

KW11-W

LOGIC TEST
MD-11-DDKWB-A

EP-DDKWB-A-DL-A

OCT 1976

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digital

FICHE 1 OF 1

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This microfiche card contains a grid of 20 frames of logic test data, arranged in 4 rows and 5 columns. Each frame displays a different set of test results, including various data tables and diagrams. The data is presented in a structured, tabular format, typical of digital logic test outputs. The frames are separated by a grid of small squares, and the overall layout is consistent across the card.

-11111-

.REM 1

IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DDKWB-A-D
PRODUCT NAME: WATCHDOG TIMER LOGIC TEST
DATE RELEASED: 21 DECEMBER 1975
MAINTAINER: DIAGNOSTIC GROUP

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MEMORY STORAGE - 00000 - 012000 OCTAL

LOADING PROCEDURE - (PAPER TAPE SUPPLIED) LOADED USING NORAML
BINARY PROCEDURE.

MAKE SURE THAT THE FOLLOWING PARAMETERS ARE THE SAME AS
THOSE OF YOUR SYSTEM.
IF NOT, PATCH THE TAGS IN ():

DEVICE ADDRESS (CSR) =172400
(CINT) =172402
(ECSR) =172404
(SWBU) =172406
INTERRUPT VECTOR (VADRS) =320
DEVICE PRIORITY INT. LEVEL(DPRIV) =265 (IN ASCII) (=5)
MODEL OF COMPUTER- (PDP11) =301 (=A) (05 OR 10 OR 20)

SWITCH SETTINGS:

SW00 =1 (UP) --- WILL EXIT ANY PARTICULAR TEST
SW01 =1 (UP) --- NO TTY WITH THE SYSTEM
SW02 =1 (UP) ---- SELECTS LOGIC TEST
SW03 =1 (UP) ---- SELECTS DELAY TEST
SW04 =1 (UP) ---- SELECTS DYNAMIC TEST
SW05 =1 (UP) ---- SELECTS DELAY:(1) WATCHDOG
SW05 =0 (DOWN) --- SELECTS DELAY:(2) WARNING AND SHORT LOOP
SW06 =1 (UP) - - HALTS ON END OF PASS

STARTING PROCEDURE:

EITHER A) ONLY IF THERE IS NO TTY WITH THE SYSTEM:

- 1.1 PATCH THE TAG TYSR TO 177570
- 1.2 LOAD ADDRESS 200 AND KEEP SW07 UP.
- 1.3 SET SW01=1 (UP)
- 1.4 SET EITHER SW02=1 --- IF LOGIC TEST TO BE PERFORMED
OR SW03=1---IF DELAY TEST TO BE PERFORMED
OR SW04=1 ---IF DYNAMIC TEST TO BE PERFORMED

IF DELAY TEST HAS BEEN SELECTED I.E. SW03=1, THEN

- 1.5 SET SW05=1 ---IF WATCHDOG DELAY TO BE PERFORMED
OR SET SW05=0 (DOWN)---FOR SHORT LOOP
AND WARNING DELAY TEST

FOR EXAMPLE, IF THERE IS NO TTY WITH THE SYSTEM, AND
ONE OF THE TWO DELAY TESTS ---WATCH DOG DELAY ---TO BE PERFORMED,
THEN SET SW01, SW03, SW05 UP.

1.6 SET SW06=1 -----FOR END OF PASS HALT (OPTIONAL)
1.7 PRESS START

IF SW01 IS UP AND NEITHER SW02 NOR SW03 NOR SW04 IS UP
THEN PROGRAM WILL HALT AT LOCATION 7256
IF SO, GO BACK TO STEP 1.2

IF THERE IS NO ERROR, PROGRAM WILL RUN FOR APPROX. 2 MINUTES
AT THE END OF WHICH THERE WILL BE A "5" ON THE DISPLAY LIGHTS
FOR COUPLE OF SECONDS (ONLY IF THE COMPUTER
IS A 1105/10/20) AND PROGRAM WILL HALT AT LOCATION
252 (ONLY IF SW06 IS UP). PRESS CONTINUE TO CONTINUE
WITH THIS TEST.

IF THERE IS ANY ERROR, PROGRAM WILL HALT.
PC OF THE ERROR WILL BE DISPLAYED ON THE LIGHTS.
ALSO, ADDRESS OF THE ERROR MESSAGE WILL BE STORED
AT LOCATION 017400.

