```
0001  .MAIN
01
02                ;                                   RCSL   : 44 - RT 808
03                ;                                   AUTHOR: JENS MICHAELSEN
04                ;                                   EDITED: 741218
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31                ;                        SMX 701
32                ;                      TESTPROGRAM
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48
49                ;            EBCDIC CARDS: RCSL: 44 - RT 809
50                ;            BINARY TAPE : RCSL: 44 - RT 810
51                ;            BINARY CARDS: RCSL: 44 - RT 811
52
53
54                ;    KEYWORDS: RC 3600, SMX 701, BSC MULTIPLEXOR
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* 0002  .MAIN
01
02                ;1.     SMX 701 TEST
03
04                ;1.1    ABSTRACT:
05
06                ;           THIS PROGRAM PROVIDES A DIAGNOSTIC TEST
07                ;       FOR THE BSC MULTIPLEXOR SMX 701 WITH FROM ONE
08                ;       TO 32 CHANNELS.
09
10                ;           SINCE THE DIAGNOSTIC PROGRAM ASSUMES A
11                ;       MALFUNCTION MAY EXIST, IT ASKS THE OPERATOR
12                ;       TO SUPPLY SOME PARAMETERS OF THE SYSTEM.
13
14                ;           WHERE POSSIBLE THE DIAGNOSTIC TESTS THE
15                ;       HARDWARE GATE BY GATE. DUE TO THE COMPLEXITY OF THE
16                ;       LOGIC (ESPECIALLY COMPARED TO THE VISIBLE TEST
17                ;       POINTS), IT IS NOT POSSIBLE TO TEST ALL OF THE GATES
18                ;       IN THIS MANNER.
19
20
21                ;2.     EQUIPMENT NEEDED:
22                ;       RC 3600 SYSTEM WITH NOVA 1210
23                ;       8K READ/WRITE MEMORY
24                ;       CONSOLE TELETYPE OR CRT DISPLAY
25                ;       ONE OR MORE SMX 701 CONTROLLERS
26                ;       ONE TESTPLUG CBL 174 FOR EACH PAIR OF CHANNELS. (SEE 5.)
27
28
29                ;3.     SWITCH SETTINGS
30
31                ;3.1        DIAGNOSTIC STARTING ADDRESS = 000002
32
33
34                ;3.2    DIAGNOSTIC:
35
36                ;           SWITCH 0(1) WHEN THE DIAGNOSTIC IS RESTARTED
37                ;                       NEW OPERATOR PARAMETERS IS REQUESTED.
38                ;3.2.1      SWITCH 0(1) PROCEED FROM A FAILING LOOP
39                ;3.2.2      SWITCH 1(1) INHIBIT PRINTOUT
40                ;3.2.3      SWITCH 2(1) PRINT THE FAILURE RATE
41
42
43                ;3.3    STATUSINFORMATION:
44
45                ;           BIT (1)=1 MEANS DATASET NOT READY
46                ;           BIT (2)=1 MEANS CALLING INDICATOR
47                ;           BIT (3)=1 MEANS CARRIER ON
48                ;           BIT (4)=1 MEANS XMITTER RUNNING
49                ;           BIT (5)=1 MEANS RECEIVER RUNNING
50                ;           BIT (6)=1 MEANS XMT DATA LATE
51                ;           BIT (7)=1 MEANS REC OVERRUN
```

```
* 0003  .MAIN
01
02                ;4.     RUNNING TIMES;
03
04
05                ;           THE DIAGNOSTIC WILL RUN UNTIL MANUALLY STOPPED.
06                ;           IF AN ERROR OCCURS, A SCOPE LOOP WILL BE ENTERED
07                ;           BY PRESSING CONTINUE AFTER A HALT ON THE CPU.
08                ;           SINCE MANY OF THE TEST LOOPS HAVE MORE THAN ONE
09                ;           ERROR HALT, OR PASSES THROUGH THE SAME HALT A
10                ;           NUMBER OF TIMES, NO ATTEMPT TO CALCULATE A FAILING
11                ;           PERCENTAGE IS MADE, INSTEAD THE NUMBER OF ERRORS
12                ;           OCCURING IN N PASSES THROUGH THE LOOP IS PRINTED
13                ;           IF SWITCH 0(0) AND 2(1).
14
15                ;           A FEATURE IS INCORPORATED  IN THE PROGRAM THAT
16                ;           PRINTS AC(0) , WHWN AN ERROR IS DETECTED.
17                ;           THIS ROUTINE IS STARTED BY DEPOSITING 6200 IN
18                ;           HALT LOCATION 1706 ON PAGE 23 IN THE LISTNING.
19
20
21                ;5.     TESTPLUG
22
23
24                ;5.1        THE TESTPLUG CBL174 MUST BE PLUGGED INTO
25                ;           TWO CHANNELS TO BE TESTED AT A TIME
26                ;           IT CONNECTS THE CHANNEL X OUTPUT TO
27                ;           CHANNEL X INPUT, AND CHANNEL X+1 OUTPUT TO
28                ;           CHANNEL X+1 INPUT
29
30                ;5.2        EACH CHANNEL MUST BE STRAPPED WITH THE
31                ;           INTERNAL CLOCK OPTION, WHAT SPEED IS
32                ;           SELECTED IS NOT IMPORTANT.
33
34                ;5.3        THE MODEM CONTROL SIGNALS ARE IN THE
35                ;           TESTPLUG CONNECTED AS FOLLOWS;
36                ;           REQUEST TO SEND TO READY FOR SENDING
37                ;           AND CARRIER DETECT,
38                ;           DATATERMINAL READY TO DATASET READY
39                ;           AND CALLING INDICATOR.
40
```

```
* 0004   .MAIN
01
02          000002          .LOC 2
03
04 00002 002103             JMP     =IDIG
05
06
07
08          000045          .LOC 45
09
10          000060 SMX = 60
11
12 00045 000002 C2    :  2
13 00046 000003 C3    :  3
14 00047 000004 C4    :  4
15 00050 000006 C6    :  6
16 00051 000010 C8.   :  8.
17 00052 000012 C10.  :  10.
18 00053 010000 C10K  :  010000
19 00054 000015 C15   :  15
20 00055 020000 C20K  :  020000
21 00056 000025 C21.  :  21.
22 00057 000030 C24.  :  24.
23 00060 000034 C28.  :  28.
24 00061 000043 C43   :  43
25 00062 000066 C54.  :  54.
26 00063 000060 C60   :  60
27 00064 060000 C60K  :  060000
28 00065 000072 C72   :  72
29 00066 000143 C143  :  143
30 00067 000177 C177  :  177
31 00070 000200 C200  :  200
32 00071 000212 C212  :  212
33 00072 000215 C215  :  215
34 00073 000343 C343  :  343
35 00074 000377 C377  :  377
36 00075 000400 C400  :  400
37 00076 123456 CONST:   123456
38 00077 000000 CTR   :  0
39 00100 000000 CTRWD:   0
40 00101 137777 DSMAS:   137777
41 00102 001330 IADIG:   ASSDIG
42 00103 000400 IDIG  :  BEGIN
43 00104 001276 ILIN  :  D1
44 00105 000000 ITR   :  0
45 00106 001000 LATMAS:  001000
46 00107 000000 LINE1:   0
47 00110 000000 LINE2:   0
48 00111 000000 LINES:   0
49 00112 000000 LINUM:   0
```

```
* 0005   .MAIN
01
02 00113 177773 M5    :  -5
03 00114 177762 M16   :  -16
04 00115 177760 M20   :  -20
05 00116 177720 M60   :  -60
06 00117 177700 M100  :  -100
07 00120 000000 MSAV  :  0
08 00121 000000 PSCNT:   0
09 00122 000000 RADRET:  0
10 00123 000000 RAND1:0
11 00124 000000 RAND2:0
12 00125 000000 RANDOM:  0
13 00126 002000 RMAS  :  002000
14 00127 000000 SAV0  :  0
15 00130 000000 SAV1  :  0
16 00131 000000 SAV2  :  0
17 00132 000120 SEVSYN:  120
18 00133 000020 SIXSYN:  20
19 00134 000320 SYNWD:   320
20 00135 000000 TEMP0:   0
21 00136 000000 TEMP1:   0
22 00137 000000 TEMP2:   0
23 00140 000000 TEMP3:   0
24 00141 000000 TEMP4:   0
25 00142 000000 TEMP5:   0
26 00143 000000 TEMP6:   0
27 00144 000000 TEMP7:   0
28 00145 000000 WHAT  :  0
29 00146 000000 TIMEX:   0
30 00147 004000 XMAS  :  004000
31 00150 000000 XWD   :  0
```

```
* 0006   .MAIN
01
02 00151 001571 ENTER
03       006151 SETUP=   JSR     *,=1
04 00152 001606 CYCLE
05       006152 LOOP=    JSR     *,=1
06 00153 001662 ERR
07       006153 EHALT=   JSR     *,=1
08 00154 002072 CRLF
09       006154 PCRLF=   JSR     *,=1
10 00155 001730 MESS
11       006155 MESSAGE=JSR     *,=1
12 00156 001753 ZOCT
13       006156 TYPZ1=   JSR     *,=1
14 00157 001757 PDEC
15       006157 TYPDEC=  JSR     *,=1
16 00160 001754 POCT
17       006160 TYPAC1=  JSR     *,=1
18 00161 001525 RAN
19       006161 RAND=    JSR     *,=1
20 00162 001371 INITX
21       006162 STRTXMT=JSR     *,=1
22 00163 001375 BRKX
23       006163 STOPXMT=JSR     *,=1
24 00164 001401 INDTR
25       006164 DTRON=   JSR     *,=1
26 00165 001410 OUTDTR
27       006165 DTROFF=  JSR     *,=1
28 00166 001417 INITR
29       006166 STRTREC=JSR     *,=1
30 00167 001422 BRKR
31       006167 STOPREC=JSR     *,=1
32 00170 001425 INCHAR
33       006170 GETCHAR=JSR     *,=1
34 00171 001433 OUTCHAR
35       006171 PUTCHAR=JSR     *,=1
36 00172 001452 XMTIME
37       006172 CHARTIM=JSR     *,=1
38 00173 001513 MULT
39       006173 MUL12=   JSR     *,=1
40 00174 001477 DIVID
41       006174 DIV012=  JSR     *,=1
42 00175 001265 TIMCO
43       006175 DELAY=   JSR     *,=1
44 00176 001442 PAD
45       006176 PADCHAR= JSR     *,=1
46 00177 002125 TYPER
47       006177 ERTYP=   JSR     *,=1
```

```
0007  .MAIN
01
02        000400          .LOC 400
03
04
05 00400 020076 BEGIN:   LDA     0,CONST
06 00401 040125          STA     0,RANDOM
07 00402 102400          SUB     0,0        ; RESTART OF DIAGNOSTIG
08 00403 040121          STA     0,PSCNT    ; RESET PASS-COUNTER
09 00404 060477          READS   0
10 00405 101100          MOVL    0,0
11 00406 020145          LDA     0,WHAT     ; NEW PARAMETERS ?
