

LISTING

096-000203-05

PROGRAM

NOVA 2 TTY TEST

TAPE

096-000203-05

ABSTRACT

THE TTY TEST IS A MAINTENANCE PROGRAM DESIGNED TO DETECT MALFUNCTIONS IN THE TTY LOGIC, INTERRUPT SYSTEM, AND THE I/O BUS LOGIC. THE PROGRAM MAY BE USED TO TEST TTY MODELS ASR33, KSR33, KSR35, ASR37 (MOD), AND KSR37. IT CAN ALSO BE USED WITH CRT CONSOLE TERMINALS. THE PROGRAM CONTAINS ROUTINES TO PUNCH AND READ RANDOM DATA, ECHO TYPED KEYS, PUNCH FROM THE SWITCH REGISTER, ETC.

0001 .MAIN

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NAME: N258TTYTST.SR PART NUMBER: 094-000135

DESCRIPTION: NOVA 800/NOVA 2 TELETYPE TEST

REVISION HISTORY:

REV.	DATE
00	02/18/71
01	09/14/71
02	10/24/72
03	02/08/74
04	06/07/74
05	06/11/76

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A 0002 .MAIN

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NOVA 800 TELETYPE TEST
OR NOVA 2 TELETYPE TEST

ABSTRACT

TELETYPE TEST IS A MAINTENANCE PROGRAM DESIGNED TO DETECT MALFUNCTIONS IN THE TELETYPE LOGIC, INTERRUPT SYSTEM, AND THE I/O BUS LOGIC. THE PROGRAM MAY BE USED TO TEST TELETYPE MODELS ASR33, KSR33, KSR 35, ASR 37 (MOD) AND KSR 37. IT CAN ALSO BE USED WITH CRT CONSOLE TERMINALS. THE PROGRAM CONTAINS ROUTINES TO PUNCH AND READ RANDOM DATA, ECHO TYPED KEYS, PUNCH FROM THE SWITCH REGISTER, ETC.

IF THIS PROGRAM IS ASSEMBLED WITH THE NOVA2SW SET TO ONE, ALL OF THE TESTS REMAIN THE SAME. THE "DIRT" BLOCK IS CHANGED TO CALL THE PROGRAM "NOVA 2 TTY TEST" FOR COMPATABILITY WITH THE OTHER CPU DEPENDENT PROGRAMS FOR DTOS.

MACHINE REQUIREMENTS

NOVA 800 PROCESSOR OR A NOVA 2 PROCESSOR
2K READ/WRITE MEMORY
ASR33, KSR33, KSR35, ASR 37 (MOD), OR KSR 37
TELETYPES OR A CRT CONSOLE DISPLAY TERMINAL.

SWITCH SETTINGS

000006	*NEW DEVICE CODE STARTING ADDRESS
000040	*DIAGNOSTIC STARTING ADDRESS
000041	*PRINT C(SWITCHES)R ON TELETYPE
000042	*ECHO TYPED INPUT
000043	*PRINT CHARACTER SET
000044	*PUNCH AND READ RANDOM DATA
000045	*PUNCH AND READ COUNTER
SWITCH 0(1)	*PROCEED FROM A ERROR
SWITCH 1(1)	*SET TO 1 FOR ASR TELETYPES
SWITCH 2(1)	*DON'T CHECK KEYBOARD PARITY (MUST BE SET TO 1 FOR ECHO TEST OF CRT.)

OPERATING PROCEDURE

LOAD THE PROGRAM VIA THE BINARY LOADER. USE THE HIGH SPEED READER IF AVAILABLE.

IF THE DEVICE CODES OF THE UNIT UNDER TEST ARE NOT 10 AND 11; ENTER THE EVEN NUMBER IN REGISTER 000005, AND START AT 000006. THE PROGRAM WILL MODIFY ITSELF AND HALT READY FOR THE NEXT STEP.

A 0003 .MAIN

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01
02 14.2 TESTING A ASR33 TELETYPE
03 SET THE TELETYPE TO THE LOCAL POSITION
04 14.2.2 PRESS THE TAPE PUNCH ON BUTTON
05 14.2.3 PRESS THE "HERE IS" KEY. THE PUNCH SHOULD
06 / FEED BLANK TAPE.
07 14.2.4 PRESS THE "REPT" KEY, THEN THE "RUR OUT"
08 / KEY. EXAMINE THE TAPE FOR ALL HOLES.
09 14.2.5 PERFORM THE ABOVE TWO STEPS UNTIL ABOUT
10 / 18 INCHES OF TAPE HAVE BEEN PUNCHED.
11 14.2.6 SET THE TELETYPE SWITCH TO LINE.
12 14.2.7 PLACE THE END OF THE PUNCHED TAPE IN THE
13 / READER. A TAPE LOOP ABOUT ONE FOOT LONG
14 / IS THUS FORMED BETWEEN THE READER AND
15 / THE PUNCH.
16 14.2.8 SET THE READER SWITCH TO THE START POSITION.
17 14.2.9 SET THE SWITCH REGISTER TO 040040
18 14.2.10 PRESS START
19 14.2.11 THE PROGRAM WILL RUN UNTIL MANUALLY
20 / STOPPED OR AN ERROR IS DETECTED. THE WORD
21 / "PASS" WILL BE PRINTED AT THE END OF EACH
22 / PASS. OTHER INDETERMINATE CODES WILL ALSO
23 / BE PRINTED.
24 14.2.12 WHEN THE PROGRAM HAS COMPLETED SEVERAL
25 / PASSES SET THE DATA SWITCHES TO 000043.
26 14.2.13 PRESS RESET
27 14.2.14 SET THE READER SWITCH TO FREE.
28 14.2.15 PRESS THE PUNCH OFF BUTTON
29 14.2.16 PRESS START
30 14.2.17 A SURSET OF THE ASCII CHARACTER SET WILL
31 / BE PRINTED. THE SET BEGINS WITH THE SE-
32 / QUENCE "MMH" TO PERMIT CARRIAGE RETURN
33 / ADJUSTMENTS ON A WIDE LETTER.
34 14.2.18 AFTER SEVERAL LINES HAVE BEEN PRINTED
35 / PRESS RESET AND EXAMINE THE PRINTED DATA.
36 14.2.19 SET THE DATA SWITCHES TO 000042
37 14.2.20 PRESS START
38 14.2.21 STRIKE EACH KEY ON THE KEYBOARD AND CHECK
39 / TO INSURE THAT IT IS ECHOED PROPERLY.
40 14.2.22 SET THE DATA SWITCHES TO 000044
41 14.2.23 PRESS RESET.
42 14.2.24 REMOVE THE PUNCHED TAPE FROM THE
43 / READER AND PUNCH.
44 14.2.25 PRESS THE PUNCH ON BUTTON
45 14.2.26 PRESS START
46 14.2.27 INSERT THE LEADER OF ALL ZEROS INTO
47 / THE READER.
48 14.2.28 SET THE READER SWITCH TO START.
49 14.2.29 THE PROGRAM SHOULD PUNCH AND READ RANDOM
50 / DATA UNTIL MANUALLY STOPPED OR AN ERROR
51 / IS DETECTED.
52 14.3 TELETYPES WHICH DO NOT CONTAIN THE READER AND
53 / PUNCH OPTIONS MAY BE TESTED BY SETTING DATA
54 / SWITCH 1(0) AND OMITTING THOSE STEPS PERTAIN-
55 / ING TO THE READING AND PUNCHING OF TAPE.
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A 0004 .MAIN

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01
02 14.4 TESTING AN ASR 37 (MODIFIED) TELETYPE
03 14.4.1 SETUP THE TELETYPE IN THE LOCAL POSITION.
04 14.4.2 I.E. PRESS THE FOLLOWING KEYS:
05 / PUNCH ON
06 / PUNCH LOCAL
07 / KBD LOCAL
08 / READER LOCAL
09 / PRINTER LOCAL
10 14.4.3 PRESS THE "NULL" KEY SEVERAL TIMES. THE
11 / PUNCH SHOULD FEED BLANK TAPE.
12 14.4.4 PRESS THE "RUBOUT" KEY SEVERAL TIMES.
13 / EXAMINE THE TAPE FOR ALL HOLES.
14 14.4.5 PERFORM THE ABOVE TWO STEPS UNTIL ABOUT
15 / 18 INCHES OF TAPE HAVE BEEN PUNCHED.
16 14.4.6 SETUP THE TELETYPE FOR LINE OPERATION.
17 / I.E. CLEAR ALL SWITCHS.
18 / PRESS PUNCH ON
19 / PRESS READER AUTO
20 14.4.7 PLACE THE END OF THE PUNCHED TAPE IN THE
21 / READER. A TAPE LOOP ABOUT ONE FOOT LONG IS
22 / THUS FORMED BETWEEN THE READER AND THE PUNCH.
23 14.4.8 SET THE READER SWITCH TO THE RUN POSITION.
24 14.4.9 SET THE SWITCH REGISTER TO 040040 AND PROCEED
25 / AS ABOVE FOR THE ASR 33.
26 14.4.10 NOTE: WHEN STARTING AT LOC 40 OR 45 (PUNCH A
27 / COUNTER) THE ERROR LIGHT ON THE TTY CONSOLE
28 / WILL LIGHT SINCE THE PARITY IS INCORRECT. THIS
29 / CAN BE IGNORED.
30
31 14.5 TESTING A CRT DISPLAY
32 14.5.1 SET THE SWITCH REGISTER TO 000040.
33 14.5.2 PRESS RESET AND START.
34 14.5.3 SET THE SWITCH REGISTER TO 000040.
35 / LET THE PROGRAM RUN UNTIL THE WORD "PASS" HAS
36 / BEEN PRINTED SEVERAL TIMES.
37 14.5.4 SET THE SWITCH REGISTER TO 000042.
38 14.5.5 PRESS RESET AND START
39 14.5.6 SET THE SWITCH REGISTER TO 020042.
40 / NOTE: THE CRT USES ODD PARITY WHILE THE
41 / TELETYPES USE EVEN PARITY.
42 14.5.7 MAKE SURE THAT ANY CHARACTERS TYPED ARE
43 / ECHOED ON THE SCREEN.
44 14.5.8 THE PROGRAM SHOULD THEN BE RESTARTED AT
45 / LOCATION 000041 (PRINT SWITCHS) OR LOCATION
46 / 000043 (PRINT CHARACTER SET).
47
48 15. PROGRAM OUTPUT/ERROR DESCRIPTION
49 15.1 WHEN AN ERROR IS DETECTED BY THE DIAGNOSTIC
50 / THE PROGRAM WILL HALT AT LOCATION ERR=14.
51 / EXAMINE AC3 TO OBTAIN THE ADDRESS OF THE
52 / FAILING ROUTINE.
53 / CONSULT THE LISTING TO DETERMINE THE CAUSE
54 / OF THE ERROR.
55 / PRESSING CONTINUE WILL CAUSE THE PROGRAM
56 / TO ENTER A FAILING LOOP SUITABLE FOR SCOPING.
57 / SETTING SWITCH 0(1) WILL CAUSE THE PROGRAM
58 / TO PROCEED FROM THE ERROR.

