERRORS ENCOUNTERED?
15 01741 000430          JMP     NOERR   ;NO ERRORS
16 01742 006253          JSR @   IMES?S  ;PRINT ERROR % HEADING
17 01743 002530          EMS3A
18 01744 024213          LDA     1,TSTNM ;GET FAILING TEST NO.
19 01745 006250          JSR @   IZOC?T  ;PRINT IT
20 01746 006253          JSR @   IMES?S
21 01747 002535          EMS3B
22 01750 102400          SUB     0,0
23 01751 024112          LDA     1,D100
24 01752 030714          LDA     2,ITR
25 01753 073101          DIV
26 01754 030716          LDA     2,ERRCT
27 01755 073301          MUL             ;CALCULATE TRUE ERROR PERCENT
28 01756 006251          JSR @   IPOC?S  ;AND VALUE
29 01757 002245          .TXTE   /%/
30 01760 006254          JSR @   ICRL?F
31 01761 152402          SUB     2,2
32 01762 054710          STA     2,ERRCT ;CLEAR ERROR COUNT
33 01763 030703          LDA     2,ITR
34 01764 054703          STA     2,ITRCT ;INITIALIZE PASS COUNTER
35 01765 020207          LDA     0,SWREG
36 01766 024224          LDA     1,MSK1
37 01767 107405          AND     0,1,SNR ;LOOP ON ERROR?
38 01770 000415          JMP     RLOOP   ;YES
39 01771 020207 NOERR:   LDA     0,SWREG
40 01772 063635          SKPDN   35      ;CHECK FOR XOR TESTER FAIL
41 01773 000406          JMP     .+6     ;NO FAILURE
42 01774 010212          ISZ     ERCNT   ;INCREMENT ERROR COUNT
43 01775 000401          JMP     .+1
44 01776 024224          LDA     1,MSK1
45 01777 107405          AND     0,1,SNR ;LOOP ON ERROR?
46 02000 000405          JMP     RLOOP   ;YES
47 02001 024232          LDA     1,MSK7
48 02002 107404          AND     0,1,SZR ;OUTPUT SUBTEST NUMBER?
49 02003 004422          JSR     TSTOUT  ;YES
50 02004 002265          JMP @   RTN?1   ;PERFORM NEXT SUBTEST
51 02005 020215 RLOOP:   LDA     0,STACK ;GET STACK POINTER
52 02006 061001          MTSP    0       ;RESET STACK
53 02007 060001          MTFP    0       ;AND FRAME POINTERS
54 02010 020207          LDA     0,SWREG
55 02011 024224          LDA     1,MSK1
56 02012 107404          AND     0,1,SZR ;LOOP ON ERROR?
57 02013 002201          JMP @   LOOPR   ;NO
58 02014 020212          LDA     0,ERCNT ;YES
59 02015 101005          MOV     0,0,SNR ;ANY ERRORS?
60 02016 002201          JMP @   LOOPR   ;NO, NOT YET
```

```
 0025 MNASY
01 02017 101224          MOVZR   0,0,SZR ;FIRST TIME FOR ERROR LOOP?
02 02020 000404          JMP     .+4     ;NO
03 02021 006253          JSR @   IMES?S
04 02022 002552                  ;OUTPUT LOOPING ON ERROR MESSAGE
05 02023 006254          JSR @   ICRL?F
06 02024 002201          JMP @   LOOPR
07 02025 054206 ?STOUT:  STA     3,RTN?2
08 02026 102400          SUB     0,0
09 02027 024213          LDA     1,TSTNM
10 02030 030211          LDA     2,INTVL
11 02031 073101          DIV             ;PERFORM PRINT-SUB CALCULATIONS
12 02032 101004          MOV     0,0,SZR ;IS THERE A REMAINDER?
13 02033 000406          JMP     .+6     ;YES, DON'T PRINT THIS TIME
14 02034 006253          JSR @   IMES?S
15 02035 002563          MDG?1           ;OUTPUT SUBTEST COMPLETION HEADING
16 02036 024213          LDA     1,TSTNM
17 02037 006250          JSR @   IZOC?T  ;AND SUBTEST NUMBER
18 02040 006254          JSR @   ICRL?F
19 02041 034206          LDA     3,RTN?2
20 02042 001400          JMP     0,3     ;RETURN TO TEST
21
22              ;*****************************************************************
23              ;FOLLOWING IS A GROUP OF TTY/LPT DRIVER AND SERVICE ROUTINES
24              ;*****************************************************************
25
26              ;FILENAME=TTY10
27
28              ;TELETYPE NON INTERRUPT PACKAGE
29              ;CARRY,AC0,AC1,AC2 SAVED
30              ;"MES?S" PRINTS ASCII MESSAGES AS SPECIFIED BY ASSEMBLER
31              ;"CRL?F" PRINTS A CARRIAGE RETURN
32              ;"POC?T" PRINTS C(1) IN OCTAL
33              ;"ZOC?T" PRINTS C(1) IN OCTAL, LEADING ZEROS SUPPRESSED
34              ;"POD?C" PRINTS C(1) IN DECIMAL, LEADING ZEROS SUPPRESSED,
35              ;THE ABOVE THREE ARE FOLLOWED BY A TAB
36              ;"POC?S" PRINTS C(1) IN DECIMAL, LEADING ZEROS SUPPRESSED,
37              ;FOLLOWED BY THE CHARACTER STORED AT CALLING LOCATION +1.
38              ;PROGRAM RETURNS TO CALLING LOCATION +2.
39              ;"TIN?O" ACCEPTS OCTAL, AND
40              ;"TIN?D" ACCEPTS DECIMAL SINGLE PRECISION SIGNED INTEGERS
41              ;INTO AC1 FROM THE TTI.  LEADING NULLS, TABS,
42              ;AND SPACES ARE IGNORED.  A 16 BIT UNSIGNED INTEGER IS
43              ;FORMED, THEN NEGATED IF A MINUS SIGN IS TYPED.
44              ;EXIT AT CALL+1 IF INPUT ERROR WITH AC0=BAD CHARACTER.
45              ; (NOT A LEGAL DIGIT OR TERMINATING CHARACTER)
46              ;EXIT AT CALL+2 UPON TERMINATING CHARACTER
47              ; WITH AC0=0, 0, 40, 12, 15, 55
48              ; FOR NULL, SPACE, LINE-FEED, CARRIAGE RETURN, COMMA
49              ;THE ABOVE WAIT FOR TTO DONE, THEN CLEAR TTO.
50              ;"CHC?T" PRINTS ASCII CHARACTOR IN C(0)R; C(0)L MUST BE 0.
51              ;EXITS CALL +2 IF C(0)R=0; SIMULATES TAB
52              ;"TYP?E" PRINTS C(0)R TO THE TTO OR LPT OR BOTH AS PER THE
53              ;SWITCH SELECTION REGISTER 'SWREG'.
54              ;EXITS AT CALL+1.  REPLACE "TYP?E" WITH
55              ;INTERRUPT 'TYP?E' IF DESIRED.
56              ;"TPS?P" PRINTS A SPACE AND EXITS AT CALL+1 WITH AC0 = 40
57
58 02043 054551 MES?S:   STA     3,RTN?A         ;SAVE THE RTN ADDRESS
59 02044 004562          JSR     SAV?E           ;SAVE THE STATE OF MACHINE
60 02045 034547          LDA     3,RTN?A         ;
```