12 00407 101067          MOVC    0,0,SBN
13 00410 006104          JSR     @ILIN      ; YES, GET THEM
14 00411 020107 SECOND:  LDA     0,LINE1
15 00412 101120          MOVZL   0,0
16 00413 040112          STA     0,LINUM
17
18
19
20
21
22
23 00414 024052 A00:     LDA     1,C10,
24 00415 044105          STA     1,ITR      ;ITERATE COUNTER
25
26
27 00416 006151 A00A:    SETUP              ; CHECK SELB LINE
28 00417 063500          SKPBZ    0         ;(1003 A 29) AND ALL
29 00420 006153          EHALT              ;DEVICES ON THE I/O BUS
30 00421 006152          LOOP               ;
31
32
33 00422 006151 A01:     SETUP              ;CHECK BUSY SELECTORS
34 00423 020112          LDA      0,LINUM
35 00424 063060          DOC      0,SMX
36 00425 063560          SKPBZ    SMX       ;POS,117 AND 92A,
37 00426 006153          EHALT              ;ALL FIFOS AND BUSY SHOULD BE
38 00427 006152          LOOP               ;ZERO AFTER IORESET
39
40
41 00430 006151 A03:     SETUP              ;A DIB SHOULD READ
42 00431 020112          LDA      0,LINUM
43 00432 063060          DOC      0,SMX
44 00433 065460          DIB      1,SMX     ;STATUS BACK, EXCEPT
45 00434 020101          LDA      0,DSMAS   ;FOR BIT1 DATASET, ALL
46 00435 107414          ANDA     0,1,SZR   ;SHOULD BE ZEROS,
47 00436 006153          EHALT              ;CHECK THE STATUS
48 00437 006152          LOOP               ;SELECTORS
```

```
* 0008   .MAIN
01
02 00440 006151 A04:    SETUP
03 00441 006162         STRTXMT
04 00442 061460         DIB     0,SMX     ; THE DIB SHOULD READ
05 00443 006163         STOPXMT           ; BIT 4: XMT RUNNING
06 00444 024147         LDA     1,XMAS    ; CHECK R-S FLOPS
07 00445 107405         AND     0,1,SNR   ; POS 3 & 4
08 00446 006153         EHALT
09 00447 006152         LOOP
10
11
12 00450 006151 A05:    SETUP
13 00451 006164         DTRON             ;SET DATATERMINAL READY
14 00452 061460         DIB     0,SMX     ;THEN CHECK DATASET RDY
15 00453 006165         DTROFF            ;AND CALLING IS 1
16 00454 024055         LDA     1,C20K
17 00455 107415         ANDA    0,1,SNR
18 00456 006153         EHALT             ;CALLING IS MISSING
19 00457 101100         MOVL    0,0
20 00460 101102         MOVL    0,0,SZC
21 00461 006153         EHALT             ;DATASET IS MISSING TOO
22 00462 006152         LOOP              ;CHECK FIRST DATATERM,RDY,
23
24
25 00463 006151 A06:    SETUP
26 00464 006162         STRTXMT           ;CHECK CARRIER ON WIRED
27 00465 061460         DIB     0,SMX     ;TO REQ, TO SEND ON THIS
28 00466 006163         STOPXMT           ;CHANNEL
29 00467 024053         LDA     1,C10K
30 00470 107415         ANDA    0,1,SNR
31 00471 006153         EHALT             ; SURE THERE IS A TESTPLUG
32 00472 006152         LOOP              ; ON THIS CHANNEL
33
34
35 00473 006151 A07:    SETUP
36 00474 006166         STRTREC           ; DIB SHOULD READ BIT 5
37 00475 061460         DIB     0,SMX     ; AS A 1,
38 00476 006167         STOPREC           ; CHECK R-S FLOPS
39 00477 024126         LDA     1,RMAS
40 00500 107405         AND     0,1,SNR
41 00501 006153         EHALT
42 00502 006152         LOOP
43
44
45 00503 006151 A08:    SETUP             ; THIS DIB SHOULD NOT
46 00504 061400         DIB     0,0       ; READ ANYTHING BACK,
47 00505 101004         MOV     0,0,SZR   ; CHECK DIB GATES AND
48 00506 006153         EHALT             ; SMX SELECT IF BIT 1
49 00507 006152         LOOP              ; IS A LOGICAL 1,
```

```
* 0009   .MAIN
01
02 00510 020045          LDA     0,C2
03 00511 040105          STA     0,ITR
04
05 00512 006151 A09;     SETUP                ;CHANGING THE CHARACTER SIZE SHOULD
06 00513 020064          LDA     0,C60K       ;CHANGE THE TIME IT TAKES TO SEND
07 00514 006172          CHARTIM              ;A CHARACTER,CHECK CWREG,74174
08 00515 020064          LDA     0,C60K
09 00516 006172          CHARTIM
10 00517 101112          MOVLR   0,0,SZC      ;AND XMT BIT COUNTER  74166,
11 00520 006153          EHALT                ;TIMEOUTERROR, IS THE CLOCK RUNNING
12 00521 040135          STA     0,TEMP0      ;TIME TO SEND 8 BITS
13 00522 020055          LDA     0,C20K
14 00523 006172          CHARTIM
15 00524 101112          MOVLR   0,0,SZC
16 00525 006153          EHALT
17 00526 040136          STA     0,TEMP1      ;TIME TO SEND 7 BITS
18 00527 102400          SUB     0,0
19 00530 006172          CHARTIM
20 00531 101112          MOVLR   0,0,SZC
21 00532 006153          EHALT
22 00533 040137          STA     0,TEMP2      ;TIME TO SEND 6 BITS
23 00534 105000          MOV     0,1
24 00535 030060          LDA     2,C28,       ;28 * TEMP2 =
25 00536 006173          MUL12
26 00537 044143          STA     1,TEMP6
27 00540 024136          LDA     1,TEMP1
28 00541 030057          LDA     2,C24,       ;24 * TEMP1 =
29 00542 006173          MUL12
30 00543 044142          STA     1,TEMP5
31 00544 024135          LDA     1,TEMP0      ; 21 * TEMP0,
32 00545 030056          LDA     2,C21,       ; BUT MAKE COMPARISON
33 00546 006173          MUL12                ; TO WITHIN + OR - 10 PCT,
34 00547 044144          STA     1,TEMP7      ; 21*TEMP0
35 00550 030052          LDA     2,C10,
36 00551 006174          DIV012
37 00552 101102          MOVL    0,0,SZC
38 00553 125400          INC     1,1
39 00554 030144          LDA     2,TEMP7
40 00555 133000          ADD     1,2
41 00556 050141          STA     2,TEMP4      ; =TIME FOR 8 BITS + 10 PCT,
42 00557 030144          LDA     2,TEMP7
43 00560 132400          SUB     1,2
44 00561 050140          STA     2,TEMP3      ; =TIME FOR 8 BITS - 10 PCT,
45 00562 024143          LDA     1,TEMP6
46 00563 020141          LDA     0,TEMP4
47 00564 106437          SUBZR   0,1,SBN
48 00565 146433          SUBZR   2,1,SNC
49 00566 006153          EHALT                ; 6 BIT TIME OUT OF TOLERANCE
50 00567 024142          LDA     1,TEMP5
51 00570 106437          SUBZR   0,1,SBN
52 00571 146433          SUBZR   2,1,SNC
53 00572 006153          EHALT                ; 7 BIT TIME OUT OF TOLERANCE
