```
 0001 .MAIN MACRO REV 01                    09:39:58 09/04/75
01
02                ;                                        RCSL: 44-RT 1001
03                ;                                        AUTHOR: JESPER JOHANSEN
04                ;                                        EDITED: 75.09.02
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23
24                ;                  TESTPROGRAM FOR
25                ;                   TTC 705/706
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39
40                ;        BINARY TAPE: RCSL: 44-RT 1003
41                ;        ASCII TAPE:  RCSL: 44-RT 1002
42                ;        BINARY CARDS:RCSL: 44-RT 1015
43
44                ; KEYWORDS: RC 3600, TTC 705, TTC 706, TEST PROGRAM
```

```
!0002 .MAIN
01              ;*****************************************************************
02              ;
03              ;
04              ; DESCRIPTION: TESTPROGRAM FOR TTC 705/706
05              ;
06              ; REVISION HISTORY:
07              ;
08              ;       REV.            DATE            INITIALS
09              ;
10              ;       00              75.09.04        JJO
11              ;
12              ;
13              ; COPYRIGHT (C) A/S REGNECENTRALEN, 1975
14              ; ALL RIGHTS RESERVED.
15              ;*****************************************************************
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```
!0003 .MAIN
01                ;                DIAGNOSTIC FOR TTC 705 AND TTC 706
02                ;1.      ABSTRACT
03                ;             THE DIAGNOSTIC IS A MAINTENANCE PROGRAM
04                ;             DESIGNED TO TEST THE TTC 705 AND TTC 706
05                ;             HARDWARE.
06                ;             IF MORE THAN ONE TTY-CONTROLER
07                ;             IS USED THE PROGRAM REQUESTS THAT THE
08                ;             OPERATOR TYPE IN THE PARAMETER FOR THE
09                ;             OUTPUT AND INPUT DEVICE CODES.
10                ;
11                ;2.      MACHINE REQUIREMENTS
12                ;2.1          RC 3601D CENTRAL PROCESSOR
13                ;2.2          4K READ/WRITE MEMORY
14                ;2.3          CONSOLE
15                ;2.4          TTC 705 OR TTC 706
16                ;2.5          TEST PLUG
17                ;
18                ;3.      SWITCH SETTINGS
19                ;3.1          MORE THAN ONE CONTROLLER STARTING ADDRESS=000002
20                ;             ONLY ONE CONTROLLER STARTING ADDRESS=000003
21                ;3.2          SWITCH 0(1) WHEN THE PROGRAM IS STARTED OR RESTARTED
22                ;             A NEW OPERATOR PARAMETER WILL BE REQUESTED.
23                ;3.3          SWITCH 0(1) PROCEED FROM THE ERROR LOOP.
24                ;3.4          SWITCH 1(1) INHIBIT PRINTING ON CONSOLE TETETYPE.
25                ;3.5          SWITCH 2(1) PRINT THE FAILURE RATE.
26                ;4.      OPERATING PROCEDURE
27                ;4.1          DISCONNECT THE COMMUNICATION EQUIPMENT AND
28                ;             INSERT THE TEST PLUG INTO THE CONNECTOR ON
29                ;             THE CHS 701 BACK PANEL.
30                ;4.2          LOAD THE PROGRAM VIA THE BINARY LOADER
31                ;4.3          SET SWITCHES TO 000002
32                ;4.4          PRESS START
33                ;4.5          IF MORE THAN ONE CONTROLLER IS USED
34                ;             THE PROGRAM WILL REQUEST THE RECVR DEVICE
35                ;             CODE. THE OPERATOR SHOULD TYPE THE DEVICE
36                ;             CODE ASSIGNED TO HIS HARDWARE.
```

```
10004 .MAIN
01                  ;4.6        EXECUTION OF THE PROGRAM WILL NOW BEGIN.
02                  ;4.7        THE PROGRAM WILL NOT REQUEST A NEW PARA-
03                  ;           METER FRAOM THE OPERATOR UPON RESTARTING
04                  ;           UNLESS SWITCH 0 IS SET.
05                  ;4.8        IF NO ERRORS ARE DETECTED THE TIME REQUIRED
06                  ;           TO SEND A WORD (NOM 10 BPS ) WILL BE PRINTED
07                  ;           EVERY PASS. THE TIME PRINTED IS ONLY AN
08                  ;           APPROXIMATION AND MAY CHANGE BY AS MUCH AS
09                  ;           20 MICROSECONDS DUE TO THE METOD OF MEASURE-
10                  ;           MENTS.
11                  ;5.     ERROR DESCRIPTION
12                  ;5.1        IF A MALFUNCTION IS DETECTED THE PROGRAM
13                  ;           WILL HALT AT LOCATION "ERR1+1". THE OPE-
14                  ;           RATOR MAY CHANGE SWITCH SETTINGS AT THIS
15                  ;           TIME IF DESIRED. IF SWITCH 0 AND 1 ARE
16                  ;           ZERO PRESSING CONTINUE WILL CAUSE A
17                  ;           PRINTOUT OF THE ERROR LOCATION. THE RUN-
18                  ;           TIME WILL ENTER A LOOP SUITABLE FOR
19                  ;           SCOPING THE MALFUNCTION.
20                  ;5.2        WHEN THE PROGRAM IS IN A SCOPE LOOP, SET-
21                  ;           TING SWITCH 2(1) WILL CAUSE THE FAILURE
22                  ;           RATE TO BE PRINTED. SETTING SWITCH 0(1)
23                  ;           WILL CAUSE THE PROGRAM TO PROCEED TO THE
24                  ;           NEXT TEST.
25                  ;
26                  ;6.     THEORY OF OPERATION
27                  ;           THIS PROGRAM PERFORMS A GATE BY GATE CHECK
28                  ;           OF THE TTC 705/706 LOGIC. THE DATA LINE DRIVER
29                  ;           AND LINE RECEIVER ARE TESTED IN THE
30                  ;           FOLLOWING MANNER. THE PROGRAM SENDS INFOR-
31                  ;           MATION FROM THE OUTPUT TO THE INPUT. THE
32                  ;           TEST PLUG COMPLETES THE RETURN PATH TO
33                  ;           THE INPUT. THE PROGRAM IS THUS ABLE TO
34                  ;           CHECK ON THE INPUTS DATA SENT TO THE
35                  ;           OUTPUT.
36                  ;7.     MISC
37                  ;           THE TEST PLUG CBL 244 CONSIST OF A WIRE CONNECTING
38                  ;           THE OUTPUT TO THE INPUT.
39          000002          .LOC 2
40 00002 002056          JMP @XF01
41 00003 002057          JMP @XF02
42          000050          .LOC 50
43 00050 000000 TINRET:  0
44 00051 001553 ITIN:    TIN
45 00052 000000 DEVRET:  0
46 00053 000415 FIRST:   T00
47 00054 160077 CIOT:    160077
48 00055 001474 LAST:    CDOA+1
49 00056 000400 XF01:    STRT1
50 00057 000410 XF02:    STRT2
51 00060 000000 WHAT:    0
52 00061 001475 CHCODE:  HCODE
53 00062 001512 IDCODE:  DCODE
54 00063 001613 TIME:    XTIME
55 00064 001741 SETUP:   ENTER
```

```
!0005 .MAIN
01 00065 001761 LOOP:   CYCLE
02 00066 002034 ER:     ERR
03       006066 EHALT=JSR @ER
04 00067 000000 TEST:   0
05 00070 000000 PASS:   0
06 00071 002253 ICRLF:  CRLF
07 00072 002126 IMESS:  MESS
08 00073 000000 DCRET:  0
09 00074 000252 CHARX:  000252
10 00075 000125 CHARY:  000125
11 00076 002150 IDEC:   PDEC
12 00077 002102 XDIV:   DIVID
13 00100 002114 XMUL:   MULT
14 00101 002115 XMUL1:  MULT+1
15 00102 000000 MSAV:   0
16 00103 000000 CALIBR: 0
17 00104 000000 TIMEX:  0
18 00105 061177 CN077:  DOAS 0,77
19 00106 000060 C60:    60
20 00107 000072 C72:    72
21 00110 000144 C144:   144
22 00111 023420 C1750:  23420
23 00112 000012 K144:   12
24 00113 000015 K15:    15
25 00114 000177 K177:   177
26 00115 000037 K37:    37
27 00116 000377 K377:   377
28 00117 177760 M20:    -20
29 00120 177720 M60:    -60
30 00121 177700 M100:   -100
31 00122 060040 C60K:   060040
32 00123 000000 DVCD:   0
33 00124 000000 CDVCD:  0
34       000040 .TTI=40
35       000041 .TTO=41
36 00125 000003 C3:     3
37 00126 000003 ITR:    3
38 00127 000012 C12:    12
39 00130 000000 WHICH:  0
40 00131 000004 K4:     4
41 00132 000012 K12:    12
42 00133 177772 M6:     -6
43 00134 000000 CLIB1:  0
44 00135 000000 XTSV0:  0
45 00136 000000 XMULT:  0
46 00137 000010 TTYC1:  10
47 00140 000011 TTYC2:  11
```

```
!0006 .MAIN
01
02          000400              .LOC 400
03 00400 102520 STRT1:  SUBZL 0,0
04 00401 040067         STA 0,TEST
05 00402 060477         READS 0
06 00403 101100         MOVL 0,0            ;REQUEST OPERATOR PARAMETERS
07 00404 020060         LDA 0,WHAT          ;IF SWITCH 0(1) OR C(WHAT)=0
08 00405 101067         MOVC 0,0,SBN
09 00406 006062         JSR @IDCODE         ;REQUEST INPUT
10 00407 000404         JMP T00-2
11
12 00410 102400 STRT2:  SUB 0,0
13 00411 040067         STA 0,TEST
14 00412 006061         JSR @CHCODE
15 00413 102620         SUBZR 0,0           ;INIT FOR POSSIBLE INTERRUPT.
16 00414 040001         STA 0,1
17
18 00415 006064 T00:    JSR @SETUP          ;THE SELB LINE IS
19 00416 063500         SKPBZ 0             ;GROUNDED.
20 00417 006066         EHALT               ;CHECK 1003A29
21 00420 006065         JSR @LOOP
22
23 00421 006064 T01:    JSR @SETUP          ;THE SELD LINE IS
24 00422 063700         SKPDZ 0             ;GROUNDED.
25 00423 006066         EHALT               ;CHECK 1003B29
26 00424 006065         JSR @LOOP
27
28 00425 006064 T02:    JSR @SETUP          ;TTO SHOULD NOT BE
29 00426 060241         NIOC .TTO           ;BUSY,ITS BEEN CLEARED
30 00427 062677         IORST               ;IN TWO DIFFIRENT WAYS.
31 00430 063541         SKPBZ .TTO          ;CHECK TTO1 BUSY INPUT
32 00431 006066         EHALT               ;TO SELB LINE 1003A29
33 00432 006065         JSR @LOOP
34
35 00433 006064 T03:    JSR @SETUP          ;TTI SHOULD NOT BE BUSY
36 00434 060240         NIOC .TTI           ;IT HAS BEEN CLEARED IN
37 00435 062677         IORST               ;TWO WAYS.CHECK TTI1 INPUT
38 00436 063540         SKPBZ .TTI          ;TO SELB LINE 1003A29
39 00437 006066         EHALT               ;CHECK THE FLOP
40 00440 006065         JSR @LOOP
41
42 00441 006064 T04:    JSR @SETUP          ;TTO SHOULD NOT BE DONE
43 00442 060241         NIOC .TTO           ;IT HAS BEEN CLEARED
44 00443 062677         IORST               ;IN TWO WAYS. CHECK
45 00444 063741         SKPDZ .TTO          ;TTO INPUT TO SELD 1003B29
46 00445 006066         EHALT               ;ALSO THE DONE FLOP
47 00446 006065         JSR @LOOP
48
49 00447 006064 T05:    JSR @SETUP          ;TTI SHOULD NOT BE DONE
50 00450 060240         NIOC .TTI           ;IT HAS BEEN CLEARED
51 00451 062677         IORST               ;IN TWO WAYS. CHECK
52 00452 063740         SKPDZ .TTI          ;TTI INPUT TO SELD 1003 B29
53 00453 006066         EHALT               ;ALSO THE TTI DONE FLOP.
54 00454 006065         JSR @LOOP
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!0007 .MAIN
01 00455 006064 T06:    JSR @SETUP      ;TTO BUSY CAN NOT
02 00456 060141         NIOS .TTO       ;CLEARED BY I/O RESET
03 00457 060241         NIOC .TTO       ;RESET OR A CLEAR
04 00460 062677         IORST           ;PULSE. CHECK THE "AND"
05 00461 063541         SKPBZ .TTO      ;GATES AND THE
06 00462 006066         EHALT           ;CLEAR INPUT TO TTO
07 00463 006065         JSR @LOOP       ;BUSY.
08 00464 006064 T07:    JSR @SETUP      ;TTO BUSY CAN'T BE
09 00465 060141         NIOS .TTO       ;BE CLEARED BY I/O
10 00466 062677         IORST           ;CHECK THE 'AND'
11 00467 063541         SKPBZ .TTO      ;GATES FORMING THE I/O
12 00470 006066         EHALT           ;RESET PULSE SIGNAL.
13 00471 006065         JSR @LOOP
14
15 00472 006064 T08:    JSR @SETUP      ;THE CLEAR PULSE TO
16 00473 060141         NIOS .TTO       ;THE TTO BUSY FLOP
17 00474 060241         NIOC .TTO       ;FAILED. CHECK THE GATE FORMING
18 00475 063541         SKPBZ .TTO      ;(CLEAR,TTO SELECT) ALSO
19 00476 006066         EHALT           ;I/O RESET PULSE TO
20 00477 006065         JSR @LOOP       ;CLEAR INPUT OF FLOP.
21
22 00500 006064 T09:    JSR @SETUP      ;SELECTING TTO SET
23 00501 060041         NIO .TTO        ;ITS BUSY FLOP
24 00502 063541         SKPBZ .TTO      ;'AND' GATE (START,
25 00503 006066         EHALT           ;TTO SELECT),NO START
26 00504 006065         JSR @LOOP       ;PULSE WAS ISSUED.
27
28 00505 006064 T10:    JSR @SETUP      ;A START PULSE TO
29 00506 060100         NIOS 0          ;A DEVICE NOT THE TTO
30 00507 063541         SKPBZ .TTO      ;SET TTO BUSY.CHECK
31 00510 006066         EHALT           ;THE TTO SELECT INPUT.
32 00511 006065         JSR @LOOP
33
34 00512 006064 T11:    JSR @SETUP      ;THE TTI BUSY FLOP
35 00513 060140         NIOS .TTI       ;WAS NOT CLEARED BY
36 00514 060240         NIOC .TTI       ;A CLEAR PULSE OR
37 00515 062677         IORST           ;I/O RESET. CHECK CLEAR
38 00516 063540         SKPBZ .TTI      ;INPUT TO FLOP
39 00517 006066         EHALT
40 00520 006065         JSR @LOOP
41
42 00521 006064 T12:    JSR @SETUP      ;THE TTI BUSY FLOP
43 00522 060140         NIOS .TTI       ;WAS NOT CLEARED BY
44 00523 062677         IORST           ;I/O RESET. CHECK
45 00524 063540         SKPBZ .TTI      ;I/O RESET INPUT TO
46 00525 006066         EHALT           ;CLEAR SIDE OF TTI BUSY.
47 00526 006065         JSR @LOOP
```

