

0001 .MAIN DOMUS MACRO ASSEMBLER REV 01.06

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RCSL: 44 - RT 1806  
AUTHOR: JJO/HH  
EDITED: 79.01.09

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TESTPROGRAM  
FOR RTC 702

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;

BINARY TAPE : RCSL 44 - RT 1807  
ASCII TAPE : RCSL 44 - RT 1808  
BINARY CARDS: RCSL 44 - RT 1809

;KEYWORDS: RC 3600, RTC 702, TEST PROGRAM

!0002 .MAIN

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;  
; DESCRIPTION: TESTPROGRAM FOR RTC 702  
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; REVISION HISTORY:  
;  
;          REV.          DATE          INITIALS  
;  
;          00           75.03.18        JJO  
;          01           75.09.04        JJO  
;          02           78.01.09        HH  
;  
;  
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10003 .MAIN

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01
02 ; RTC 702 REAL TIME CLOCK TEST
03
04 ;1. ABSTRACT
05 ; THE REAL TIME CLOCK TEST IS A MAINTENANCE
06 ; PROGRAM TO TEST THE REAL TIME CLOCK LOGIC
07
08 ;2. MACHINE REQUIREMENTS
09 ;2.1 ANY RC3600 CENTRAL PROCESSORS
10 ;2.2 REAL TIME CLOCK: RTC 702
11 ;2.3 ANY OPERATOR DEVICE
12
13 ;3. SWITCH SETTINGS
14 ;3.1 STARTING ADDRESS =000002
15 ;3.2 SWITCH 0(1) =PROCEED FROM ERROR
16 ;3.3 SWITCH 1(1) =INHIBIT PRINTOUT
17 ;3.4 SWITCH 2(1) =PRINT FAILURE RATE
18
19 ;4. OPERATING PROCEDURE
20 ;4.1 LOAD THE PROGRAM VIA THE BINARY LOADER
21 ;4.2 SET SWITCHES TO 000002
22 ;4.3 PRESS START
23 ;4.4 THE PROGRAM WILL RUN UNTILL MANUALLY STOPPED
24 ; OR AN ERROR IS DETECTED
25 ;4.5 IF SO, THE PROGRAM WILL HALT AT LOCATION
26 ; "ERR1+1" ASKING YOU TO SET SWTS AND CONT
27 ;4.6 FOR EVERY PASS THE PROGRAM WILL WRITE THE
28 ; PASS NUMBER SINCE LAST RESTART
29
30 ;5. PROGRAM OUTPUT/ERROR DESCRIPTION
31 ;5.1 IF A MALFUNCTION IS DETECTED THE PROGRAM
32 ; WILL HALT AT LOCATION "ERR1+1". THE OPERATION
33 ; MAY SET SWITCHES AT THIS TIME IF DESIRED.
34 ; IF SWTS 0 AND 1 ARE ZERO, PRESSING CONTINUE
35 ; WILL CAUSE A PRINTOUT OF THE ERROR LOCATION
36 ; ENTERING A LOOP SUITABLE FOR SCOPING.
37 ;5.2 WHEN THE PROGRAM IS IN A SCOPE LOOP SETTING
38 ; SWITCH 2(1) WILL CAUSE THE FAILURE RATE TO
39 ; BE PRINTED. SETTING SWITCH 0(1) WILL CAUSE
40 ; THE PROGRAM TO PROCEED TO THE NEXT TEST.
41
42 ;6. PROGRAM DESCRIPTION/THEORY OF OPERATION
43 ;6.1 "SETUP" THIS ROUTINE IS EXECUTED PRIOR TO THE
44 ; TEST PORTION OF EVERY TEST ROUTINE. IT
45 ; PROVIDES AN ADDRESS FOR THE LOOP ROUTINE
46 ; TO ITERATE TO. IT RESETS PROGRAMMED ERROR
47 ; SWITCHES. THE ITERATION COUNT, AND ISSUES A
48 ; I/O RESET PULSE.
49 ;6.2 "LOOP" THIS ROUTINE IS EXECUTED AT THE END OF
50 ; EVERY TEST. WHEN NO ERRORS HAVE OCCURRED IT IS
51 ; USED ONLY TO ITERATE THE TEST 100 TIMES
52 ; WHEN AN ERROR HAS OCCURRED IT IS USED TO INTERRUPT
53 ; GATE CONSOLE SWITCHES 0 AND 2 . THE ROUTINE
54 ; ISSUES A I/O RESET PULSE PRIOR TO RETURNING
55 ; TO THE TEST.
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!0004 .MAIN

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01
02           ;6.3      "EHALT" THIS ROUTINE IS EXECUTED WHENEVER
03           ;          AN ERROR HAS BEEN DETECTED. THE ROUTINE WILL
04           ;          HALT, SET PROGRAMMED ERROR SWITCHES, AND
05           ;          PRINT THE ERROR LOCATION
06           ;6.4      "TIME" THIS ROUTINE WILL RECORD THE TIME
07           ;          IT TAKES THE INSTRUCTION FOLLOWING THE CALL
08           ;          TO SKIP. THE RETURN TO THIS CALL+2. IF THE
09           ;          INSTRUCTION FOLLOWING THE CALL NEVER SKIPS
10           ;          THE ROUTINE WILL RETURN WITH THE CARRY FLAG SET
11
12           ;7.       RESTRICTIONS/MISC
13           ;7.1      OBS OBS OBS OBS OBS OBS OBS OBS OBS OBS
14           ;          THIS PROGRAM DO NOT CHECK THE ABSOLUTE FREQUENC
15           ;          THE OSCILLATOR. THIS CHECK SHALL BE DONE
16           ;          WITH OSCILLOSCOPE OR COUNTER.
17           ;          EXECUTION TIME FOR 1 PASS IS 67 SECONDS.
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10005 .MAIN