54 00573 006152          LOOP
```

```
* 0010   ,MAIN
01
02 00574 020052           LDA     0,C10,
03 00575 040105           STA     0,ITR
04
05 00576 006151 A10:      SETUP             ; TEST THAT THE RECEIVER NOT IS
06 00577 020064           LDA     0,C60K    ; SYNCHRONIZED ON ONE SYN-CHAR,
07 00600 024134           LDA     1,SYNWD
08 00601 107000           ADD     0,1
09 00602 066060           DOB     1,SMX
10 00603 006166           STRTREC
11 00604 020134           LDA     0,SYNWD
12 00605 006171           PUTCHAR
13 00606 006153           EHALT             ; FIFO ERROR
14 00607 006161           RAND
15 00610 006171           PUTCHAR
16 00611 006153           EHALT             ; FIFO ERROR
17 00612 006176           PADCHAR
18 00613 006153           EHALT
19 00614 006162           STRTXMT
20 00615 020046           LDA     0,C3
21 00616 040077           STA     0,CTR     ; WAIT FOR XMT DATA LATE,
22 00617 006175           DELAY
23 00620 000135           TEMP0
24 00621 014077           DSZ     CTR
25 00622 000775           JMP     .-3
26 00623 065460           DIB     1,SMX
27 00624 030106           LDA     2,LATMAS
28 00625 133405           AND     1,2,SNR
29 00626 006153           EHALT             ; TIMEOUT ERROR, CHECK THE CLOCK
30 00627 030112           LDA     2,LINUM
31 00630 006170           GETCHAR
32 00631 000402           JMP     .+2
33 00632 006153           EHALT             ; AC(0) = RECVD CHAR
34 00633 061460           DIB     0,SMX     ; THE RECEIVER SHOULD
35 00634 024075           LDA     1,C400    ; NOT BE OVERRUNNED, YET,
36 00635 107404           AND     0,1,SZR   ; AC(0) = STATUS
37 00636 006153           EHALT             ; CHECK OVERRUN FLOP
38 00637 006152           LOOP
```

```
; 0011   ,MAIN
01
02 00640 006151 A11:    SETUP              ; TEST RECEIVER SYNCHRONIZATION ON
03 00641 020064          LDA     0,C60K     ; TWO SYN-CHARS, AND THAT TRANSMITTED
04 00642 024134          LDA     1,SYNWD    ; CHARACTERS ARE RECEIVED CORRECTLY.
05 00643 107000          ADD     0,1
06 00644 066060          DOB     1,SMX
07 00645 006166          STRTREC
08 00646 020134          LDA     0,SYNWD
09 00647 006171          PUTCHAR
10 00650 006153          EHALT              ; FIFO ERROR
11 00651 006171          PUTCHAR            ; ONE MORE SYN-CHAR,
12 00652 006153          EHALT              ; FIFO ERROR
13 00653 006161          RAND
14 00654 040123          STA     0,RAND1
15 00655 006171          PUTCHAR
16 00656 006153          EHALT              ; FIFO ERROR
17 00657 006161          RAND
18 00660 040124          STA     0,RAND2
19 00661 006171          PUTCHAR
20 00662 006153          EHALT              ; FIFO ERROR
21 00663 006176          PADCHAR
22 00664 006153          EHALT
23 00665 006162          STRTXMT
24 00666 020047          LDA     0,C4
25 00667 040077          STA     0,CTR
26 00670 006175          DELAY              ; WAIT FOR XMT DATA LATE
27 00671 000135          TEMP0
28 00672 014077          DSZ     CTR
29 00673 000775          JMP     .-3
30 00674 065460          DIB     1,SMX
31 00675 030106          LDA     2,LATMAS
32 00676 133405          AND     1,2,SNR
33 00677 006153          EHALT              ; TIMEOUT ERROR
34 00700 006163          STOPXMT
35 00701 030112          LDA     2,LINUM
36 00702 073060          DOC     2,SMX
37 00703 063460          SKPBN   SMX        ; RECEIVER SYNCHRONIZED?
38 00704 006153          EHALT              ; NO, ERROR IN SYNC-LOGIC,
39 00705 060400          DIA     0,0        ; OK, MAKE DIA DEVICE 0
40 00706 024123          LDA     1,RAND1    ; SENT CHAR,
41 00707 030074          LDA     2,C377
42 00710 147400          AND     2,1
43 00711 101004          MOV     0,0,SZR    ; AC(1)=GOOD, AC(0)=BAD
44 00712 006153          EHALT              ; DIA DEV,0 SHOULD NOT READ CHAR,
45 00713 006170          GETCHAR            ; CHECK DIA SMX GATES, SMX SEL,
46 00714 006153          EHALT              ; FIFO ERROR
47 00715 106414          SUBR    0,1,SZR
48 00716 006153          EHALT              ; AC(1)=GOOD, AC(0)=BAD
49 00717 024124          LDA     1,RAND2    ; GET NEXT XMITTED CHAR
50 00720 030074          LDA     2,C377
51 00721 147400          AND     2,1
52 00722 006170          GETCHAR            ; GET NEXT RECVD BYTE
53 00723 006153          EHALT              ; FIFO ERROR
54 00724 106414          SUBR    0,1,SZR
55 00725 006153          EHALT              ; DATA ERROR
56 00726 006152          LOOP               ; AC(1)=GOOD, AC(0)=BAD
57
```

```
* 0012   ,MAIN
01
02 00727 024047           LDA     1,C4
03 00730 044105           STA     1,ITR
04
05 00731 006151 A12:      SETUP             ; TEST THAT THE RECEIVER NOT IS
06 00732 020064           LDA     0,C60K    ; SYNCHRONIZED AFTER A STOP COMMAND.
07 00733 024134           LDA     1,SYNWD
08 00734 107000           ADD     0,1
09 00735 066060           DOB     1,SMX
10 00736 006166           STRTREC
11 00737 020134           LDA     0,SYNWD
12 00740 006171           PUTCHAR
13 00741 006153           EHALT             ; SURE THIS FIFO IS OK?
14 00742 006171           PUTCHAR           ; ANOTHER SYNC
15 00743 006153           EHALT             ; THIS SHOULD ELSE BE OK.
16 00744 024047           LDA     1,C4
17 00745 044077           STA     1,CTR
18 00746 006161           RAND
19 00747 006171           PUTCHAR           ; FILL XMT WITH FOUR CHARS.
20 00750 006153           EHALT             ; OH - THIS FIFOU
21 00751 014077           DSZ     CTR
22 00752 000774           JMP     .-4
23 00753 006176           PADCHAR
24 00754 006153           EHALT
25 00755 006162           STRTXMT
26 00756 020047           LDA     0,C4
27 00757 040077           STA     0,CTR
28 00760 006175           DELAY             ; WAIT FOR FOUR CHARS. TO
29 00761 000135           TEMPO             ; BE TRANSMITTED
30 00762 014077           DSZ     CTR
31 00763 000775           JMP     .-3
32 00764 006170           GETCHAR           ;A CHAR. SHOULD BE READY IN REC.