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!0008 .MAIN
01 00527 006064 T13:    JSR @SETUP      ;THE TTI BUSY FLOP
02 00530 060140         NIOS .TTI       ;WAS NOT CLEARED BY
03 00531 060240         NIOC .TTI       ;TTI SELECT AND A
04 00532 063540         SKPBZ .TTI      ;CLEAR PULSE. CHECK
05 00533 006066         EHALT           ;'AND' GATE.
06 00534 006065         JSR @LOOP
07
08 00535 006064 T14:    JSR @SETUP      ;SELECTING THE TTI
09 00536 060040         NIO .TTI        ;WITHOUT A START
10 00537 063540         SKPBZ .TTI      ;PULSE SET TTI
11 00540 006066         EHALT           ;BUSY. CHECK
12 00541 006065         JSR @LOOP       ;SELECT GATES
13
14 00542 006064 T15:    JSR @SETUP      ;START AND TTO SELECT
15 00543 060141         NIOS .TTO       ;FAILED TO SET TTO
16 00544 063441         SKPBN .TTO      ;BUSY. CHECK SELB 1003A29
17 00545 006066         EHALT           ;BUSY FLOP, ETC,ETC.
18 00546 006065         JSR @LOOP
19
20 00547 006064 T16:    JSR @SETUP      ;THE BUSY FLOP (TTO)
21 00550 060141         NIOS .TTO       ;WAS GATED ON TO THE
22 00551 063500         SKPBZ 0         ;SELB LINE 1003A29
23 00552 006066         EHALT           ;WITHOUT TTO SELECT
24 00553 006065         JSR @LOOP       ;BEING PRESENT.
25
26 00554 006064 T17:    JSR @SETUP      ;THE TTO BUSY FLOP
27 00555 060141         NIOS .TTO       ;WAS CLEARED VIA A
28 00556 060200         NIOC 0          ;CLEAR PULSE WITH-
29 00557 063441         SKPBN .TTO      ;OUT TTO SEELECT
30 00560 006066         EHALT
31 00561 006065         JSR @LOOP
32
33 00562 006064 T18:    JSR @SETUP      ;THE TTO BUSY FLOP
34 00563 060141         NIOS .TTO       ;WAS CLEARED VIA
35 00564 060041         NIO  .TTO       ;SELECTING THE TTO
36 00565 063441         SKPBN .TTO      ;WITHOUT A CLEAR PULSE.
37 00566 006066         EHALT
38 00567 006065         JSR @LOOP
39
40 00570 006064 T19:    JSR @SETUP      ;THE TTO FLAG WAS
41 00571 061141         DOAS 0,.TTO     ;CLEARED VIA DEVICE
42 00572 060213         NIOC 13         ;CODE 13. CHECK
43 00573 063441         SKPBN .TTO      ;INPUT TO DEVICE
44 00574 006066         EHALT           ;SELECT.
45 00575 006063         JSR @TIME
46 00576 063541         SKPBZ .TTO
47 00577 006065         JSR @LOOP
48
49 00600 006064 T20:    JSR @SETUP      ;THE TTI BUSY FLOP
50 00601 060140         NIOS .TTI       ;FAILED TO SET VIA
51 00602 063440         SKPBN .TTI      ;A START PULSE.
52 00603 006066         EHALT
53 00604 060240         NIOC .TTI
54 00605 006065         JSR @LOOP
```