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A 0005 .MAIN

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01
02      15.2      WHEN A HALT IS EXECUTED IN ROUTINES OTHER
03      /        THAN THE DIAGNOSTIC CONSULT THE LISTING FOR
04      /        THE CAUSE OF ERROR.
05      15.3      PUNCH SWITCHES ROUTINE (START ADDRESS 41)
06      /        THIS ROUTINE MAY BE USED FOR SCOPING THE
07      /        TELETYPE OUTPUT LOGIC. THE ROUTINE TRANS-
08      /        MITS A CHARACTER EVERY 102MS INDEPENDENT
09      /        OF THE TELETYPE BUSY OR DONE FLAG. THE
10      /        CHARACTER TRANSMITTED IS A FUNCTION OF THE
11      /        RIGHT HALF DATA SWITCHES.
12      15.4      TERMINATING A LINE INPUTTED IN THE ECHO
13      /        TEST WITH "CTRL Z" WILL CAUSE THE LINE TO
14      /        BE REPEATED UNTIL ANOTHER KEY IS STRUCK.
15      /        THIS PERMITS SPECIAL CODE COMBINATIONS,
16      /        FOR MECHANICAL ADJUSTMENTS, TO BE TYPED.
17
18      16.        PROGRAM DESCRIPTION/THEORY OF OPERATION
19      16.1      TELETYPE DIAGNOSTIC (START ADDRESS 40)
20      /        THIS ROUTINE WILL TEST THE TELETYPE INTER-
21      /        FACE LOGIC. THE ROUTINE WILL ALSO TEST
22      /        INPUT-OUTPUT BUS AND INTERRUPT LOGIC
23      /        CONTAINED IN THE CPU. AT THE END OF EACH
24      /        PROGRAM PASS THE WORD PASS IS PRINTED.
25      /        IF AFTER A FEW MINUTES THE WORD PASS IS
26      /        NOT PRINTED THE PROGRAM MAY BE IN A LOOP
27      /        OR THERE MAY BE A TELETYPE MALFUNCTION.
28      16.2      PUNCH SWITCHES (START ADDRESS 41)
29      /        THE PUNCH SWITCHES ROUTINE PERMITS THE
30      /        OPERATOR TO SCOPE THE TELETYPE OUTPUT
31      /        LOGIC. THE ROUTINE ISSUES A I/O RESET
32      /        PULSE, SENDS THE CONTENTS OF THE SWITCHES
33      /        RIGHT HALF, WAITS 102MS, AND ITERATES THE
34      /        SEQUENCE.
35      16.3      ECHO TEST (START ADDRESS 42)
36      /        THE ECHO TEST PROVIDES A MEANS OF DETER-
37      /        MINING IF THE CODES PRODUCED BY THE KEY-
38      /        BOARD ARE CORRECT. WHEN THE OPERATOR STRIKES
39      /        A KEY THE PROGRAM RECEIVES THE CHARACTER AND
40      /        CHECKS IT FOR EVEN PARITY.... THE CHARAC-
41      /        TOR IS STORED IN A BUFFER AND ECHOED BACK
42      /        TO THE OPERATOR. IF A TAB HAS BEEN TYPED
43      /        A RETURN IS ALSO ECHOED. THE OPERATOR MUST
44      /        CHECK THE CHARACTER PRINTED TO BE THE SAME
45      /        AS THE KEY DEPRESSED. WHEN THE CARRIAGE
46      /        RETURN KEY IS STRUCK THE PROGRAM CLEARS
47      /        THE BUFFER AND ECHOES A CARRIAGE RETURN
48      /        LINE FEED SEQUENCE. IF THE OPERATOR TERMIN-
49      /        ATES A LINE WITH A "CTRL Z" KEY THE PROGRAM
50      /        WILL INSERT A CARRIAGE RETURN AND ECHO THE
51      /        LINE UNTIL ANOTHER KEY IS STRUCK.

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A 0006 .MAIN

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01
02      16.4      PRINT CHARACTER SET (START ADDRESS 43)
03      /        A PORTION OF THE ASCII CHARACTER SET IS
04      /        REPEATLY TYPED.
05      16.5      PUNCH AND READ RANDOM (START ADDRESS 44)
06      /        THIS IS THE PRIME TEST OF THE TELETYPE
07      /        HEADER AND PUNCH IN FULL DUPLEX OPERATION.
08      /        THE MSKO INSTRUCTION AND THE INTERRUPT SYS-
09      /        TEM ARE USED TO PROVIDE RANDOM START-STOP
10      /        SEQUENCES TO THE HEADER AND PUNCH. THE DATA
11      /        PUNCHED IS EVEN PARITY... RANDOM NUMBERS.
12      16.6      PUNCH AND READ COUNT (START ADDRESS 45)
13      /        THIS TEST IS SIMILAR TO THE PREVIOUS TEST
14      /        EXCEPT THAT A COUNT PATTERN IS USED.
15
16      17.        RESTRICTIONS/MISC
17      17.1      THE DIAGNOSTIC ROUTINE WILL PRINT VARIOUS
18      /        INDETERMINATE CHARACTERS.
19      17.2      THE PRIMARY TIMING TEST IS THE ECHO TEST.
20      /        IF A UNIT UNDER TEST WILL NOT PROPERLY ECHO
21      /        CHARACTERS FROM THE KEYBOARD THE INTERFACE
22      /        TIMING CIRCUITS SHOULD BE SUSPECT.
23      17.3      A MODEL 37 ASR TELETYPE MUST BE MODIFIED
24      /        BEFORE IT CAN BE TESTED WITH THIS PROGRAM.

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A 0007 ,MAIN
01
02      000000 ,LOC 0
03 000000 002505      DIRT
04 000001 000575      INTR
05
06      000005 ,LOC 5
07 000005 000010 XSAV: 10
08 000006 002053      JMP #FIRST
09
10      000040      ,LOC 40
11
12 000040 002074      JMP #HEG
13 000041 002046      JMP #SWIT1
14 000042 002047      JMP #ECHX
15 000043 002073      JMP #ALPHA
16 000044 002071      JMP #MAINR
17 000045 002072      JMP #MAINC
18
19 000046 000457 SWIT1: SWITCH
20 000047 000472 ECHX: ECHO
21 000050 060010 DVCOD: 060010
22 000051 000010 DVCD: 10
23 000052 060010 C60K: 060010
24 000053 000400 FIRST: START
25 000054 002256 LAST: CRLF
26 000055 000000 DEVRET: 0
27 000056 160077 CIGT: 160077
28 000057 177700 M100: -100
29 000060 177634 CM100: -144
30 000061 100004 IND4: 04
31 000062 002153 EK: EKR
32      000062 EHALT=JSR #ER
33 000063 002136 SETUP: ENTER
34 000064 002212 LOOP: CYCLE
35 000065 002123 TIME: TIMER
36 000066 061634 CTIMM: 25500. 1102MS
37 000067 000000 TIMEX: 0
38 000070 000000 PASS: 0
39 000071 000711 MAINR: MAIN
40 000072 000712 MAINC: MAIN+1
41 000073 002264 ALPHA: ALPH
42 000074 000774 BEG: BEGIN
43 000075 000011 T94A: .TTO
44 000076 000011 U20A: .TTO

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INTERRUPT SERVICE ADDRESS

10DIAGNOSTIC
 11PRINT FROM SWITCH
 12ECHO THE INPUT
 13PRINT CHARACTER SET
 14RANDOM READ/PUNCH
 15COUNTER READ/PUNCH

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A 0008 ,MAIN
01
02
03 00077 000000 SAV0: 0
04 00100 000000 SAV1: 0
05 00101 000000 SAV2: 0
06 00102 000000 SAV3: 0
07 00103 000000 SAVC: 0
08 00104 000011 T10: .TTO
09 00105 000010 T10X: .TTI
10 00106 000000 TINCH: 0
11 00107 135525 C1355: 135525
12 00110 000000 RANI: 0
13 00111 000000 BROKEN: 0
14 00112 000000 ICTR: 0
15 00113 000000 CRA: 0
16 00114 000751 RAND: XRAND
17 00115 000000 OCTR: 0
18 00116 000000 RAND: 0
19 00117 000100 LT: 100
20 00120 000000 TYO: 0
21 00121 000000 TIMDEL: 0
22 00122 000004 C4: 4
23 00123 000177 C177: 177
24 00124 000000 MESSR: 0
25 00125 000377 C377: 377
26 00126 000015 CR15: 15
27 00127 000215 C215: 215
28 00130 000012 C12: 12
29 00131 004000 C4000: 4000
30 00132 000575 CINTR: INTR
31 00133 002552 CTABL: TABLE+100
32 00134 002452 CTABF: TABLE
33 00135 000000 CNTR: 0
34 00136 000032 C232: 32
35 00137 020000 C200K: 20000
36 00140 002256 ICRLF: CRLF
37 00141 002233 IMESS: MESS
38 00142 000010 C10: 10
39 00143 000011 C11: 11
40      000011 .TTO=11
41      000010 .TTI=10
42
43
44 00144 030045 HERE: LDA 2,45
45 00145 025000 LDA 1,0,2
46 00146 125005 MOV 1,1,SNR
47 00147 002074 JMP #BEG
48 00150 025001 LDA 1,1,2
49 00151 020142 LDA 0,C10
50 00152 106435 SURZ# 0,1,SNR
51 00153 002074 JMP #BEG
52 00154 044005 STA 1,XSAV
53 00155 002156 JMP 0,+1
54 00156 000400 START