33 00765 006153           EHALT             ;IMPOSSIBLE
34 00766 006170           GETCHAR           ;GET THE SECOND ONE
35 00767 006153           EHALT
36 00770 006167           STOPREC           ; STOP RECEIVER
37 00771 006175           DELAY
38 00772 000045           C2
39 00773 006166           STRTREC           ; START IT AGAIN
40 00774 020046           LDA     0,C3
41 00775 040077           STA     0,CTR
42 00776 006175           DELAY             ; WAIT XMT DATA LATE
43 00777 000135           TEMPO
44 01000 014077           DSZ     CTR
45 01001 000775           JMP     .-3
46 01002 065460           DIB     1,SMX
47 01003 030106           LDA     2,LATMAS
48 01004 133405           AND     1,2,SNR
49 01005 006153           EHALT             ; TIMEOUT ERROR
50 01006 030112           LDA     2,LINUM   ; THE RECEIVER MUST NOT BE
51 01007 006170           GETCHAR           ; SYNCHRONIZED AND NO CHARACTERS
52 01010 000402           JMP     .+2       ; SHOULD STAY IN THE FIFO
53 01011 006153           EHALT
54 01012 006152           LOOP
55
56
57 01013 024045           LDA     1,C2
58 01014 044105           STA     1,ITR
```

```
* 0013   .MAIN
01
02 01015 006151 A13;     SETUP              ; TEST THAT THERE ARE 64 PLACES
03 01016 020064          LDA     0,C60K     ; IN THE RECEIVE FIFO
04 01017 024134          LDA     1,SYNWD
05 01020 107000          ADD     0,1
06 01021 066060          DOB     1,SMX
07 01022 006166          STRTREC
08 01023 020134          LDA     0,SYNWD
09 01024 006171          PUTCHAR
10 01025 006153          EHALT              ; IMPOSSIBLE
11 01026 006171          PUTCHAR
12 01027 006153          EHALT              ; CHECK THAT FIFO IR,S,
13 01030 024052          LDA     1,C10,
14 01031 044077          STA     1,CTR
15 01032 006161          RAND
16 01033 006171          PUTCHAR
17 01034 006153          EHALT              ; FIFO INPUT NOT READYUU
18 01035 014077          DSZ     CTR
19 01036 000774          JMP     .-4
20 01037 006162          STRTXMT            ; NOW START XMT
21 01040 020046          LDA     0,C3
22 01041 040077          STA     0,CTR
23 01042 006175          DELAY              ; WAIT 3 CHARS TIME,
24 01043 000135          TEMP0
25 01044 014077          DSZ     CTR
26 01045 000775          JMP     .-3
27 01046 024062          LDA     1,C54,     ; NOW THER SHOULD BE ROOM FOR
28 01047 044077          STA     1,CTR      ; THE LAST 54 CHARS,
29 01050 006161          RAND
30 01051 006171          PUTCHAR
31 01052 006153          EHALT              ; FIFO ERROR
32 01053 014077          DSZ     CTR
33 01054 000774          JMP     .-4
34 01055 006176          PADCHAR
35 01056 006153          EHALT
36 01057 024061          LDA     1,C43      ; NOW WAIT 63 CHARS TIME FOR
37 01060 044077          STA     1,CTR      ; THE RECEIVER FIFO TO BE
38 01061 006175          DELAY              ; FILLED AND THEN ONE MORE CHAR
39 01062 000135          TEMP0              ; TIME TO GET THE SERIAL REC.-
40 01063 014077          DSZ     CTR        ; REGISTER FILLED TOO,
41 01064 000775          JMP     .-3
42 01065 061460          DIB     0,SMX
43 01066 024075          LDA     1,C400
44 01067 107414          ANDA    0,1,SZR    ; CHECK RECEIVER OVERRUN
45 01070 006153          EHALT              ; THIS CAN ONLY BE A REC,FIFO
46 01071 020050          LDA     0,C6
47 01072 040077          STA     0,CTR
48 01073 006175          DELAY
49 01074 000135          TEMP0
50 01075 014077          DSZ     CTR
51 01076 000775          JMP     .-3
52 01077 006163          STOPXMT
53 01100 061460          DIB     0,SMX      ; THIS DIB SHOULD READ
54 01101 024075          LDA     1,C400     ; RECEIVER OVEERUN,
55 01102 107415          ANDA    0,1,SNR    ; CHECK OVERRUN FLOP,
56 01103 006153          EHALT
57 01104 006152          LOOP               ; ERROR, NOT PLACES ENOUGH,
```

```
* 0014   .MAIN
01
02 01105 024052          LDA     1,C10,
03 01106 044105          STA     1,ITR
04
05 01107 006151 A14:     SETUP             ; TEST 7 = BIT CHARACTERS
06 01110 024055          LDA     1,C20K
07 01111 020132          LDA     0,SEVSYN
08 01112 107000          ADD     0,1
09 01113 066060          DOB     1,SMX
10 01114 006166          STRTREC
11 01115 006171          PUTCHAR
12 01116 006153          EHALT             ; FIFO BUSY
13 01117 006171          PUTCHAR           ; FILL WITH TWO SYNS
14 01120 006153          EHALT             ; FIFO BUSY
15 01121 024047          LDA     1,C4
16 01122 044077          STA     1,CTR
17 01123 020073          LDA     0,C343    ; 8 BIT CHARS, WITH MSB AS
18 01124 006171          PUTCHAR           ; "1", SHOULD BE RECVD, AS "0",
19 01125 006153          EHALT             ; FIFO PERMANENT BUSY
20 01126 123000          ADD     1,0
21 01127 014077          DSZ     CTR
22 01130 000774          JMP     .-4
23 01131 006176          PADCHAR
24 01132 006153          EHALT
25 01133 006162          STRTXMT
26 01134 020050          LDA     0,C6
27 01135 040077          STA     0,CTR
28 01136 006175          DELAY             ; WAIT FOR 6 SEVEN BITS CHARS
29 01137 000136          TEMP1             ; TO BE TRANSMITTED
30 01140 014077          DSZ     CTR
31 01141 000775          JMP     .-3
32 01142 065460          DIB     1,SMX
33 01143 030106          LDA     2,LATMAS
34 01144 133405          AND     1,2,SNR
35 01145 006153          EHALT             ; TIMEOUT ERROR
36 01146 020047          LDA     0,C4
37 01147 040077          STA     0,CTR
38 01150 024066          LDA     1,C143    ; NOW GET THE FOUR
39 01151 006170          GETCHAR           ; CHARS, RECVD,
40 01152 006153          EHALT             ; FIFO
41 01153 122414          SUBR    1,0,SZR
42 01154 006153          EHALT             ; AC(1)=GOOD, AC(0)=BAD
43 01155 020047          LDA     0,C4
44 01156 107000          ADD     0,1
45 01157 014077          DSZ     CTR
46 01160 000771          JMP     .-7
47 01161 006152          LOOP
48
```

```
* 0015   .MAIN
01
02 01162 006151 A15:    SETUP              ; TEST 6-BIT CHARACTERS
03 01163 020133          LDA     0,SIXSYN
04 01164 062060          DOB     0,SMX
05 01165 006166          STRTREC
06 01166 006171          PUTCHAR
07 01167 006153          EHALT              ; FIFO ERROR
08 01170 006171          PUTCHAR
09 01171 006153          EHALT              ; FIFO ERROR
10 01172 024047          LDA     1,C4
11 01173 044077          STA     1,CTR
12 01174 020073          LDA     0,C343     ; 8-BIT CHARS, WITH 2 MSB,S
13 01175 006171          PUTCHAR            ; AS "1" SHOULD BE RECVD AS
14 01176 006153          EHALT              ; TWO "0".
15 01177 123000          ADD     1,0
16 01200 014077          DSZ     CTR
17 01201 000774          JMP     .-4
18 01202 006176          PADCHAR
19 01203 006153          EHALT
20 01204 006162          STRTXMT
21 01205 020050          LDA     0,C6
22 01206 040077          STA     0,CTR
23 01207 006175          DELAY              ; WAIT FOR 6 SIX BIT CHARS,
24 01210 000137          TEMP2              ; TO BE XMT,ED,
25 01211 014077          DSZ     CTR
26 01212 000775          JMP     .-3
27 01213 065460          DIB     1,SMX
28 01214 030106          LDA     2,LATMAS
29 01215 133405          AND     1,2,SNR
30 01216 006153          EHALT              ; TIMEOUT ERROR
31 01217 020047          LDA     0,C4
32 01220 040077          STA     0,CTR
33 01221 024061          LDA     1,C43      ; GET THE 4 CHARS, RECVD,
34 01222 006170          GETCHAR
35 01223 006153          EHALT              ; FIFO
36 01224 122414          SUBR    1,0,SZR
37 01225 006153          EHALT              ; AC(1)=GOOD, AC(0)=BAD,
38 01226 020047          LDA     0,C4
39 01227 107000          ADD     0,1
40 01230 014077          DSZ     CTR
41 01231 000771          JMP     .-7
42 01232 006152          LOOP
43
```

```
* 0016   .MAIN
01
02 01233 006154 ENDIT:  PCRLF              ; ONE LINE IS TESTED0
03 01234 006155          MESSAGE
04 01235 002242          LINE
05 01236 024112          LDA     1,LINUM
06 01237 125200          MOVR    1,1
07 01240 006157          TYPDEC
08 01241 006155          MESSAGE
09 01242 002245          TESTED
10 01243 020112          LDA     0,LINUM
11 01244 101220          MOVZR   0,0
12 01245 030110          LDA     2,LINE2
13 01246 112424          SUBZ    0,2,SZR
14 01247 000411          JMP     .+11       ; EXIT WITHIN ONE PASS
15 01250 010121          ISZ     PSCNT
16 01251 006154          PCRLF
17 01252 006155          MESSAGE
18 01253 002251          PASNO
19 01254 024121          LDA     1,PSCNT
20 01255 006157          TYPDEC             ; RESTART WITH ALL LINES
21 01256 002401          JMP     @.+1       ; PASS COUNTER IS NOT
22 01257 000411          SECOND             ; CLEARED.