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01
02          000002 .LOC 2
03 00002 020012 INIT:   LDA      0,NOPAS
04 00003 040010          STA      0,PASCO
05 00004 006014          JSR      ANIMES
06 00005 001261          PNAME
07 00006 002007          JMP      A,+1
08 00007 000066          BEGIN
09 00010 000000 PASCO:   0
10 00011 020000 SWCON:  020000
11 00012 000014 NOPAS:  12.
12 00013 001272 ITADM:  TADM
13 00014 001043 NIMES:  MESS
14
15          000040 .LOC 40
16 00040 000004 C5:      4
17 00041 000677 SETUP:  ENTER
18 00042 000720 LOOP:   CYCLE
19 00043 000771 ER:     ERR
20 00044 000000 PASS:   0
21 00045 000004 C4:      4
22 00046 035454 CALIBR: 35454
23 00047 000466 TIME:   TIMER
24 00050 023420 C23420: 23420
25 00051 000000 TIMEX:  0
26 00052 000152 C152:   152
27 00053 023410 C9997:  23410
28 00054 023422 C10002: 23422
29 00055 000000 CLKTIM: 0
30 00056 001200 XICRLF: CRLF
31 00057 001065 XIPDEC: PDEC
32 00060 001043 XIMESS: MESS
33 00061 000451 CIDIV:  IDIV
34 00062 000011 C11:     11
35 00063 000013 C13:     13
36 00064 000144 C144:   144
37 00065 001224 ISWTS:  SWTS
38          006043 EHALT= JSR      KER
39          000035 DISP= 35
40
41 00066 102400 BEGIN:   SUB      0,0      ;CLEAR PASS COUNTER
42 00067 040044          STA      0,PASS
43
44 00070 006041 A00:    JSR      ASETUP  ;INITIALIZE AND IO RESET
45 00071 063514          SKPBZ   RTC      ;BUSY SHOULD BE ZERO.
46 00072 006043          EHALT   ;CHECK E 65 4-5-6 TO
47 00073 006042          JSR      ALOOP   ;PRODUCE SELB (A 82)
48
49 00074 006041 A02:    JSR      ASETUP  ;INITIALIZE AND IO RESET
50 00075 063714          SKPDZ   RTC      ;DONE SHOULD BE ZERO.
51 00076 006043          EHALT   ;CHECK E 65 8-9-10 TO
52 00077 006042          JSR      ALOOP   ;PRODUCE SELD (A 80)
53
54 00100 006041 A04:    JSR      ASETUP  ;SET BUSY; SEE IF 50/60 HZ
55 00101 060114          NIOS    RTC      ;WILL CLEAR IT. CHECK
56 00102 006047          JSR      ATIME   ;SELB (A82), CLK BUSY FLOP
57 00103 063514          SKPBZ   RTC      ;E 54 AND OF (CLK0(0)),
58 00104 101012          MOV0    0,0,SZC ;CLK1(0) AND LINE FREQ.
59 00105 006043          EHALT   ;INPUT. IS THE BOARD IN
60 00106 006042          JSR      ALOOP   ;SLOT "3"? CHECK 6-B6.
```

!0006 .MAIN

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01
02 00107 006041 A06: JSR   ASETUP ;SET BUSY, THEN TEST
03 00110 060114      NIOS   RTC   ;CLEAR. CHECK CLK BUSY
04 00111 060214      NIOC   RTC   ;FLOP, THE CLEAR INPUT.
05 00112 063514      SKPBZ  RTC   ;CHECK THE CLEAR SIGNAL.
06 00113 006043      EHALT
07 00114 006042      JSR     ALOOP
08
09
10 00115 006041 A08: JSR   ASETUP ;SET BUSY, CHECK
11 00116 060114      NIOS   RTC   ;THAT IT IS CLEARED.
12 00117 062677      IORST
13 00120 063514      SKPBZ  RTC   ;BY I/O RESET
14 00121 006043      EHALT
15 00122 006042      JSR     ALOOP
16
17 00123 006041 A10: JSR   ASETUP ;SEE IF IT IS
18 00124 060114      NIOS   RTC
19 00125 006047      JSR     ATIME ;POSSIBLE TO SET
20 00126 063514      SKPBZ  RTC   ;THE CLOCK BUSY FLOP
21 00127 060114      NIOS   RTC   ;FIRST SYNC, THEN TRY
22 00130 063414      SKPBN  RTC   ;TO SET.
23 00131 006043      EHALT
24 00132 006042      JSR     ALOOP
25
26 00133 006041 A12: JSR   ASETUP ;CHECK THAT A
27 00134 060100      NIOS   0     ;START PULSE TO A
28 00135 063514      SKPBZ  RTC   ;DEVICE OTHER THAN
29 00136 006043      EHALT
30 00137 006042      JSR     ALOOP ;THE CLOCK.
31
32 00140 006041 A14: JSR   ASETUP ;CHECK DEVICE SELECTION
33 00141 060154      NIOS   54  ;SHOULD NOT CHANGE RTC.
34 00142 063514      SKPBZ  RTC
35 00143 006043      EHALT
36 00144 006042      JSR     ALOOP
37
38 00145 006041 A16: JSR   ASETUP ;CHECK DEVICE SELECTION
39 00146 060134      NIOS   34  ;SHOULD NOT CHANGE RTC
40 00147 063514      SKPBZ  RTC
41 00150 006043      EHALT
42 00151 006042      JSR     ALOOP
43
44 00152 006041 A18: JSR   ASETUP ;CHECK DEVICE SELECTION
45 00153 060104      NIOS   4   ;SHOULD NOT CHANGE RTC
46 00154 063514      SKPBZ  RTC
47 00155 006043      EHALT
48 00156 006042      JSR     ALOOP
49
50 00157 006041 A20: JSR   ASETUP ;CHECK DEVICE SELECTION
51 00160 060110      NIOS   10  ;SHOULD NOT CHANGE RTC.
52 00161 063514      SKPBZ  RTC
53 00162 006043      EHALT
54 00163 006042      JSR     ALOOP
55
56 00164 006041 A22: JSR   ASETUP ;CHECK DEVICE SELECTION
57 00165 060116      NIOS   16  ;SHOULD NOT CHANGE RTC.
58 00166 063514      SKPRZ  RTC
59 00167 006043      EHALT
60 00170 006042      JSR     ALOOP
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!0007 .MAIN

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01
02 00171 006041 A24: JSR   ASETUP ;CHECK DEVICE SELECTION
03 00172 060116      NIOS   RTC   ;SHOULD NOT CHANGE RTC
04 00173 063514      SKPBZ  RTC
05 00174 006043      EHALT
06 00175 006042      JSR     ALOOP
07
08 00176 006041 A26: JSR   ASETUP ;COMMAND TO RTC
09 00177 060014      NIO    RTC   ;SHOULD NOT CHANGE ITS
10 00200 063514      SKPBZ  RTC   ;BUSY FLOP WITHOUT
11 00201 006043      EHALT  ;A START PULSE.
12 00202 006042      JSR     ALOOP
13
14 00203 006041 A28: JSR   ASETUP
15 00204 060114      NIOS   RTC
16 00205 006047      JSR   ATIME ;SYNC THE CLOCK
17 00206 063514      SKPBZ  RTC   ;THEN CHECK THAT
18 00207 060114      NIOS   RTC   ;A COMMAND TO THE
19 00210 060014      NIO    RTC   ;CLOCK WITHOUT A
20 00211 063414      SKPBN  RTC   ;CLEAR PULSE DOES NOT
21 00212 006043      EHALT  ;CLEAR THE BUSY FLOP
22 00213 006042      JSR     ALOOP
23
24 00214 006041 A30: JSR   ASETUP
25 00215 060114      NIOS   RTC
26 00216 006047      JSR   ATIME ;SYNC THE CLOCK
27 00217 063514      SKPBZ  RTC   ;THEN CHECK THAT A
28 00220 060114      NIOS   RTC   ;COMMAND TO DEVICE
29 00221 060200      NIOC   0     ;0 WITH A CLEAR PULSE
30 00222 063414      SKPBN  RTC   ;DOES NOT AFFECT THE
31 00223 006043      EHALT  ;REAL TIME CLOCK.
32 00224 006042      JSR     ALOOP
33
34 00225 006041 A32: JSR   ASETUP
35 00226 060114      NIOS   RTC   ;START THE CLOCK AND
36 00227 006047      JSR   ATIME ;WAIT UNTILL BUSY
37 00230 063514      SKPBZ  RTC   ;GOES TO ZERO. THIS SHOULD
38 00231 063614      SKPDN  RTC   ;SET DONE. CLK DONE FAILED
39 00232 006043      EHALT  ;TO SET OR SELD GATE
40 00233 006042      JSR     ALOOP ;FAILED TO GROUND BUS.
41
42 00234 006041 A34: JSR   ASETUP ;CHECK THAT BUSY IS
43 00235 060114      NIOS   RTC   ;NOT GATED TO SELB
44 00236 063500      SKPBZ  0     ;AT TIMES OTHER THAN
45 00237 006043      EHALT  ;CLK SELECT.
46 00240 006042      JSR     ALOOP
47
48 00241 006041 A36: JSR   ASETUP ;CHECK THAT CLK DONE
49 00242 060114      NIOS   RTC   ;IS NOT GATED TO SELD
50 00243 006047      JSR   ATIME ;AT TIMES OTHER THAN
51 00244 063514      SKPBZ  RTC   ;CLK SELECT.
52 00245 063700      SKPDZ  0
53 00246 006043      EHALT
54 00247 006042      JSR     ALOOP
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!0008 .MAIN

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01
02 00250 006041 A38:   JSR   ASETUP   ;A TEST TO INSURE
03 00251 060114       NIOS   RTC       ;THAT I/O RESET WILL
04 00252 006047       JSR   ATIME   ;CLEAR THE DONE FLAG.
05 00253 063514       SKPBZ  RTC       ;SYNC THE CLOCK