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A 0000 ,MAIN

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01
02      000400      ,LOC 400
03
04 00400 030005 START: LDA 2,XSAV
05 00401 151400      INC 2,2
06 00402 024052      LDA 1,C60K
07 00403 125400      INC 1,1
08 00404 044050      STA 1,CDVCD
09 00405 050076      STA 2,U20A
10 00406 050075      STA 2,T94A
11 00407 050104      STA 2,TIO
12 00410 050051      STA 2,DVCD
13 00411 004422      JSR DEVC0
14
15 00412 024052      LDA 1,C60K
16 00413 044050      STA 1,CDVCD
17 00414 030005      LDA 2,XSAV
18 00415 050105      STA 2,TIOX
19 00416 050051      STA 2,DVCD
20 00417 004414      JSR DEVC0
21
22 00420 024057      LDA 1,M100
23 00421 020052      LDA 0,C60K
24 00422 123400      AND 1,0
25 00423 024051      LDA 1,DVCD
26 00424 123000      ADD 1,0
27 00425 040052      STA 0,C60K
28 00426 030045      LDA 2,45
29 00427 025000      LDA 1,0,2
30 00430 125005      MOV 1,1,SNR
31 00431 063077      HALT
32 00432 002074      JMP 0BEG
33
34 00433 054055 DEVC0: STA 3,DEVRET
35 00434 030053      LDA 2,FIRST
36 00435 021000      LDA 0,0,2
37 00436 024056      LDA 1,CIDT
38 00437 123400      AND 1,0
39 00440 024050      LDA 1,COVCD
40 00441 100415      SUB# 0,1,SNR
41 00442 000406      JMP DEVC2
42 00443 151400 DEVC1: INC 2,2
43 00444 020054      LDA 0,LAST
44 00445 112414      SUB# 0,2,SZR
45 00446 000767      JMP DEVC0+2
46 00447 002055      JMP 0DEVRET
47 00450 021000 DEVC2: LDA 0,0,2
48 00451 024057      LDA 1,M100
49 00452 123400      AND 1,0
50 00453 024051      LDA 1,DVCD
51 00454 123000      ADD 1,0
52 00455 041000      STA 0,0,2
53 00456 000765      JMP DEVC1
54

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CHANGE THE ,TTO DEVICE CODES

CHANGE THE ,TTI DEVICE CODES

CHANGE CONSTANTS FOR THE NEXT RUN,

FIX THE DEVICE CODE
1160077

INITIALLY 000010

CHANGE THE INSTRUCTION

MASK THE DEVICE CODE

NEW DEVICE CODE

A 0010 ,MAIN

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01
02 00457 062677 SWITCH: IURST      ;TYPE FROM SWITCHES
03 00460 020066      LDA 0,CTIMH
04 00461 100420      NEGZ 0,0
05 00462 102411      SUB# 0,0,SKP
06 00463 101000      MOV 0,0
07 00464 063600      SKPDN 0      ;DELAY ABOUT 102 MS
08 00465 101404      INC 0,0,SZR
09 00466 000774      JMP ,+4
10 00467 074477      READS 3
11 00470 075111      DDAS 3,,TTO
12 00471 000767      JMP SWITCH+1
13
14 00472 006140 ECHO1: JSR 0ICHLF      ;ECHO ON OUTPUT THE
15 00473 030133      LDA 2,CTABL      ;CHARACTERS RECEIVED
16 00474 034134      LDA 3,CTABF      ;ON INPUT,
17 00475 102400      SUB 0,0
18 00476 041400      STA 0,0,3
19 00477 175400      INC 3,3
20 00500 156414      SUB# 2,3,SZR
21 00501 000775      JMP ,+3
22 00502 030134      LDA 2,CTARF
23 00503 040135      STA 0,CNTR      ;SET COUNTER TO 0
24 00504 004436 ECHO1: JSR TIN        ;LOOK FOR INPUT
25 00505 024126      LDA 1,CR15
26 00506 100405      SUB 0,1,SNR
27 00507 000763      JMP ECHO
28 00510 024136      LDA 1,C232
29 00511 106414      SUB# 0,1,SZR
30 00512 000407      JMP ECHO3
31 00513 006140 ECHO2: JSR 0ICHLF      ;STORE THE CHARACTER
32 00514 003710      SKPDZ ,TTI      ;CNTRL Z TYPED
33 00515 000423      JMP ECHO4      ;KEEP SENDING THE
34 00516 006141      JSR 0IMESS      ;LINE TYPED UNTILL
35 00517 002452      TABLE        ;A KEY IS STRUCK,
36 00520 000773      JMP ECHO2
37 00521 024125 ECHO3: LDA 1,C377      ;STORE THE CHARACTER
38 00522 030135      LDA 2,CNTR      ;LDA 2,CNTR
39 00523 010135      ISZ CNTR
40 00524 034134      LDA 3,CTABF      ;BEGIN OF TABLE
41 00525 151223      MOVZR 2,2,SNR
42 00526 123401      AND 1,0,SKP
43 00527 123700      ANDS 1,0
44 00530 157000      ADD 2,3
45 00531 025400      LDA 1,0,3
46 00532 107000      ADD 0,1
47 00533 045400      STA 1,0,3
48 00534 030133      LDA 2,CTABL
49 00535 156414      SUB# 2,3,SZR
50 00536 000746      JMP ECHO1      ;CHECK FOR
51 00537 000733      JMP ECHO      ;BUFFER FULL
52 00540 000210 ECHO4: NIOC ,TTI
53 00541 000731      JMP ECHO

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A 0011 .MAIN

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01
02 00542 003010 TIN1 SKPDN ,TTI      INPUT A CHARACTER
03 00543 000777      JMP ,.-1      FROM THE KEYBOARD.
04 00544 000010      DIAC 0,.,TTI   ICHAR TO ACB
05 00545 003710      SKPDZ ,TTI
06 00546 003077      MALT          FLAG CHECK
07 00547 001111      DOAS 0,.,TTO   XMITT CHARACTER
08 00550 111020      MOVZ 0,2
09 00551 120000      ADC 1,1
10 00552 147000      ADD 2,1
11 00553 133404      AND 1,2,SZR
12 00554 000775      JMP ,.-3
13 00555 024137      LOA 1,C20K     LOOK AT SWITCH 2
14 00556 070477      READS 2
15 00557 133404      AND 1,2,SZR
16 00560 000403      JMP ,.+3
17 00561 101012      MOVW 0,0,SZC   DONT CHECK PARITY.
18 00562 003077      MALT          IC(0)=CHARACTER
19 00563 024123      LOA 1,C177     STRIP THE PARITY BIT.
20 00564 123400      AND 1,0
21 00565 024143      LOA 1,C11
22 00566 100414      SUBW 0,1,SZR   CHECK FOR TAB
23 00567 001400      JMP 0,3        EXIT NOT A TAB.
24 00570 120000      ADC 1,1
25 00571 003011      SKPDN ,TTO     INSERT A RUBOUT
26 00572 000777      JMP ,.-1
27 00573 005111      DOAS 1,.,TTO
28 00574 001400      JMP 0,3
29
30 00575 040077 INTR: STA 0,SAV0   INTERRUPT SERVICE
31 00576 044100      STA 1,SAV1
32 00577 050101      STA 2,SAV2
33 00600 054102      STA 3,SAV3
34 00601 173200      MOVR 3,3
35 00602 054103      STA 3,SAVC     SAVE AC+CARRY.
36 00603 063777      SKPDZ CPU     POWER FAIL FLAG?
37 00604 003077      MALT
38 00605 024104      LDA 1,TIO
39 00606 071477      INTA 2
40 00607 132415      SUBW 1,2,SNR
41 00610 000447      JMP TYPE      OUTPUT
42 00611 024105      LDA 1,TIOX
43 00612 132414      SUBW 1,2,SZR
44 00613 003077      MALT
45
46 00614 003010 XTIN: SKPDN ,TTI     READER INPUT
47 00615 003077      MALT          RD DONE FLAG FAILED.
48 00616 004510      DIAS 1,.,TTI   GET CHARACTER
49 00617 003710      SKPDZ ,TTI
50 00620 003077      MALT          FLAG CHECK
51 00621 003410      SKPDN ,TTI
52 00622 003077      MALT          FLAG CHECK
53 00623 044106      STA 1,TINCH     SAVE INPUT CHARACTER.

```

A 0012 .MAIN

```

01
02 00024 125004 TIN1: MOV 1,1,SZR
03 00025 000410      JMP TIN2
04 00026 020107      LDA 0,C1355   NON ZERO INPUT
05 00027 040110      STA 0,RANI    INIT RANDOM NUMBER
06 00030 010111      ISZ BROKEN   IF TO MUCH LEADER
07 00031 102401      SUB 0,0,SKP   FOR ALL CHARACTORS 0
08 00032 003077      MALT          ERROR.
09 00033 040112      STA 0,ICTR    INIT COUNT PATTERN.
10 00034 000505      JMP DISMIS    EXIT INTERRUPT.
11
12 00035 030000 TIN2: LOA 2,CM100
13 00036 050111      STA 2,BROKEN
14 00037 034113      LOA 3,CRA
15 00040 175005      MOV 3,3,SNR
16 00041 000410      JMP TIN3
17 00042 010112      ISZ ICTR
18 00043 101000      MOV 0,0
19 00044 020112      LOA 0,ICTR
20 00045 100414      SUBW 0,1,SZR   IC(0)=GOOD,C(1)=BAD
21 00046 003077      MALT          READ OR PUNCH ERROR.
22 00047 044112      STA 1,ICTR    RESET COUNTER
23 00050 000471      JMP DISMIS    EXIT INTERRUPT.
24
25 00051 000114 TIN3: JSR 0,RAND
26 00052 000110      RANI
27 00053 024106      LOA 1,TINCH
28 00054 100414      SUBW 0,1,SZR   IC(0)=GOOD,C(1)=BAD
29 00055 003077      MALT          READ OR PUNCH ERROR.
30 00056 000403      JMP DISMIS
31
32 00057 003011 TYPE: SKPDN ,TTO
33 00060 003077      MALT          OUTPUT COUNT OR RANDOM
34 00061 034113      LOA 3,CRA     PATTERN. FLAG CHECK.
35 00062 175005      MOV 3,3,SNR   SWITCH
36 00063 000405      JMP TYPE1
37 00064 010115      ISZ OCTR
38 00065 101000      MOV 0,0
39 00066 020115      LOA 0,OCTR
40 00067 000403      JMP ,.+3
41 00070 000114 TYPE1: JSR 0,RAND
42 00071 000116      RAND
43 00072 024117      LDA 1,LT
44 00073 030120      LOA 2,TYO
45 00074 132032      ADCW 1,2,SZC
46 00075 000406      JMP TYPE2
47 00076 020107      LDA 0,C1355   RESET RANDOM IN LEADER
48 00077 040116      STA 0,RAND
49 00080 010120      ISZ TYO
50 00081 102400      SUB 0,0
51 00082 040115      STA 0,OCTR
52 00083 061111 TYPE2: DOAS 0,.,TTO
53 00084 003411      SKPDN ,TTO
54 00085 003077      MALT          FLAG CHECK
55 00086 003711      SKPDZ ,TTO
56 00087 003077      MALT          FLAG CHECK
57 00090 000431      JMP DISMIS    EXIT INTERRUPT.

```