23 01260 101400          INC     0,0
24 01261 101120          MOVZL   0,0
25 01262 040112          STA     0,LINUM
26 01263 002401          JMP     @.+1
27 01264 000414          A00
28
29
30
31
32
33 01265 023400 TIMCO:  LDA     0,@0,3     ; TIMECONSUMING ROUTINE.
34 01266 040407          STA     0,TIMDIV   ; CALL BY DELAY     , FOLLOWED
35 01267 020113          LDA     0,M5       ; BY ADDRESS OF ARGUMENT.
36 01270 101404          INC     0,0,SZR    ; FOR TIME TO TRANSMIT/RECEIVE
37 01271 000777          JMP     .-1        ; 8 BIT CHARS USE TEMP0
38 01272 014403          DSZ     TIMDIV     ; 7 BIT   "     "  TEMP1
39 01273 000774          JMP     .-4        ; 6 BIT   "     "  TEMP2
40 01274 001401          JMP     1,3        ; TIME=TIMDIV*16 USECS.
41 01275 000000 TIMDIV: 0
```

```
* 0017   .MAIN
01
02 01276 054431 D1:     STA     3,DRET
03 01277 060210         NIOC    TTI
04 01300 006154         PCRLF                   ;ENTER THE NUMBER OF THE FIRST
05 01301 006155         MESSAGE                 ;LINE IN THE SYSTEM (IN DECIMAL)
06 01302 002140         NUMLINE                 ;AND CR.
07 01303 006102         JSR     @IADIG
08 01304 000773         JMP     D1+1
09 01305 020117         LDA     0,M100
10 01306 123404         AND     1,0,SZR
11 01307 000771         JMP     D1+2
12 01310 044107         STA     1,LINE1
13 01311 006154         PCRLF
14 01312 006155         MESSAGE
15 01313 002166         LSTLINE                 ;ENTER IN DECIMAL THE NUMBER
16 01314 006102         JSR     @IADIG          ;OF THE LAST LINE AND CR.
17 01315 000762         JMP     D1+1
18 01316 044110         STA     1,LINE2
19 01317 030107         LDA     2,LINE1
20 01320 132435         SUBZR   1,2,SNR
21 01321 126521         SUBZL   1,1,SKP         ;ONLY ONE LINE IN SYSTEMU
22 01322 146420         SUBZ    2,1
23 01323 044111         STA     1,LINES
24 01324 102000         ADC     0,0
25 01325 040145         STA     0,WHAT
26 01326 002401         JMP     @DRET
27 01327 000000 DRET:   0
```

```
; 0018  .MAIN
01
02 01330 054425 ASSDIG: STA     3,ASSRET ;ASSEMBLE IN OCTAL
03 01331 152400         SUB     2,2      ;A NUMBER IN AC2,
04 01332 126400         SUB     1,1      ;DECIMAL IN AC1,
05 01333 004423         JSR     TIN
06 01334 034065         LDA     3,C72
07 01335 116032         ADCZR   0,3,SZC
08 01336 034116         LDA     3,M60
09 01337 117046         ADDO    0,3,SEZ
10 01340 000411         JMP     ASS1     ;EXIT ON CARRIAGE RETURN
11 01341 121000         MOV     1,0
12 01342 127120         ADDZL   1,1
13 01343 107120         ADDZL   0,1      ; AC(1)*10
14 01344 167000         ADD     3,1
15 01345 151123         MOVZL   2,2,SNC
16 01346 153120         ADDZL   2,2
17 01347 173003         ADD     3,2,SNC
18 01350 000763         JMP     ASSDIG+3 ; GET NEXT CHARACTER
19 01351 034054 ASS1:   LDA     3,C15
20 01352 116415         SUBR    0,3,SNR
21 01353 010402         ISZ     ASSRET   ; EXIT+2 IF OK
22 01354 002401         JMP     @ASSRET  ; ELSE EXIT+1
23 01355 000000 ASSRET: 0
24
25
26
27
28 01356 054412 TIN:    STA     3,TINRET
29 01357 063610         SKPDN   TTI
30 01360 000777         JMP     .-1
31 01361 060610         DIAC    0,TTI
32 01362 061111         DOAS    0,TTO
33 01363 034067         LDA     3,C177
34 01364 163400         AND     3,0
35 01365 063511         SKPBZ   TTO
36 01366 000777         JMP     .-1
37 01367 002401         JMP     @TINRET
38 01370 000000 TINRET: 0
39
40
41 01371 030112 INITX:  LDA     2,LINUM  ; CALL BY STRTXMT
42 01372 151400         INC     2,2
43 01373 073160         DOCS    2,SMX
44 01374 001400         JMP     0,3
45
46
47 01375 030112 BRKX:   LDA     2,LINUM  ; CALL BY STOPXMT
48 01376 151400         INC     2,2
49 01377 073260         DOCC    2,SMX
50 01400 001400         JMP     0,3
```

```
; 0019  .MAIN
01
02 01401 030112 INDTR:  LDA     2,LINUM
03 01402 073060         DOC     2,SMX
04 01403 030053         LDA     2,C10K    ; CALL BY DTRON
05 01404 024100         LDA     1,CTRWD
06 01405 133000         ADD     1,2
07 01406 072060         DOB     2,SMX
08 01407 001400         JMP     0,3
09
10
11 01410 030112 OUTDTR: LDA     2,LINUM
12 01411 073060         DOC     2,SMX
13 01412 152400         SUB     2,2       ; "ALL BY DTROFF
14 01413 024100         LDA     1,CTRWD
15 01414 133000         ADD     1,2
16 01415 072060         DOB     2,SMX
17 01416 001400         JMP     0,3
18
19
20 01417 030112 INITR:  LDA     2,LINUM   ; CALL BY STRTREC
21 01420 073160         DOCS    2,SMX
22 01421 001400         JMP     0,3
23
24
25 01422 030112 BRKR:   LDA     2,LINUM   ; CALL BY STOPREC
26 01423 073260         DOCC    2,SMX
27 01424 001400         JMP     0,3
28
29
30 01425 030112 INCHAR: LDA     2,LINUM   ; CALL BY GETCHAR
31 01426 073060         DOC     2,SMX
32 01427 063460         SKPBN   SMX
33 01430 001400         JMP     0,3       ; CHAR, NOT READY, RETURN AC3
34 01431 060460         DIA     0,SMX
35 01432 001401         JMP     1,3       ; NORMAL RETURN: AC3+1
36
37
38 01433 030112 OUTCHAR:LDA     2,LINUM   ; CALL BY PUTCHAR
39 01434 151400         INC     2,2
40 01435 073060         DOC     2,SMX
41 01436 063560         SKPBZ   SMX
42 01437 001400         JMP     0,3       ; NO SPACE IN FIFO, RETURN AC3
43 01440 061060         DOA     0,SMX
44 01441 001401         JMP     1,3       ; NORMAL RETURN: AC3 +1
45
46
47 01442 030112 PAD:    LDA     2,LINUM   ; CALL BY PADCHAR
48 01443 151400         INC     2,2
49 01444 073060         DOC     2,SMX
50 01445 063560         SKPBZ   SMX
51 01446 001400         JMP     0,3
52 01447 020074         LDA     0,C377    ; FORM PAD=CHAR
53 01450 061060         DOA     0,SMX
54 01451 001401         JMP     1,3
```

```
* 0020   .MAIN
01                          ; TIME TO TRANSMIT ONE CHARACTER
02                          ; TIMEX CONTAINS THE NUMBER * 14.4 MICROSECS.
03 01452 054424 XMTIME: STA     3,TIMRET
04 01453 030112         LDA     2,LINUM   ; CALL BY CHARTIM
05 01454 151400         INC     2,2       ; AC 0 CONTAINS CHAR. SIZE.
06 01455 073260         DOCC    2,SMX     ; STOP XMT & CLEAR FIFO
07 01456 062060         DOB     0,SMX
08 01457 020074         LDA     0,C377
09 01460 061060         DOA     0,SMX     ; OUTPUT CHAR.
10 01461 006175         DELAY             ; WAIT 2*16 USECS, TO BE SURE
11 01462 000045         C2                ; THE CHAR. IS READY TO XMT.