```
10009 .MAIN
01 00606 006064 T21:    JSR @SETUP      ;SETTING TTI BUSY
02 00607 060140         NIOS .TTI       ;CAUSED SELB
03 00610 063500         SKPBZ 0         ;LINE 1003A29 TO GO LOW
04 00611 006066         EHALT           ;WITHOUT TTI SELECT.
05 00612 060240         NIOC .TTI       ;CHECK TTI BUSY GATE(TTI1BUSY,
06 00613 006065         JSR @LOOP       ;TTI1SEL).
07
08 00614 006064 T22:    JSR @SETUP      ;SETTING TTO DONE
09 00615 061141         DOAS 0,.TTO     ;CAUSED ALL DONE
10 00616 006063         JSR @TIME       ;FLAGS TESTING TO SKIP.
11 00617 063541         SKPBZ .TTO      ;DONE IS GATED ONTO
12 00620 063700         SKPDZ 0         ;SELD 1003B29 WITHOUT
13 00621 006066         EHALT           ;DEVICE SELECT.
14 00622 006065         JSR @LOOP
15
16 00623 006064 T23:    JSR @SETUP      ;BOTH A I/O RESET
17 00624 061141         DOAS 0,.TTO     ;AND A CLEAR PULSE
18 00625 006063         JSR @TIME       ;FAILED TO CLEAR
19 00626 063541         SKPBZ .TTO      ;THE DONE FLAG(TTO).
20 00627 060241         NIOC .TTO       ;CHECK THE FSTRT+TTO1SEL+RESET
21 00630 062677         IORST           ;PULSE,THE FOLLOWING
22 00631 063741         SKPDZ .TTO      ;INVERTER,THE
23 00632 006066         EHALT           ;DONE FLOP ITSELF.
24 00633 006065         JSR @LOOP
25
26 00634 006064 T24:    JSR @SETUP      ;A I/O RESET FAILED
27 00635 061141         DOAS 0,.TTO     ;TO CLEAR THE TTO
28 00636 006063         JSR @TIME       ;DONE FLOP. INPUT
29 00637 063541         SKPBZ .TTO      ;AND FLOP ITSELF.
30 00640 062677         IORST
31 00641 063741         SKPDZ .TTO
32 00642 006066         EHALT
33 00643 006065         JSR @LOOP
34
35 00644 006064 T25:    JSR @SETUP      ;A TTO CLEAR PULSE
36 00645 061141         DOAS 0,.TTO     ;FAILED TO RESET
37 00646 006063         JSR @TIME       ;TTO DONE. CHECK
38 00647 063541         SKPBZ .TTO      ;THE GATES THAT
39 00650 060241         NIOC .TTO       ;PRODUCE THE CLEAR SIGNAL
40 00651 063741         SKPDZ .TTO      ;FOR THE DONE FLOP.
41 00652 006066         EHALT
42 00653 006065         JSR @LOOP
43
44 00654 006064 T26:    JSR @SETUP      ;A TTO STRT PULSE
45 00655 061141         DOAS 0,.TTO     ;FAILED TO CLEAR TTO
46 00656 006063         JSR @TIME       ;DONE.CHECK THE
47 00657 063541         SKPBZ .TTO      ;GATES THAT PRODUCES
48 00660 061141         DOAS 0,.TTO     ;THE -,CLRTTO1DN PULSE
49 00661 063741         SKPDZ .TTO
50 00662 006066         EHALT
51 00663 006065         JSR @LOOP
```

```
10010 .MAIN
01 00664 006064 T27:    JSR @SETUP          ;THE -,SETTTO1DN PULSE
02 00665 102000         ADC 0,0             ;FAILED TO CLEAR BUSY.
03 00666 061141         DOAS 0,.TTO         ;CHECK TEH TWO INVERTERS,
04 00667 006063         JSR @TIME           ;AND THE UART.
05 00670 063541         SKPBZ .TTO
06 00671 063541         SKPBZ .TTO
07 00672 006066         EHALT
08 00673 006065         JSR @LOOP
09
10 00674 006064 T28:    JSR @SETUP          ;TRY TO SET DONE
11 00675 102000         ADC 0,0             ;VIA -,SETTTO1DN.CHECK
12 00676 061141         DOAS 0,.TTO         ;SELD 1003B29
13 00677 006063         JSR @TIME           ;INPUTS AND
14 00700 063541         SKPBZ .TTO          ;THE TTO DONE FLOP
15 00701 063641         SKPDN .TTO          ;OUTPUT,RESET AND
16 00702 006066         EHALT               ;CLOCK INPUTS
17 00703 006065         JSR @LOOP
18
19 00704 006064 T29:    JSR @SETUP
20 00705 102520         SUBZL 0,0           ;A BIT 15 WAS READ
21 00706 065477         INTA 1              ;IN ON INTA. CHECK
22 00707 107414         AND# 0,1,SZR        ;GATES THAT RESPOND TO INTA
23 00710 006066         EHALT
24 00711 006065         JSR @LOOP
25
26 00712 006064 T30:    JSR @SETUP          ;AFTER A I/O RESET
27 00713 061477         INTA 0              ;(ISSUED BY SETUP) INTA
28 00714 101004         MOV 0,0,SZR         ;SHOULD READ BACK NO
29 00715 006066         EHALT               ;BITS, BUT IT DID
30 00716 006065         JSR @LOOP           ;GET BITS BACK.
31
32 00717 006064 T31:    JSR @SETUP          ;SET THE TTO
33 00720 102000         ADC 0,0             ;DONE FLAG. THEN
34 00721 062077         MSKO 0              ;PERFORM AN INTA
35 00722 062677         IORST               ;AND CHECK IF
36 00723 061141         DOAS 0,.TTO         ;ANY BITS WERE
37 00724 006063         JSR @TIME           ;RECEIVED BY THE
38 00725 063541         SKPBZ .TTO          ;CPU.
39 00726 061477         INTA 0              ;SUGGEST TTO INT
40 00727 101005         MOV 0,0,SNR                 ;REQUEST FLOP FAILED.
41 00730 006066         EHALT
42 00731 006065         JSR @LOOP
43
44 00732 006064 T32:    JSR @SETUP          ;WITH THE DONE
45 00733 061141         DOAS 0,.TTO         ;FLAG SET INTA
46 00734 006063         JSR @TIME           ;SHOULD READ BACK
47 00735 063541         SKPBZ .TTO          ;TTI OR TTO CODES.
48 00736 061477         INTA 0
49 00737 024123         LDA 1,DVCD
50 00740 125400         INC 1,1
51 00741 106405         SUB 0,1,SNR
52 00742 000403         JMP .+3
53 00743 125224         MOVZR 1,1,SZR
54 00744 006066         EHALT
55 00745 006065         JSR @LOOP
```

```
!0011 .MAIN
01 00746 006064 T33:    JSR @SETUP      ;A MSKO WITH BIT 15
02 00747 061141         DOAS 0,.TTO     ;ZERO SHOULD NOT
03 00750 006063         JSR @TIME       ;CHANGE THE STATE OF
04 00751 063541         SKPBZ .TTO      ;TTO INT DISABLE.
05 00752 102400         SUB 0,0         ;NO BITS WERE READ
06 00753 062077         MSKO 0          ;BACK ON INTA HOW-
07 00754 061477         INTA 0          ;EVER.CHECK DATA15
08 00755 101005         MOV 0,0,SNR     ;INPUT TO TTO INT
09 00756 006066         EHALT           ;DISABLE FLOP.
10 00757 006065         JSR @LOOP
11
12 00760 024123         LDA 1,DVCD
13 00761 125400         INC 1,1
14 00762 044402         STA 1,.+2
15 00763 101001         MOV 0,0,SKP
16 00764 000000 T34A:   0
17 00765 006064 T34:    JSR @SETUP      ;THE DEVICE CODE
18 00766 061141         DOAS 0,.TTO     ;READ BACK FOR
19 00767 006063         JSR @TIME       ;THE TTY SHOULD
20 00770 063541         SKPBZ .TTO      ;BE CONTENTS OF T34A
21 00771 061477         INTA 0
22 00772 111000         MOV 0,2
23 00773 024771         LDA 1,T34A
24 00774 146405         SUB 2,1,SNR     ;SOME OTHER CODE BESIDE TTO
25 00775 000403         JMP .+3         ;OR TTI WAS READ IN.
26 00776 125224         MOVZR 1,1,SZR   ;ON A HALT,
27 00777 006066         EHALT           ;EXAMINE C(0).
28 01000 006065         JSR @LOOP
29
30 01001 006064 T35:    JSR @SETUP      ;THE TTO INT DISABLE
31 01002 102520         SUBZL 0,0       ;FLOP IS SET VIA
32 01003 062077         MSKO 0          ;MSKO THEN CLEARED
33 01004 062677         IORST           ;VIA I/O RESET. NO
34 01005 061141         DOAS 0,.TTO     ;BITS WERE READ BACK.
35 01006 006063         JSR @TIME       ;SUGGEST I/O RESET
36 01007 063541         SKPBZ .TTO      ;FAILED TO CLEAR
37 01010 061477         INTA 0          ;TTO INT DISABLE FLOP.
38 01011 101005         MOV 0,0,SNR     ;OR ITS INPUT TO TTO
39 01012 006066         EHALT           ;INT REQ FAILED.
40 01013 006065         JSR @LOOP
41
42 01014 006064 T36:    JSR @SETUP      ;THE TTO INT DISABLE
43 01015 102000         ADC 0,0         ;FLOP EITHER FAILED TO
44 01016 062077         MSKO 0          ;SET VIA MSKO OR
45 01017 061141         DOAS 0,.TTO     ;THE NOR GATE
46 01020 006063         JSR @TIME       ;(-,TTO1DN,TTO1INT DIS)
47 01021 063541         SKPBZ .TTO      ;FAILED, BECAUSE IT
48 01022 061477         INTA 0          ;DID NOT PREVENT
49 01023 101004         MOV 0,0,SZR     ;TTO INT REQ FROM
50 01024 006066         EHALT           ;SETTING
51 01025 006065         JSR @LOOP
```