```
 0026 MNASY
01 02046 010546          ISZ     RTN?A
02 02047 031400          LDA     2,0,3           ;C(2) POINTS TO MESSAGE
03 02050 024417          LDA     1,P377?         ;A 8 BIT MASK
04 02051 021000 MES?M:   LDA     0,0,2           ;C(2)=DATA WORD
05 02052 125112          MOVL#   1,1,SZC
06 02053 123701          ANDS    1,0,SKP
07 02054 123401          AND     1,0,SKP         ;C(0)=DATA CHARACTOR RIGHT
08 02055 151400          INC     2,2             ;INC TO NEXT WORD
09 02056 124000          COM     1,1             ;FLIP MASK
10 02057 004414          JSR     CHC?T           ;PRINT
11 02060 000771          JMP     MES?M           ;ANOTHER
12 02061 000402          JMP     .+2
13 02062 004411 PLS?T:   JSR     CHC?T
14 02063 004551 PEX?T:   JSR     RST?R           ;RESTORE THE STATE OF MACHINE
15 02064 002530          JMP     @RTN?A          ;EXIT
16
17 02065 000000 PSP?:    0
18 02066 000000 SPT?G:   0
19 02067 000377 P377?:   377
20 02070 000011 PC1?1:   11
21 02071 000000 CHR?E:   0
22 02072 000000 CAC?0:   0                       ;AC0 SAVE IN CHC?T ROUTINE
23
24 02073 040777 CHC?T:   STA     0,CAC?0         ;SAVE AC0
25 02074 101315          MOVS#   0,0,SNR         ;RETURN +2 IF NULL
26 02075 001401          JMP     1,3
27 02076 175100          MOVL    3,3             ;FOR CARRY SAVE
28 02077 054772          STA     3,CHR?E         ;PRINT C(0) RIGHT
29 02100 034770          LDA     3,PC1?1         ;AC3 = 11
30 02101 116415          SUB#    0,3,SNR         ;SKIP IF A TAB IS NOT TO
31                                               ;BE SIMULATED
32 02102 000403          JMP     CHA?3
33 02103 004556          JSR     TYP?E           ;PRINT IT
34 02104 000407          JMP     CHE?X           ;EXIT
35 02105 004551 CHA?3:   JSR     TPS?P           ;PRINT A SPACE
36 02106 020513          LDA     0,CHR?Z
37 02107 034410          LDA     3,PC7?          ;AC3 = 7
38 02110 163404          AND     3,0,SZR
39 02111 000774          JMP     CHA?3           ;SIMULATE A TAB WITH 1
40                                               ;TO 7 SPACES
41 02112 040507          STA     0,CHR?Z
42 02113 020757 CHE?X:   LDA     0,CAC?0         ;RESTORE AC0
43 02114 034755          LDA     3,CHR?E         ;RESTORE CRY
44 02115 175200          MOVR    3,3             ;
45 02116 001400          JMP     0,3             ;EXIT
46
47 02117 000007 PC7?:    7
48
49 02120 054474 CRL?F:   STA     3,RTN?A         ;SAVE RETURN
50 02121 004505          JSR     SAV?E           ;SAVE THE WORLD
51 02122 020405          LDA     0,K15?
52 02123 004536          JSR     TYP?E           ;PRINT CARRIAGE AND LF
53 02124 020402          LDA     0,K12?
54 02125 000735          JMP     PLS?T           ;GO TO RESTORE THE WORLD
55 02126 000012 K12?:    12
56 02127 000015 K15?:    15
57
58
59
60 02130 054464 ZOC?T:   STA     3,RTN?A         ;SAVE THE RTN ADDRESS
```