12 01463 073160         DOCS    2,SMX     ; START XMT
13 01464 102040         ADCO    0,0
14 01465 040146         STA     0,TIMEX
15 01466 065460         DIB     1,SMX
16 01467 030106         LDA     2,LATMAS  ; DATALATE = BIT6
17 01470 133404         AND     1,2,SZR
18 01471 000403         JMP     .+3       ; OK, RETURN
19 01472 101403         INC     0,0,SNC   ; OVERFLOW IN AC(0) CARRY
20 01473 000772         JMP     .-6       ; LOOP
21 01474 101200         MOVR    0,0       ; DIVIDE BY TWO
22 01475 002401         JMP     @.+1      ; COUNT IN AC (0)
23 01476 000000 TIMRET: 0
24
25
26 01477 054120 DIVID:  STA     3,MSAV    ; DIVIDE
27 01500 142432         SUBZR   2,0,SZC
28 01501 002120         JMP      @MSAV
29 01502 034115         LDA     3,M20
30 01503 125120         MOVZL   1,1
31 01504 101100 DLOOP:  MOVL    0,0
32 01505 142412         SUBR    2,0,SZC
33 01506 142400         SUB     2,0
34 01507 125100         MOVL    1,1
35 01510 175404         INC     3,3,SZR
36 01511 000773         JMP     DLOOP
37 01512 002120         JMP     @MSAV
38
39
40 01513 102460 MULT:   SUBC    0,0       ; MULTIPLY
41 01514 054120         STA     3,MSAV
42 01515 034115         LDA     3,M20
43 01516 125203 MLOOP:  MOVR    1,1,SNC
44 01517 101201         MOVR    0,0,SKP
45 01520 143220         ADDZR   2,0
46 01521 175404         INC     3,3,SZR
47 01522 000774         JMP     MLOOP
48 01523 125260         MOVCR   1,1
49 01524 002120         JMP     @MSAV
```

```
* 0021   .MAIN
01                              ; GENERATE A RANDOM NUMBER IN AC0
02 01525 020125 RAN:    LDA     0,RANDOM
03 01526 054437         STA     3,.UD03
04 01527 050435         STA     2,.UD02  ; SAVE AC'S
05 01530 044433         STA     1,.UD01
06 01531 004417         JSR     .UD50
07 01532 034435         LDA     3,.UD20
08 01533 163000         ADD     3,0
09 01534 024125         LDA     1,RANDOM
10 01535 106405         SUB     0,1,SNR  ; TEST THAT THE CHARACTER WAS
11 01536 000773         JMP     .-5      ; NOT THE SAME AS BEFORE
12 01537 040125         STA     0,RANDOM
13 01540 024074         LDA     1,C377
14 01541 123400         AND     1,0
15 01542 024134         LDA     1,SYNWD
16 01543 106405         SUB     0,1,SNR
17 01544 000765         JMP     .-13     ; THE CHAR WAS A SYN
18 01545 030417         LDA     2,.UD02  ; RESTORE AC'S
19 01546 024415         LDA     1,.UD01
20 01547 002416         JMP     @.UD03
21
22 01550 024420 .UD50:  LDA     1,.UD21
23 01551 044415         STA     1,.UD10
24 01552 105120         MOVZL   0,1
25 01553 125120         MOVZL   1,1
26 01554 014412         DSZ     .UD10
27 01555 000776         JMP     .-2
28 01556 107000         ADD     0,1
29 01557 125120         MOVZL   1,1
30 01560 125120         MOVZL   1,1
31 01561 123000         ADD     1,0
32 01562 001400         JMP     0,3
33
34 01563 000000 .UD01:  0
35 01564 000000 .UD02:  0
36 01565 000000 .UD03:  0
37 01566 000000 .UD10:  0
38 01567 033031 .UD20:  33031
39 01570 000010 .UD21:  10
```

```
* 0022   .MAIN
01
02 01571 054414 ENTER:  STA     3,LOOPR   ; LOOP ITERATE RETURN
03 01572 034105         LDA     3,ITR     ; THIS ROUTINE INITIALIZES
04 01573 054406         STA     3,ITRCT   ; EACH TEST
05 01574 176400         SUB     3,3
06 01575 054405         STA     3,ESWIT
07 01576 054405         STA     3,ERRCT
08 01577 062677         IORST             ; I/O RESET
09 01600 002405         JMP     @LOOPR
10
11
12 01601 000000 ITRCT:  0
13 01602 000000 ESWIT:  0
14 01603 000000 ERRCT:  0
15 01604 000000 RETURN: 0
16 01605 000000 LOOPR:  0
17
18 01606 054776 CYCLE:  STA     3,RETURN  ; END OF TEST ITERATION
19 01607 050131         STA     2,SAV2    ; ROUTINE,
20 01610 044130         STA     1,SAV1    ; SAVE THE AC'S
21 01611 040127         STA     0,SAV0
22 01612 014767         DSZ     ITRCT
23 01613 000435         JMP     CYCTS     ; NOT N TIMES ITERATED
24
25 01614 034105         LDA     3,ITR     ; RESET ITERATION CNTR,
26 01615 054764         STA     3,ITRCT
27 01616 074477         READS   3
28 01617 030763         LDA     2,ESWIT   ; IF SWITCH 2 =(1), AND
29 01620 175120         MOVZL   3,3       ; AN ERROR HAS OCCURRED
30 01621 175100         MOVL    3,3       ; THE ERROR RATE WILL
31 01622 151005         MOV     2,2,SNR   ; BE PRINTED
32 01623 000417         JMP     NOEX
33 01624 175103         MOVL    3,3,SNC
34 01625 000421         JMP     INGE
35
36 01626 006134         PCRLF             ; PRINT CR/LF
37 01627 024754         LDA     1,ERRCT
38 01630 006157         TYPDEC
39 01631 006155         MESSAGE
40 01632 002214         MESERR            ; ERRORS
41 01633 020750         LDA     0,ERRCT
42 01634 024105         LDA     1,ITR
43 01635 106400         SUB     0,1
44 01636 006157         TYPDEC
45 01637 006155         MESSAGE
46 01640 002221         MESPAS            ; PASSES
47 01641 000405         JMP     INGE
48
49 01642 020127 NOEX:   LDA     0,SAV0    ; NORMAL EXIT
50 01643 024130         LDA     1,SAV1    ; NO ERRORS
51 01644 030131         LDA     2,SAV2
52 01645 002737         JMP     @RETURN
53
54 01646 102400 INGE:   SUB     0,0
55 01647 040734         STA     0,ERRCT   ; RESET ERROR COUNT
```

```
* 0023   .MAIN
01
02 01650 020127 CYCTS:  LDA     0,SAV0
03 01651 024130         LDA     1,SAV1    ; RESTORE AC'S
04 01652 030131         LDA     2,SAV2
05 01653 062677         IORST
06 01654 034726         LDA     3,ESWIT
07 01655 175004         MOV     3,3,SZR
08 01656 074477         READS   3
09 01657 175113         MOVLR   3,3,SNC   ; SWITCH 0 ?