```

* 0013 ,MAIN
01
02 00711 102401 MAIN:  SUR 0,0,SKP      JREAD/PUNCH RANDOM
03 00712 102000      ADC 0,0      JREAD/PUNCH COUNTER
04 00713 040113      STA 0,CHA      JINITAILIZE
05 00714 062077      IORST
06 00715 020060      LWA 0,CMI00
07 00716 040111      STA 0,BROKEN
08 00717 102400      SUR 0,0
09 00720 040120      STA 0,TYO
10 00721 024132      LWA 1,CINTR
11 00722 044001      STA 1,1
12 00723 060177      INTEN
13 00724 061111      DDAS 0,,TT0
14 00725 060510      DIAS 0,,TTI
15
16 00726 000114 MAIN1: JSR 0,HAND      JMAIN LOOP CNTL
17 00727 000121      TIMDEL      JOF READER/PUNCH
18 00730 152400      SUR 2,2      JINTERRUPT.
19 00731 104300      CUMS 0,1
20 00732 072077      MSKU 2
21 00733 125404      INC 1,1,SRZ
22 00734 000777      JMP .-1
23 00735 151400      INC 2,2
24 00736 151237      MOVZL 2,2,SHN
25 00737 000772      JMP MAIN1+3
26 00740 000766      JMP MAIN1
27
28 00741 020077 DISMIS: LWA 0,SAV0      JDISMISS A INTERRUPT
29 00742 024100      LDA 1,SAV1      JRESTORE MACHINE STATE.
30 00743 030101      LDA 2,SAV2
31 00744 034103      LDA 3,SAV3
32 00745 175100      MOVL 3,3
33 00746 034102      LDA 3,SAV3
34 00747 060177      INTEN
35 00750 002000      JMP 00
36
37 00751 027400 XHAND:  LDA 1,00,3      JGENERATE A 8 BIT
38 00752 020123      LDA 0,C177      JEVEN PARITY RANDOM
39 00753 131120      MOVZL 1,2      INUMBER.
40 00754 151120      MOVZL 2,2
41 00755 133000      ADD 1,2
42 00756 024403      LDA 1,,+3
43 00757 147000      ADD 2,1
44 00760 001300      MOVS 0,0
45 00761 123725      ANDZS 1,0,SNR
46 00762 000770      JMP XHAND+1
47 00763 047400      STA 1,00,3      JSTORE A 16 BIT RANDOM
48 00764 111300      MOVS 0,2
49 00765 120000      JPARITY GENERATOR
50 00766 107000      ADD 0,1
51 00767 123404      AND 1,0,SRZ
52 00770 000775      JMP .-3
53 00771 101200      MOVR 0,0
54 00772 143300      ADDS 2,0
55 00773 001401      JMP 1,3

```

```

* 0014 ,MAIN
01
02 00774 102400 BEGIN:  SUR 0,0      JDIAGNOSTIC STARTS HERE.
03 00775 040077      STA 0,PASS
04 00776 000140      JSR 0ICRLF
05 00777 000065      JSR 0TIME
06 01000 060000      NIO 0
07
08 01001 102600 T00:    SURZ0 0,0      JINIT FOR POSSIBLE INTERRUPT.
09 01002 040001      STA 0,1
10 01003 000063      JSR 0SETUP      JTHE SELB LINE IS
11 01004 063500      SKPHZ 0      JGROUNDED.
12 01005 000062      EHALL      JCHECK (A02)
13 01006 000064      JSR 0LOOP      JAND INPUT TO SKIP LOGIC.
14
15 01007 000763 T02:    JSR 0SETUP      JTHE SELD LINE IS
16 01011 063700      SKPDZ 0      JGROUNDED.
17 01011 000062      EHALL      JCHECK (A00).
18 01012 000064      JSR 0LOOP      JCHECK SKIP LOGIC.
19
20 01013 000763 T04:    JSR 0SETUP      JTO SHOULD NOT BE
21 01014 060211      NI0C .TTO      JBUSY,ITS BEEN CLEARED.
22 01015 062677      IORST      JIN TO DIFFERENT WAYS.
23 01016 063511      SKPHZ .TTO      JCHECK TTO BUSY(1) INPUT
24 01017 000062      EHALL      JTO SELB LINE (A02).
25 01020 000064      JSR 0LOOP
26
27 01021 000763 T06:    JSR 0SETUP      JTROUBLE IN CPU.
28 01022 063411      SKPHN .TTO      JSELECTION OF SKIP SEX.
29 01023 101001      MOV 0,0,SKP      JCHECK SKIP INVERT LOGIC
30 01024 000062      EHALL
31 01025 000064      JSR 0LOOP
32
33 01026 000763 T08:    JSR 0SETUP      JTTI SHOULD NOT BE BUSY
34 01027 060210      NI0C .TTI      JIT HAS BEEN CLEARED IN
35 01030 062677      IORST      JTO TWO WAYS, CHECK TTI INPUT
36 01031 063510      SKPHZ .TTI      JTO SELB LINE (A02).
37 01032 000062      EHALL      JCHECK THE FLOP.
38 01033 000064      JSR 0LOOP
39
40 01034 000763 T10:    JSR 0SETUP      JTO SHOULD NOT BE DONE
41 01035 060211      NI0C .TTO      JIT HAS BEEN CLEARED
42 01036 062677      IORST      JIN TWO WAYS, CHECK
43 01037 063711      SKPDZ .TTO      JTO INPUT TO SELD (A00)
44 01040 000062      EHALL      JALSO THE TTO DONE FLOP.
45 01041 000064      JSR 0LOOP
46
47 01042 000763 T12:    JSR 0SETUP      JTTI SHOULD NOT BE DONE
48 01043 060210      NI0C .TTI      JIT HAS BEEN CLEARED
49 01044 062677      IORST      JIN TWO WAYS, CHECK
50 01045 063710      SKPDZ .TTI      JTTI INPUT TO SELD(A00).
51 01046 000062      EHALL      JALSO THE TTI DONE FLOP.
52 01047 000064      JSR 0LOOP

```

A 0015 ,MAIN

```

01
02
03 01050 006063 T14: JSR #SETUP      ICHECK SKIP
04 01051 063010      SKPN ,TTI      INVERTER IN CPU
05 01052 101001      MOV 0,0,SKP    ITTI DONE IS ZERO
06 01053 006062      EHMT
07 01054 006064      JSR #LOOP
08
09 01055 006063 T16: JSR #SETUP      ITTO BUSY CAN NOT BE
10 01056 060111      NIOS ,TTO      ICLEARED BY AN I/O
11 01057 060211      NIOC ,TTO      IRESET OF A CLEAR PULSE.
12 01060 062677      IORST
13 01061 063511      SKPHZ ,TTO
14 01062 006062      EHMT
15 01063 006064      JSR #LOOP
16
17 01064 006063 T18: JSR #SETUP      ITTO BUSY CAN'T BE CLEARED
18 01065 060111      NIOS ,TTO      BY AN IORST. CHECK THE I/O
19 01066 062677      IORST          IRESET PULSE SIGNAL.
20 01067 063511      SKPHZ ,TTO
21 01070 006062      EHMT
22 01071 006064      JSR #LOOP
23
24 01072 006063 T20: JSR #SETUP      ITHE CLEAR PULSE TO THE TTO
25 01073 060111      NIOS ,TTO      IBUSY FLOP FAILED.
26 01074 060211      NIOC ,TTO
27 01075 063511      SKPHZ ,TTO
28 01076 006062      EHMT
29 01077 006064      JSR #LOOP
30
31 01100 006063 T22: JSR #SETUP      ISELECTING TTO SET IT'S BUSY
32 01101 060011      NIO ,TTO      IFLOP. NO START PULSE WAS ISSUED.
33 01102 063511      SKPHZ ,TTO
34 01103 006062      EHMT
35 01104 006064      JSR #LOOP
36
37 01105 006063 T24: JSR #SETUP      IA START PULSE TO A DEVICE
38 01106 060100      NIOS 0          INOT THE ,TTO SET BUSY FLOP.
39 01107 063511      SKPHZ ,TTO      ICHECK THE TTO SELECT INPUT.
40 01110 006062      EHMT
41 01111 006064      JSR #LOOP

```

A 0016 ,MAIN

```

01
02 01112 006063 T26: JSR #SETUP      ITHE TTI BUSY FLOP
03 01113 060110      NIOS ,TTI      IWAS NOT CLEARED BY
04 01114 060210      NIOC ,TTI      IA CLEAR PULSE OR
05 01115 062677      IORST          I/O RESET, CHECK CLEAR
06 01116 063510      SKPHZ ,TTI      INPUT TO FLOP. ALSO
07 01117 006062      EHMT          IE39 8-9,E41 8-9-10
08 01120 006064      JSR #LOOP
09
10 01121 006063 T28: JSR #SETUP      ITHE TTI BUSY FLOP
11 01122 060110      NIOS ,TTI      IWAS NOT CLEARED BY
12 01123 062677      IORST          I/O RESET, CHECK
13 01124 063510      SKPHZ ,TTI      IE41 8-9, I/O RESET
14 01125 006062      EHMT          INPUT TO CLEAR SIDE
15 01126 006064      JSR #LOOP      IOF TTI BUSY.
16
17 01127 006063 T30: JSR #SETUP      ITHE TTI BUSY FLOP
18 01130 060110      NIOS ,TTI      IWAS NOT CLEARED BY
19 01131 060210      NIOC ,TTI      ITTI SELECT AND A
20 01132 063510      SKPHZ ,TTI      ICLEAR PULSE, CHECK
21 01133 006062      EHMT          IAND GATE E42 8-9-10
22 01134 006064      JSR #LOOP      IAND THE INPUT TO E41.
23
24 01135 006063 T32: JSR #SETUP      ISELECTING THE TTI
25 01136 060010      NIO ,TTI      IWITHOUT A START
26 01137 063510      SKPHZ ,TTI      IPULSE SET TTI
27 01140 006062      EHMT          IRRR BUSY. CHECK
28 01141 006064      JSR #LOOP      IE42 11-12-13
29
30 01142 020426      LDA 0,K40      IA TEST THE INSURE THAT THE
31 01143 040426      STA 0,XORDEV    I,TTO RESPONDS ONLY TO ONE
32 01144 006063 T36: JSR #SETUP      IDEVICE CODE.
33 01145 060111      NIOS ,TTO
34 01146 006065      JSR #TIME
35 01147 063511      SKPHZ ,TTO
36 01150 060111      NIOS ,TTO
37 01151 020421      LDA 0,CNIOC
38 01152 024417      LDA 1,XORDEV
39 01153 131000      MOV 1,2
40 01154 113520      ANDZL 0,2
41 01155 107000      ADD 0,1
42 01156 140400      SUB 2,1
43 01157 044401      STA 1,0+1
44 01160 000000      P
45 01161 063411      SKPN ,TTO
46 01162 006062      EHMT
47 01163 006064      JSR #LOOP
48 01164 020405      LDA 0,XORDEV
49 01165 101224      MOVZ 0,0,SZ
50 01166 000755      JMP T36-1
51

```

A 0017 .MAIN