```
 0027 MNASY
01 02131 004475           JSR     SAV?E           ;SAVE THE WORLD
02 02132 102400           SUB     0,0             ;
03 02133 000404           JMP     ZPO?T           ;
04 02134 054460 POC?T:    STA     3,RTN?A         ;SAVE THE RTN ADDRESS
05 02135 004471           JSR     SAV?E           ;SAVE THE WORLD
06 02136 020464           LDA     0,PC6?0         ;
07 02137 152620 ZPO?T:    SUBZR   2,2             ;PRINT C(1) IN OCTAL
08 02140 034463           LDA     3,PC1?0         ;C(2)=100000, C(3)=10
09 02141 000416           JMP     POC?1           ;
10 02142 175400 POC?S:    INC     3,3             ;UPDATE THE RTN ADDR PNTR
11 02143 054451           STA     3,RTN?A         ;
12 02144 004462           JSR     SAV?E           ;SAVE THE WORLD
13 02145 034447           LDA     3,RTN?A         ;
14 02146 021777           LDA     0,-1,3          ;READ THE CHARACTER TO BE
                                                  ;PRINTED AFTER THE DECIMAL
                                                  ;NUMBER
17 02147 040716           STA     0,PSP?          ;SAVE THE SPECIAL CHAR.
18 02150 102000           ADC     0,0             ;AC0= -1
19 02151 000404           JMP     POC?2           ;
20 02152 054442 PDE?C:    STA     3,RTN?A         ;SAVE THE RTN ADDRESS
21 02153 004453           JSR     SAV?E           ;SAVE THE WORLD
22 02154 102400           SUB     0,0             ;
23 02155 034751 POC?2:    LDA     3,K12?          ;C(3)=12
24 02156 030446           LDA     2,DET?8         ;PRINT C(1) IN DECIMAL
25 02157 040767 POC?1:    STA     0,SPT?G         ;ACTIVATE/DEACTIVATE THE TAG FOR
                                                  ;SPECIAL CHARACTER
                                                  ;BOTH ENTRIES PRINT NUMBER
26 02160 101415           INC#    0,0,SNR         ;SKIP IF AC0 IS NOT -1
29 02161 101400           INC     0,0
30 02162 040542           STA     0,ZSU?P         ;THEN TAB TO NEXT POSITION
31 02163 054442           STA     3,TMP?          ;SAVE AC3
32 02164 034540 DCO?T:    LDA     3,ZSU?P         ;ZEROS SUPPRESS STUF
33 02165 102001 DEC?T:    ADC     0,0,SKP         ;SKIP FIRST TIME HERE PER DIGIT
34 02166 146400           SUB     2,1             ;DIVIDE C(AC1)  BY C(AC2)
35 02167 101405           INC     0,0,SNR         ;
36 02170 151235           MOVZR#  2,2,SNR         ;FOR ZERO SUPPRESS
37 02171 034431           LDA     3,PC6?0         ;
38 02172 146453           SUBO#   2,1,SNC         ;SUBTRACT MORE?
39 02173 000773           JMP     .-5             ;YES,GO BACK
40 02174 054530           STA     3,ZSU?P         ;NO,SAVE ZERO SUPPRESS FLAG
                                                  ;C(0)=DIGIT
42 02175 163004           ADD     3,0,SZR         ;MAKE ASCII
43 02176 004675           JSR     CHC?T           ;PRINT
44 02177 034426           LDA     3,TMP?          ;RESTORE AC3
45 02200 102400           SUB     0,0             ;
46 02201 172423           SUBZ    3,2,SNC         ;DIVIDE C(AC2) BY C(AC3)

48 02202 000403           JMP     .+3             ;SKIP IF AC3 > AC2
49 02203 101400           INC     0,0             ;AC3 < AC2
50 02204 000775           JMP     .-3             ;SUBTRACT MORE
51 02205 111004           MOV     0,2,SZR         ;WAS IT LAST DIGIT?
52 02206 000756           JMP     DCO?T           ;NO,GET NEXT DIGIT
53 02207 034657           LDA     3,SPT?G         ;YES,CHECK THE SPECIAL CHAR FLAG
54 02210 020660           LDA     0,PC171         ;FOLLOW THE PRINTOUT WITH
55 02211 175405           INC     3,3,SNR         ;TAB IF NOT SPCL CHAR FLAG
56 02212 020653           LDA     0,PSP?          ;OTHERWISE FOLLOW WITH THE CHAR
57 02213 000647           JMP     PLS?T           ;TO EXIT

59 02214 000000 RTN?A:    0
60 02215 000000 PCR?Y:    0                       ;CRY SAVE LOCATION
```

```
 0028 MNASY
01 02216 000000 PAC?0:    0                       ;AC0 SAVE LOCATION
02 02217 000000 PAC?1:    0                       ;AC1 SAVE LOCATION
03 02220 000000 PAC?2:    0                       ;AC2 SAVE LOCATION
04 02221 000000 CHR?Z:    0
05 02222 000060 PC6?0:    60
06 02223 000010 PC1?0:    10
07 02224 023420 DET?8:    10000.
08 02225 000000 TMP?:     0
09
10                ;
11                ; SAV?E , SAVE THE WORLD ROUTINE
12                ;
13                ; THIS ROUTINE SAVES AC0,AC1,AC2 AND CRY
14                ;
15
16 02226 040770 SAV?E:    STA     0,PAC?0         ;
17 02227 044770           STA     1,PAC?1         ;
18 02230 050770           STA     2,PAC?2         ;
19 02231 101100           MOVL    0,0             ;
20 02232 040763           STA     0,PCR?Y         ;
21 02233 001400           JMP     0,3             ;
22
23
24                ;
25                ; RST?R , RESTORE THE WORLD ROUTINE
26                ;
27                ; THIS ROUTINE RESTORES THE AC0,AC1,AC2 AND CRY
28                ;
29
30 02234 020761 RST?R:    LDA     0,PCR?Y         ;
31 02235 101200           MOVR    0,0             ;
32 02236 020760           LDA     0,PAC?0         ;
33 02237 024760           LDA     1,PAC?1         ;
34 02240 030760           LDA     2,PAC?2         ;
35 02241 001400           JMP     0,3             ;
36
37
38 02242 135005 RUB?:     MOV     1,3,SNR         ;CAN'T RUB-OUT IF AC1 = 0
39 02243 000466           JMP     TIN?R           ;RETURN WITH ILLEGAL CHARACTER
40 02244 126400           SUB     1,1
41 02245 156422           SUBZ    2,3,SZC         ;SKIP IF AC3 IS LESS THAN AC2
42 02246 125401           INC     1,1,SKP
43 02247 157001           ADD     2,3,SKP
44 02250 000775           JMP     .-3
45 02251 054500           STA     3,FST?D         ;"FST?D" IS NON -1
46 02252 020750           LDA     0,PC6?0         ;AC0 = 60
47 02253 163000           ADD     3,0
48 02254 004405           JSR     TYP?E           ;ECHO AND DELETE THE DIGIT
49 02255 000523           JMP     TIN?W
50
51 02256 040444 TPS?P:    STA     0,TAC?0         ;SAVE AC0
52 02257 020446           LDA     0,PC47?
53 02260 101001           MOV     0,0,SKP         ;SKIP OVER AC0 SAVE
54 02261 040441 TYP?E:    STA     0,TAC?0         ;SAVE AC0
55 02262 175100           MOVL    3,3             ;SAVE CRY AND RTN ADDR
56 02263 054440           STA     3,TYP?R         ;TYPE THE RIGHT BYTE OF AC0
57 02264 034565           LDA     3,INT?          ;IF IT IS HERE DUE TO SWITCH
                                                  ;SETTING ROUTINE THEN THE TYPE
                                                  ;OUTS TO THE TTY WILL BE ENABLED
60 02265 175404           INC     3,3,SZR         ;SKIP IF INT? IS -1
```