10 01660 002725         JMP     @LOOPR    ; =(1) LOOP ROUTINE
11 01661 002723         JMP     @RETURN   ; =(0) PROCEED TO NEXT
12
13 01662 054722 ERR:    STA     3,RETURN  ; ERROR SUBROUTINE
14 01663 050131         STA     2,SAV2
15 01664 044130         STA     1,SAV1
16 01665 040127         STA     0,SAV0
17 01666 034714         LDA     3,ESWIT
18 01667 175005         MOV     3,3,SNR
19 01670 000405         JMP     ERR1
20 01671 030131 ERET:   LDA     2,SAV2    ; RESTORE AC'S
21 01672 010711         ISZ     ERRCT     ; COUNT ERRORS
22 01673 000401         JMP     .+1
23 01674 002710         JMP     @RETURN   ; EXIT
24
25 01675 034707 ERR1:   LDA     3,RETURN  ; ERROR, AC(3)=PC
26 01676 054704         STA     3,ESWIT
27 01677 074477         READS   3
28 01700 175100         MOVL    3,3
29 01701 175113         MOVLR   3,3,SNC   ; LOOK AT SWITCH 1
30 01702 004406         JSR     EPRINT    ; PRINT ERROR DATA
31 01703 034677         LDA     3,ESWIT
32 01704 024130         LDA     1,SAV1
33 01705 020127         LDA     0,SAV0
34 01706 063077         HALT              ; OPERATOR SET SWITCHES
35 01707 000762         JMP     ERET
36
37 01710 054672 EPRINT: STA     3,ESWIT   ; ERROR MESSAGE PRINTER
38 01711 006154         PCRLF             ; PRINT CR/LF
39 01712 006155         MESSAGE           ; AND HEADER
40 01713 002237         HEADER
41 01714 020670         LDA     0,RETURN
42 01715 126000         ADC     1,1
43 01716 107000         ADD     0,1
44 01717 006160         TYPAC1            ; PC OF ERROR
45 01720 006155         MESSAGE
46 01721 002225         CHNUM             ; CHANNEL NUMBER
47 01722 020112         LDA     0,LINUM
48 01723 101200         MOVR    0,0
49 01724 024067         LDA     1,C177
50 01725 107400         AND     0,1
51 01726 006157         TYPDEC
52 01727 002653         JMP     @ESWIT    ; RETURN TO CALL
```

```
0024  .MAIN
01                ;TTO NON INTERRUPT PACKAGE
02                ;"MESS" PRINTS ASCII MESSAGES AS SPECIFIED BY ASSEMBLER
03                ;"CHAR" PRINTS ASCII CHARACTOR, C(0)R,C(0)L MUST BE 0
04                ;WILL RETURN +2 IF C(0)R=0,CORRECTS THE PARITY,33 SIMULATE
05                ;"TYPE" PRINTS C(0)R, MUST HAVE PROPER PARITY, RETURN IS
06                ;TO CALL+1,REPLACE THIS ROUTINE WITH INTERRUPT TYPE IF DESIRED,
07                ;"CRLF" PRINTS A CARRIAGE RETURN
08                ;"POCT" PRINTS C(1) IN OCTAL FOLLOWED BY A TAB
09                ;"PDEC" PRINTS C(1) IN DECIMAL,LEADING ZEROS SUPPRESSED,
10                ;FOLLOWED BY A TAB,
11
12 01730 070477 MESS: READS 2
13 01731 153102       ADDL 2,2,SZC      ;NO PRINT IF SW1=1
14 01732 001401       JMP 1,3
15 01733 054562       STA 3,MESSR
16 01734 010561       ISZ MESSR
17 01735 031400       LDA 2,0,3         ;C(2) POINTS TO MESSAGE
18 01736 024074       LDA 1,C377        ;A B BIT MASK
19 01737 021000 MES,1: LDA 0,0,2        ;C(2)=DATA WORD
20 01740 125112       MOVLR 1,1,SZC
21 01741 123701       ANDS 1,0,SKP
22 01742 123401       AND 1,0,SKP       ;C(0)=DATA CHARACTOR RIGHT
23 01743 151400       INC 2,2           ;INC TO NEXT WORD
24 01744 124000       COM 1,1           ;FLIP MASK
25 01745 004467       JSR CHAR,         ;PRINT
26 01746 000771       JMP MES,1         ;ANOTHER
27 01747 063511       SKPBZ TTO
28 01750 000777       JMP .-1
29 01751 060211       NIOC TTO
30 01752 002543       JMP @MESSR        ;LAST
31
32 01753 102401 ZOCT: SUB 0,0,SKP
33 01754 020063 POCT: LDA 0,C60
34 01755 030437       LDA 2,OCTAB       ;PRINT C(1) IN OCTAL
35 01756 000403       JMP .+3
36 01757 030445 PDEC: LDA 2,DECTB       ;PRINT C(1) IN DECIMAL
37 01760 102400       SUB 0,0
38 01761 054122       STA 3,RADRET      ;BOTH ENTRYS PRINT NUMBER
39 01762 074477       READS 3
40 01763 177102       ADDL 3,3,SZC      ;NO PRINT IF SW1=1
41 01764 002122       JMP @RADRET
42 01765 040446 TNUM: STA 0,ZSUPP       ;THEN TAB TO NEXT POSITION
43 01766 050401       STA 2,,.+1
```

```
* 0025  .MAIN
01
02 01767 000000 DECOCT: 0                ;A"LDA 2,TABLE" INSTRUCTION
03 01770 010777         ISZ .-1
04 01771 034122         LDA 3,RADRET     ;SETUP "TAB" AT END
05 01772 020515         LDA 0,CHTAB
06 01773 151005         MOV 2,2,SNR      ;IF TABLE ENTRY=0
07 01774 000440         JMP CHAR,        ;EXIT WITH TAB
08 01775 034436         LDA 3,ZSUPP      ;ZEROS SUPPRESS STUF
09 01776 102400         SUB 0,0
10 01777 146512 DECOT:  SUBLZR 2,1,SZC
11 02000 000405         JMP DECP
12 02001 146400         SUB 2,1          ;FORM THE DIGIT
13 02002 034063         LDA 3,C60
14 02003 101400         INC 0,0
15 02004 000773         JMP DECOT
16 02005 151235 DECP:   MOVZRR 2,2,SNR
17 02006 034063         LDA 3,C60
18 02007 054424         STA 3,ZSUPP      ;C(0)=DIGIT
19 02010 163000         ADD 3,0          ;MAKE ASCII
20 02011 175004         MOV 3,3,SZR
21 02012 004422         JSR CHAR,        ;PRINT
22 02013 000754         JMP DECOCT       ;GET NEXT DIGIT
23
24
25 02014 030426 OCTAB:  LDA 2,,+1+,=DECOCT
26 02015 100000         100000
27 02016 010000         10000
28 02017 001000         1000
29 02020 000100         100
30 02021 000010         10
31 02022 000001         1
32 02023 000000         0
33
34 02024 030436 DECTB:  LDA 2,,+1+,=DECOCT
35       000012 ,RDX 10
36 02025 023420         10000
37 02026 001750         1000
38 02027 000144         100
39 02030 000012         10
40 02031 000001         1
41 02032 000000         0
42       000010 ,RDX 8
43
44 02033 000000 ZSUPP:  0
```

```
. 0026   .MAIN
01
02 02034 054454 CHAR,:   STA 3,CHRET      ;PRINT C(0) RIGHT
03 02035 101325          MOVZS 0,0 SNR     ;RETURN +2 IF NULL
04 02036 001401          JMP 1,3
05 02037 040452          STA 0,CHSAV
06 02040 176000          ADC 3,3           ;COMPUTE THE PARITY
07 02041 117000          ADD 0,3
08 02042 163404          AND 3,0,SZR
09 02043 000775          JMP .-3
10 02044 176660          SUBCR 3,3         ;COMBINE PARITY WITH CHAR
11 02045 020444          LDA 0,CHSAV
12 02046 163300          ADDS 3,0
13 02047 034440 CHAR1:   LDA 3,CHTAB       ;IS THIS A TAB
14 02050 116415          SUBR 0,3,SNR
15 02051 000407          JMP .+7           ;YES
16 02052 004444          JSR TYPE          ;NO PRINT IT
17 02053 000413          JMP CHAR2+1       ;EXIT
18 02054 020436          LDA 0,CHORZ       ;SIMULATE A TAB
19 02055 034051          LDA 3,C8,         ;VIA 1 TO 8 SPACES
20 02056 162426          SUBZ 3,0,SEZ
21 02057 000777          JMP .-1
22 02060 101005          MOV 0,0,SNR
23 02061 000404          JMP CHAR2
24 02062 020431          LDA 0,CH240
25 02063 004433          JSR TYPE
26 02064 000770          JMP .-10
27 02065 040425 CHAR2:   STA 0,CHORZ
28 02066 063511          SKPBZ TTO
29 02067 000777          JMP .-1
30 02070 060211          NIOC TTO
31 02071 002417          JMP @CHRET
```

```
* 0027   ,MAIN
01 02072 060477 CRLF:   READS 0
02 02073 103102         ADDL 0,0,SZC     ;NO PRINT IF SW1=1
03 02074 001400         JMP 0,3
04 02075 054417         STA 3,CRLFR      ;SAVE RETURN