```

01
02 01167 000404 JMP ,+4
03 01170 00040 K4P: 40
04 01171 000000 XORDFV: 0
05 01172 000211 CNIOC: NIOC ,TTO
06
07 01173 006063 T54: JSR #SETUP ;START AND TTO SELECT
08 01174 000111 NIOS ,TTO ;FAILED TO SET TTO
09 01175 003411 SKPHN ,TTO ;BUSY. CHECK SELB (A82)
10 01176 006062 EHALLT ;BUSY FLOP, ETC,ETC.
11 01177 006064 JSR #LOOP
12
13 01200 006063 T56: JSR #SETUP ;THE BUSY FLOP (TTO)
14 01201 000111 NIOS ,TTO ;WAS GATED ON TO THE
15 01202 003500 SKPBZ 0 ;SELB LINE (A82)
16 01203 006062 EHALLT ;WITHOUT TTO SELECT
17 01204 006064 JSR #LOOP ;BEING PRESENT.
18
19 01205 006063 T58: JSR #SETUP ;THE TTO BUSY FLOP
20 01206 000111 NIOS ,TTO ;WAS CLEARED VIA A
21 01207 000200 NIOC 0 ;START PULSE WITH-
22 01210 003411 SKPHN ,TTO ;OUT TTO SELECT.
23 01211 006062 EHALLT
24 01212 006064 JSR #LOOP

```

A 0018 .MAIN

```

01
02 01213 006063 T60: JSR #SETUP ;THE TTO BUSY FLOP
03 01214 000111 NIOS ,TTO ;WAS CLEARED VIA
04 01215 000011 NIO ,TTO ;SELECTING THE TTO
05 01216 003411 SKPHN ,TTO ;WITHOUT A CLEAR PULSE.
06 01217 006062 EHALLT
07 01220 006064 JSR #LOOP
08
09 01221 006063 T64: JSR #SETUP ;THE TTI BUSY FLOP
10 01222 000111 NIOS ,TTI ;FAILED TO SET VIA
11 01223 003411 SKPHN ,TTI ;A START PULSE.
12 01224 006062 EHALLT ;CHECK THE READER
13 01225 006065 JSR #TIME ;START LEVEL,ETC,ETC.
14 01226 003510 SKPBZ ,TTI
15 01227 006064 JSR #LOOP
16
17 01230 006063 T66: JSR #SETUP ;SETTING TTI BUSY
18 01231 000111 NIOS ,TTI ;CAUSED SELB
19 01232 003500 SKPBZ 0 ;LINE (A82) TO GO LOW
20 01233 006062 EHALLT ;WITHOUT TTI SELECT.
21 01234 006065 JSR #TIME ;CHECK AND GATE OF
22 01235 003510 SKPBZ ,TTI ;TT RDR BUSY(1),
23 01236 006064 JSR #LOOP ;TTI SELECT). E29 1-2-3
24
25 01237 006063 T68: JSR #SETUP ;SETTING TTO DONE
26 01240 000111 NIOS ,TTO ;CAUSED ALL DONE
27 01241 006065 JSR #TIME ;FLAGS TESTING TO SKIP.
28 01242 003511 SKPBZ ,TTO ;DONE IS GATED ONTO
29 01243 003700 SKPDZ 0 ;SELB (A80) WITHOUT
30 01244 006062 EHALLT ;DEVICE SELECT.
31 01245 006064 JSR #LOOP
32
33 01246 006063 T70: JSR #SETUP ;BOTH A I/O RESET
34 01247 000111 NIOS ,TTO ;AND A CLEAR PULSE
35 01250 006065 JSR #TIME ;FAILED TO CLEAR
36 01251 003511 SKPBZ ,TTO ;THE DONE FLAG(TTO).
37 01252 000211 NIOC ,TTO ;CHECK THE START+CLR+RST
38 01253 006277 IORST ;PULSE, THE FOLLOWING
39 01254 003711 SKPDZ ,TTO ;INVERTER, THE
40 01255 006062 EHALLT ;DONE FLOP ITSELF.
41 01256 006064 JSR #LOOP
42
43 01257 006063 T72: JSR #SETUP ;A I/O RESET FAILED
44 01260 000111 NIOS ,TTO ;TO CLEAR THE TTO
45 01261 006065 JSR #TIME ;DONE FLOP. INPUT
46 01262 003511 SKPBZ ,TTO ;TO OR GATE E40 FAILED
47 01263 006277 IORST ;CHECK LEAD 10, THEN
48 01264 003711 SKPDZ ,TTO ;REPLACE E40.
49 01265 006062 EHALLT
50 01266 006064 JSR #LOOP

```

4 0019 .MAIN

```

01
02 01207 006063 T74: JSR #SETUP
03 01270 060111 NIOS ,TTO
04 01271 006065 JSR #TIME
05 01272 063511 SKPBZ ,TTO
06 01273 060211 NIOC ,TTO
07 01274 063711 SKPDZ ,TTO
08 01275 006062 EHMT
09 01276 006064 JSR #LOOP
10
11 01277 006063 T76: JSR #SETUP
12 01300 060111 NIOS ,TTO
13 01301 006065 JSR #TIME
14 01302 063511 SKPBZ ,TTO
15 01303 060111 NIOS ,TTO
16 01304 063711 SKPDZ ,TTO
17 01305 006062 EHMT
18 01306 006064 JSR #LOOP
19
20 01307 006063 T78: JSR #SETUP
21 01310 102000 ADC 0,0
22 01311 061111 DOAS 0,,TTO
23 01312 006065 JSR #TIME
24 01313 063511 SKPBZ ,TTO
25 01314 063511 SKPBZ ,TTO
26 01315 006062 EHMT
27 01316 006064 JSR #LOOP
28
29 01317 006063 T80: JSR #SETUP
30 01320 102000 ADC 0,0
31 01321 061111 DOAS 0,,TTO
32 01322 006065 JSR #TIME
33 01323 063511 SKPBZ ,TTO
34 01324 063511 SKPDZ ,TTO
35 01325 006062 EHMT
36 01326 006064 JSR #LOOP
37
38 01327 006063 T82: JSR #SETUP
39 01330 102000 ADC 0,0
40 01331 061477 INTA 0
41 01332 100015 COM# 0,0,SNR
42 01333 006062 EHMT
43 01334 006064 JSR #LOOP
44
45 01335 006063 T84: JSR #SETUP
46 01336 102520 SURZL 0,0
47 01337 065477 INTA 1
48 01340 107414 AND# 0,1,SNR
49 01341 006062 EHMT
50 01342 006064 JSR #LOOP
51

```

JA T70 CLEAR PULSE
 I FAILED TO RESET
 ITT DONE, CHECK
 IE40-9, THE OR GATE
 I THAT PRODUCES THE
 I (STR+CLR+RST) PULSE.

JA T70 STRY PULSE
 I FAILED TO CLEAR T70
 IDONE, CHECK E40-11
 I THE OR GATE THAT
 I PRODUCES THE (STRY
 I +CLR+RST) PULSE.

I THE T70 FINISH PULSE
 I FAILED TO CLEAR BUSY.
 I SCOPE TO FIND OUT WHY.

JA LARGE NUMBER OF THINGS
 I COULD HAVE FAILED.

I TRY TO SET DONE
 I VIA T70 FINISH, CHECK
 I SELD (A80)
 I INPUTS AND
 I THE T70 DONE FLOP
 I OUTPUT, RESET, AND
 I CLOCK INPUTS.

I THE CPU FAILED
 I TO READ IN ANYTHING
 I ON INTA, CHECK CPU.

JA BIT 15 WAS READ
 I IN ON INTA.

4 0020 .MAIN

```

01
02 01343 006063 T86: JSR #SETUP
03 01344 061477 INTA 0
04 01345 101004 MOV 0,0,SNR
05 01346 006062 EHMT
06 01347 006064 JSR #LOOP
07
08 01350 006063 T88: JSR #SETUP
09 01351 102000 ADC 0,0
10 01352 062077 MSKO 0
11 01353 062077 IORST
12 01354 061111 DOAS 0,,TTO
13 01355 006065 JSR #TIME
14 01356 063511 SKPBZ ,TTO
15 01357 061477 INTA 0
16 01360 101005 MOV 0,0,SNR
17 01361 006062 EHMT
18 01362 006064 JSR #LOOP
19
20 01363 006063 T90: JSR #SETUP
21 01364 064111 NIOS ,TTO
22 01365 006065 JSR #TIME
23 01366 063511 SKPBZ ,TTO
24 01367 061477 INTA 0
25 01370 125520 SURZL 1,1
26 01371 107405 AND 0,1,SNR
27 01372 006062 EHMT
28 01373 006064 JSR #LOOP
29
30 01374 006063 T92: JSR #SETUP
31 01375 062111 NIOS ,TTO
32 01376 006065 JSR #TIME
33 01377 063511 SKPBZ ,TTO
34 01400 102120 ADCZL 0,0
35 01401 062077 MSKO 0
36 01402 061477 INTA 0
37 01403 101005 MOV 0,0,SNR
38 01404 006062 EHMT
39 01405 006064 JSR #LOOP
40
41 01406 006063 T94: JSR #SETUP
42 01407 060111 NIOS ,TTO
43 01410 006065 JSR #TIME
44 01411 063511 SKPBZ ,TTO
45 01412 061477 INTA 0
46 01413 024075 LOA 1,T94A
47 01414 106414 SUB# 0,1,SNR
48 01415 006062 EHMT
49 01416 006064 JSR #LOOP

```

I AFTER A I/O RESET
 I (ISSUED BY SETUP) INTA
 I SHOULD READ BACK NO
 I BITS, BUT IT DID
 I GET BITS BACK.

I SET THE T70
 I DONE FLAG, THEN
 I PERFORM A INTA
 I AND CHECK IF
 I ANY BITS WERE
 I RECEIVED BY THE
 I CPU.
 I SUGGEST T70 INT
 I REQUEST FLOP FAILED.

I WITH THE DONE
 I FLAG SET INTA
 I SHOULD READ BACK
 I BIT 15, CHECK
 I INTA INPUT TO BIT 15
 IE31,E32,E12

JA MSKO WITH BIT 15
 I ZERO SHOULD NOT
 I CHANGE THE STATE OF
 I T70 INT DISABLT.
 I NO BITS WERE READ
 I BACK ON INTA HOW-
 I EVER, CHECK DATA-15
 I INPUT TO T70 INT
 I DISABLE FLOP.

I THE DEVICE CODE
 I READ BACK FOR
 I THE T70 SHOULD
 I BE 11 (FIRST T70) OR
 I 151 (SECOND T70).
 I SOME OTHER NUMBER
 I WAS READ BACK,
 I EXAMINE C(0).