```
 0029 MNASY
01 02266 034207          LDA     3,SWREG         ;READ THE SWITCHES
02 02267 177100          ADDL    3,3             ;SHIFT AC3 BY 2 PLACES
03 02270 175112          MOVL#   3,3,SZC         ;SKIP IF TYPEOUTS ARE NOT
04                                               ;SUPPRESSED
05 02271 000405          JMP     PLP?T
06 02272 061111 TTY?:    DOAS    0,TTO
07 02273 063511          SKPBZ   TTO
08 02274 000777          JMP     .-1
09 02275 060211          NIOC    TTO             ;CLEAR TTO DONE FLAG
10 02276 177100 PLP?T:   ADDL    3,3             ;SHIFT AC3 BY 2 PLACES
11 02277 177103          ADDL    3,3,SNC         ;SKIP IF THE OUTPUT IS
12                                               ;REQUIRED ON THE LPT
13 02300 000405          JMP     TPR?T
14 02301 061117          DOAS    0,LPT           ;OUTPUT THE CHARACTER TO LPT
15 02302 063517          SKPBZ   LPT             ;WAIT FOR LPT
16 02303 000777          JMP     .-1
17 02304 060217          NIOC    LPT             ;CLEAR THE DONE FLAG FOR LPT
18 02305 034545 TPR?T:   LDA     3,P177?         ;STRIP THE PARITY BIT
19 02306 163400          AND     3,0
20 02307 116043          AUCO    0,3,SNC         ;SKIP IF IT WAS RUBOUT
21 02310 034415          LDA     3,PC47?         ;AC3 = 40
22 02311 162432          SUBZ#   3,0,SZC         ;SKIP FOR NON PRINTING CHR.
23 02312 010707          ISZ     CHR?Z
24 02313 034541          LDA     3,PC17?         ;AC3 = 15
25 02314 116445          SUBO    0,3,SNR         ;SKIP IF IT WAS NOT A "CR"
26 02315 054704          STA     3,CHR?Z         ;CLEAR THE HORZ POS
27 02316 024404          LDA     0,TAC?0         ;RESTORE AC0
28 02317 034404          LDA     3,TYP?R ;RESTORE CRY AND RTN ADDR
29 02320 175200          MOVR    3,3             ;
30 02321 001400          JMP     0,3             ;RETURN
31 02322 000000 TAC?0:   0
32 02323 000000 TYP?R:   0
33 02324 000000 ZSU?P:   0
34 02325 000040 PC47?:   40
35
36 02326 020525 TIN?C:   LDA     0,PC17?
37 02327 004732          JSR     TYP?E
38 02330 010664 TIN?X:   ISZ     RTN?A
39 02331 040420 TIN?R:   STA     0,FST?D         ;"FST?D" IS NON -1
40 02332 152000          AUC     2,2             ;AC2 = -1
41 02333 020771 TSI?:    LDA     0,ZSU?P
42 02334 175620          INCZR   3,3             ;AC3 IS 1 IF THE CHARACTER
43                                               ;TYPED WAS A + AND A 100000
44                                               ;IF IT WAS A -.
45 02335 054767          STA     3,ZSU?P
46 02336 101112          MOVL#   0,0,SZC         ;SKIP IF THE PREVIOUS SIGN
47                                               ;WAS A PLUS
48 02337 124400          NEG     1,1             ;TAKE TWO'S COMPLEMENT IF
49                                               ;THE PREVIOUS SIGN WAS "-"
50 02340 034657          LDA     3,PAC?1
51 02341 167000          ADD     3,1
52 02342 044655          STA     1,PAC?1         ;PAC?1 HAS THE INTERMEDIATE
53                                               ;RESULT
54 02343 126400          SUB     1,1
55 02344 151113          MOVL#   2,2,SNC         ;SKIP IF EXIT IS REQUIRED
56 02345 000433          JMP     TIN?W
57 02346 004666          JSR     RST?R           ;RESTORE THE WORLD
58 02347 020402          LDA     0,FST?D         ;RESTORE AC0
59 02350 002644          JMP     @RTN?A          ;RETURN
60
```