06 00254 062677       IORST   RTC       ;I/O RESET, LOOK FOR
07 00255 063714       SKPDZ  RTC       ;DONE IS ZERO.
08 00256 006043       EHALLT
09 00257 006042       JSR   ALOOP
10
11 00260 006041 A40:   JSR   ASETUP   ;A TEST TO INSURE
12 00261 060114       NIOS   RTC       ;THAT CLEAR WILL
13 00262 006047       JSR   ATIME   ;RESET THE DONE FLAG.
14 00263 063514       SKPBZ  RTC       ;CHECK THE 4 INPUT
15 00264 060214       NIOC   RTC       ;OR GATE, TO CLEAR
16 00265 063714       SKPDZ  RTC       ;SIDE OF CLK DONE.
17 00266 006043       EHALLT
18 00267 006042       JSR   ALOOP
19
20 00270 006041 A42:   JSR   ASETUP   ;A TEST TO INSURE
21 00271 060114       NIOS   RTC       ;THAT START WILL
22 00272 006047       JSR   ATIME   ;RESET THE DONE FLOP.
23 00273 063514       SKPBZ  RTC       ;CHECK 4 INPUT
24 00274 060114       NIOS   RTC       ;OR GATE, TO CLEAR
25 00275 063714       SKPDZ  RTC       ;SIDE OF CLK DONE.
26 00276 006043       EHALLT
27 00277 006042       JSR   ALOOP
28
29 00300 006041 A44:   JSR   ASETUP   ;A CHECK THAT NO
30 00301 102620       SUBZR   0,0     ;INTERRUPT OCCURES WHEN
31 00302 060177       NIOS   CPU      ;INTERRUPTS ARE ENABLED.
32 00303 040001       STA     0,1     ;CHECK INTR LINE(B29)
33 00304 063477       SKPBN  CPU
34 00305 006043       EHALLT
35 00306 006042       JSR   ALOOP
36
37 00307 006041 A46:   JSR   ASETUP   ;TEST THAT SETTING
38 00310 102620       SUBZR   0,0     ;CLK INT DISABLE WILL
39 00311 040001       STA     0,1     ;PREVENT INTERRUPTS.THE
40 00312 060277       NIOC   CPU      ;TEST IS PERFORMED BY
41 00313 020045       LDA     0,C4    ;TESTING CPU INTERRUPT
42 00314 062077       MSKO   0       ;ENABLE FLAG. IF AN
43 00315 060177       NIOS   CPU      ;INTERRUPT OCCURES THIS
44 00316 060114       NIOS   RTC       ;FLAG IS CLEARED.
45 00317 006047       JSR   ATIME   ;WAIT FOR RTC DONE TO
46 00320 063514       SKPBZ  RTC       ;SET . THEN CHECK IF
47 00321 063477       SKPBN  CPU      ;AN INTERRUPT OCCURED
48 00322 006043       EHALLT   ;CHECK MSKO , INT CLK DISABLE
49 00323 006042       JSR   ALOOP   ;FLOP , CLK INT REQ
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!0009 .MAIN

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01
02 00324 102620 A48:  SUBZR  0,0    ;CHECK THAT CLK DONE
03 00325 040001      STA   0,1    ;WILL CAUSE INTERRUPTS.
04 00326 006041      JSR   ASETUP ;C(LOC 1) = RETURN TO
05 00327 060277      NIOC  CPU    ;PROGRAM
06 00330 060114      NIOS  RTC
07 00331 006047      JSR   ATIME  ;WAIT FOR RTC CLOCK
08 00332 063514      SKPBZ  RTC    ;TO SET DONE
09 00333 060177      NIOS  CPU    ;ENABLE INTERRUPTS
10 00334 101000      MOV   0,0
11 00335 063577      SKPBZ  CPU    ;INTERRUPT ENABLE WILL
12 00336 006043      EHALT          ;BE ZERO IF INTERRUPT
13 00337 006042      JSR   ALOOP  ;OCCURED.
14
15 00340 006041 A50:  JSR   ASETUP  ;CHECK THAT MSKO
16 00341 060277      NIOC  CPU    ;WITHOUT BIT 13 DOES
17 00342 102400      SUB   0,0    ;NOT PREVENT INTERRUPTS.
18 00343 062077      MSKO  0      ;CHECK DATA 13 TO
19 00344 060114      NIOS  RTC    ;CLK INT DISABLE.
20 00345 006047      JSR   ATIME
21 00346 063514      SKPBZ  RTC
22 00347 060177      NIOS  CPU
23 00350 101000      MOV   0,0
24 00351 063577      SKPBZ  CPU
25 00352 006043      EHALT
26 00353 006042      JSR   ALOOP
27
28 00354 006041 A52:  JSR   ASETUP  ;CHECK THE CLEAR
29 00355 060277      NIOC  CPU    ;INPUT TO CLK INT
30 00356 060114      NIOS  RTC    ;REQ FLOP
31 00357 006047      JSR   ATIME
32 00360 063514      SKPBZ  RTC
33 00361 060177      NIOS  CPU    ;ENABLE INTERRUPTS TO CPU.
34 00362 060214      NIOC  RTC    ;TRY TO CLEAR INT REQ.
35 00363 101000      MOV   0,0
36 00364 063477      SKPBN  CPU    ;SEE IF INTERRUPT OCCURED.
37 00365 006043      EHALT
38 00366 006042      JSR   ALOOP
39
40 00367 006041 A54:  JSR   ASETUP  ;A TEST TO INSURE
41 00370 060277      NIOC  CPU    ;THAT I/O RESET
42 00371 020045      LDA   0,C4   ;CLEARS THE CLK INT
43 00372 062077      MSKO  0      ;DISABLE FLOP.
44 00373 062677      IORST          ;CHECK THE CLEAR INPUT.
45 00374 060114      NIOS  RTC
46 00375 006047      JSR   ATIME
47 00376 063514      SKPBZ  RTC
48 00377 060177      NIOS  CPU
49 00400 101000      MOV   0,0
50 00401 063577      SKPBZ  CPU
51 00402 006043      EHALT
52 00403 006042      JSR   ALOOP
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!0010 .MAIN

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01
02 00404 006041 A56:   JSR   ASETUP   ;SEE IF THE BUSY
03 00405 102520       SUBZL  0,0      ;FLAG WILL BE CLEARED
04 00406 101140       MOVOL  0,0      ;BY SELECT 1000 AND
05 00407 061114       DOAS   0,RTC   ;1000 HERTZ.
06 00410 006047       JSR   ATIME
07 00411 063514       SKPBZ  RTC     ;CHECK TEST INPUTS
08 00412 101012       MOV@   0,0,SZC ;TO CLK BUSY.
09 00413 006043       EHALT
10 00414 006042       JSR   ALOOP   ;OVERFLOW
11
12 00415 006041 A58:   JSR   ASETUP   ;SEE IF THE BUSY
13 00416 102520       SUBZL  0,0      ;FLAG WILL BE CLEARED.
14 00417 101120       MOVZL  0,0      ;BY SELECT 100, AND
15 00420 061114       DOAS   0,RTC   ;100 HERTZ.
16 00421 006047       JSR   ATIME   ;CHECK THESE INPUTS
17 00422 063514       SKPBZ  RTC     ;TO CLOCK BUSY
18 00423 101012       MOV@   0,0,SZC ;C(CARRY) =1 IF TIME
19 00424 006043       EHALT   ;OVERFLOW.
20 00425 006042       JSR   ALOOP
21
22 00426 006041 A60:   JSR   ASETUP   ;SEE IF THE BUSY
23 00427 102520       SUBZL  0,0      ;FLAG WILL BE CLEARED
24 00430 061114       DOAS   0,RTC   ;BY SELECT 10 AND 10 HZ.
25 00431 006047       JSR   ATIME   ;CHECK THESE INPUTS
26 00432 063514       SKPBZ  RTC     ;TO CLK BUSY.
27 00433 101012       MOV@   0,0,SZC ;C(CARRY)=1 IF TIME
28 00434 006043       EHALT   ;OVERFLOW.
29 00435 006042       JSR   ALOOP
30 00436 000441       JMP   NEXT
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!0011 .MAIN

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01
02 00437 102460 MULT:  SUBC  0,0  ;MULTIPLY C(1)+C(2)
03 00440 054425      STA  3,MSAV ;RESULT TO C(0),C(1)
04 00441 034423      LDA  3,MDCTR
05 00442 125203 MLOOP: MOV  1,1,SNC
06 00443 101201      MOV  0,0,SKP
07 00444 143220      ADD  2,0
08 00445 175404      INC  3,3,SZR
09 00446 000774      JMP  MLOOP
10 00447 125260      MOV  1,1
11 00450 002415      JMP  AMSAV
12
13 00451 102400 IDIV:  SUB  0,0  ;DIVIDE C(0),C(1)/C(2)
14 00452 054413 XDIV:  STA  3,MSAV ;C(0)=REMAINDER
15 00453 034411      LDA  3,MDCTR ;C(1)=QUOTIENT
16 00454 125120      MOV  1,1
17 00455 101100 DLOOP: MOV  0,0
18 00456 142412      SUB  2,0,SZC
19 00457 142400      SUB  2,0
20 00460 125100      MOV  1,1
21 00461 175404      INC  3,3,SZR
22 00462 000773      JMP  DLOOP
23 00463 002402      JMP  AMSAV
24 00464 177760 MDCTR: -20
25 00465 000000 MSAV:  0
26
27 00466 021400 TIMER: LDA  0,0,3  ;CALL VIA JSR@TIME
28 00467 040404      STA  0,0,+4 ;SKIP TO BE TIMED.
29 00470 102040      ADD  0,0  ;TIME STORED IN
30 00471 101402      INC  0,0,SZC ;REGISTER TIMEX.
31 00472 001401      JMP  1,3  ;C(CARRY)=0 IF NOT TIME
32 00473 000000      Q      ;OVERFLOW OCCURED.
33 00474 000775      JMP  -3   ;C(CARRY)=1 FOR OVERFLOW
34 00475 040051      STA  0,TIMEX
35 00476 001401      JMP  1,3
36
37
```