IF YOU WISH TO RUN ANOTHER TEST, GO BACK TO STEP 1.2.

THERE IS NO END OF PASS FOR DELAY TESTS.

OR B) IF THERE IS A TTY:

1.1 LOAD ADDRESS 200
1.2 PRESS START

THE PROGRAM WILL ASK THE FOLLOWING QUESTIONS TO WHICH
THE OPERATOR MUST RESPOND BY TYPING:

FIRST DEVICE ADDRESS = (ANSWER IN 6 CHARACTERS)
FIRST INT. VECTOR = (3 CHARACTERS)
PRIORITY INT. LEVEL = (INPUT INT. LEVEL OF DEVICE 4-7)
PDP-11 (A)=05, 10, 20 (B)=35, 40 (C)=45, 50 ---ANSWER IS A OR B OR C
LOGIC TEST (1), DELAY TEST (2), DYNAMIC TEST (3) ---ANSWER IS 1 OR 2 OR 3

IF THE ANSWER TYPED WAS 2
PROGRAM WILL TYPE OUT ---
DELAY ADJUSTMENT TEST
DELAY: (1)WATCHDOG. (2)WARNING & SHORT LOOP ---THIS LINE IS A QUESTION.
ANSWER IS 1 OR 2

YOU WILL HAVE 15 SECONDS TO ANSWER A QUESTION (VIA TTY).
IF YOU ARE NOT ANSWERING THE QUESTIONS VIA TTY, THEN
YOU MUST START AT STEP 1.1 OF PART A) OR START DIRECT AS DESCRIBED
BELOW.

IF AN ERROR IS ENCOUNTERED WHILE INPUTTING THE DEVICE ADDRESS
OR INT. VECTOR, THE OPERATOR MAY TYPE A RUB OUT AND REPEAT
ENTIRE LINE INPUTTING. WHEN LINE IS COMPLETE OR IF NO CHANGES
(FROM STANDARD DEVICE) THE OPERATOR MUST TERMINATE THE LINE
WITH A CARRIAGE RETURN.

STARTING ADDRESS 1000:

DIRECT STARTING OR RESTARTING OF LOGIC TEST.
YOU CAN SKIP STEPS 1.2 THRU 1.5 OF PART A) AND START
DIRECTLY AT ADDRESS 1000.
BUT BEFORE THAT YOU MUST CHECK THE PARAMETERS
IF THEY ARE STANDARD.

STARTING ADDRESS 220:

DIRECT STARTING OR RESTARTING OF DELAY ADJUSTMENT TEST.
BUT IF YOU DO NOT HAVE A TRY TO ANSWER ANOTHER
QUESTION IN DELAY TEST, THEN YOU MUST START AT ADDRESS
200 I.E. GO BACK TO STEP 1.1 OF PART A).

STARTING ADDRESS 240:

DIRECT STARTING OR RESTARTING OF DYNAMIC SYSTEM TEST.

LOGIC TEST OPERATING PROCEDURE AND DESCRIPTION

 THE LOGIC TEST CONSISTS OF 44 SUB TESTS EACH CONTAINING AN ERROR ROUTINE. LOGIC TEST SHOULD BE STARTED WITH ALL CONSOLE (POP-11) SWITCHES DOWN. IF AN ERROR IS ENCOUNTERED, THE TELETYPE WILL REPORT WITH FAILING TEST AND HALT. TO LOOP ON A FAILURE CONSOLE SWITCH REGISTER, BIT 14 IS RAISED AND THE TEST IS LOOPED BY DEPRESSING THE CONTINUE KEY. TO INHIBIT THE ERROR TYPING RAISE SWITCH REGISTER BIT 13.

LOGIC TEST REQUIREMENTS:

TO RUN THE LOGIC TEST, THE SUPPLIED TEST PLUG MUST BE CONNECTED TO THE MODULE CONNECTOR. THE T3 DELAY MUST EXCEED T2 BY 50 MICRO-SECONDS. THE ADJUSTMENT OF T1 MUST BE SET AT A MINIMUM.

LOGIC TEST ERROR REPORTS.