```
!0012 .MAIN
01 01026 006064 T37:    JSR @SETUP          ;DIA DID NOT
02 01027 102000         ADC 0,0             ;CHANGE THE CONTENTS
03 01030 060440         DIA 0,.TTI          ;OF AC0
04 01031 100015         COM# 0,0,SNR
05 01032 006066         EHALT
06 01033 006065         JSR @LOOP
07
08 01034 006064 T38:    JSR @SETUP          ;RECEIVING CHARACTERS
09 01035 060140         NIOS .TTI
10 01036 102000         ADC 0,0
11 01037 061141         DOAS 0,.TTO
12 01040 006063         JSR @TIME
13 01041 063641         SKPDN .TTO
14 01042 102000         ADC 0,0
15 01043 061141         DOAS 0,.TTO         ;DID NOT CAUSE DONE
16 01044 006063         JSR @TIME           ;TO SET.
17 01045 063641         SKPDN .TTO          ;IS THE TEST PLUG
18 01046 063640         SKPDN .TTI          ;IN PLACE?
19 01047 006066         EHALT
20 01050 006065         JSR @LOOP
21 01051 006064 T39:    JSR @SETUP          ;THE SETTING OF
22 01052 060140         NIOS .TTI
23 01053 061141         DOAS 0,.TTO         ;TTI DONE DID NOT
24 01054 006063         JSR @TIME           ;CLEAR TTI BUSY.
25 01055 063640         SKPDN .TTI          ;CHECK TTI1DONE
26 01056 063540         SKPBZ .TTI          ;INPUT TO CLOCK. ALSO
27 01057 006066         EHALT               ;DATA INPUT SHOULD BE
28 01060 006065         JSR @LOOP           ;GROUND.
29
30 01061 006064 T40:    JSR @SETUP          ;I/O RESET FAILED
31 01062 060140         NIOS .TTI
32 01063 061141         DOAS 0,.TTO         ;TO CLEAR THE TTI
33 01064 006063         JSR @TIME           ;DONE FLOP. CHECK
34 01065 063640         SKPDN .TTI          ;GATES TO
35 01066 062677         IORST               ;THE RESET SIDE
36 01067 063740         SKPDZ .TTI          ;OF THE
37 01070 006066         EHALT               ;DONE FLOP.
38 01071 006065         JSR @LOOP
39
40 01072 006064 T41:    JSR @SETUP          ;A CLEAR PULSE TO
41 01073 060140         NIOS .TTI
42 01074 061141         DOAS 0,.TTO         ;THE TTI LOGIC FAILED
43 01075 006063         JSR @TIME           ;TO CLEAR DONE.
44 01076 063640         SKPDN .TTI          ;CHECK
45 01077 060240         NIOC .TTI           ;THE GATES TO
46 01100 063740         SKPDZ .TTI          ;RESET SIDE OF DONE.
47 01101 006066         EHALT
48 01102 006065         JSR @LOOP
49
```

```
!0013 .MAIN
01 01103 006064 T42:    JSR @SETUP      ;A START PULSE TO
02 01104 060140         NIOS .TTI
03 01105 061141         DOAS 0,.TTO     ;THE TTI LOGIC FAILED
04 01106 006063         JSR @TIME       ;TO CLEAR DONE.
05 01107 063640         SKPDN .TTI      ;CHECK
06 01110 064540         DIAS 1,.TTI     ;THE GATES TO
07 01111 063740         SKPDZ .TTI      ;RESET SIDE OF DONE.
08 01112 006066         EHALT
09 01113 006063         JSR @TIME
10 01114 063540         SKPBZ .TTI
11 01115 006065         JSR @LOOP
12
13 01116 006064 T43:    JSR @SETUP      ;AFTER A I/O
14 01117 061477         INTA 0          ;RESET INTA SHOULD
15 01120 101004         MOV 0,0,SZR     ;READ NO BITS
16 01121 006066         EHALT
17 01122 006065         JSR @LOOP
18
19 01123 006064 T44:    JSR @SETUP      ;WITH THE DONE FLAG
20 01124 102400         SUB 0,0         ;SET INTA SHOULD
21 01125 062077         MSKO 0          ;READ BACK A DEVICE
22 01126 062677         IORST           ;CODE.CHECK TTI
23 01127 060140         NIOS .TTI
24 01130 061141         DOAS 0,.TTO     ;INT REQ FLOP.
25 01131 006063         JSR @TIME
26 01132 063640         SKPDN .TTI
27 01133 060241         NIOC .TTO
28 01134 061477         INTA 0
29 01135 101005         MOV 0,0,SNR
30 01136 006066         EHALT
31 01137 006065         JSR @LOOP
32 01140 006064 T45:    JSR @SETUP      ;CHECK THAT I/O RESET
33 01141 102520         SUBZL 0,0       ;WILL RESET TTI INT
34 01142 101100         MOVL 0,0        ;DISABLE.
35 01143 062077         MSKO 0          ;SET THE FLOP
36 01144 062677         IORST           ;TRY TO CLEAR
37 01145 060140         NIOS .TTI
38 01146 061141         DOAS 0,.TTO     ;SET DONE
39 01147 006063         JSR @TIME
40 01150 063640         SKPDN .TTI
41 01151 060241         NIOC .TTO
42 01152 061477         INTA 0          ;ECPECT DEVICE CODE.
43 01153 101005         MOV 0,0,SNR
44 01154 006066         EHALT
45 01155 006065         JSR @LOOP
46
```

```
!0014 .MAIN
01 01156 006064 T46:    JSR @SETUP          ;A MSKO INSTRUCTION
02 01157 102400         SUB 0,0             ;WITHOUT A BIT 14
03 01160 062077         MSKO 0              ;SHOULD NOT SET
04 01161 060140         NIOS .TTI
05 01162 061141         DOAS 0,.TTO         ;TTI INT DISABLE, NO
06 01163 006063         JSR @TIME           ;DEVICE CODE WAS READ
07 01164 063640         SKPDN .TTI
08 01165 060241         NIOC .TTO
09 01166 061477         INTA 0              ;SUGGEST THE DATA INPUT
10 01167 101005         MOV 0,0,SNR         ;TO TTI INT DISABLE
11 01170 006066         EHALT               ;FAILED.
12 01171 006065         JSR @LOOP
13
14 01172 006064 T47:    JSR @SETUP          ;TTI INT DISABLE FAILED
15 01173 102520         SUBZL 0,0           ;TO SET ON A MSKO
16 01174 101120         MOVZL 0,0           ;INSTRUCTION OR,THE
17 01175 062077         MSKO 0              ;NOR GATE (TTI INT DISABLE,
18 01176 060140         NIOS .TTI
19 01177 061141         DOAS 0,.TTO         ;-,TTI1DONE) FAILED.
20 01200 006063         JSR @TIME           ;MSKO SHOULD PREVENT
21 01201 063641         SKPDN .TTO          ;INTA FROM READING
22 01202 060241         NIOC .TTO           ;DEVICE CODE.
23 01203 061477         INTA 0
24 01204 101014         MOV# 0,0,SZR
25 01205 006066         EHALT
26 01206 006065         JSR @LOOP
27
28 01207 006064 T48:    JSR @SETUP          ;CHECK THAT I/O RESET
29 01210 102620         SUBZR 0,0           ;WILL CLEAR TTI
30 01211 040001         STA 0,1             ;INT REQ.
31 01212 060140         NIOS .TTI
32 01213 061141         DOAS 0,.TTO
33 01214 006063         JSR @TIME           ;WAIT FOR DONE
34 01215 063640         SKPDN .TTI
35 01216 060241         NIOC .TTO
36 01217 062677         IORST               ;I/O RESET
37 01220 060177         INTEN               ;ENABLE INTERRUPT
38 01221 063477         SKPBN CPU           ;CHECK THAT NO
39 01222 006066         EHALT               ;INTERRUPT OCCURED.
40 01223 060277         INTDS
41 01224 006065         JSR @LOOP
42 01225 034055         LDA 3,LAST
43 01226 025777         LDA 1,-1,3          ;(AC1)=DOAS 0,0
44 01227 034123         LDA 3,DVCD
45 01230 175400         INC 3,3
46 01231 137000         ADD 1,3
47 01232 054102         STA 3,MSAV
48 01233 102520         SUBZL 0,0
49
```

```
!0015 .MAIN
01 01234 006064 T49:    JSR @SETUP      ;A TEST TO INSURE THAT
02 01235 044401         STA 1,.+1
03 01236 000000         0
04 01237 063541         SKPBZ .TTO      ;THE TTO DOES NOT RESPONDE
05 01240 006066         EHALT           ;TO ANY OTHER DEVICE CODE.
06 01241 006065         JSR @LOOP       ;CHECK GATES THAT FORM
07 01242 107000         ADD 0,1         ;TTO SELECT.
08 01243 034102         LDA 3,MSAV
09 01244 136414         SUB# 1,3,SZR
10 01245 000767         JMP T49
11 01246 034105         LDA 3,CN077     ;=DOA 0,77
12 01247 054102         STA 3,MSAV
13 01250 136415         SUB# 1,3 SNR
14 01251 000403         JMP .+3
15 01252 107000         ADD 0,1
16 01253 000761         JMP T49
17
18 01254 101001         MOV 0,0,SKP
19 01255 060577 CN177:  DIAS 0,CPU
20 01256 034055         LDA 3,LAST
21 01257 025400         LDA 1,0,3       ;(AC1)=DIAS 0,0
22 01260 034123         LDA 3,DVCD
23 01261 137000         ADD 1,3
24 01262 054102         STA 3,MSAV
25 01263 152520         SUBZL 2,2
26 01264 006064 T50:    JSR @SETUP      ;A TEST TO INSURE THAT
27 01265 044401         STA 1,.+1
28 01266 000000         0
29 01267 063540         SKPBZ .TTI      ;THE TTI DOES NOT RESPONDE
30 01270 006066         EHALT           ;TO ANY OTHER DEVICE
31 01271 006065         JSR @LOOP       ;CODE.CHECK GATES THAT FORM
32 01272 147000         ADD 2,1         ;TTI SELEST.
33 01273 034102         LDA 3,MSAV
34 01274 136414         SUB# 1,3,SZR
35 01275 000767         JMP T50
36 01276 034757         LDA 3,CN177
37 01277 054102         STA 3,MSAV
38 01300 136415         SUB# 1,3,SNR
39 01301 000403         JMP .+3
40 01302 147000         ADD 2,1
41 01303 000761         JMP T50
```