!0012 .MAIN

```
01
02 00477 102520 NEXT:  SUBZL 0,0 ;SET CALIBRATION
03 00500 061114      DOAS  0,RTC ;TO 100MS VIA
04 00501 063514      SKPBZ RTC  ;REAL TIME CLOCK.
05 00502 000777      JMP   -1
06 00503 060114      NIOS  RTC
07 00504 006047      JSR   &TIME
08 00505 063514      SKPBZ RTC
09 00506 040046      STA   0,CALIBR
10
11 00507 006041 A61:  JSR   &SETUP ;WHEN DONE EQUAL 0
12 00510 061477      INTA  0      ;NO BITS SHOULD BE READ
13 00511 101014      MOVØ  0,0,SZR
14 00512 006043      EHALT
15 00513 006042      JSR   &LOOP
16
17 00514 006041 A611: JSR   &SETUP ;CHECK THAT THE DEVICE
18 00515 060114      NIOS  RTC  ;CODE IS READ BACK
19 00516 063514      SKPBZ RTC  ;WHEN DONE IS SET
20 00517 000777      JMP   -1
21 00520 020473      LDA   0,XX14
22 00521 065477      INTA  1
23 00522 106414      SUBØ  0,1,SZR
24 00523 006043      EHALT
25 00524 006042      JSR   &LOOP
26
27
```