```
 0030 MNASY
01 02351 000000 FST?D:   0
02
03 02352 054642 TOD?T:   STA     3,RTN?A         ;SAVE THE RTN ADDR
04 02353 004653          JSR     SAV?E           ;SAVE THE WORLD
05 02354 102000          ADC     0,0             ;AC1 = -1 (ENTRY FOR ODT)
06 02355 040774          STA     0,FST?D         ;LOOK FOR FIRST DIGIT
07 02356 101120          MOVZL   0,0             ;AC1 = -2
08 02357 000411          JMP     TIN?Z
09 02360 054634 TIN?O:   STA     3,RTN?A         ;OCTAL ENTRY,SAVE RTN ADDR
10 02361 004645          JSR     SAV?E           ;SAVE THE WORLD
11 02362 102120          ADCZL   0,0             ;OCTAL ENTRY SWITCH
12 02363 000404          JMP     TIN?Q           ;
13 02364 054630 TIN?D:   STA     3,RTN?A         ;DECIMAL ENTRY,RTN SAVED
14 02365 004641          JSR     SAV?E           ;SAVE THE WORLD
15 02366 102440          SUBO    0,0             ;DECIMAL ENTRY SWITCH
16 02367 126400 TIN?Q:   SUB     1,1
17 02370 030463 TIN?Z:   LDA     2,PC12?
18 02371 113000          ADD     0,2             ;AC2 IS 10 FOR OCTAL AND 12
19                                               ;FOR DECIMAL NUMBERS
20 02372 102440          SUBO    0,0
21 02373 040731          STA     0,ZSU?P         ;SIGN AND LEADING SPACES FLAG
22 02374 034730 TIN?S:   LDA     3,ZSU?P
23 02375 175014          MOV#    3,3,SZR         ;SKIP FOR LEADING SPACES
24 02376 000732          JMP     TIN?X
25 02377 054620          STA     3,PAC?1
26 02400 063610 TIN?W:   SKPDN   TTI
27 02401 000777          JMP     .-1
28 02402 060610          DIAC    0,TTI
29 02403 004656          JSR     TYP?E
30 02404 034446          LDA     3,P177?
31 02405 163400          AND     3,0             ;STRIP THE PARITY BIT
32 02406 116415          SUB#    0,3,SNR         ;SKIP IF NOT A RUB-OUT
33 02407 000633          JMP     RUB?
34 02410 034715          LDA     3,PC47?
35 02411 116414          SUB#    0,3,SZR
36 02412 101015          MOV#    0,0,SNR
37 02413 000761          JMP     TIN?S           ;SPACE, OR NULL
38 02414 034442          LDA     3,TIN?2
39 02415 116405          SUB     0,3,SNR         ;COMMA
40 02416 000712          JMP     TIN?X
41 02417 175414          INC#    3,3,SZR         ;MINUS
42 02420 175235          MOVZR#  3,3,SNR         ;OR PLUS ?
43 02421 000712          JMP     TSI?            ;MODIFY THE SIGN
44 02422 034432 TIN?M:   LDA     3,PC17?         ;AC3 = 15
45 02423 116415          SUB#    0,3,SNR         ;IS IT A CARRIAGE RETURN?
46 02424 000702          JMP     TIN?C           ;IF CR THEN GO TO TIN?C
47 02425 034426          LDA     3,PC12?         ;AC3 = 12
48 02426 116404          SUB     0,3,SZR         ;SKIP FOR LINE FEED
49 02427 000403          JMP     TIN?N
50 02430 020424          LDA     0,PC17?         ;AC0 = 15
51 02431 000676          JMP     TIN?C+1
52 02432 034423 TIN?N:   LDA     3,TIN?1
53 02433 117022          ADDZ    0,3,SZC         ;SKIP IF NOT A DIGIT
54 02434 156513          SUBL#   2,3,SNC         ;SKIP IF DIGIT
55 02435 000674          JMP     TIN?R
56 02436 010666          ISZ     ZSU?P           ;OUT OF LEADING SPACES
57 02437 102400          SUB     0,0             ;AC0 = 0
58 02440 010711          ISZ     FST?D           ;SKIP IF IT WAS FIRST DIGIT
59                                               ;FOR ODT
60 02441 121120          MOVZL   1,0
```

```
 0031 MNASY
01 02442 105120          MOVZL   0,1
02 02443 125120          MOVZL   1,1             ;AC1 IS SHIFTED BY 3 PLACES
03 02444 167000          ADD     3,1             ;8 OLD PAC?1'S + NEW DIGIT
04 02445 155220          MOVZR   2,3
05 02446 175252          MOVZR#  3,3,SZC         ;SKIP IF OCTAL MODE
06 02447 107000          ADD     0,1             ;ADD 2 OLD PAC?1'S
07 02450 000730          JMP     TIN?#
08
09 02451 000000 INT?:    0                       ;TYPE OUTSS CAN BE FORCED TO
10                                                ;TTY BY PLACING -1 IN THIS LOC.
11 02452 000177 P177?:   177
12 02453 000012 PC12?:   12
13 02454 000015 PC15?:   15
14 02455 177720 TIN?1:   -60
15 02456 000054 TIN?2:   54
16 02457 000100 CIP?0:   100
17
18               ;*****************************************************************
19               ;TEXT BUFFERS FOLLOW
20               ;*****************************************************************
21 02460 151305 ERMS1:   .TXTE   /ERROR NUMBER /
22       147722
23       120322
24       052516
25       041115
26       151305
27       000240
28 02467 142640 EMS1A:   .TXTE   / ENCOUNTERED SUBTEST /
29       141516
30       052717
31       152116
32       151305
33       042305
34       051640
35       041125
36       142724
37       152123
38       000240
39 02502 151303 ERMS2:   .TXTE   /LRY     AC0     AC1     AC2     AC3     PC/
40       120131
41       120240
42       120240
43       141501
44       120060
45       120240
46       120240
47       141501
48       120261
49       120240
50       120240
51       141501
52       120262
53       120240
54       120240
55       141501
56       120063
57       120240
58       120240
59       141520
60       000000
```