```

0021 ,MAIN
01
02 01417 006063 T96: JSR #SFTUP ;THE TTO INT DISABLE
03 01420 102520 SUPZL 0,0 ;FLOP IS SET VIA
04 01421 062077 MSKO 0 ;MSKO THEN CLEARED
05 01422 062677 TORST ;VIA I/O RESET, NO
06 01423 060111 NIOS ,TTO ;BITS WERE READ BACK.
07 01424 006065 JSR #TIME ;SUGGEST I/O RESET
08 01425 063511 SKPBZ ,TTO ;FAILED TO CLEAR
09 01426 061477 INTA 0 ;TTO INT DISABLE FLOP.
10 01427 101005 MOV 0,0,SNR ;FOR ITS INPUT TO TTO
11 01430 006062 EHMT ;INT REQ FAILED.
12 01431 006064 JSR #LOOP
13
14 01432 006063 T9A: JSR #SFTUP ;THE TTO INT DISABLE
15 01433 102520 SUPZL 0,0 ;FLOP EITHER FAILED TO
16 01434 062077 MSKO 0 ;SET VIA MSKO OR
17 01435 060111 NIOS ,TTO ;THE AND GATE
18 01436 006065 JSR #TIME ;(TTO DONE(1),TTO INT DIS(0))
19 01437 063511 SKPBZ ,TTO ;FAILED, BECAUSE IT
20 01440 061477 INTA 0 ;DID NOT PREVENT
21 01441 101004 MOV 0,0,SZR ;TTO INT REQ FROM
22 01442 006062 EHMT ;SETTING.
23 01443 006064 JSR #LOOP
24
25 01444 006063 U16: JSR #SFTUP ;THE MSKO LEVEL
26 01445 102520 SUPZL 0,0 ;WAS RAISED AT OTOR
27 01446 062000 DOR 0,0 ;TIME EVEN THOUGH
28 01447 060111 NIOS ,TTO ;IT WAS NOT A CPU INST.
29 01450 006065 JSR #TIME ;CHECK MSKO (A38).
30 01451 063511 SKPBZ ,TTO
31 01452 061477 INTA 0
32 01453 101005 MOV 0,0,SNR
33 01454 006062 EHMT
34 01455 006064 JSR #LOOP
35
36 01456 006063 U18: JSR #SETUP ;THE MSKO LEVEL
37 01457 102520 SUBZL 0,0 ;WAS RAISED AT
38 01460 060077 NIO CPU ;CPU INST TIME
39 01461 060111 NIOS ,TTO ;EVEN THOUGH NO
40 01462 006065 JSR #TIME ;OTOR WAS GIVEN.
41 01463 063511 SKPBZ ,TTO
42 01464 061477 INTA 0
43 01465 101005 MOV 0,0,SNR
44 01466 006062 EHMT
45 01467 006064 JSR #LOOP
46
47 01470 006063 U20: JSR #SETUP ;THE INTA LEVEL (A40)
48 01471 060111 NIOS ,TTO ;WAS RAISED AT OTIB
49 01472 006065 JSR #TIME ;TIME EVEN THOUGH NO
50 01473 063511 SKPBZ ,TTO ;CPU INSTRUCTION WAS
51 01474 061400 DIR 0,0 ;GIVEN.
52 01475 024076 LDA 1,U20A
53 01476 100415 SUB# 0,1,SNR
54 01477 006062 EHMT
55 01500 006064 JSR #LOOP

```

A 0023 .MAIN

```

01
02 01550 006063 B13: JSR #SETUP      ITEST FOR ION RESET
03 01551 102001      ADC R,0,SKP      IBY PI CYCLE
04 01552 001562      B13A
05 01553 024777      LDA 1,,-1
06 01554 044001      STA 1,1
07 01555 061111      OQAS 0,,TTO
08 01556 063511      SKPBZ ,TTO
09 01557 000777      JMP ,.-1
10 01560 060177      NIOS CPU          IION STILL ON FOLLOWING
11 01561 101000      MOV R,0          INTERRUPT
12 01562 063577 B13A: SKPBZ CPU      ICHECK PTG1-PI RESET
13 01563 006062      EHMT             IGATE ON ION
14 01564 006064      JSR #LOOP
15
16 01565 006063 B14: JSR #SETUP      ITEST FOR ONE INSTRUCTION
17 01566 102001      ADC R,0,SKP      ITO BE PERFORMED BEFORE
18 01567 001600      B14A             INTERRUPT OCCURS
19 01570 024777      LDA 1,,-1
20 01571 044001      STA 1,1
21 01572 061111      OQAS 0,,TTO
22 01573 063511      SKPBZ ,TTO
23 01574 000777      JMP ,.-1
24 01575 060177      NIOS CPU
25 01576 102620      SUBR R,0          IIO INTERRUPT, CHECK ION,
26 01577 006062      EHMT             IINTRQ, PI
27 01600 101125 B14A: MOVZL R,0,SNR
28 01601 101003      MOV R,0,SNR
29 01602 006062      EHMT
30 01603 006064      JSR #LOOP
31
32
33
34
35 01604 006063 B15: JSR #SETUP      ISEE IF PC STORED IN
36 01605 102620      SUBR R,0          ILOC 0 DURING PI CYCLE
37 01606 040000      STA R,0
38 01607 040001      STA R,1
39 01610 061111      OQAS 0,,TTO
40 01611 063511      SKPBZ ,TTO
41 01612 000777      JMP ,.-1
42 01613 060177      NIOS CPU
43 01614 101001      MOV R,0,SKP
44 01615 001616      ,+1
45 01616 020777      LDA R,,-1
46 01617 024000      LDA 1,0
47 01620 100414      SUB# R,1,SNR
48 01621 006062      EHMT
49 01622 006064      JSR #LOOP
50

```

A 0024 .MAIN

```

01
02 01623 006063 B16: JSR #SETUP      IDEFER FAILED TO SET
03 01624 020001      LDA R,IND4
04 01625 040001      STA R,1
05 01626 102001      ADC R,0,SKP      IAT THE END OF PI-2
06 01627 001637      B16A             ICYCLE, CHECK 3 INPUT
07 01630 024777      LDA 1,,-1      IOR GATE TO PRODUCE
08 01631 044004      STA 1,4          IDEFER SET.
09 01632 061111      OQAS 0,,TTO
10 01633 063511      SKPBZ ,TTO
11 01634 000777      JMP ,.-1
12 01635 060177      NIOS CPU
13 01636 101000      MOV R,0
14 01637 100014 B16A: COMW R,0,SZR
15 01640 006062      EHMT
16 01641 060277      NIOC CPU
17 01642 006064      JSR #LOOP
18
19 01643 006063 B17: JSR #SETUP      IIA INTERRUPT DEFERED
20 01644 102001      ADC R,0,SKP      ITHROUGH LOCATION 0
21 01645 001637      B17A             INOT LOCATION 1, CHECK
22 01646 024777      LDA 1,,-1      I1 TO MA AT PI-2 TIME.
23 01647 044004      STA 1,4          ICHECK ADD ONE LOGIC
24 01650 061111      OQAS 0,,TTO      I(A91) AND GATE
25 01651 063511      SKPBZ ,TTO      I(PI2,TS3).
26 01652 000777      JMP ,.-1
27 01653 060177      NIOS CPU
28 01654 101000      MOV R,0
29 01655 063477      SKPBZ CPU
30 01656 006062      EHMT
31 01657 060277 B17A: NIOC CPU
32 01660 006064      JSR #LOOP
33
34 01661 006063 B18: JSR #SETUP      IIA INTERRUPT OCCURED
35 01662 102001      ADC R,0,SKP      IBUT FAILED TO STORE
36 01663 001674      B18A             IANYTHING IN LOC 0.
37 01664 024777      LDA 1,,-1      ICHECK INPUTS TO
38 01665 044004      STA 1,4          IMEM MOD LOGIC.
39 01666 040000      STA R,0
40 01667 061111      OQAS 0,,TTO
41 01670 063511      SKPBZ ,TTO
42 01671 000777      JMP ,.-1
43 01672 060177      NIOS CPU
44 01673 000404      JMP ,+4
45 01674 024000 B18A: LDA 1,0
46 01675 100415      SUB# R,1,SNR
47 01676 006062      EHMT
48 01677 006064      JSR #LOOP

```

A 0025 .MAIN

```

01
02 01700 006063 V00: JSR #SETUP      IDIA DID NOT
03 01701 102000      ADC 0,0      ICHANGE THE CONTENTS
04 01702 060410      DIA 0,.TTI   IOF AC0. CHECK READ IO
05 01703 100015      COM# 0,0,SNR ITHRU MEM TO AR-AC0
06 01704 006062      EHALL
07 01705 006064      JSR #LOOP
08
09 01706 074477      READS 3      IIF KSR TTY DON'T
10 01707 175100      MOVL 3,3
11 01710 175103      MOVL 3,3,SNR IDO THIS SECTION
12 01711 000567      JMP LEO25
13
14
15 01712 006063 V02: JSR #SETUP      ISTARTING THE PAPER
16 01713 060110      NIOS .TTI   ITAPE READER DID NOT
17 01714 006065      JSR #TIME   ICAUSE DONE TO SET.
18 01715 063610      SKPDN .TTI  IIS THE READER IN THE
19 01716 101002      MOV 0,0,SZC ISTART POSITION? TAPE IN
20 01717 006062      EHALL        IREADER? SWITCH IN THE
21 01720 006064      JSR #LOOP    ILINE POSITION?
22
23 01721 006063 V04: JSR #SETUP      ITHE SETTING OF
24 01722 060110      NIOS .TTI   ITTI DONE DID NOT
25 01723 006065      JSR #TIME   ICLEAR TT RDR BUSY.
26 01724 063610      SKPDN .TTI  ICHECK TTI DONE(1)
27 01725 063510      SKPBZ .TTI  IINPUT TO CLOCK. ALSO
28 01726 006062      EHALL        IDATA INPUT SHOULD BE
29 01727 006064      JSR #LOOP    IGROUND.
30
31 01730 006063 V06: JSR #SETUP      II/O RESET FAILED
32 01731 060110      NIOS .TTI   ITO CLEAR THE TTI
33 01732 006065      JSR #TIME   IDONE FLOP, CHECK
34 01733 063510      SKPBZ .TTI  IE40 5-6. ALSO INVERTER
35 01734 062677      IORST      IE39 10-11. TO THE
36 01735 063710      SKPDZ .TTI  IRESET SIDE OF THE
37 01736 006062      EHALL        IDONE FLOP.
38 01737 006064      JSR #LOOP
39
40 01740 006063 V08: JSR #SETUP      IIA CLEAR PULSE TO
41 01741 060110      NIOS .TTI   ITHE TTI LOGIC FAILED
42 01742 006065      JSR #TIME   ITO CLEAR DONE.
43 01743 063510      SKPBZ .TTI  ICHECK E40 4-6.
44 01744 060210      NIOC .TTI   ITHE OF GATE TO
45 01745 063710      SKPDZ .TTI  IRESET SIDE OF DONE.
46 01746 006062      EHALL
47 01747 006064      JSR #LOOP

```

A 0025 .MAIN