TEST	FAILURE
T1	STATUS AND CONTROL REG. NOT CLEAR UPON INITIALIZE.
T2	INT. ENABLE BIT 6 OF CSR NOT SET.
T3	INT. ENABLE BIT 6 OF CSR NOT CLEAR.
T4	AN ILLEGAL INT. IS PRESENT FROM THE MODULE.
T5	AN ILLEGAL INT. IS PRESENT AFTER A DELAY TIME OUT.
T6	STATUS REGISTER NOT CLEAR AFTER DELAY TIME OUT.
T7	STATUS REGISTER WAS AFFECTED BY A CLEAR FLAGS INSTRUCTION.
T8	FAILED TO MONITOR A T2 FLAG.
T9	ALARM RECEIVED BIT 14 OF CSR SET WITHOUT AN EXT. ENALBE.
T10	ALARM RECIEVE FLAG FAILED TO SET AFTER ENABLING THE EXTER NAL WORLD.
T11	T2 FLAG FAILED TO CLEAR.
T12	RECIEVE FLAG FAILED TO CLEAR.
T13	SHORT LOOP (T1) FAILED TO CLEAR.
T14	T2 FLAG SET SHOULD HAVE BEEN TEMINATED BY THE LOCK FLOP UPON THE SHORT LOOP GENERATED IN T13.
T15	RECEIVE FLAG WAS SET UPON A SHORT LOOP WITHOUT THE EXTERNAL ENABLE.
T16	LOCK FLOP FAILED TO CLEAR UPON ENABLING THE EXTERNAL WORLD AND WAITING 5M.SEC. FOR CLEAR ERROR.
T17	NO ERROR CHECKING, CONDITIONING FOR T18, T19, AND T20.
T18	T1 FLAG FAILED TO CLEAR.
T19	T2 FLAG FAILED TO CLEAR.
T20	RECEIVE FLAG FAILED TO CLEAR.
T21	RECEIVE FLAG FAILED TO SET UPON A TIME OUT OF T3.
T22	ALARM REC. FLAG FAILED TO CLEAR.
T23	ENABLE FLOP NOT CLEARED AN ALARM OUT.
T24	A T2 FLAG FAILED TO RAISE AN INT. AT VECTOR 350.
T25	SHORT LOOP FLAG FAILED TO RAISE AN INT. AT VECTOR 350.

T26 ALARM REC. FLAG FAILED TO RAISE AN INT. AT VECTOR 350.
 T27 SHORT LOOP "LOCK" FAILED TO TERMINATE T3.
 T28 SHORT LOOP "LOCK" FAILED TO TERMINATE T2.
 T29 THE CLEARING OF "LOCK" DIDNOT RELEASE T2 TO THE
 BUS (REFER TO T26, T27, & T28).
 T30 SHORT LOOP " LOCK" FAILED TO LOCK PULSING OF TIMER.
 T31 INITIALIZE FAILED TO CLEAR SHORT LOOP FLAG.
 T32 INITIALIZE FAILED TO CLEAR RECEIVE FLAG.
 T33 INITIALIZE FAILED TO CLEAR THE LOCK FLOP.
 T34 INITIALIZE FAILED TO TERMINATE T3.
 T35 INITIALIZE FAILED TO TERMINATE T2.
 T36 INCORRECT STATUS IN EXTERNAL STATUS REG.
 T37 STATUS OF ECSR CHANGED UPON A RESET INSTRUCTION.
 T38 SWITCH BUS INSTRUCTION FAILED TO CHANGE THE EXTERNAL
 STATUS REGISTER.
 T39 THE LATCH FAILED TO PREVENT A 2ND BUS SWITCHING
 (REFER TO T38).
 T40 BUS FAILED TO SWITCH TO 2ND LATCH.
 T41 TERMINATION OF T3 FAILED TO RELEASE THE LATCH.
 T42 A SWITCH BUS COMMAND FAILED TO CHANGE THE BUS STATUS.
 T43 A RESET INSTRUCTION FAILED TO CLEAR THE LATCH.
 T44 MANUAL ENABLE INPUT FAILED.

 T38S TEST FOLLOWED BY AN "S" DENOTES SUBTEST.
 T40S WHICH IS A FAILURE OF THE EXTERNAL STATUS
 T41S REGISTER (STATUS READ IS INCORRECT).
 T43S

ALL TESTS MUST BE SUCCESSFULLY COMPLETED BEFORE THE NEXT TEST MAY
BE EXECUTED.

UPON SUCCESSFUL COMPLETION OF THE LOGIC TEST, THE TELETYPE WILL
PRINT "PASS".