```
!0016 .MAIN
01 01304 020127          LDA 0,C12        ;CHANGE NUM OF ITERATIONS
02 01305 040126          STA 0,ITR
03
04 01306 020074          LDA 0,CHARX
05 01307 006064 T51:     JSR @SETUP       ;XMIT A CHAR.WAIT TILL
06 01310 060140          NIOS .TTI
07 01311 061141          DOAS 0,.TTO      ;IT IS RECEIVED. CHECK
08 01312 006063          JSR @TIME        ;THAT OUTPUT BUFFER
09 01313 063540          SKPBZ .TTI       ;CONTAINS A NON-ZERO
10 01314 064440          DIA 1,.TTI       ;WORD
11 01315 125005          MOV 1,1,SNR
12 01316 006066          EHALT
13 01317 006065          JSR @LOOP
14
15 01320 030075          LDA 2,CHARY
16 01321 020074          LDA 0,CHARX
17 01322 006064 T52:     JSR @SETUP       ;TEST THE XMTION OF
18 01323 060140          NIOS .TTI
19 01324 061141          DOAS 0,.TTO      ;ALTERNATION ANE'S AND
20 01325 006063          JSR @TIME        ;ZEROS. EACH DATA BIT SHOULD
21 01326 063540          SKPBZ .TTI       ;ALTERNATE BETWEEN VALUES.
22 01327 064440          DIA 1,.TTI       ;AC0=CHAR SENT
23 01330 125232          MOVZR# 1,1,SZC   ;IF BITS 8-15 OF AC1=0
24 01331 000405          JMP .+5                  ;NOTHING IS BEING RECVD
25 01332 106414          SUB# 0,1,SZR             ;CHECK LINE.
26 01333 006066          EHALT
27 01334 020075          LDA 0,CHARY
28 01335 000404          JMP .+4
29 01336 146414          SUB# 2,1,SZR
30 01337 006066          EHALT
31 01340 020074          LDA 0,CHARX
32 01341 006065          JSR @LOOP
33
34 01342 102400          SUB 0,0
35 01343 006064 T53:     JSR @SETUP       ;SEND ALL POSSIBLE NO.S
36 01344 060140          NIOS .TTI
37 01345 061141          DOAS 0,.TTO      ;CHECK INPUTS
38 01346 006063          JSR @TIME        ;C(0) = NO SENT
39 01347 063540          SKPBZ .TTI       ;C(1) = NO RECVD
40 01350 064440          DIA 1,.TTI
41 01351 122414          SUB# 1,0,SZR
42 01352 006066          EHALT
43 01353 006065          JSR @LOOP
44 01354 034116          LDA 3,K377
45 01355 166415          SUB# 3,1,SNR
46 01356 000403          JMP .+3
47 01357 101400          INC 0,0
48 01360 000763          JMP T53
49
50 01361 020125          LDA 0,C3
51 01362 040126          STA 0,ITR        ;RESTORE ITER COUNTER
52 01363 020067          LDA 0,TEST
53 01364 101004          MOV 0,0,SZR
54 01365 000403          JMP FINIS
55 01366 002401          JMP @.+1
56 01367 000415          T00
```

```
10017 .MAIN
01 01370 006071 FINIS:  JSR @ICRLF      ;END OF DIAGNOSTIC
02 01371 006071         JSR @ICRLF
03 01372 020070         LDA 0,PASS
04 01373 024115         LDA 1,K37
05 01374 107404         AND 0,1,SZR
06 01375 000403         JMP .+3
07 01376 006072         JSR @IMESS
08 01377 001660         MICRO           ;"CLOCK INTERVAL IN MICRO-SEC
09 01400 010070         ISZ PASS
10 01401 006063         JSR @TIME
11 01402 063511         SKPBZ TTO
12 01403 102520         SUBZL 0,0       ;MAKE CONSTANT FOR 100 MS
13 01404 061114         DOAS 0,RTC      ;START REAL TIME CLOCK
14 01405 006063         JSR @TIME
15 01406 063614         SKPDN RTC
16 01407 102520         SUBZL 0,0
17 01410 061114         DOAS 0,RTC
18 01411 006063         JSR @TIME
19 01412 063614         SKPDN RTC
20 01413 060214         NIOC RTC
21 01414 044103         STA 1,CALIBR    ;TIME FOR 100 MILLISECONDS
22 01415 030131         LDA 2,K4
23 01416 006100         JSR @XMUL
24 01417 030132         LDA 2,K12
25 01420 006077         JSR @XDIV
26 01421 044134         STA 1,CLIB1     ;TIME FOR 40 MILLISECONDS
27 01422 131000         MOV 1,2
28 01423 102000         ADC 0,0
29 01424 061141         DOAS 0,.TTO
30 01425 006063         JSR @TIME
31 01426 063541         SKPBZ .TTO
32 01427 102000         ADC 0,0
33 01430 061141         DOAS 0,.TTO
34 01431 006063         JSR @TIME
35 01432 063541         SKPBZ .TTO      ;TIME THE .TTO CLOCK
36 01433 102000         ADC 0,0
37 01434 061141         DOAS 0,.TTO
38 01435 006063         JSR @TIME
39 01436 063541         SKPBZ .TTO
40 01437 044104         STA 1,TIMEX
```

```
!0018 .MAIN
01 01440 146433          SUBZ# 2,1,SNC    ;SKIP IF TIMEX > 40 MS
02 01441 000407          JMP .+7
03 01442 126520          SUBZL 1,1
04 01443 044112          STA 1,K144       ;YES, CHANGE CONSTANTS
05 01444 024133          LDA 1,M6
06 01445 044130          STA 1,WHICH
07 01446 024104          LDA 1,TIMEX
08 01447 000405          JMP .+5
09 01450 024104          LDA 1,TIMEX
10 01451 125400          INC 1,1
11 01452 125400          INC 1,1
12 01453 125400          INC 1,1
13 01454 030112          LDA 2,K144
14 01455 006100          JSR @XMUL
15 01456 101004          MOV 0,0,SZR
16 01457 000763          JMP .-15         ;OVERFLOW MAY OCCUR,
17 01460 030111          LDA 2,C1750
18 01461 006100          JSR @XMUL
19 01462 030103          LDA 2,CALIBR
20 01463 006077          JSR @XDIV
21 01464 006076          JSR @IDEC        ;PRINT C(1), THE TIME
22 01465 020132          LDA 0,K12        ;REINITIALIZE SWITCH AND CONSTANT
23 01466 040112          STA 0,K144
24 01467 102400          SUB 0,0
25 01470 040130          STA 0,WHICH
26 01471 002401          JMP @.+1
27 01472 000415          T00
```

```
!0019 .MAIN
01 01473 061100 CDOA:   DOAS 0,0        ;A CONSTANT
02 01474 060500 CDIA:   DIAS 0,0        ;ANOTHER CONSTANT
03
04 01475 054073 HCODE:  STA 3,DCRET     ;CHANGE THE .TTO DEVICE
05 01476 024122         LDA 1,C60K      ;CODE TO 11
06 01477 125400         INC 1,1
07 01500 044124         STA 1,CDVCD
08 01501 030140         LDA 2,TTYC2
09 01502 050123         STA 2,DVCD
10 01503 004531         JSR DEVCD
11 01504 024122         LDA 1,C60K      ;CHANGE THE .TTI DEVICE
12 01505 044124         STA 1,CDVCD     ;CODE TO 10
13 01506 030137         LDA 2,TTYC1
14 01507 050123         STA 2,DVCD
15 01510 004524         JSR DEVCD
16 01511 002073         JMP @DCRET      ;RETURN
```

```
!0020 .MAIN
01 01512 054073 DCODE:  STA 3,DCRET      ;OPERATOR INPUT
02 01513 060210         NIOC TTI
03 01514 006071         JSR @ICRLF
04 01515 006072         JSR @IMESS
05 01516 001700         NUMTYPE          ;TYPE IN OCTAL
06 01517 006071         JSR @ICRLF
07 01520 006072         JSR @IMESS       ;TYPE A 2 DIGIT DEVICE
08 01521 001711         NEXNUM           ;CODE AND CARRIAGE
09 01522 004443         JSR ASSDIG
10 01523 000770         JMP DCODE+1      ;ERROR
11 01524 151232         MOVZR# 2,2,SZC   ;MUST BE AN EVEN NUMBER
12 01525 000766         JMP DCODE+1
13 01526 050102         STA 2,MSAV
14 01527 151400         INC 2,2
15 01530 024122         LDA 1,C60K
16 01531 125400         INC 1,1
17 01532 044124         STA 1,CDVCD
18 01533 050123         STA 2,DVCD
19 01534 004500         JSR DEVCD        ;CHANGE THE .TTO DEVICE CODE.
20
21 01535 024122         LDA 1,C60K
22 01536 044124         STA 1,CDVCD
23 01537 030102         LDA 2,MSAV
24 01540 050123         STA 2,DVCD
25 01541 004473         JSR DEVCD        ;CHANGE THE .TTI DEVICE CODE.
26
27 01542 024121         LDA 1,M100
28 01543 020122         LDA 0,C60K       ;CHANGE CONSTANTS FOR NEW
29 01544 123400         AND 1,0
30 01545 024123         LDA 1,DVCD       ;DEVICE CODE ON NEXT RUN
31 01546 123000         ADD 1,0
32 01547 040122         STA 0,C60K
33
34 01550 102000         ADC 0,0
35 01551 040060         STA 0,WHAT       ;SET SWITCH
36 01552 002073         JMP @DCRET
37
38 01553 054050 TIN:    STA 3,TINRET     ;TYPE IN A CHARACTER.
39 01554 063610         SKPDN TTI
40 01555 000777         JMP .-1
41 01556 060610         DIAC 0,TTI
42 01557 061111         DOAS 0,TTO
43 01560 034114         LDA 3,K177
44 01561 163400         AND 3,0
45 01562 063511         SKPBZ TTO
46 01563 000777         JMP .-1
47 01564 002050         JMP @TINRET
```