```
 0032 MNASY
01 02530 051640 EMS3A:   .TXTE   / SUBTEST /
02       041125
03       142724
04       152123
05       000240
06 02535 143240 EMS3B:   .TXTE   / FAILED /
07       144501
08       142714
09       120104
10       000000
11 02542 040512 ERMS4:   .TXTE   /HALTED ON ERROR/
12       152314
13       042305
14       147640
15       120116
16       151305
17       147722
18       000322
19 02552 147714 ERMS5:   .TXTE   /LOOPING ON ERROR/
20       050317
21       047311
22       120107
23       047317
24       142640
25       151322
26       151317
27       000000
28 02563 141640 MDG?1:   .TXTE   / COMPLETED SUBTEST /
29       046717
30       146120
31       152305
32       042305
33       051640
34       041125
35       142724
36       152123
37       000240
38 02575 142640 MDG?2:   .TXTE   / END OF PASS /
39       042116
40       147640
41       120306
42       040520
43       051523
44       000240
45
```

```
#0033 MNASY
01
                        .TITL   MNASYN
03
04
05                  ;*****************************************************************
06                  ;DATA AND CONSTANTS FOLLOW
07                  ;*****************************************************************
08 02604 120011 MDG1:   .TXTE   /        MICRO-NOVA ASYNCHRONOUS INTERFACE DIAGN
09       144515
10       151303
11       026717
12       147516
13       040526
14       042640
15       054523
16       141516
17       151110
18       047317
19       052717
20       120123
21       047311
22       142724
23       143322
24       141501
25       120305
26       144504
27       043501
28       147516
29       152123
30       141711
31       120240
32       142722
33       027126
34       030240
35       000060
36 02640 120240 MDG2:   .TXTE   /   ALL TEST NUMBERS ARE REPORTED IN OCTAL EXCEP
37       040640
38       146314
39       152240
40       051705
41       120324
42       052516
43       041115
44       151305
45       120123
46       151101
47       120305
48       142722
49       147520
50       152322
51       042305
52       144640
53       120116
54       141717
55       040724
56       120314
57       154305
58       142703
59       152120
60       142640
```

```
#0034 MNASY
01       151322
02       151317
03       122640
04       040640
05       042116
06       041240
07       052501
08       120104
09       040722
10       142724
11       000000
12 02704 041240 MDG3:   .TXTE   / BAUD RATE CALCULATED AS /
13       052501
14       120104
15       040722
16       142724
17       141640
18       146101
19       052703
20       040714
21       142724
22       120104
23       051501
24       000240
25
26 02721 052640 MDG4:   .TXTE   / UNIT UNDER TEST DEVICE NOT FOUND/
27       144516
28       120324
29       047125
30       142504
31       120322
32       142724
33       152123
34       042240
35       053305
36       141711
37       120305
38       147516
39       120324
40       147706
41       047125
42       000104
43 02742 000200 BUFF:   000200
44 02743 000100         000100
45 02744 000040         000040
46 02745 000020         000020
47 02746 000010         000010
48 02747 000004         000004
49 02750 000002         000002
50 02751 000001         000001
51 02752 000000         000000
52 02753 000177         000177
53 02754 000277         000277
54 02755 000337         000337
55 02756 000357         000357
56 02757 000367         000367
57 02760 000373         000373
58 02761 000375         000375
59 02762 000376         000376
60 02763 000377         000377
```

```
0035 MNASY
01 02764 000252          000252
02 02765 000125          000125
03 02766 000245          000245
04 02767 000132          000132
05 02770 000360          000360
06 02771 000017          000017
07 02772 002000 ROM:     002000  ;MACHINE LANGUAGE CODE FOR CONSOLE DEBUG
08 02773 044560          044560
09 02774 024000          024000
10 02775 044561          044561
11 02776 040554          040554
12 02777 050555          050555
13 03000 054555          054555
14 03001 102560          102560
15 03002 063477          063477
16 03003 101121          101121
17 03004 101140          101140
18 03005 060277          060277
19 03006 063611          063611
20 03007 101121          101121
21 03010 101140          101140
22 03011 040550          040550
23 03012 061201          061201
24 03013 040544          040544
25 03014 060201          060201
26 03015 040543          040543
27 03016 004503          004503
28 03017 020545          020545
29 03020 034543          034543
30 03021 126001          126001
31 03022 055000          055000
32 03023 175414          175414
33 03024 042537          042537
34 03025 044536          044536
35 03026 060210          060210
36 03027 000577          000577
37 03030 175665          175665
38 03031 000766          000766
39 03032 034430          034430
40 03033 162014          162014
41 03034 000551          000551
42 03035 061077          061077
43 03036 044520          044520
44 03037 020520          020520
45 03040 061001          061001
46 03041 020517          020517
47 03042 060001          060001
48 03043 024516          024516
49 03044 125223          125223
50 03045 060211          060211
51 03046 125220          125220
52 03047 125204          125204
53 03050 175004          175004
54 03051 126000          126000
55 03052 044507          044507
56 03053 020477          020477
57 03054 024477          024477
58 03055 030477          030477
59 03056 034477          034477
60 03057 010502          010502
```