FOR SCOPING ERRORS, SWITCH REGISTER BIT 7 MAY BE RAISED TO INCREASE
THE TEST REPEATIBILITY RATE.

DELAY ADJUSTMENT TESTS.

THE OPERATOR MUST RESPOND TO THE QUESTION, "(1) WATCHDOG, (2) WARNING & SHORT LOOP" BY TYPING A 1 OR A 2 FOR DESIRED ADJUSTMENT LOOP TO BE RUN.

DYNAMIC SYSTEM TEST.

THIS TEST IS INTENDED AS AN EXERCISER WHICH SHOULD BE RUN ONLY AFTER COMPLETING THE LOGIC TEST.

THE TEST EXERCISES THE INTERRUPT LOGIC, EXTERNAL STATUS AND DELAYS.

THE TIMER IS PRIMED BY PULSING THE DELAYS AND ENABLING THE INTERRUPT. THE ONLY LEGAL INTERRUPTS ARE THOSE FROM THE T2 DELAY. AFTER EACH LEGAL INTERRUPT, THE EXTERNAL STATUS IS SWITCHED AND TESTED FOR A CORRECT STATUS READING.

A "PASS" IS PRINTED AFTER 100 SUCCESSFUL INTERRUPTS.
POSSIBLE ERRORS REPORTED ARE:

1. SHORT LOOP FLAG SET
2. EXTERNAL STATUS BAD
3. ILLEGAL INTERRUPT

TO EXIT ANY TEST, RAISE CONSOLE SWITCH REGISTER, BIT 00. THE PROGRAM WILL THEN OUTPUT THE HEADER. MAKE SURE THAT THE SWITCH IS LOWERED BEFORE ENTERING A NEW TEST.

LOGIC TEST FOR WATCH DOG TIMER (HARDWARE MONITOR)
FOR POP-11 SYSTEMS.
THE WATCH DOG TIMER MUST BE PULSED FROM THE
COMPUTER PROGRAM WITHIN A SPECIFIED TIME TO
INHIBIT THE TIMER FROM TIMING OUT. UPON A TIME
OUT CONDITION THE WATCH DOG WILL POST AN
INTERRUPT ALLOWING THE PROCESSOR A CHANCE TO
RECOVER BEFORE A SECOND TIME OUT CONDITION
OCCURS ISSUING AN "ALARM OUT" TO THE EXTERNAL
WORLD. THE WARNING INTERRUPT IS SENSED AT
BIT 07 OF THE CONTROLL AND STATUS REGISTER.
THE TIMER ALSO HAS A "SHORT LOOP" PROTECTION WHICH
GUARDS AGAINST A PROGRAM FAILURE THAT MAYBE PULSING THE
TIMER BEFORE A SPECIFIED INTERVAL. THE SHORT LOOP WILL
POST AN INTERRUPT ALSO AT VECTOR (XXX) WHENEVER PULSED
TWICE WITHIN A SPECIFIED TIME INTERVAL. THE SHORT LOOP
INTERRUPT IS SENSED IN THE STATUS REGISTER BY BIT 14.
THE RECEIVE CIRCUIT ALLOWS FOR AN INTERRUPT (VECTOR XXX) TO BE
POSTED WHEN AN "ALARM SIGNAL" IS RECEIVED FROM THE
EXTERNAL WORLD. THE RECEIVE INTERRUPT IS SENSED AT
BIT 7 OF THE STATUS REGISTER.

FOR TEST PURPOSES THE "ALARM OUT" SIGNAL IS
JUMPERED TO THE ALARM RECEIVE WITH A SUPPLIED
TEST PATCH.

]

PS=177776	
TKB=177562	; TELETYPE READER BUFFER
TKS=177560	; TELETYPE READER STATUS
TYDB=177566	; TELETYPE PRINTER BUFFER
CSR=172400	; CONTROLL AND STATUS-WATCHDOG
CINT=172402	; INTERRUPT CLR INSTRUCTION
ECSR=172404	; EXTERNAL CSR
SWBU=172406	; SWITCH BUS
SR=177570	; SWITCH REGISTER
NULL=104000	
NOP=240	
HLT=0	
SW00=01	
SW01=02	
SW02=4	
SW03=10	
SW04=20	
SW05=40	
SW06=100	
RO=%0	
R1=%1	