```
!0021 .MAIN
01 01565 054425 ASSDIG: STA 3,ASSRET     ;ASSEMBLE IN OCTAL
02 01566 152400         SUB 2,2          ;A NUMBER IN AC1.
03 01567 126400         SUB 1,1          ;DECIMAL IN AC2
04 01570 006051         JSR @ITIN
05 01571 034107         LDA 3,C72                ;EXIT+1 IF ERROR
06 01572 116032         ADCZ# 0,3,SZC    ;EXIT+2 IF O.K.
07 01573 034120         LDA 3,M60        ;EXIT ON CARRIAGE
08 01574 117046         ADDO 0,3,SEZ
09 01575 000411         JMP ASS1
10 01576 121000         MOV 1,0          ;C(1)*10
11 01577 127120         ADDZL 1,1
12 01600 107120         ADDZL 0,1
13 01601 167000         ADD 3,1
14 01602 151123         MOVZL 2,2,SNC
15 01603 153120         ADDZL 2,2
16 01604 173003         ADD 3,2,SNC
17 01605 000763         JMP ASSDIG+3
18 01606 034113 ASS1:   LDA 3,K15
19 01607 116415         SUB# 0,3,SNR
20 01610 010402         ISZ ASSRET
21 01611 002401         JMP @ASSRET
22 01612 000000 ASSRET: 0
23
24 01613 040135 XTIME:  STA 0,XTSV0
25 01614 021400         LDA 0,0,3        ;CALCULATE THE TIME
26 01615 126520         SUBZL 1,1
27 01616 125400         INC 1,1
28 01617 044136         STA 1,XMULT      ;JUST LOAD MULTIPLIER WITH SOME #
29 01620 040405         STA 0,.+5
30 01621 126040 XTLUP:  ADCO 1,1
31 01622 125402         INC 1,1,SZC
32 01623 000406         JMP TMULT
  Q01624 102410         SUB# 0,0
34 01625 000000         0
35 01626 000774         JMP .-4
36 01627 020135         LDA 0,XTSV0
37 01630 001401         JMP 1,3
38 01631 014136 TMULT:  DSZ XMULT        ;MULT IS INCLUDED FOR OVRFLO
39 01632 000767         JMP XTLUP        ;OF AC1 ON FAST MACHINES,
40 01633 000774         JMP TMULT-2
```

```
!0022 .MAIN
01 01634 054052 DEVCD:  STA 3,DEVRET     ;FIX DEVICE CODE
02 01635 030053         LDA 2,FIRST
03 01636 021000         LDA 0,0,2
04 01637 024054         LDA 1,CIOT       ;160077
05 01640 123400         AND 1,0
06 01641 024124         LDA 1,CDVCD      ;060040 INITIAL VALUE
07 01642 106415         SUB# 0,1,SNR
08 01643 000406         JMP DEVC2        ;A .TTX INSTRUCTION
09 01644 151400 DEVC1:  INC 2,2
10 01645 020055         LDA 0,LAST
11 01646 112414         SUB# 0,2,SZR
12 01647 000767         JMP DEVCD+2
13 01650 002052         JMP @DEVRET
14 01651 021000 DEVC2:  LDA 0,0,2        ;CHANGE INSTRUCTION
15 01652 024121         LDA 1,M100
16 01653 123400         AND 1,0          ;MASK DEVICE CODE
17 01654 024123         LDA 1,DVCD
18 01655 123000         ADD 1,0          ;NEW DEVICE CODE
19 01656 041000         STA 0,0,2
20 01657 000765         JMP DEVC1
```

```
!0023 .MAIN
01 01660 146303 MICRO:  .TXTE ]CLOCK INTERVAL IN MICRO-SEC.   ]
02       141717
03       120113
04       047311
05       142724
06       053322
07       146101
08       144640
09       120116
10       144515
11       151303
12       026717
13       142523
14       027303
15       120240
16       000240
17 01700 152240 NUMTYPE:.TXTE ] TYPE IN OCTAL  ]
18       050131
19       120305
20       047311
21       147640
22       152303
23       146101
24       120240
25       000000
26 01711 047101 NEXNUM: .TXTE ]AN EVEN 2 DIGIT REC DEVICE CODE AND CARRIAGE   ]
27       142640
28       142526
29       120116
30       120262
31       144504
32       144507
33       120324
34       142722
35       120303
36       142504
37       144526
38       142703
39       141640
40       042317
41       120305
42       047101
43       120104
44       040703
45       151322
46       040711
47       142507
48       120240
49       000240
```

```
10024 .MAIN
01 01741 054417 ENTER:  STA 3,LOOPR      ;LOOP ITERATE RETURN
02 01742 034126         LDA 3,ITR        ;THIS ROUTINE INITIALIZES
03 01743 054406         STA 3,ITRCT      ;EACH TEST
04 01744 176400         SUB 3,3
05 01745 054405         STA 3,ESWIT
06 01746 054405         STA 3,ERRCT
07 01747 062677         IORST            ;,2/0RESET
08 01750 002410         JMP @LOOPR
09
10 01751 000000 ITRCT:  0
11 01752 000000 ESWIT:  0
12 01753 000000 ERRCT:  0
13 01754 000000 RETURN: 0
14 01755 000000 SAV2:   0
15 01756 000000 SAV1:   0
16 01757 000000 SAV0:   0
17 01760 000000 LOOPR:  0
18
19 01761 054773 CYCLE:  STA 3,RETURN     ;END OF TEST ITERATION
20 01762 050773         STA 2,SAV2       ;ROUTINE
21 01763 044773         STA 1,SAV1       ;SAVE THE ACS'
22 01764 040773         STA 0,SAV0
23 01765 014764         DSZ ITRCT
24 01766 000434         JMP CYCTS        ;NOT 100 TIMES ITERATED
25 01767 034126         LDA 3,ITR        ;RESET ITERATION CNTR
26 01770 054761         STA 3,ITRCT
27 01771 074477         READS 3
28 01772 030760         LDA 2,ESWIT      ;IF SWITCH 2=(1)
29 01773 175120         MOVZL 3,3        ;AND A ERROR HAS OCCURED
30 01774 175100         MOVL 3,3         ;THE ERROR RATE WILL
31 01775 151005         MOV 2,2,SNR      ;BE PRINTED
32 01776 000415         JMP NOEX
33 01777 175103         MOVL 3,3,SNC
34 02000 000417         JMP PCENT-1
35 02001 006071         JSR @ICRLF       ;PRINT CARRIAGE
36 02002 024751         LDA 1,ERRCT
37 02003 030110         LDA 2,C144
38 02004 004510         JSR MULT
39 02005 030126         LDA 2,ITR
40 02006 004474         JSR DIVID
41 02007 006465         JSR @IPDEC       ;PRINT VALUE
42 02010 020410         LDA 0,PCENT      ;EXAMPLE:  89%
43 02011 006461         JSR @ICHAR
44 02012 000405         JMP PCENT-1
45 02013 020744 NOEX:   LDA 0,SAV0       ;NORMAL EXIT,NO ERR
46 02014 024742         LDA 1,SAV1
47 02015 030740         LDA 2,SAV2
48 02016 002736         JMP @RETURN
```

```
!0025 .MAIN
01 02017 102401           SUB 0,0,SKP
02 02020 000245 PCENT:    245                ;CHARACTOR
03 02021 040732           STA 0,ERRCT        ;RESET ERROR COUNT
04 02022 020735 CYCTS:    LDA 0,SAV0         ;RESTORE ACS
05 02023 024733           LDA 1,SAV1
06 02024 030731           LDA 2,SAV2
07 02025 034725           LDA 3,ESWIT
08 02026 175004           MOV 3,3,SZR
09 02027 074477           READS 3
10 02030 062677           IORST              ;I/O RESET
11 02031 175113           MOVL# 3,3,SNC      ;SWITCH 0
12 02032 002726           JMP @LOOPR         ;(1)=LOOP ROUTINE
13 02033 002721           JMP @RETURN        ;(0)=PROCEED TO NEXT TEST
14 02034 054720 ERR:      STA 3,RETURN       ;ERROR SUBROUTINE
15 02035 050720           STA 2,SAV2
16 02036 044720           STA 1,SAV1
17 02037 040720           STA 0,SAV0
18 02040 034712           LDA 3,ESWIT
19 02041 175005           MOV 3,3,SNR
20 02042 000407           JMP ERR1
21 02043 030712 ERET:     LDA 2,SAV2         ;RESTORE ACS
22 02044 024712           LDA 1,SAV1
23 02045 020712           LDA 0,SAV0
24 02046 010705           ISZ ERRCT          ;COUNT
   02047 101010           MOV# 0,0           ;ERRORS, I/O RESET
26 02050 002704           JMP @RETURN        ;EXIT
27 02051 034703 ERR1:     LDA 3,RETURN       ;ERROR, C(3)=PC
28 02052 063077           HALT               ;OPERATOR,SET SWITCHS;
29 02053 054677           STA 3,ESWIT
30 02054 074477           READS 3
31 02055 175100           MOVL 3,3
32 02056 175113           MOVL# 3,3,SNC              ;LOOK AT SWITCH 1
33 02057 004402           JSR EPRINT         ;PRINT ERROR DATA
34 02060 000763           JMP ERET
```

```
!0026 .MAIN
01  02061  054671  EPRINT:  STA 3,ESWIT      ;ERROR MESSAGE PRINTER
02  02062  006071           JSR @ICRLF       ;PRINT CARRIAGE
03  02063  006072           JSR @IMESS       ;AND HEADER
04  02064  002075           HEADER
05  02065  020667           LDA 0,RETURN
06  02066  126000           ADC 1,1
07  02067  107000           ADD 0,1
08  02070  004455           JSR POCT         ;PC OF ERROR
09  02071  002661           JMP @ESWIT       ;RETURN TO CALL
10  02072  002224  ICHAR:   CHAR
11  02073  002276  ITYPE:   TYPE
12  02074  002150  IPDEC:   PDEC
13                  HEADER:  .TXT ]
14  02075  041520  PC       ]
15         020040
16         020040
17         020040
18         000000
19  02102  054102  DIVID:   STA 3,MSAV       ;DIVIDE
20  02103  034117           LDA 3,M20
21  02104  125120           MOVZL 1,1
22  02105  101100  DLOOP:   MOVL 0,0
23  02106  142412           SUB# 2,0,SZC
24  02107  142400           SUB 2,0
25  02110  125100           MOVL 1,1
26  02111  175404           INC 3,3,SZR
27  02112  000773           JMP DLOOP
28  02113  002102           JMP @MSAV
29  02114  102460  MULT:    SUBC 0,0         ;MULTIPLY
30  02115  054102           STA 3,MSAV
31  02116  034117           LDA 3,M20
32  02117  125203  MLOOP:   MOVR 1,1,SNC
33  02120  101201           MOVR 0,0,SKP
34  02121  143220           ADDZR 2,0
35  02122  175404           INC 3,3,SZR
36  02123  000774           JMP MLOOP
37  02124  125260           MOVCR 1,1
38  02125  002102           JMP @MSAV
```