05 02076 020072         LDA 0,C215
06 02077 004735         JSR CHAR,        ;PRINT CARRIAGE AND LF
07 02100 020071         LDA 0,C212
08 02101 004733         JSR CHAR,
09 02102 020074         LDA 0,C377       ;PRINT RUB
10 02103 004731         JSR CHAR,
11 02104 102400         SUB 0,0
12 02105 040405         STA 0,CHORZ      ;CLEAR HORZ POSISTION
13 02106 002406         JMP @CRLFR       ;EXIT
14 02107 000011 CHTAB:  11
15 02110 000000 CHRET:  0
16 02111 000000 CHSAV:  0
17 02112 000000 CHORZ:  0
18 02113 000240 CH240:  240
19 02114 000000 CRLFR:  0
20 02115 000000 MESSR:  0
21 02116 054406 TYPE:   STA 3,TYPRET     ;TYPE THE C(0)R IF
22 02117 010773         ISZ CHORZ
23 02120 063511         SKPBZ TTO
24 02121 000777         JMP .-1
25 02122 061111         DOAS 0,TTO
26 02123 002401         JMP @TYPRET
27 02124 000000 TYPRET: 0
28
29                      ;       TYPE AC(0) IN AN ERROR CONDITION,
30
31 02125 040410 TYPER:  STA     0,TYP0
32 02126 044410         STA     1,TYP1
33 02127 054410         STA     3,TYP3
34 02130 105000         MOV     0,1
35 02131 006160         TYPAC1
36 02132 020403         LDA     0,TYP0
37 02133 024403         LDA     1,TYP1
38 02134 002403         JMP     @TYP3
39 02135 000000 TYP0:   0
40 02136 000000 TYP1:   0
41 02137 000000 TYP3:   0
```

```
* 0028   .MAIN
01                      ;ENTER FIRST CHANNEL NUMBER
02                NUMLIN: .TXTE  UENTER IN DECIMAL THE FIRST CHANNEL NO & CR U
   02140 047305
   02141 142724
   02142 120322
   02143 047311
   02144 042240
   02145 141705
   02146 046711
   02147 146101
   02150 152240
   02151 142510
   02152 143240
   02153 151311
   02154 152123
   02155 141640
   02156 040510
   02157 047116
   02160 146305
   02161 047240
   02162 120317
   02163 120246
   02164 151303
   02165 000240
03                      ;ENTER LAST CHANNEL NUMBER
04                LSTLIN: .TXTE  UENTER IN DECIMAL THE LAST CHANNEL NO & CR  U
   02166 047305
   02167 142724
   02170 120322
   02171 047311
   02172 042240
   02173 141705
   02174 046711
   02175 146101
   02176 152240
   02177 142510
   02200 146240
   02201 051501
   02202 120324
   02203 044303
   02204 047101
   02205 142516
   02206 120314
   02207 147516
   02210 123240
   02211 141640
   02212 120322
   02213 000240
05                      ;ERRORS
06                MESERR: .TXTE  UERRORS  U
   02214 151305
   02215 147722
   02216 051722
   02217 120240
   02220 000000
```

```
* 0029   .MAIN
01                          ;PASSES
02                  MESPAS: .TXTE  UPASSESU
    02221 040520
    02222 051523
    02223 051705
    02224 000000
03                          ;CHANNEL NUMBER
04                  CHNUM:  .TXTE  UIN CHANNEL NUMBER U
    02225 047311
    02226 141640
    02227 040510
    02230 047116
    02231 146305
    02232 047240
    02233 046525
    02234 142502
    02235 120322
    02236 000000
05                          ;PC OF ERROR
06                  HEADER: .TXTE  U PC U
    02237 050240
    02240 120303
    02241 000000
07                          ;LINE #
08                  LINE:   .TXTE  ULINE U
    02242 144714
    02243 142516
    02244 000240
09                          ;TESTED
10                  TESTED: .TXTE UTESTEDU
    02245 142724
    02246 152123
    02247 042305
    02250 000000
11                          ;PASS #
12                  PASNO:  .TXTE  U<7><7><7><7>PASS NO U
    02251 103607
    02252 103607
    02253 040520
    02254 051523
    02255 047240
    02256 120317
    02257 000000
13                  .END
```

0030 .MAIN

0031 ,MAIN

0032 .MAIN

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| LINE2 | 000110 | 4/47 | 16/12 | 17/18 | | | | | |
| LINES | 000111 | 4/48 | 17/23 | | | | | | |
| LINUM | 000112 | 4/49 | 7/16 | 7/34 | 7/42 | 10/30 | 11/35 | 12/50 | 16/0 |
| | | 16/10 | 16/25 | 18/41 | 18/47 | 19/02 | 19/11 | 19/20 | 19/2 |
| | | 19/30 | 19/38 | 19/47 | 20/04 | 23/47 | | | |
| LOOP | 006152 | 6/05 | 7/30 | 7/38 | 7/48 | 8/09 | 8/22 | 8/32 | 8/4 |
| | | 8/49 | 9/54 | 10/38 | 11/56 | 12/54 | 13/57 | 14/47 | 15/4 |
| LOOPR | 001605 | 22/02 | 22/09 | 22/16 | 23/10 | | | | |
| LSTLI | 002166 | 17/15 | 28/04 | | | | | | |
| M100 | 000117 | 5/06 | 17/09 | | | | | | |
| M16 | 000114 | 5/03 | | | | | | | |
| M20 | 000115 | 5/04 | 20/29 | 20/42 | | | | | |
| M5 | 000113 | 5/02 | 16/35 | | | | | | |
| M60 | 000116 | 5/05 | 18/08 | | | | | | |
| MESER | 002214 | 22/40 | 28/06 | | | | | | |
| MESPA | 002221 | 22/46 | 29/02 | | | | | | |
| MESS | 001730 | 6/10 | 24/12 | | | | | | |
| MESSA | 006155 | 6/11 | 16/03 | 16/08 | 16/17 | 17/05 | 17/14 | 22/39 | 22/4 |
| | | 23/39 | 23/45 | | | | | | |
| MESSR | 002115 | 24/15 | 24/16 | 24/30 | 27/20 | | | | |
| MES.1 | 001737 | 24/19 | 24/26 | | | | | | |
| MLOOP | 001516 | 20/43 | 20/47 | | | | | | |
| MSAV | 000120 | 5/07 | 20/26 | 20/28 | 20/37 | 20/41 | 20/49 | | |
| MUL12 | 006173 | 6/39 | 9/25 | 9/29 | 9/33 | | | | |
| MULT | 001513 | 6/38 | 20/40 | | | | | | |
| NOEX | 001642 | 22/32 | 22/49 | | | | | | |
| NUMLI | 002140 | 17/06 | 28/02 | | | | | | |
| OCTAB | 002014 | 24/34 | 25/25 | | | | | | |
| OUTCH | 001433 | 6/34 | 19/38 | | | | | | |
| OUTDT | 001410 | 6/26 | 19/11 | | | | | | |
| PAD | 001442 | 6/44 | 19/47 | | | | | | |
| PADCH | 006176 | 6/45 | 10/17 | 11/21 | 12/23 | 13/34 | 14/23 | 15/18 | |
| PASNO | 002251 | 16/18 | 29/12 | | | | | | |
| PCRLF | 006154 | 6/09 | 16/02 | 16/16 | 17/04 | 17/13 | 22/36 | 23/38 | |
| PDEC | 001757 | 6/14 | 24/36 | | | | | | |
| POCT | 001754 | 6/16 | 24/33 | | | | | | |
| PSCNT | 000121 | 5/08 | 7/08 | 16/15 | 16/19 | | | | |
| PUTCH | 006171 | 6/35 | 10/12 | 10/15 | 11/09 | 11/11 | 11/15 | 11/19 | 12/1 |
| | | 12/14 | 12/19 | 13/09 | 13/11 | 13/16 | 13/30 | 14/11 | 14/1 |
| | | 14/18 | 15/06 | 15/08 | 15/13 | | | | |
| RADRE | 000122 | 5/09 | 24/38 | 24/41 | 25/04 | | | | |
| RAN | 001525 | 6/18 | 21/02 | | | | | | |
| RAND | 006161 | 6/19 | 10/14 | 11/13 | 11/17 | 12/18 | 13/15 | 13/29 | |
| RAND1 | 000123 | 5/10 | 11/14 | 11/40 | | | | | |
| RAND2 | 000124 | 5/11 | 11/18 | 11/49 | | | | | |
| RANDO | 000125 | 5/12 | 7/06 | 21/02 | 21/09 | 21/12 | | | |
| RETUR | 001604 | 22/15 | 22/18 | 22/52 | 23/11 | 23/13 | 23/23 | 23/25 | 23/4 |
| RMAS | 000126 | 5/13 | 8/39 | | | | | | |
| SAV0 | 000127 | 5/14 | 22/21 | 22/49 | 23/02 | 23/16 | 23/33 | | |
| SAV1 | 000130 | 5/15 | 22/20 | 22/50 | 23/03 | 23/15 | 23/32 | | |
| SAV2 | 000131 | 5/16 | 22/19 | 22/51 | 23/04 | 23/14 | 23/20 | | |
| SECON | 000411 | 7/14 | 16/22 | | | | | | |
| SETUP | 006151 | 6/03 | 7/27 | 7/33 | 7/41 | 8/02 | 8/12 | 8/25 | 8/3 |
| | | 8/45 | 9/05 | 10/05 | 11/02 | 12/05 | 13/02 | 14/05 | 15/0 |
| SEVSY | 000132 | 5/17 | 14/07 | | | | | | |
| SIXSY | 000133 | 5/18 | 15/03 | | | | | | |
| SMX | 000060 | 4/10 | 7/35 | 7/36 | 7/43 | 7/44 | 8/04 | 8/14 | 8/2 |
| | | 8/37 | 10/09 | 10/26 | 10/34 | 11/06 | 11/30 | 11/36 | 11/3 |
| | | 12/09 | 12/46 | 13/06 | 13/42 | 13/53 | 14/09 | 14/32 | 15/0 |