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```
R2=%2      ;SUBROUTINE RETAIN  
R3=%3      ;TELETYPE ROUTINE RETAIN  
R4=%4      ;TIME CONTROL ROUTINES  
R5=%5      ;ERROR PRINT & SCOPE MODE  
SP=%6  
PC=%7  
;LOAD TRAP CATCHER
```



```

    .+2
    HLT          ;TRAPPED TO PREVIOUS VECTOR
    .+2
    HLT          ;TRAPPED TO PREVIOUS VECTOR
    .+2
    HLT          ;TRAPPED TO PREVIOUS VECTOR
    .+2
    HLT          ;TRAPPED TO PREVIOUS VECTOR
    .+2
    HLT          ;TRAPPED TO PREVIOUS VECTOR
    .+2
    HLT          ;TRAPPED TO PREVIOUS VECTOR
    .+2
    HLT          ;TRAPPED TO PREVIOUS VECTOR
    .+2
    HLT          ;TRAPPED TO PREVIOUS VECTOR
    .+2
    HLT          ;TRAPPED TO PREVIOUS VECTOR
    ;
    .=4
    TOBE          ;TIME OUT BUSS ERROR
    340           ;PROCESSOR STATUS
    .=30
    NULPRT
    340
    ;
    .=350
    WAOG          ;WATCH DOG INTERRUPT
    340           ;SET PROCESSOR STATUS BACK TO 7
    RECF          ;RECEIVE FLAG VECTOR
    340
    ;
    .=500
    TYSR:        177564
    XCSR:        CSR
    XCINT:       CINT
    XECSR:       ECSR
    XSWBU:       SWBU
    VADRS:       320
    DPRIV:       265 ;DEVICE PRIORITY LEVEL (5) IN ASCII
    PPRIV:       200 ;PROCESSOR PRIORITY LEVEL [DPRIV-1]
    PDP11:       301
    ;
    .=250
    EOPHLT:      HALT
    RTS          PC ;THIS IS AN END OF PASS HALT
                 ;NOT AN ERROR HALT.THIS HAPPENS ONLY
                 ;WHEN SW06 IS UP.
                 ;PRESS CONTINUE TO CONTINUE
    .=600
    STACK:      0 ;STACK LOCATOR
    .=200

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```

15:  MOV    #STACK, SP
     JSR    R5, ADDR0
     JMP    HEADER
           ;ASK FOR VECTORS AND ADDRESSES
           ;PRINT HEADER AND TAKE COMMANDS
           .
           .=220
     MOV    #STACK, SP
     JMP    DELAY
           ;DIRECT ENTRY TO DELAY TEST
           .
           .=240
     MOV    #STACK, SP
     JMP    DYNAM
           ;DIRECT ENTRY TO DYNAMIC TEST
           .
LOGIC: .=1000
       MOV    #STACK, SP
       NULL
       RESET
       NULL
       JMP    TEST
           ;
           .
:*****
:***** LOGIC TEST
:*****
TEST:  MOV    #LT, MES
       JSR    R3, PRINT
           ;SET REGISTER 3 FOR OUTCODE
           ;PRINT "LOGIC TEST"
           .
           ;TEST THAT ALL STATUS BITS ARE CLEARED IN THE CSR
           .
T1:   JSR    R1, CHECK
       MOV    #340, PS
       MOV    #T1, LOOP
       BIT    #177777, @XCSR
           ;TEST ALL BITS OF STATUS REG
       BEQ    T2
       JSR    R5, ERROR
       MOV    #EE1, MES
       JSR    R3, PRINT
       JSR    R5, SCOPE
       HLT
       JMP    T1
           ;STATUS REG NOT CLEAR
           .
           ;TEST THAT INTERRUPT ENABLE (BIT 6 OF CSR) CAN
           ;BE SET AND CLEARED .
           .
T2:   JSR    R1, CHECK
       MOV    #T2, LOOP
       MOV    #100, @XCSR
       BIT    #100, @XCSR
           ;TEST THAT INT.EN. IS SET IN THE CSR
       BNE    T3
       JSR    R5, ERROR
       MOV    #EE2, MES
       JSR    R3, PRINT
       JSR    R5, SCOPE
       HLT
       JMP    T2
           ;INT. EN. BIT FAILED TO SET

```