```
0036 MNASY
01 03060 000177          000177
02 03061 002475          002475
03 03062 000121          000121
04 03063 010503          010503
05 03064 125121          125121
06 03065 126440          126440
07 03066 125120          125120
08 03067 125120          125120
09 03070 160000          160000
10 03071 004455          004455
11 03072 004454          004454
12 03073 000542          000542
13 03074 034500          034500
14 03075 115405          115405
15 03076 000500          000500
16 03077 175655          175655
17 03100 034463          034463
18 03101 175645          175645
19 03102 125112          125112
20 03103 000725          000725
21 03104 044457          044457
22 03105 036456          036456
23 03106 054456          054456
24 03107 034453          034453
25 03110 020662          020662
26 03111 030466          030466
27 03112 173400          173400
28 03113 143000          143000
29 03114 004706          004706
30 03115 044436          044436
31 03116 024445          024445
32 03117 000656          000656
33 03120 131000          131000
34 03121 054447          054447
35 03122 050444          050444
36 03123 131000          131000
37 03124 126021          126021
38 03125 132401          132401
39 03126 020551          020551
40 03127 101400          101400
41 03130 132452          132452
42 03131 004411          004411
43 03132 000773          000773
44 03133 125004          125004
45 03134 000772          000772
46 03135 030431          030431
47 03136 004407          004407
48 03137 000177          000177
49 03140 002430          002430
50 03141 021400          021400
51 03142 125220          125220
52 03143 125220          125220
53 03144 125221          125221
54 03145 020720          020720
55 03146 061111          061111
56 03147 063511          063511
57 03150 000777          000777
58 03151 005401          005401
59 03152 177777          177777          ;16 LOCATIONS OF RAM HERE
60 03153 177777          177777
```

0037 MNASY

01	03154	177777	177777
02	03155	177777	177777
03	03156	177777	177777
04	03157	177777	177777
05	03160	177777	177777
06	03161	177777	177777
07	03162	177777	177777
08	03163	177777	177777
09	03164	177777	177777
10	03165	177777	177777
11	03166	177777	177777
12	03167	177777	177777
13	03170	177777	177777
14	03171	177777	177777
15	03172	004726	004726
16	03173	004746	004746
17	03174	000101	000101
18	03175	145000	145000
19	03176	004747	004747
20	03177	000377	000377
21	03200	171000	171000
22	03201	133000	133000
23	03202	034550	034550
24	03203	136453	136453
25	03204	000501	000501
26	03205	116005	116005
27	03206	000631	000631
28	03207	034501	034501
29	03210	116405	116405
30	03211	004507	004507
31	03212	034465	034465
32	03213	162405	162405
33	03214	000457	000457
34	03215	145000	145000
35	03216	101405	101405
36	03217	000411	000411
37	03220	126460	126460
38	03221	115644	115644
39	03222	161665	161665
40	03223	000410	000410
41	03224	004715	004715
42	03225	000077	000077
43	03226	004464	004464
44	03227	025000	025000
45	03230	176440	176440
46	03231	054736	054736
47	03232	176000	176000
48	03233	054732	054732
49	03234	054732	054732
50	03235	063610	063610
51	03236	000777	000777
52	03237	060610	060610
53	03240	034677	034677
54	03241	163400	163400
55	03242	116405	116405
56	03243	004676	004676
57	03244	176137	176137
58	03245	000767	000767
59	03246	034443	034443
60	03247	116452	116452

0038 MNASY

01	03250	000404	000404
02	03251	034426	034426
03	03252	116442	116442
04	03253	000610	000610
05	03254	010711	010711
06	03255	124400	124400
07	03256	034711	034711
08	03257	167000	167000
09	03260	044707	044707
10	03261	034435	034435
11	03262	116414	116414
12	03263	034431	034431
13	03264	116414	116414
14	03265	000605	000605
15	03266	045000	045000
16	03267	175232	175232
17	03270	000736	000736
18	03271	004421	004421
19	03272	145400	145400
20	03273	152220	152220
21	03274	147400	147400
22	03275	020455	020455
23	03276	004653	004653
24	03277	000057	000057
25	03300	166422	166422
26	03301	122433	122433
27	03302	167001	167001
28	03303	000667	000667
29	03304	004614	004614
30	03305	025000	025000
31	03306	004613	004613
32	03307	000720	000720
33	03310	000114	000114
34	03311	000067	000067
35	03312	054656	054656
36	03313	004626	004626
37	03314	000015	000015
38	03315	004624	004624
39	03316	000012	000012
40	03317	004622	004622
41	03320	121041	121041
42	03321	002647	002647
43	03322	152400	152400
44	03323	025521	025521
45	03324	045002	045002
46	03325	175400	175400
47	03326	151400	151400
48	03327	125014	125014
49	03330	000773	000773
50	03331	061077	061077
51	03332	001344	001344
52	03333	024026	024026
53	03334	107400	107400
54	03335	124000	124000
55	03336	010014	010014
56	03337	010030	010030
57	03340	010032	010032
58	03341	125404	125404
59	03342	000005	000005
60	03343	030016	030016

```
 0039 MNASY
01 03344 050377          050377
02 03345 060077          060077
03 03346 101102          101102
04 03347 000377          000377
05 03350 004030          004030
06 03351 101065          101065
07 03352 000017          000017
08 03353 004027          004027
09 03354 046026          046026
10 03355 010100          010100
11 03356 000022          000022
12 03357 000077          000077
13 03360 126420          126420
14 03361 063577          063577
15 03362 000030          000030
16 03363 060477          060477
17 03364 107363          107363
18 03365 000030          000030
19 03366 125300          125300
20 03367 001400          001400
21 03370 000000          000000
22 03371 077401          077401          ;END OF ROM TEST BUFFER
23 03372 000000 EBUF:    .BLK 60 ;BUFFER FOR NO LOOP DATA FAILURES
24
25 03452 047503          .TXT    /COPYRIGHT (C) DGC, 1976
26       054520
27       044522
28       044107
29       020124
30       041450
31       020051
32       043504
33       020103
34       030440
35       033471
36 03465 040466 ALL RIGHTS RESERVED./
37       046114
38       051040
39       043511
40       052110
41       020123
42       042522
43       042523
44       053122
45       042105
46       000056
47
48                       .END