```

01
02 01750 006063 V10: JSR #SETUP      IIA START PULSE TO
03 01751 060110      NIOS .TTI   ITHE TTI LOGIC FAILED
04 01752 006065      JSR #TIME   ITO CLEAR DONE.
05 01753 063510      SKPBZ .TTI  ICHECK E40 3-6. THE
06 01754 060110      NIOS .TTI   IOR GATE TO RESET SIDE
07 01755 063710      SKPDZ .TTI  IOF DONE.
08 01756 006062      EHALL
09 01757 006065      JSR #TIME
10 01760 063510      SKPBZ .TTI
11 01761 006064      JSR #LOOP
12
13 01762 006063 V12: JSR #SETUP      IAFTER A I/O
14 01763 061477      INTA 0      IRESET INTA SHOULD
15 01764 101004      MOV 0,0,SZR IREAD NO BITS.
16 01765 006062      EHALL
17 01766 006064      JSR #LOOP
18
19 01767 006063 V14: JSR #SETUP      IWITH THE DONE FLAG
20 01770 102400      SUB 0,0      ISET INTA SHOULD
21 01771 062077      MSKO 0      IREAD BACK A DEVICE
22 01772 062677      IORST      ICODE. CHECK TTI
23 01773 060110      NIOS .TTI   IINT REQ FLOP.
24 01774 006065      JSR #TIME
25 01775 063510      SKPBZ .TTI
26 01776 061477      INTA 0
27 01777 101005      MOV 0,0,SNR
28 02000 006062      EHALL
29 02001 006064      JSR #LOOP
30
31
32 02002 006063 V16: JSR #SETUP      ICHECK THAT I/O RESET
33 02003 102520      SUBZL 0,0    Iwill RESET TTI INT
34 02004 101100      MOVL 0,0    IDISABLE.
35 02005 062077      MSKO 0      ISET THE FLOP
36 02006 062677      IORST      ITRY TO CLEAR
37 02007 060110      NIOS .TTI   ISET DONE.
38 02010 006065      JSR #TIME
39 02011 063510      SKPBZ .TTI
40 02012 061477      INTA 0
41 02013 101005      MOV 0,0,SNR
42 02014 006062      EHALL
43 02015 006064      JSR #LOOP
44
45 02016 006063 V18: JSR #SETUP      IIA MSKO INSTRUCTION
46 02017 102400      SUB 0,0      IWITHOUT A BIT 14
47 02020 062077      MSKO 0      Ishould NOT SET
48 02021 060110      NIOS .TTI   ITTI INT DISABLE, NO
49 02022 006065      JSR #TIME   IDEVICE CODE WAS READ
50 02023 063510      SKPBZ .TTI  IBACK ON INTA HOWEVER.
51 02024 061477      INTA 0      ISUGGEST THE DATA INPUT
52 02025 101005      MOV 0,0,SNR ITO TTI INT DISABLE
53 02026 006062      EHALL        IFAILED.
54 02027 006064      JSR #LOOP

```

A 0027 .MAIN

```

01
02 02030 006063 V20: JSR #SETUP
03 02031 102520 SUBZL R,R
04 02032 101120 MOVZL R,R
05 02033 062077 MSKO R
06 02034 060110 NIOS ,TTI
07 02035 006065 JSR #TIME
08 02036 063510 SKPBZ ,TTI
09 02037 061477 INTA R
10 02040 101004 MOV R,R,SZR
11 02041 006062 EHALL
12 02042 006064 JSR #LOOP
13
14 02043 006063 V22: JSR #SETUP
15 02044 102620 SURZR R,R
16 02045 040001 STA R,1
17 02046 060110 NIOS ,TTI
18 02047 006065 JSR #TIME
19 02050 063510 SKPBZ ,TTI
20 02051 060177 NIOS CPU
21 02052 062477 DIC R,CPU
22 02053 063477 SKPRN CPU
23 02054 006062 EHALL
24 02055 060277 NIOC CPU
25 02056 006064 JSR #LOOP
26 02057 000421 JMP V26
27
28 002072 .LOC 2072
29
30 02072 000000 EGGS: R
31 02073 000000 R
32 02074 000000 R
33 02075 000000 R
34 02076 000000 R
35 02077 000000 R
36
37 002100 LE025=.
38 02100 006140 V26: JSR #ICHLF
39 02101 030045 LDA 2,45
40 02102 025000 LDA 1,0,2
41 02103 125005 MOV 1,1,SNR
42 02104 000410 JMP V27
43 02105 015003 DSZ 3,2
44 02106 000413 JMP V27+5
45 02107 062677 IORST
46 02110 035004 LDA 3,4,2
47 02111 025003 LDA 1,3,2
48 02112 045776 STA 1,-2,3
49 02113 001400 JMP R,3
50 02114 006141 V27: JSR #IMESS
51 02115 002336 PMESS
52 02116 006140 JSR #ICHLF
53 02117 063011 SKPRN TIO
54 02120 000777 JMP ,=1
55 02121 002401 JMP R,+1
56 02122 001001 T00

```

TTI INT DISABLE FAILED
ITO SET ON A MSKO
INSTRUCTION OR , THE
IAND GATE (TTI INT DISABLE
I(0),TTI DONE(1)) FAILED.
IMSKO SHOULD PREVENT
INTA FROM READING
IDEVICE CODE.

ICHECK THAT I/O RESET
WILL CLEAR TTI
INT REQ.

WAIT FOR DONE

ENABLE INTERRUPT
I/O RESET
ICHECK THAT NO
INTERRUPT OCCURED.

OTOS AUTO-RUN SWITCH
IDEVICE CODE
ICAT SWITCH
NUMBER OF PASSES THIS RUN
OTOS RETURN ADDRESS
ISWITCH REGISTER

END OF PASS MESSAGE

A 0028 .MAIN

```

01
02 02123 021400 TIMER: LDA R,R,3
03 02124 040406 STA R,+6
04 02125 102040 ADDC R,0
05 02126 040067 STA R,TIMEX
06 02127 101000 MOV R,R
07 02130 101402 INC R,R,SZC
08 02131 001401 JMP 1,3
09 02132 000000 R
10 02133 000774 JMP ,=4
11 02134 040067 STA R,TIMEX
12 02135 001401 JMP 1,3
13
14 02136 054413 ENTER: STA 3,LOOPR
15 02137 034406 LDA 3,ITR
16 02140 054406 STA 3,ITRCT
17 02141 176400 SUB 3,3
18 02142 054405 STA 3,ESWIT
19 02143 062677 IORST
20 02144 002405 JMP #LOOPR
21
22 02145 000003 ITR: 3
23 02146 000000 ITRCT: 0
24 02147 000000 ESWIT: 0
25 02150 000000 RETURN: 0
26 02151 000000 LOOPR: 0
27 02152 002341 IPOCT: POCT
28
29 02153 054775 ERR: STA 3,RETURN
30 02154 034773 LDA 3,ESWIT
31 02155 175004 MOV 3,3,SZR
32 02156 002772 JMP #RETURN
33 02157 034771 LDA 3,RETURN
34 02160 054767 STA 3,ESWIT
35 02161 050430 STA 2,.AA02
36 02162 044426 STA 1,.AA01
37 02163 030045 LDA 2,45
38 02164 025000 LDA 1,0,2
39 02165 125004 MOV 1,1,SZR
40 02166 000405 JMP ,=5
41 02167 024421 LDA 1,.AA01
42 02170 030421 LDA 2,.AA02
43 02171 063077 HALT
44 02172 002756 JMP #RETURN
45 02173 024755 LDA 1,RETURN
46 02174 004405 JSR EPRINT
47 02175 060277 INTDS
48 02176 030045 LDA 2,45
49 02177 035004 LDA 3,4,2
50 02200 001400 JMP R,3
51
52 02201 054746 EPRINT: STA 3,ESWIT
53 02202 006140 JSR #ICHLF
54 02203 121000 MOV 1,0
55 02204 120000 AUC 1,1
56 02205 107000 ADD R,1
57 02206 006744 JSR #IPOCT
58 02207 002740 JMP #ESWIT

```

TIME THE INST
FOLLOWING THE CALL.

ITERATION RETURN
THIS TEST INITIALIZES
EACH ROUTINE.

I/O RESET

ERROR

NOT FIRST ERROR
SET ERROR SWITCH
IC(3)=PC+1 OF THE

ERROR


```

A 0031 .MAIN
01
02
03 02341 020443 POCT: LDA 0,C60
04 02342 030430 LDA 2,0CTAB
05 02343 054440 STA 3,RADRET
06 02344 040436 STA 0,ZSUPP
07 02345 050401 STA 2,+.1
08 02346 000000 DECOCT: 0
09 02347 010777 ISZ .-1
10 02350 034433 LDA 3,RADRET
11 02351 020473 LDA 0,CHTAB
12 02352 151005 MOV 2,2,SNR
13 02353 000432 JMP ICHAR
14 02354 034426 LDA 3,ZSUPP
15 02355 102400 SUR 0,0
16 02356 146512 DECOCT: SURLM 2,1,SZC
17 02357 000405 JMP DECP
18 02360 146400 SUR 2,1
19 02361 034423 LDA 3,C60
20 02362 101400 INC 0,0
21 02363 000773 JMP DECOCT
22 02364 151235 DECP: MOVZRM 2,2,SNR
23 02365 034417 LDA 3,C60
24 02366 054414 STA 3,ZSUPP
25 02367 163000 AUD 3,0
26 02370 004415 JSR ICHAR
27 02371 000755 JMP DECOCT
28 02372 030425 OCTAB: LDA 2,+.1+.DECOCT
29 02373 100000 100000
30 02374 010000 10000
31 02375 001000 1000
32 02376 000100 100
33 02377 000010 10
34 02400 000001 1
35 02401 000000 0
36
37 02402 000000 ZSUPP: 0
38 02403 000000 RADRET: 0
39 02404 000060 C60: 60
40 02405 054440 ICHAR: STA 3,CHRET
41 02406 101325 MOVZS 0,0,SNR
42 02407 001401 JMP 1,3
43 02410 040436 STA 0,CHSAV
44 02411 176000 ADC 3,3
45 02412 117000 ADD 0,3
46 02413 163400 AND 3,0,82R
47 02414 000775 JMP .-3
48 02415 176660 SUBCR 3,3
49 02416 020430 LDA 0,CHSAV
50 02417 163300 ADDS 3,0
51 02420 034424 LDA 3,CHTAB
52 02421 116405 SUR 0,3,SNR
53 02422 000403 JMP .+3
54 02423 004411 JSR ITYPE
55 02424 002421 JMP 0CHRET
56 02425 020422 LDA 0,CHORZ
57 02426 034422 LDA 3,CHAR7
58 02427 117405 AND 0,3,SNR

```