```

:
:
T3: JSR    R1,CHECK
      MOV    #T3,LOOP
      CLR    2XCSR
      BIT    #100,2XCSR          ;CHECK THAT INT ENABLE CLEARED
      BEQ    T4
      JSR    R5,ERROR
      MOV    #EE3,MES
      JSR    R3,PRINT
      JSR    R5,SCOPE
      HLT
      JMP    T3          ;INT.ENABLE FAILED TO CLEAR
:
:EX
:ENABLE PROCESSOR INTERRUPT AND CHECK FOR ILLEGAL
:INTERRUPTS OF WATCH DOG TIMER
:
T4: JSR    R1,CHECK
      MOV    #T4,LOOP
      MOV    #AA1,R4          ;SET UP INT RETURN
      MOV    #AA1,R5
      BIS    #100,2XCSR      ;ENABLE INT
      MOV    PPRIV,PS        ;SET PROCESSOR STATUS TO PPRIV
      NOP
      NOP          ;WAIT FOR INTERRUPT
      MOV    #340,PS        ;NO INTERRUPT SO GO
      JMP    T5
AA1: JSR    R5,ERROR          ;CHECK FOR ERROR PRINTOUT
      MOV    #EE4,MES        ;PRINT ERROR MESSAGE

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JSR    R3,PRINT      ;PRINT ERROR 1
JSR    R5,SCOPE      ;CHECK FOR SCOPE LOOP
HLT
JMP    T4            ;RUN TEST OVER ON KEY "COUNT"
:
:WAIT FOR POSSIBLE TIME OUT OF DELAYS AND CHECK AGAIN
:FOR ILLEGAL WATCHDOG INTERRUPTS
:
T5:    JSR    R1,CHECK      ;SET PROCESSOR STATUS TO 7
      MOV    #340,PS      ;WAIT FOR TIME OUTS
      JSR    R2,TOUT      ;SET INT RETURN
      MOV    #AA2,R4
      MOV    #AA2,R5
      MOV    PPRIV,PS    ;P.S. TO PPRIV
      NOP
      NOP                ;WAIT FOR INT
      MOV    #340,PS      ;SET STATUS TO 7
      BIC    #100,@XCSR
      JMP    T6
AA2:   JSR    R5,ERROR      ;GO ON
      MOV    #EE5,MES      ;CHECK FOR ERROR PRINT
      JSR    R3,PRINT      ;PRINT ERROR MESSAGE
      JSR    R5,SCOPE      ;PRINT ERROR 1A
      HLT
      JMP    T5
:
:READ THE STATUS WORD TO CHECK THAT ALL BITS ARE
:CLEAR AT THIS TIME.
:
T6:    JSR    R1,CHECK      ;SET FOR SCOPE LOOP RUN
      MOV    #T6,LOOP      ;CHECK STATUS REGISTER
      BIT    #177777,@XCSR ;IF 0 GO TO TEST 7
      BEQ    T7
      JSR    R5,ERROR
      MOV    #EE6,MES
      JSR    R3,PRINT      ;PRINT ERROR2
      JSR    R5,SCOPE      ;CHECK FOR SCOPE LOOP
      HLT
      JMP    T6          ;STAY HERE
:
:GENERATE A CLEAR COMMAND AND CHECK
:THAT STATUS WAS UNAFFECTED
:
T7:    JSR    R1,CHECK      ;SET UP FOR SCOPE LOOP RUN
      MOV    #T7,LOOP      ;CLR TO FLAGS SHORT LOOP, SECOND CHANCE
      TST    @XCINT
      JSR    R2,TOUT
      BIT    #177777,@XCSR
      BEQ    T8          ;ALL CLEAR GO TO TEST 8
      JSR    R5,ERROR
      MOV    #EE7,MES      ;PRINT ERROR 3
      JSR    R3,PRINT

```



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:TEST THAT T2 FLAG IS CLEARED BY (164002)CINT
T11: JSR    R1,CHECK
      MOV    #T11,LOOP
      TST    @XCINT
      TSTB   @XCSR
      BPL    T12
      JSR    RS,ERROR
      MOV    #EE11,MES
      JSR    R3,PRINT
      JSR    RS,SCOPE
      HLT
      JMP    T11
;T2 NOT CLEARED BY CINT(164002)