```
10027 .MAIN
01 02126 054547 MESS:   STA 3,MESSR      ;PRINT A TEXT MESSAGE
02 02127 010546         ISZ MESSR
03 02130 031400         LDA 2,0,3        ;C(2) POINTS TO MESSAGE
04 02131 024543         LDA 1,C377       ;A 8 BIT MASK
05 02132 021000         LDA 0,0,2        ;C(2)=DATA WORD
06 02133 125112         MOVL# 1,1,SZC
07 02134 123701         ANDS 1,0,SKP
08 02135 123401         AND 1,0,SKP      ;C(0)=DATA CHARACTOR RIGHT
09 02136 151400         INC 2,2          ;INC TO NEXT WORD
10 02137 124000         COM 1,1          ;FLIP MASK
11 02140 004464         JSR CHAR         ;PRINT
12 02141 000771         JMP MESS+4       ;ANOTHER
13 02142 002533         JMP @MESSR       ;LAST
14 02143 020527 ZOCT:   LDA 0,CH240
15 02144 101001         MOV 0,0,SKP
16 02145 020106 POCT:   LDA 0,C60
17 02146 030435         LDA 2,OCTAB      ;PRINT C(1) IN OCTAL
18 02147 000403         JMP .+3
19 02150 030443 PDEC:   LDA 2,DECTB      ;PRINT C(1) IN DECIMAL
20 02151 020521         LDA 0,CH240      ;SUPPRESS LEADING ZEROS
21 02152 054451         STA 3,RADRET     ;BOTH ENTRYS PRINT NUMBER
22 02153 040447         STA 0,ZSUPP      ;THEN TAB TO NEXT POSITION
23 02154 050401         STA 2,.+1
24 02155 000000 DECOCT: 0                ;A"LDA 2,TABLE" INSTRUCTION
25 02156 010777         ISZ .-1
26 02157 034444         LDA 3,RADRET     ;SETUP "TAB" AT END
27 02160 020106         LDA 0,C60        ;UNLESS SWITCH IS SET
28 02161 010130         ISZ WHICH        ;THEN PRINT AN EXTRA ZERO.
29 02162 020503         LDA 0,CHTAB
30 02163 151005         MOV 2,2,SNR      ;IF TABLE ENTRY=0
31 02164 000440         JMP CHAR         ;EXIT WITH TAB
32 02165 034435         LDA 3,ZSUPP      ;ZEROS SUPPRESS STUF
33 02166 102400         SUB 0,0
34 02167 146512 DECOT:  SUBL# 2,1,SZC
35 02170 000405         JMP DECP
36 02171 146400         SUB 2,1          ;FORM THE DIGIT
37 02172 034106         LDA 3,C60
38 02173 101400         INC 0,0
39 02174 000773         JMP DECOT
40 02175 151235 DECP:   MOVZR# 2,2,SNR
41 02176 034106         LDA 3,C60
42 02177 054423         STA 3,ZSUPP      ;C(0)=DIGIT
43 02200 163000         ADD 3,0          ;MAKE ASCIT
44 02201 004423         JSR CHAR         ;PRINT
45 02202 000753         JMP DECOCT       ;GET NEXT DIGIT
```

```
10028 .MAIN
01 02203 030427 OCTAB:  LDA 2,.+1+.-DECOCT
02 02204 100000         100000
03 02205 010000         10000
04 02206 001000         1000
05 02207 000100         100
06 02210 000010         10
07 02211 000001         1
08 02212 000000         0
09 02213 030437 DECTB:  LDA 2,.+1+.-DECOCT
10       000012 .RDX 10
11 02214 023420         10000
12 02215 001750         1000
13 02216 000144         100
14 02217 000012         10
15 02220 000001         1
16 02221 000000         0
17       000010 .RDX 8
18 02222 000000 ZSUPP:  0
19 02223 000000 RADRET: 0
20 02224 054442 CHAR:   STA 3,CHRET      ;PRINT C(0) RIGHT
21 02225 101325         MOVZS 0,0,SNR    ;RETURN +2 IF NULL
22 02226 001401         JMP 1,3
23 02227 040440         STA 0,CHSAV
24 02230 176000         ADC 3,3          ;COMPUTE THE PARITY
25 02231 117000         ADD 0,3
26 02232 163404         AND 3,0,SZR
27 02233 000775         JMP .-3
28 02234 176660         SUBCR 3,3        ;COMBIND PARITY WITH CHAR
29 02235 020432         LDA 0,CHSAV
30 02236 163300         ADDS 3,0
31 02237 034426 CHAR1:  LDA 3,CHTAB      ;IS THIS A TAB
32 02240 116405         SUB 0,3,SNR
33 02241 000403         JMP .+3          ;YES
34 02242 004434         JSR TYPE         ;NO PRINT IT
35 02243 002423         JMP @CHRET       ;EXIT
36 02244 020424         LDA 0,CHORZ      ;SIMULATE A TAB
37 02245 034424         LDA 3,CHAR7              ;VIA 1 TO 8 SPACES
38 02246 117405         AND 0,3,SNR
39 02247 002417         JMP @CHRET
40 02250 020422         LDA 0,CH240
41 02251 004425         JSR TYPE
42 02252 000772         JMP .-6
```