10013 .MAIN

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01
02 00525 006041 A62: JSR    ASETUP    ;CHECK THAT
03 00526 102520      SUBZL   0,0      ;SELECT 100 IS
04 00527 101120      MOVZL   0,0      ;TEN TIMES FASTER
05 00530 061114      DOAS    0,RTC    ;THAN SEL 10
06 00531 063514      SKPBZ   RTC
07 00532 000777      JMP     -1
08 00533 060114      NIOS    RTC
09 00534 006047      JSR     ATIME
10 00535 063514      SKPBZ   RTC
11 00536 024046      LDA     1,CALIBR
12 00537 030051      LDA     2,TIMEX
13 00540 006061      JSR     ACIDIV
14 00541 020062      LDA     0,C11
15 00542 030063      LDA     2,C13
16 00543 106432      SUBZ0   0,1,SZC
17 00544 146032      ADCZ0   2,1,SZC
18 00545 006043      EHALT
19 00546 006042      JSR     ALOOP
20
21 00547 006041 A64: JSR    ASETUP    ;CHECK THAT
22 00550 102520      SUBZL   0,0      ;SELECT 1000 IS
23 00551 101140      MOVOL   0,0      ;100 TIMES FASTER
24 00552 061114      DOAS    0,RTC    ;THAN SELECT 10
25 00553 063514      SKPBZ   RTC
26 00554 000777      JMP     -1
27 00555 060114      NIOS    RTC
28 00556 006047      JSR     ATIME
29 00557 063514      SKPBZ   RTC
30 00560 024046      LDA     1,CALIBR
31 00561 030051      LDA     2,TIMEX
32 00562 006061      JSR     ACIDIV
33 00563 020064      LDA     0,C144
34 00564 030052      LDA     2,C152
35 00565 106432      SUBZ0   0,1,SZC
36 00566 146032      ADCZ0   2,1,SZC
37 00567 006043      EHALT
38 00570 006042      JSR     ALOOP
39
40 00571 006041 A66: JSR    ASETUP    ;CHECK THAT 5 OR 6
41 00572 102400      SUB     0,0      ;CLOCK PULSES
42 00573 061114      DOAS    0,RTC    ;EQUAL 10 HERTZ
43 00574 063514      SKPBZ   RTC      ;MAY USE EITHER 50/60
44 00575 000777      JMP     -1      ;HERTZ POWER.
45 00576 060114      NIOS    RTC
46 00577 006047      JSR     ATIME
47 00600 063514      SKPBZ   RTC
48 00601 024046      LDA     1,CALIBR
49 00602 030051      LDA     2,TIMEX
50 00603 006061      JSR     ACIDIV
51 00604 020040      LDA     0,C5
52 00605 122655      SUBOR0   1,0,SNR
53 00606 000403      JMP     +3
54 00607 106014      ADC0    0,1,SZR
55 00610 006043      EHALT
56 00611 006042      JSR     ALOOP
57
58 00612 101001      MOV     0,0,SKP
59 00613 000014 XX14: 14
60
61
```

!0014 .MAIN

```
01
02 00614 006041 A68: JSR   ASETUP ;CHECK THAT CLK
03 00615 102520 SUBZL 0,0 ;RESET CLEARS
04 00616 101140 MOVOL 0,0
05 00617 061114 DOAS 0,RTC ;CLK0 AND CLK1
06 00620 062677 IORST
07 00621 060114 NIOS RTC
08 00622 063514 SKPBZ RTC
09 00623 000777 JMP   .-1
10 00624 060114 NIOS RTC
11 00625 006047 JSR   ATIME
12 00626 063514 SKPBZ RTC
13 00627 024046 LDA   1,CALIBR
14 00630 030051 LDA   2,TIMEX
15 00631 006061 JSR   ACIDIV
16 00632 020040 LDA   0,C5
17 00633 122655 SUBOR0 1,0,SNR
18 00634 000403 JMP   .+3
19 00635 106014 ADC0 0,1,SZR
20 00636 006043 EHALT
21 00637 006042 JSR   ALOOP
22
23 00640 006041 A70: JSR   ASETUP ;CHECK TO INSURE
24 00641 102520 SUBZL 0,0 ;THAT A "DOA" TO
25 00642 101140 MOVOL 0,0 ;A DEVICE OTHER THAN
26 00643 061000 DOA 0,0 ;RTC DOES NOT
27 00644 060114 NIOS RTC ;AFFECT RTC.
28 00645 063514 SKPBZ RTC
29 00646 000777 JMP   .-1
30 00647 060114 NIOS RTC
31 00650 006047 JSR   ATIME
32 00651 063514 SKPBZ RTC
33 00652 024046 LDA   1,CALIBR
34 00653 030051 LDA   2,TIMEX
35 00654 006061 JSR   ACIDIV
36 00655 020040 LDA   0,C5
37 00656 122655 SUBOR0 1,0,SNR
38 00657 000403 JMP   .+3
39 00660 106014 ADC0 0,1,SZR
40 00661 006043 EHALT
41 00662 006042 JSR   ALOOP
42
43 00663 010044 PASER: ISZ   PASS ;END OF PASS
44 00664 101000 MOV   0,0
45 00665 006546 JSR   AICRLF ;PRINT CARRIAGE
46 00666 006542 JSR   AIMESS ;AND PASS
47 00667 000674 MPASS
48 00670 024044 LDA   1,PASS
49 00671 006544 JSR   AIPDEC
50
51 ;IDU-INSTR: JSR   AITADM
52
53 00672 002401 JMP   A.+1
54 00673 000070 ADD
55
56 00674 040520 MPASS: .TXT !PASS!
57 051523
58 000000
59
60
```

!0015 .MAIN

```
01
02 00677 054420 ENTER: STA 3,LOOPR ;LOOP ITERATE RETURN
03 00700 034407 LDA 3,ITR ;THIS ROUTINE INITIALIZES
04 00701 054407 STA 3,ITRCT ;EACH TEST
05 00702 176400 SUB 3,3
06 00703 054406 STA 3,ESWIT
07 00704 054406 STA 3,ERRCT
08 00705 062477 DIC 0,CPU ;I/O RESET
09 00706 002411 JMP &LOOPR
10
11 00707 000144 ITR: 144
12 00710 000000 ITRCT: 0
13 00711 000000 ESWIT: 0
14 00712 000000 ERRCT: 0
15 00713 000000 RETURN: 0
16 00714 000000 SAV2: 0
17 00715 000000 SAV1: 0
18 00716 000000 SAV0: 0
19 00717 000000 LOOPR: 0
20
21 00720 054773 CYCLE: STA 3,RETURN;END OF TEST ITERATION
22 00721 050773 STA 2,SAV2 ;ROUTINE
23 00722 044773 STA 1,SAV1 ;SAVE THE AC'S
24 00723 040773 STA 0,SAV0
25 00724 014764 DSZ ITRCT
26 00725 000432 JMP CYCTS ;NOT 100 TIMES ITERATION
27
28 00726 034761 LDA 3,ITR ;RESET ITERATION CNTR
29 00727 054761 STA 3,ITRCT
30
31 00730 074477 READS 3 ;IDU-INSTR: LDA 3,SWCON
32
33 00731 030760 LDA 2,ESWIT ;IF SWITCH 2=(1)
34 00732 175120 MOVZL 3,3 ;AND ERROR HAS OCCURED
35 00733 175100 MOVL 3,3 ;THE ERROR RATE WILL
36 00734 151005 MOV 2,2,SNR ;BE PRINTED
37 00735 000413 JMP NOEX
38 00736 175103 MOVL 3,3,SNC
39 00737 000415 JMP PCENT-1
40
41 00740 006473 JSR &ICRLF ;PRINT CARRIAGE
42 00741 024751 LDA 1,ERRCT
43 00742 006473 JSR &IPDEC ;PRINT VALUE
44 00743 020412 LDA 0,PCENT ;EXAMPLE: 89%
45 00744 006465 JSR &ICHAR
46 00745 063611 SKPDN T10 ;WAIT DONE FLAG
47 00746 000777 JMP .-1
48 00747 000405 JMP PCENT-1
49
50 00750 020746 NOEX: LDA 0,SAV0 ;NORMAL EXIT , NO ERR
51 00751 024744 LDA 1,SAV1
52 00752 030742 LDA 2,SAV2
53 00753 002740 JMP &RETURN
54
55
```