**00000 TOTAL ERRORS, 00000 PASS 1 ERRORS
```

```
 0040 MNASY

A       000001   2/12   2/14   2/22   2/48   2/50   2/52   3/36
                12/26  12/29  12/40  12/43  12/57  13/11  13/32
                13/42  13/50  13/59  14/10  14/13  14/21  14/59
                15/16  15/25  16/27  16/54  17/23  17/41  18/05
                18/54  19/01  19/42  19/56  20/09
ADMSK   000032  11/09  11/30
AGIN    001254  17/33  17/42
B       000001  12/26  12/29  12/40  12/43  12/57  13/11  13/32
                13/42  13/50  13/59  14/10  14/13  14/21  14/59
                15/16  15/25  16/27  16/54  17/23  17/41  18/05
                18/54  19/01  19/42  19/56  20/09
BAUD    000100   2/34   2/55   4/04   4/05   5/19  18/27
BDOUT   001323  18/22  18/27
BDTST   001265  16/47  17/49
BITUN   001574  22/52  22/58
BREAK   001352  18/50  18/55
BUF     000136   5/49  15/55
BUFA    000137   5/50  15/56  16/13  17/10
BUFF    002742   5/49   5/50  34/43
C       000004  12/26  12/29  12/40  12/43  12/57  13/11  13/32
                13/42  13/50  13/59  14/10  14/13  14/21  14/59
                15/16  15/25  16/27  16/54  17/23  17/41  18/05
                18/54  19/01  19/42  19/56  20/09
C10     000105   5/24  11/39
C1070   002457  31/16
C16     000106   5/25  13/55
C20     000107   5/26  19/36  22/37
C252    000111   5/28  13/28  14/17  17/53
C4      000104   5/23  13/08  14/48  17/11
C50     000110   5/27  11/11  11/22
CAC70   002072  26/22  26/24  26/42
CHA73   002105  26/32  26/35  26/39
CHC2T   002073  26/10  26/13  26/24  27/43
CHECK   000577   2/36  11/03  11/18
CHE?K   002113  26/34  26/42
CHR?E   002071  26/21  26/28  26/43
CHR?Z   002221  26/36  26/41  28/04  29/23  29/26
CNT     000133   5/46  15/58  16/16  17/12
CNT1    000134   5/47  14/49  15/04  15/07  16/17  16/55
CNT2    000135   5/48  14/50  15/36  16/18  16/40
CNTR    000033  10/56  11/17  11/31
CON     001173  16/40  17/06  17/20
CONAD   000103   5/22  11/40
CONT    000015  11/08  11/17  11/27
CONUP   000034  10/21  11/37
COUNT   001345   2/52   3/02   3/06  18/49  18/52
CRL?F   002120   8/52  26/49
CTIME   001275  17/60  18/03
C?10?   001664  22/21  23/54
D       000003  12/26  12/29  12/40  12/43  12/57  13/11  13/32
                13/42  13/50  13/59  14/10  14/13  14/21  14/59
                15/16  15/25  16/27  16/54  17/23  17/41  18/05
                18/54  19/01  19/42  19/56  20/09
D100    000112   5/29  24/23
D1000   000114   5/31  18/10
D135    000113   5/30  18/12
DATER   001213  16/39  16/58
DCO?T   002164  27/32  27/52
DECR    001551  22/39  22/42
```

0045 MNASY

XLOOP	001734	8/45	24/10					
XMIT	0012B5	16/35	16/51					
XUREK	001244	16/32	17/25					
XUWFG	000143	5/54	15/54	17/18	17/25	17/29		
XSETU	001477	8/44	21/48					
ZUC?T	002130	8/48	26/60					
ZP07T	002137	27/03	27/07					
ZSU?P	002324	27/30	27/32	27/40	29/33	29/41	29/45	30/21
		30/22	30/56					
?A	000000	7/18	12/26	12/29	12/40	12/43	12/57	13/11
		13/32	13/42	13/50	13/59	14/10	14/13	14/21
		14/59	15/16	15/25	16/27	16/54	17/23	17/41
		18/05	18/54	19/01	19/42	19/56	20/09	
?B	000000	7/19	12/26	12/29	12/40	12/43	12/57	13/11
		13/32	13/42	13/50	13/59	14/10	14/13	14/21
		14/59	15/16	15/25	16/27	16/54	17/23	17/41
		18/05	18/54	19/01	19/42	19/56	20/09	
?C	000032	7/20	12/26	12/29	12/40	12/43	12/57	13/11
		13/32	13/42	13/50	13/59	14/10	14/13	14/21
		14/59	15/16	15/25	16/27	16/54	17/23	17/41
		18/05	18/54	19/01	19/42	19/56	20/09	
?D	000032	7/21	12/26	12/29	12/40	12/43	12/57	13/11
		13/32	13/42	13/50	13/59	14/10	14/13	14/21
		14/59	15/16	15/25	16/27	16/54	17/23	17/41
		18/05	18/54	19/01	19/42	19/56	20/09	
?E	000012	7/22	12/20	12/34	12/51	13/02	13/21	14/39
		15/60	17/50	18/40	19/14			
?F	000001	12/20	12/34	12/51	13/02	13/21	14/39	15/60
		17/50	18/40	19/14				
?G	000002	12/20	12/34	12/51	13/02	13/21	14/39	15/60
		17/50	18/40	19/14				
?H	000003	12/20	12/34	12/51	13/02	13/21	14/39	15/60
		17/50	18/40	19/14				
?X	000001	12/26	12/29	12/40	12/43	12/57	13/11	13/32
		13/42	13/50	13/59	14/10	14/13	14/21	14/59
		15/16	15/25	16/27	16/54	17/23	17/41	18/05
		18/54	19/01	19/42	19/56	20/09		
?Y	000004	12/26	12/29	12/40	12/43	12/57	13/11	13/32
		13/42	13/50	13/59	14/10	14/13	14/21	14/59
		15/16	15/25	16/27	16/54	17/23	17/41	18/05
		18/54	19/01	19/42	19/56	20/09		
?Z	000003	12/26	12/29	12/40	12/43	12/57	13/11	13/32
		13/42	13/50	13/59	14/10	14/13	14/21	14/59
		15/16	15/25	16/27	16/54	17/23	17/41	18/05
		18/54	19/01	19/42	19/56	20/09		