```
!0029 .MAIN
01 02253 054420 CRLF:   STA 3,CRLFR     ;SAVE RETURN
02 02254 020410         LDA 0,C215
03 02255 004747         JSR CHAR        ;PRINT CARRIAGE AND LF
04 02256 020405         LDA 0,C212
05 02257 004745         JSR CHAR
06 02260 102400         SUB 0,0
07 02261 040407         STA 0,CHORZ     ;CLEAR HORZ POSITION
08 02262 002411         JMP @CRLFR      ;EXIT
09 02263 000212 C212:   212
10 02264 000215 C215:   215
11 02265 000011 CHTAB:  11
12 02266 000000 CHRET:  0
13 02267 000000 CHSAV:  0
14 02270 000000 CHORZ:  0
15 02271 000007 CHAR7:  7
16 02272 000240 CH240:  240
17 02273 000000 CRLFR:  0
18 02274 000377 C377:   377
19 02275 000000 MESSR:  0
20 02276 054417 TYPE:   STA 3,TYPRET    ;TYPE THE C(0)R IF
21 02277 010771         ISZ CHORZ
22 02300 034067         LDA 3,TEST
23 02301 175005         MOV 3,3,SNR
24 02302 002413         JMP @TYPRET
25 02303 074477         READS 3         ;SWITCH 1(0).
26 02304 175100         MOVL 3,3
27 02305 175102         MOVL 3,3,SZC
28 02306 002407         JMP @TYPRET     ;INHIBIT TYPE EXIT.
29 02307 063511         SKPBZ TTO
30 02310 000777         JMP .-1
31 02311 061111         DOAS 0,TTO
32 02312 063511         SKPBZ TTO
33 02313 000777         JMP .-1
34 02314 002401         JMP @TYPRET
35 02315 000000 TYPRET: 0
36              .END
```

0030 .MAIN

ASS1	001606	21/09	21/18					
ASSDI	001565	20/09	21/01	21/17				
ASSRE	001612	21/01	21/20	21/21	21/22			
C12	000127	5/38	16/01					
C144	000110	5/21	24/37					
C1750	000111	5/22	18/17					
C212	002263	29/04	29/09					
C215	002264	29/02	29/10					
C3	000125	5/36	16/50					
C377	002274	27/04	29/18					
C60	000106	5/19	27/16	27/27	27/37	27/41		
C60K	000122	5/31	19/05	19/11	20/15	20/21	20/28	20/32
C72	000107	5/20	21/05					
CALIB	000103	5/16	17/21	18/19				
CDIA	001474	19/02						
CDOA	001473	4/48	19/01					
CDVCD	000124	5/33	19/07	19/12	20/17	20/22	22/06	
CH240	002272	27/14	27/20	28/40	29/16			
CHAR	002224	26/10	27/11	27/31	27/44	28/20	29/03	29/05
CHAR1	002237	28/31						
CHAR7	002271	28/37	29/15					
CHARX	000074	5/09	16/04	16/16	16/31			
CHARY	000075	5/10	16/15	16/27				
CHCOD	000061	4/52	6/14					
CHORZ	002270	28/36	29/07	29/14	29/21			
CHRET	002266	28/20	28/35	28/39	29/12			
CHSAV	002267	28/23	28/29	29/13				
CHTAB	002265	27/29	28/31	29/11				
CIOT	000054	4/47	22/04					
CLIB1	000134	5/43	17/26					
CN077	000105	5/18	15/11					
CN177	001255	15/19	15/36					
CRLF	002253	5/06	29/01					
CRLFR	002273	29/01	29/08	29/17				
CYCLE	001761	5/01	24/19					
CYCTS	002022	24/24	25/04					
DCODE	001512	4/53	20/01	20/10	20/12			
DCRET	000073	5/08	19/04	19/16	20/01	20/36		
DECOC	002155	27/24	27/45	28/01	28/09			
DECOT	002167	27/34	27/39					
DECP	002175	27/35	27/40					
DECTB	002213	27/19	28/09					
DEVC1	001644	22/09	22/20					
DEVC2	001651	22/08	22/14					
DEVCD	001634	19/10	19/15	20/19	20/25	22/01	22/12	
DEVRE	000052	4/45	22/01	22/13				
DIVID	002102	5/12	24/40	26/19				
DLOOP	002105	26/22	26/27					
DVCD	000123	5/32	10/49	11/12	14/44	15/22	19/09	19/14
		20/18	20/24	20/30	22/17			
EHALT	006066	5/03	6/20	6/25	6/32	6/39	6/46	6/53
		7/06	7/12	7/19	7/25	7/31	7/39	7/46
		8/05	8/11	8/17	8/23	8/30	8/37	8/44
		8/52	9/04	9/13	9/23	9/32	9/41	9/50
		10/07	10/16	10/23	10/29	10/41	10/54	11/09
		11/27	11/39	11/50	12/05	12/19	12/27	12/37
		12/47	13/08	13/16	13/30	13/44	14/11	14/25
		14/39	15/05	15/30	16/12	16/26	16/30	16/42
ENTER	001741	4/55	24/01					
EPRIN	002061	25/33	26/01					

0031 .MAIN

ER	000066	5/02	5/03					
ERET	002043	25/21	25/34					
ERR	002034	5/02	25/14					
ERR1	002051	25/20	25/27					
ERRCT	001753	24/06	24/12	24/36	25/03	25/24		
ESWIT	001752	24/05	24/11	24/28	25/07	25/18	25/29	26/01
		26/09						
FINIS	001370	16/54	17/01					
FIRST	000053	4/46	22/02					
HCODE	001475	4/52	19/04					
HEADE	002075	26/04	26/13					
ICHAR	002072	24/43	26/10					
ICRLF	000071	5/06	17/01	17/02	20/03	20/06	24/35	26/02
IDCOD	000062	4/53	6/09					
IDEC	000076	5/11	18/21					
IMESS	000072	5/07	17/07	20/04	20/07	26/03		
IPDEC	002074	24/41	26/12					
ITIN	000051	4/44	21/04					
ITR	000126	5/37	16/02	16/51	24/02	24/25	24/39	
ITRCT	001751	24/03	24/10	24/23	24/26			
ITYPE	002073	26/11						
K12	000132	5/41	17/24	18/22				
K144	000112	5/23	18/04	18/13	18/23			
K15	000113	5/24	21/18					
K177	000114	5/25	20/43					
K37	000115	5/26	17/04					
K377	000116	5/27	16/44					
K4	000131	5/40	17/22					
LAST	000055	4/48	14/42	15/20	22/10			
LOOP	000065	5/01	6/21	6/26	6/33	6/40	6/47	6/54
		7/07	7/13	7/20	7/26	7/32	7/40	7/47
		8/06	8/12	8/18	8/24	8/31	8/38	8/47
		8/54	9/06	9/14	9/24	9/33	9/42	9/51
		10/08	10/17	10/24	10/30	10/42	10/55	11/10
		11/28	11/40	11/51	12/06	12/20	12/28	12/38
		12/48	13/11	13/17	13/31	13/45	14/12	14/26
		14/41	15/06	15/31	16/13	16/32	16/43	
LOOPR	001760	24/01	24/08	24/17	25/12			
M100	000121	5/30	20/27	22/15				
M20	000117	5/28	26/20	26/31				
M6	000133	5/42	18/05					
M60	000120	5/29	21/07					
MESS	002126	5/07	27/01	27/12				
MESSR	002275	27/01	27/02	27/13	29/19			
MICRO	001660	17/08	23/01					
MLOOP	002117	26/32	26/36					
MSAV	000102	5/15	14/47	15/08	15/12	15/24	15/33	15/37
		20/13	20/23	26/19	26/28	26/30	26/38	
MULT	002114	5/13	5/14	24/38	26/29			
NEXNU	001711	20/08	23/26					
NOEX	002013	24/32	24/45					
NUMTY	001700	20/05	23/17					
OCTAB	002203	27/17	28/01					
PASS	000070	5/05	17/03	17/09				
PCENT	002020	24/34	24/42	24/44	25/02			
PDEC	002150	5/11	26/12	27/19				
POCT	002145	26/08	27/16					
RADRE	002223	27/21	27/26	28/19				
RETUR	001754	24/13	24/19	24/48	25/13	25/14	25/26	25/27

0032 .MAIN

		26/05						
SAV0	001757	24/16	24/22	24/45	25/04	25/17	25/23	
SAV1	001756	24/15	24/21	24/46	25/05	25/16	25/22	
SAV2	001755	24/14	24/20	24/47	25/06	25/15	25/21	
SETUP	000064	4/55	6/18	6/23	6/28	6/35	6/42	6/49
		7/01	7/08	7/15	7/22	7/28	7/34	7/42
		8/01	8/08	8/14	8/20	8/26	8/33	8/40
		8/49	9/01	9/08	9/16	9/26	9/35	9/44
		10/01	10/10	10/19	10/26	10/32	10/44	11/01
		11/17	11/30	11/42	12/01	12/08	12/21	12/30
		12/40	13/01	13/13	13/19	13/32	14/01	14/14
		14/28	15/01	15/26	16/05	16/17	16/35	
STRT1	000400	4/49	6/03					
STRT2	000410	4/50	6/12					
T00	000415	4/46	6/10	6/18	16/56	18/27		
T01	000421	6/23						
T02	000425	6/28						
T03	000433	6/35						
T04	000441	6/42						
T05	000447	6/49						
T06	000455	7/01						
T07	000464	7/08						
T08	000472	7/15						
T09	000500	7/22						
T10	000505	7/28						
T11	000512	7/34						
T12	000521	7/42						
T13	000527	8/01						
T14	000535	8/08						
T15	000542	8/14						
T16	000547	8/20						
T17	000554	8/26						
T18	000562	8/33						
T19	000570	8/40						
T20	000600	8/49						
T21	000606	9/01						
T22	000614	9/08						
T23	000623	9/16						
T24	000634	9/26						
T25	000644	9/35						
T26	000654	9/44						
T27	000664	10/01						
T28	000674	10/10						
T29	000704	10/19						
T30	000712	10/26						
T31	000717	10/32						
T32	000732	10/44						
T33	000746	11/01						
T34	000765	11/17						
T34A	000764	11/16	11/23					
T35	001001	11/30						
T36	001014	11/42						
T37	001026	12/01						
T38	001034	12/08						
T39	001051	12/21						
T40	001061	12/30						
T41	001072	12/40						
T42	001103	13/01						
T43	001116	13/13						

0033 .MAIN

T44	001123	13/19						
T45	001140	13/32						
T46	001156	14/01						
T47	001172	14/14						
T48	001207	14/28						
T49	001234	15/01	15/10	15/16				
T50	001264	15/26	15/35	15/41				
T51	001307	16/05						
T52	001322	16/17						
T53	001343	16/35	16/48					
TEST	000067	5/04	6/04	6/13	16/52	29/22		
TIME	000063	4/54	8/45	9/10	9/18	9/28	9/37	9/46
		10/04	10/13	10/37	10/46	11/03	11/19	11/35
		11/46	12/12	12/16	12/24	12/33	12/43	13/04
		13/09	13/25	13/39	14/06	14/20	14/33	16/08
		16/20	16/38	17/10	17/14	17/18	17/30	17/34
		17/38						
TIMEX	000104	5/17	17/40	18/07	18/09			
TIN	001553	4/44	20/38					
TINRE	000050	4/43	20/38	20/47				
TMULT	001631	21/32	21/38	21/40				
TTYC1	000137	5/46	19/13					
TTYC2	000140	5/47	19/08					
TYPE	002276	26/11	28/34	28/41	29/20			
TYPRE	002315	29/20	29/24	29/28	29/34	29/35		
WHAT	000060	4/51	6/07	20/35				
WHICH	000130	5/39	18/06	18/25	27/28			
XDIV	000077	5/12	17/25	18/20				
XF01	000056	4/40	4/49					
XF02	000057	4/41	4/50					
XMUL	000100	5/13	17/23	18/14	18/18			
XMUL1	000101	5/14						
XMULT	000136	5/45	21/28	21/38				
XTIME	001613	4/54	21/24					
XTLUP	001621	21/30	21/39					
XTSV0	000135	5/44	21/24	21/36				
ZOCT	002143	27/14						
ZSUPP	002222	27/22	27/32	27/42	28/18			
.TTI	000040	5/34	6/36	6/38	6/50	6/52	7/35	7/36
		7/38	7/43	7/45	8/02	8/03	8/04	8/09
		8/10	8/50	8/51	8/53	9/02	9/05	12/03
		12/09	12/18	12/22	12/25	12/26	12/31	12/34
		12/36	12/41	12/44	12/45	12/46	13/02	13/05
		13/06	13/07	13/10	13/23	13/26	13/37	13/40
		14/04	14/07	14/18	14/31	14/34	15/29	16/06
		16/09	16/10	16/18	16/21	16/22	16/36	16/39
		16/40						
.TTO	000041	5/35	6/29	6/31	6/43	6/45	7/02	7/03
		7/05	7/09	7/11	7/16	7/17	7/18	7/23
		7/24	7/30	8/15	8/16	8/21	8/27	8/29
		8/34	8/35	8/36	8/41	8/43	8/46	9/09
		9/11	9/17	9/19	9/20	9/22	9/27	9/29
		9/31	9/36	9/38	9/39	9/40	9/45	9/47
		9/48	9/49	10/03	10/05	10/06	10/12	10/14
		10/15	10/36	10/38	10/45	10/47	11/02	11/04
		11/18	11/20	11/34	11/36	11/45	11/47	12/11
		12/13	12/15	12/17	12/23	12/32	12/42	13/03
		13/24	13/27	13/38	13/41	14/05	14/08	14/19
		14/21	14/22	14/32	14/35	15/04	16/07	16/19

0034 .MAIN

16/37 17/29 17/31 17/33 17/35 17/37 17/39