```

A 0032 .MAIN
01
02 02430 002415 JMP 0CHRET
03 02431 020420 LDA 0,CH240
04 02432 004402 JSR ITYPE
05 02433 000772 JMP .-6
06
07 02434 010413 ITYPE: ISZ CHORZ
08 02435 003511 SKPBZ TIO
09 02436 000777 JMP .-1
10 02437 001111 DDAS 0,TIO
11 02440 003511 SKPBZ TIO
12 02441 000777 JMP .-1
13 02442 001400 JMP 0,3
14
15 02443 000212 C212: 212
16 02444 000011 CHTAB: 11
17 02445 000000 CHRET: 0
18 02446 000000 CHSAV: 0
19 02447 000000 CHORZ: 0
20 02450 000007 CHAR7: 7
21 02451 000240 CH240: 240
22
23
24 02452 000000 TABLE: 0
25
26 .TXT /COPYRIGHT (C) DGC,1971,72,74,76
02453 047503
02454 054520
02455 044522
02456 044107
02457 020124
02460 041450
02461 020051
02462 043504
02463 026103
02464 034461
02465 030467
02466 033454
02467 026062
02470 032067
02471 033454
27 02472 040466 ALL RIGHTS RESERVED/
02473 046114
02474 051040
02475 043511
02476 052110
02477 020123
02500 042522
02501 042523
02502 053122
02503 042105
02504 000000
28

```

A 0033 .MAIN

01
02 .IFE NOVA2SW
03 DIRT: .TXTE 18TTYTST 51

04
05
06
07
08
09
10
11
12
13
14
15
000001 DIRT: .IFN NOVA2SW
.TXTE 1N2TTYTST 51

02505 131116
02506 152324
02507 152131
02510 152123
02511 032640
02512 000000
16 02513 000000
17 02514 000144
18 02515 157772
19 02516 000300
20 02517 000000
21 02520 000000
22 02521 000000
23 02522 100010
24
25
26

000000
HERE
137772
000300
000000
000000
000000
100010
.ENDC

.END IEND OF SOURCE TAPE

0034 .MAIN

ALP 002270 29/54 30/02
ALPM 002264 7/41 29/52 29/55
ALPHA 000073 7/15 7/41
B10 001501 22/02
B11 001515 22/15
B11A 001530 22/26
B12 001532 22/29
B12A 001547 22/31 22/34 22/42
B13 001550 23/02
B13A 001562 23/04 23/12
B14 001565 23/16
B14A 001600 23/18 23/27
B15 001604 23/35
B16 001623 24/02
B16A 001637 24/06 24/14
B17 001643 24/19
B17A 001657 24/21 24/31
B18 001661 24/34
B18A 001674 24/36 24/45
BEG 000074 7/12 7/42 8/47 8/51 9/32
BEGIN 000774 7/42 14/02
BROKE 000111 8/13 12/06 12/13 13/07
C10 000142 8/38 8/49
C11 000143 8/39 11/21
C12 000130 8/28 29/48
C1355 000107 8/11 12/04 12/47
C177 000123 8/23 11/19 13/38
C20K 000137 8/35 11/13
C212 002443 32/15
C215 000127 8/27 29/46
C232 000136 8/34 10/28
C377 000125 8/25 10/37 29/27
C4 000122 8/22
C4000 000131 8/29
C60 002404 31/03 31/19 31/23 31/39
C60K 000052 7/23 9/06 9/15 9/23 9/27
COVCO 000050 7/21 9/08 9/16 9/39
CM240 002451 32/03 32/21
CHAR 002250 29/34 29/38 29/47 29/49
CHAR7 002450 31/57 32/20
CHORZ 002447 31/56 32/07 32/19
CHRET 002445 31/40 31/55 32/02 32/17
CHSAV 002446 31/43 31/49 32/18
CHTAB 002444 31/11 31/51 32/16
CINTR 000132 8/30 13/10
CIOT 000056 7/27 9/37
CM100 000060 7/29 12/12 13/06
CNIOC 001172 16/37 17/05
CNTR 000135 8/33 10/23 10/38 10/39
CR15 000126 8/26 10/25
CRA 000113 8/15 12/14 12/34 13/04
CRLF 002256 7/25 8/36 29/45
CTABF 000134 8/32 10/16 10/22 10/40
CTABL 000133 8/31 10/15 10/48
CTIMH 000066 7/36 10/03
CYCLE 002212 7/34 29/05
CYCTS 002224 29/07 29/16
DECOC 002346 31/08 31/27 31/28
DECOT 002356 31/16 31/21

0035 .MAIN

DECP	002364	31/17	31/22						
DEVC1	000443	9/42	9/53						
DEVC2	000450	9/41	9/47						
DEVC0	000433	9/13	9/20	9/34	9/45				
DEVRE	000055	7/26	9/34	9/46					
DIRT	002505	7/03	33/03	33/15					
DISMI	000741	12/10	12/23	12/30	12/57	13/28			
DVCD	000051	7/22	9/12	9/19	9/25	9/50			
ECHO	000472	7/20	10/14	10/27	10/51	10/53			
ECHO1	000504	10/24	10/50						
ECHO2	000513	10/31	10/36						
ECHO3	000521	10/30	10/37						
ECHO4	000540	10/33	10/52						
ECHX	000047	7/14	7/20						
EGGS	002072	27/30							
EMALT	000052	7/32	14/12	14/17	14/24	14/30	14/37	14/44	14/51
		15/06	15/14	15/21	15/28	15/34	15/40	16/07	16/14
		16/21	16/27	16/46	17/10	17/16	17/23	18/06	18/12
		18/20	18/30	18/40	18/49	19/08	19/17	19/26	19/35
		19/42	19/49	20/05	20/17	20/27	20/38	20/48	21/11
		21/22	21/33	21/44	21/54	22/11	22/26	22/41	23/13
		23/26	23/29	23/48	24/15	24/30	24/47	25/06	25/20
		25/28	25/37	25/46	26/08	26/16	26/28	26/42	26/53
		27/11	27/23						
ENTER	002136	7/33	28/14						
EPRIN	002201	28/46	28/52						
ER	000052	7/31	7/32						
ERR	002153	7/31	28/29						
ESWIT	002147	28/18	28/24	28/30	28/34	28/52	28/58	29/10	29/16
FIRST	000053	7/08	7/24	9/35					
HERE	000144	8/44	33/05	33/17					
ICHAR	002405	31/13	31/26	31/40					
ICRLF	000140	8/36	10/14	10/31	14/04	27/38	27/52	28/53	29/52
ICTR	000112	8/14	12/09	12/17	12/19	12/22			
IMESS	000141	8/37	10/34	27/50					
IND4	000061	7/30	24/03						
INTR	000575	7/04	8/30	11/30					
IPOCT	002152	28/27	28/57						
ITR	002145	28/15	28/22	29/08					
ITRCT	002146	28/16	28/23	29/06	29/09				
ITYPE	002434	31/54	32/04	32/07					
K40	001170	16/30	17/03						
LAST	000054	7/25	9/43						
LEO25	002100	25/12	27/37						
LOOP	000064	7/34	14/13	14/18	14/25	14/31	14/38	14/45	14/52
		15/07	15/15	15/22	15/29	15/35	15/41	16/08	16/15
		16/22	16/28	16/47	17/11	17/17	17/24	18/07	18/15
		18/23	18/31	18/41	18/50	19/09	19/18	19/27	19/36
		19/43	19/50	20/06	20/18	20/28	20/39	20/49	21/12
		21/23	21/34	21/45	21/55	22/13	22/27	22/42	23/14
		23/30	23/49	24/17	24/32	24/48	25/07	25/21	25/29
		25/38	25/47	26/11	26/17	26/29	26/43	26/54	27/12
		27/25							
LOOPR	002151	28/14	28/20	28/26	29/13	29/21			
LT	000117	8/19	12/43						
M100	000057	7/28	9/22	9/48					
MAIN	000711	7/39	7/40	13/02					
MAIN1	000726	13/16	13/25	13/26					
MAINC	000072	7/17	7/40						

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MAINR	000071	7/16	7/39						
MESS	002233	8/37	29/24	29/35					
MESSR	000124	8/24	29/24	29/25	29/36	29/45	29/50		
NOVA2	000001	33/02	33/14						
OCTAB	002372	31/04	31/28						
OCTR	000115	8/17	12/37	12/39	12/51				
PASS	000070	7/38	14/03						
PMESS	002336	27/51	30/11						
POCT	002341	28/27	31/03						
RADRE	002403	31/05	31/10	31/38					
RAND	000114	8/16	12/25	12/41	13/16				
RANI	000110	8/12	12/05	12/26					
RANO	000116	8/18	12/42	12/48					
RETUR	002150	28/25	28/29	28/32	28/33	28/44	28/45	29/05	29/14
		29/22							
SAV0	000077	8/03	11/30	13/28					
SAV1	000100	8/04	11/31	13/29					
SAV2	000101	8/05	11/32	13/30					
SAV3	000102	8/06	11/33	13/33					
SAVC	000103	8/07	11/35	13/31					
SETUP	000063	7/33	14/10	14/15	14/20	14/27	14/33	14/40	14/47
		15/03	15/09	15/17	15/24	15/31	15/37	16/02	16/10
		16/17	16/24	16/32	17/07	17/13	17/19	18/02	18/09
		18/17	18/25	18/33	18/43	19/02	19/11	19/20	19/29
		19/38	19/45	20/02	20/08	20/20	20/30	20/41	21/02
		21/14	21/25	21/36	21/47	22/02	22/15	22/29	23/02
		23/16	23/35	24/02	24/19	24/34	25/02	25/15	25/23
		25/31	25/40	26/02	26/13	26/19	26/32	26/45	27/02
		27/14							
START	000400	7/24	8/54	9/04					
SWIT1	000046	7/13	7/19						
SWITC	000457	7/19	10/02	10/12					
T00	001001	14/08	27/56						
T02	001007	14/15							
T04	001013	14/20							
T06	001021	14/27							
T08	001026	14/33							
T10	001034	14/40							
T12	001042	14/47							
T14	001050	15/03							
T16	001055	15/09							
T18	001064	15/17							
T20	001072	15/24							
T22	001100	15/31							
T24	001105	15/37							
T26	001112	16/02							
T28	001121	16/10							
T30	001127	16/17							
T32	001135	16/24							
T36	001144	16/32	16/50						
T54	001173	17/07							
T56	001200	17/13							
T58	001205	17/19							
T60	001213	18/02							
T64	001221	18/09							
T66	001230	18/17							
T68	001237	18/25							
T70	001246	18/33							
T72	001257	18/43							