```

!0016 .MAIN
01
02 00754 102401      SUB      0,0,SKP
03 00755 000245 PCENT:  STA      245      ;CHARACTOR
04 00756 040734      STA      0,ERRCT  ;RESET ERROR COUNT
05 00757 020737 CYCTS:  LDA      0,SAV0  ;RESTORE ACS
06 00760 024735      LDA      1,SAV1
07 00761 030733      LDA      2,SAV2
08 00762 034727      LDA      3,ESWIT
09 00763 175004      MOV      3,3, SZR
10
11 00764 074477      READS   3          ;IDU-INSTR:  LDA      3,SWCON
12
13 00765 062477      DIC      0,CPU   ;I/O RESET
14 00766 175113      MOVL0   3,3,SNC  ;SWITCH 0
15 00767 002730      JMP      ALOOPR  ;(1)=LOOP ROUTINE
16 00770 002723      JMP      ARETURN ;(0)=PROCEED TO NEXT TEST
17
18 00771 054722 ERR:   STA      3,RETURN;ERROR SUBROUTINE
19 00772 050722      STA      2,SAV2
20 00773 044722      STA      1,SAV1
21 00774 040722      STA      0,SAV0
22
23 00775 034714      LDA      3,ESWIT
24 00776 175005      MOV      3,3,SMR
25 00777 000407      JMP      ERR1
26 01000 030714 ERET:  LDA      2,SAV2  ;RESTORE AC'S
27 01001 024714      LDA      1,SAV1
28 01002 020714      LDA      0,SAV0
29 01003 010707      ISZ     ERRCT   ;COUNT
30 01004 062477      DIC      0,CPU   ;ERRORS,I/O RESET
31 01005 002706      JMP      ARETURN ;EXIT
32
33 01006 006065 ERR1:  JSR      AISWTS  ;SET SWITCHES
34 01007 063077      HALT
35 01010 034703      LDA      3,RETURN;ERROR. C(3)=PC
36 01011 054700      STA      3,ESWIT
37
38 01012 074477      READS   3          ;IDU-INSTR:  LDA      3,SWCON
39
40 01013 175100      MOVL    3,3
41 01014 175113      MOVL0   3,3,SNC  ;LOOK AT SWITCH 1
42 01015 004402      JSR      EPRINT  ;PRINT ERROR DATA
43 01016 000762      JMP      ERET

```



!0017 .MAIN

```
01
02 01017 054672 EPRINT: STA      3,ESWIT ;ERROR MESSAGE PRINTER
03 01020 006413      JSR      #ICRLF ;PRINT CARRIAGE
04 01021 006407      JSR      #IMESS  ;AND HEADER
05 01022 001036      HEADER
06 01023 020670      LDA      0,RETURN
07 01024 126000      ADC      1,1
08 01025 107000      ADD      0,1
09 01026 006406      JSR      #IPOCT  ;PC OF ERROR
10 01027 002662      JMP      #ESWIT  ;RETURN TO CALL
11
12 01030 001043 IMESS: MESS
13 01031 001137 ICHAR: CHAR
14 01032 001166 ITYPE: TYPE
15 01033 001200 ICRLF: CRLF
16 01034 001062 IPOCT: POCT
17 01035 001065 IPDEC: PDEC
18
19
20 01036 051105 HEADER: .TXT !ERROR AT !
21      047522
22      020122
23      052101
24      000040
25
26
```

!0018 .MAIN

01  
02 ;TTO AND DISPLAY NON INTERRUPT PACKAGE  
03 ;"MESS" PRINTS ASCII MESSAGES AS SPECIFIED BY ASSEMBLER  
04 ;"CHAR" PRINTS ASCII CHARACTER, C(O)R,C(O)L MUST BE 0  
05 ;WILL RETURN +2 IF C(O)R=0, CORRECTS THE PARITY, 33 SIMULATE  
06 ;"TYPE" PRINTS C(O)R. MUST HAVE PROPER PARITY. RETURN IS  
07 ;TO CALL+1.REPLACE THIS ROUTINE WITH INTERRUPT TYPE IF DESIRED  
08 ;"CRLF" PRINTS A CARRIAGE RETURN  
09 ;"POCT" PRINTS C(1) IN OCTAL FOLLOWED BY A TAB  
10 ;"PDEC" PRINTS C(1) IN DECIMAL. LEADING ZEROS SUPPRESSED,  
11 ;FOLLOWED BY A TAB.  
12

13 01043 054560 MESS: STA 3,MESSR ;PRINT A TEXT MESSAGE  
14 01044 010557 ISZ MESSR  
15 01045 031400 LDA 2,0,3 ;C(2) POINTS TO MESSAGE  
16 01046 024554 LDA 1,C377 ;A 8 BIT MASK  
17 01047 021000 LDA 0,0,2 ;C(2)=DATA WORD  
18 01050 125112 MOVL0 1,1,SZC  
19 01051 123701 ANDS 1,0,SKP  
20 01052 123401 AND 1,0,SKP ;C(0)=DATA CHARACTER RIGHT  
21 01053 151400 INC 2,2 ;INC TO NEXT WORD  
22 01054 124000 COM 1,1 ;FLIP MASK  
23 01055 004462 JSR CHAR ;PRINT  
24 01056 000771 JMP MESS+4 ;ANOTHER  
25 01057 002544 JMP &MESSR ;LAST  
26  
27 01060 020537 ZOCT: LDA 0,CH240  
28 01061 101001 MOV 0,0,SKP  
29  
30 01062 020537 POCT: LDA 0,C60  
31 01063 030433 LDA 2,OCTAB ;PRINT C(1) IN OCTAL  
32 01064 000403 JMP .+3  
33 01065 030441 PDEC: LDA 2,DECTB ;PRINT C(1) IN DECIMAL  
34 01066 020531 LDA 0,CH240 ;SUPPRESS LEADING ZEROS  
35 01067 054447 STA 3,RADRET;BOTH ENTRYS PRINT NUMBER  
36 01070 040445 STA 0,ZSUPP ;THEN TAB TO NEXT POSITION  
37 01071 050401 STA 2,.-+1  
38 01072 000000 DECOCT: 0 ;A"LDA 2, TABLE" INSTRUCTION  
39 01073 010777 ISZ .-1  
40 01074 034442 LDA 3,RADRET;SETUP "TAB" AT END  
41 01075 020515 LDA 0,CHTAB  
42 01076 151005 MOV 2,2,SNR ;IF TABLE ENTRY=0  
43 01077 000440 JMP CHAR ;EXIT WITH TAB  
44 01100 034435 LDA 3,ZSUPP ;ZEROS SUPPRESS STUP  
45 01101 102400 SUB 0,0  
46 01102 146512 DECOT: SUBL0 2,1,SZC  
47 01103 000405 JMP DECP  
48 01104 146400 SUB 2,1 ;FORM THE DIGIT  
49 01105 034514 LDA 3,C60  
50 01106 101400 INC 0,0  
51 01107 000773 JMP DECOT  
52 01110 151235 DECP: MOVZR0 2,2,SNR  
53 01111 034510 LDA 3,C60  
54 01112 054423 STA 3,ZSUPP ;C(0)=DIGIT  
55 01113 163000 ADD 3,0 ;MAKE ASCII  
56 01114 004423 JSR CHAR ;PRINT  
57 01115 000755 JMP DECOCT ;GET NEXT DIGIT  
58  
59

10019 .MAIN

01

02 01116 030425 OCTAB: LDA 2,.,+1+.-DECOCT

03 01117 100000 100000

04 01120 010000 10000

05 01121 001000 1000

06 01122 000100 100

07 01123 000010 10

08 01124 000001 1

09 01125 000000 0

10

11 01126 030435 DECTB: LDA 2,.,+1+.-DECOCT

12 000012 .RDX 10

13 01127 023420 10000

14 01130 001750 1000

15 01131 000144 100

16 01132 000012 10

17 01133 000001 1

18 01134 000000 0

19 000010 .RDX 8

20

21 01135 000000 ZSUPP: 0

22 01136 000000 RADRET: 0

23

24 01137 054454 CHAR: STA 3,CHRET ;PRINT C(0) RIGHT

25 01140 101325 MOVZS 0,0,SNR ;RETURN +2 IF NULL

26 01141 001401 JMP 1,3

27 01142 040452 STA 0,CHSAV

28 01143 176000 ADC 3,3 ;COMPUTE THE PARITY

29 01144 117000 ADD 0,3

30 01145 163404 AND 3,0,SZR

31 01146 000775 JMP .-3

32 01147 176660 SUBCR 3,3 ;COMBIND PARITY WITH CHAR

33 01150 020444 LDA 0,CHSAV

34 01151 163300 ADDS 3,0

35

36 01152 034440 CHAR1: LDA 3,CHTAB ;IS THIS A TAB

37 01153 116405 SUB 0,3,SNR

38 01154 000403 JMP .+3 ;YES

39 01155 004411 JSR TYPE ;NO PRINT IT

40 01156 002435 JMP &CHRET ;EXIT

41

42 01157 020436 LDA 0,CHORZ ;SIMULATE A TAB

43 01160 034436 LDA 3,CHAR7 ;VIA 1 TO 8 SPACES

44 01161 117405 AND 0,3,SNR

45 01162 002431 JMP &CHRET

46 01163 020434 LDA 0,CH240

47 01164 004402 JSR TYPE

48 01165 000772 JMP .-6

49

50

10020 .MAIN

```
01
02 01166 010427 TYPE: ISZ   CHORZ   ;INC HORZ POSITION
03 01167 063535      SKPBZ   DISP
04 01170 000777      JMP     .-1
05 01171 061135      DOAS    0,DISP
06 01172 063511      SKPBZ   TTO
07 01173 000777      JMP     .-1
08 01174 061111      DOAS    0,TTO
09 01175 063535      SKPBZ   DISP
10 01176 000777      JMP     .-1
11 01177 001400      JMP     0,3   ;EXIT
12
13 01200 054420 CRLF:  STA     3,CRLF  ;SAVE RETURN
14 01201 020410      LDA     0,C215
15 01202 004735      JSR    CHAR   ;PRINT CARRIAGE AND LF
16 01203 020405      LDA     0,C212
17 01204 004735      JSR    CHAR
18 01205 102400      SUB     0,0
19 01206 040407      STA     0,CHORZ ;CLEAR HORZ POSITION
20 01207 002411      JMP     &CRLF  ;EXIT
21
22 01210 000212 C212:  212
23 01211 000215 C215:  215
24 01212 000011 CHTAB:  11
25 01213 000000 CHRET:  0
26 01214 000000 CHSAV:  0
27 01215 000000 CHORZ:  0
28 01216 000007 CHAR7:  7
29 01217 000240 CH240:  240
30 01220 000000 CRLF:  0
31 01221 000060 C60:    60
32
33 01222 000377 C377:  377
34 01223 000000 MESSR:  0
35
36
37 01224 054405 SWTS:  STA     3,CONRE
38 01225 006606      JSR    &ICRLF
39 01226 006602      JSR    &IMISS
40 01227 001232      CONTI ;"SET SWTS & CONT"
41 01230 002401      JMP     &CONRE ;EXIT
42
43 01231 000000      CONRE:  0
```

!0021 .MAIN

```
01
02 01232 044103 CONTI: .TXT !CHANGE SWITCHWORD (IF WANTED) AND CONTINUE<15><
03      047101
04      042507
05      051440
06      044527
07      041524
08      053510
09      051117
10      020104
11      044450
12      020106
13      040527
14      052116
15      042105
16      020051
17      047101
18      020104
19      047503
20      052116
21      047111
22      042525
23      005015
24      000000
25
26 01261 005015 PNAME: .TXT !<15><12>RTC 702 TEST <15><12>!
27      052122
28      020103
29      030067
30      020062
31      042524
32      052123
33      006440
34      000012
35
36 01272 014010 TADM: DSZ PASCO
37 01273 001400 JMP 0,3
38 01274 060102 NIOS 2 ;EXECUTE AUTOLOAD
39 01275 063077 HALT
```

!0022 .MAIN

01

02

.END

0000 SOURCE LINES IN ERROR

## 0023 .MAIN

A00	000070	5/44	14/54					
A02	000074	5/49						
A04	000100	5/54						
A06	000107	6/02						
A08	000115	6/10						
A10	000123	6/17						
A12	000133	6/26						
A14	000140	6/32						
A16	000145	6/38						
A18	000152	6/44						
A20	000157	6/50						
A22	000164	6/56						
A24	000171	7/02						
A26	000176	7/08						
A28	000203	7/14						
A30	000214	7/24						
A32	000225	7/34						
A34	000234	7/42						
A36	000241	7/48						
A38	000250	8/02						
A40	000260	8/11						
A42	000270	8/20						
A44	000300	8/29						
A46	000307	8/37						
A48	000324	9/02						
A50	000340	9/15						
A52	000354	9/28						
A54	000367	9/40						
A56	000404	10/02						
A58	000415	10/12						
A60	000426	10/22						
A61	000507	12/11						
A611	000514	12/17						
A62	000525	13/02						
A64	000547	13/21						
A66	000571	13/40						
A68	000614	14/02						
A70	000640	14/23						
BEGIN	000066	5/08	5/41					
C1000	000054	5/28						
C11	000062	5/34	13/14					
C13	000063	5/35	13/15					
C144	000064	5/36	13/33					
C152	000052	5/26	13/34					
C212	001210	20/16	20/22					
C215	001211	20/14	20/23					
C2342	000050	5/24						
C377	001222	18/16	20/33					
C4	000045	5/21	8/41	9/42				
C5	000040	5/16	13/51	14/16	14/36			
C60	001221	18/30	18/49	18/53	20/31			
C9997	000053	5/27						
CALIB	000046	5/22	12/09	13/11	13/30	13/48	14/13	14/33
CH240	001217	18/27	18/34	19/46	20/29			
CHAR	001137	17/13	18/23	18/43	18/56	19/24	20/15	20/17
CHAR1	001152	19/36						
CHAR7	001216	19/43	20/28					
CHORZ	001215	19/42	20/02	20/19	20/27			
CHRET	001213	19/24	19/40	19/45	20/25			
CHSAV	001214	19/27	19/33	20/26				
CHTAB	001212	18/41	19/36	20/24				
CIDIV	000061	5/33	13/13	13/32	13/50	14/15	14/35	
CLKTI	000055	5/29						

## 0024 .MAIN

CONRE	001231	20/37	20/41	20/43				
CONTI	001232	20/40	21/02					
CRLF	001200	5/30	17/15	20/13				
CRLFR	001220	20/13	20/20	20/30				
CYCLE	000720	5/18	15/21					
CYCTS	000757	15/26	16/05					
DECOC	001072	18/38	18/57	19/02	19/11			
DECOT	001102	18/46	18/51					
DECP	001110	18/47	18/52					
DECTB	001126	18/33	19/11					
DISP	000035	5/39	20/03	20/05	20/09			
DLOOP	000455	11/17	11/22					
EHALT	006043	5/38	5/46	5/51	5/59	6/06	6/14	6/23
		6/29	6/35	6/41	6/47	6/53	6/59	7/05
		7/11	7/21	7/31	7/39	7/45	7/53	8/08
		8/17	8/26	8/34	8/48	9/12	9/25	9/37
		9/51	10/09	10/19	10/28	12/14	12/24	13/18
		13/37	13/55	14/20	14/40			
ENTER	000677	5/17	15/02					
EPRIN	001017	16/42	17/02					
ER	000043	5/19	5/38					
ERET	001000	16/26	16/43					
ERR	000771	5/19	16/18					
ERR1	001006	16/25	16/33					
ERRCT	000712	15/07	15/14	15/42	16/04	16/29		
ESWIT	000711	15/06	15/13	15/33	16/08	16/23	16/36	17/02
		17/10						
HEADE	001036	17/05	17/20					
ICHAR	001031	15/45	17/13					
ICRLF	001033	14/45	15/41	17/03	17/15	20/38		
IDIV	000451	5/33	11/13					
IMESS	001030	14/46	17/04	17/12	20/39			
INIT	000002	5/03						
IPDEC	001035	14/49	15/43	17/17				
IPOCT	001034	17/09	17/16					
ISWTS	000065	5/37	16/33					
ITADM	000013	5/12						
ITR	000707	15/03	15/11	15/28				
ITRCT	000710	15/04	15/12	15/25	15/29			
ITYPE	001032	17/14						
LOOP	000042	5/18	5/47	5/52	5/60	6/07	6/15	6/24
		6/30	6/36	6/42	6/48	6/54	6/60	7/06
		7/12	7/22	7/32	7/40	7/46	7/54	8/09
		8/18	8/27	8/35	8/49	9/13	9/26	9/38
		9/52	10/10	10/20	10/29	12/15	12/25	13/19
		13/38	13/56	14/21	14/41			
LOOPR	000717	15/02	15/09	15/19	16/15			
MDCTR	000464	11/04	11/15	11/24				
MESS	001043	5/13	5/32	17/12	18/13	18/24		
MESSR	001223	18/13	18/14	18/25	20/34			
MLOOP	000442	11/05	11/09					
MPASS	000674	14/47	14/56					
MSAV	000465	11/03	11/11	11/14	11/23	11/25		
MULT	000437	11/02						
NEXT	000477	10/30	12/02					
NIMES	000014	5/05	5/13					
NOEX	000750	15/37	15/50					
NOPAS	000012	5/03	5/11					
OCTAB	001116	18/31	19/02					
PASCO	000010	5/04	5/09	21/36				
PASER	000663	14/43						
PASS	000044	5/20	5/42	14/43	14/48			
PCENT	000755	15/39	15/44	15/48	16/03			



## 0025 .MAIN

PDEC	001065	5/31	17/17	18/33				
PNAME	001261	5/06	21/26					
POCT	001062	17/16	18/30					
RADRE	001136	18/35	18/40	19/22				
RETUR	000713	15/15	15/21	15/53	16/16	16/18	16/31	16/35
		17/06						
SAVO	000716	15/18	15/24	15/50	16/05	16/21	16/28	
SAV1	000715	15/17	15/23	15/51	16/06	16/20	16/27	
SAV2	000714	15/16	15/22	15/52	16/07	16/19	16/26	
SETUP	000041	5/17	5/44	5/49	5/54	6/02	6/10	6/17
		6/26	6/32	6/38	6/44	6/50	6/56	7/02
		7/08	7/14	7/24	7/34	7/42	7/48	8/02
		8/11	8/20	8/29	8/37	9/04	9/15	9/28
		9/40	10/02	10/12	10/22	12/11	12/17	13/02
		13/21	13/40	14/02	14/23			
SWCON	000011	5/10						
SWTS	001224	5/37	20/37					
TADM	001272	5/12	21/36					
TIME	000047	5/23	5/56	6/19	7/16	7/26	7/36	7/50
		8/04	8/13	8/22	8/45	9/07	9/20	9/31
		9/46	10/06	10/16	10/25	12/07	13/09	13/28
		13/46	14/11	14/31				
TIMER	000466	5/23	11/27					
TIMEX	000051	5/25	11/34	13/12	13/31	13/49	14/14	14/34
TYPE	001166	17/14	19/39	19/47	20/02			
XDIV	000452	11/14						
XICRL	000056	5/30						
XIMES	000060	5/32						
XIPDE	000057	5/31						
XX14	000613	12/21	13/59					
ZOCT	001060	18/27						
ZSUPP	001135	18/36	18/44	18/54	19/21			