:CHECK THAT RECIEVE FLAG WAS CLEARED BY CLEAR REC FLAG (BIT 8 OF CSR)
T12: JSR    R1,CHECK
      MOV    #T11,LOOP
      MOV    #000400,@XCSR
      BIT    #040000,@XCSR
      BEQ    T13
      JSR    RS,ERROR
      MOV    #EE12,MES
      JSR    R3,PRINT
      JSR    RS,SCOPE
      HLT
      JMP    T12
;CLEAR RECIEVE FLAG
;TEST RECIEVE FLAG
;RECEIVE FLG FAILED TO CLR

:ISSUE TWO SUCCESSIVE PULSES TO THE TIMER AND MONITOR BIT 15
:OF THE CSR FOR A SHORT LOOP FLAG
T13: JSR    R1,CHECK
      MOV    #340,PS
      MOV    #THW,LOOP
      INC    @XCSR
      INC    @XCSR
      TST    @XCSR
;SET STATUS TO SEVEN
;SET FOR SCOPE LOOP
;HIT TIMER TWICE
;BIT 15 SHOULD BE SET

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```

BPL      +12
JSR      R2,TOUT      ;GO WAIT FOR TIMEOUT BRFORE PROCEEDING
JMP      T14
JSR      RS,ERROR     ;CHECK FOR ERROR PRINT
MOV      #EE13,MES    ;PRINT ERROR 13
JSR      R3,PRINT
JSR      RS,SCOPE
HLT
JMP      THW          ;SHORT LOOP FLAG FAILED TO SET
:
:
:TEST BIT 7 (2ND CHANCE) . BIT 7 SHOULD NOT BE SET
:TERMINATED BY LOCK
T14:     JSR      R1,CHECK
TSTB     @XCSR        ;TEST BIT 7
BPL      T15          ;CONTINUE TO TEST
JSR      RS,ERROR
MOV      #EE14,MES
JSR      R3,PRINT
JSR      RS,SCOPE
HLT
JMP      THW          ;T2 (2ND CHANCE) FLAG SET,CHECK LOCK FLOP
:                               ;LOOP TO TEST 13 ON KEY "CONT"
:
:WAIT 5 M.SEC AND TEST THAT THE ENABLE FLOP PREVRENTED
:THE WATCH DUG OUT SIGNAL FROM SETTING THE RECEIVE FLAG
:
T15:     JSR      R1,CHECK
MOV      #340,PS
JSR      R2,WAITX     ;WAIT FOR POSSIBLE TIME OUT OFT4
BIT      #040000,@XCSR ;TEST THAT REC.DIDNT SET
BEQ      T16
JSR      RS,ERROR
MOV      #EE15,MES
JSR      R3,PRINT
JSR      RS,SCOPE
HLT
JMP      THW          ;REC. FLAG SET WITHOUT AN ENABLE
:                               ;LOOP ON TEST 13
:
:ENABLE THE EXTERNAL WORLD AND WAIT 5 M SEC
:FOR THE LOCK FLOP TO BE CLEARED BY CLEAR ERROR
:SIGNAL. TEST THAT LOCK FLOP WAS CLEARED BY RESETTING
:THE 2ND. CHANCE FLAG (T2).
T16:     JSR      R1,CHECK
MOV      #2,@XCSR     ;ENABLE THE EXTERNAL WORLD
JSR      R2,WAITX     ;WAIT FOR CLEAR ERROR
INC      @XCSR        ;SET T2 FLAG AGAIN
JSR      R2,TOUT     ;TIME OUT DELAYS
TSTB     @XCSR
BMI      T17          ;RE CLR AND PROCEED
JSR      RS,ERROR
MOV      #EE16,MES

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      JSR      R3,PRINT
      JSR      R5,SCOPE
      HLT
      JMP      THW          ;LOCK FLOP NOT CLEARED BY
      MOV      #2,@XCSR    ;CLEAR ERROR
      JSR      R2,WAITX    ;CLEAR LOCK FOR RECYCLE
      TST      @XCINT      ;CLEAR FLAGS SHORT LOOP, SECOND CHANCE
      MOV      #000400,@XCSR ;CLEAR RECIEVE FLAG
      RESET
      JMP      T13
      :
      :
      :WITH RECEIVE AND SHORT LOOP FLAG SET PULSE TIMER
      :AND WAIT FOR TIME OUT OF T2 THEN ISSUE AN CLEAR INSTRUCTION
      :AND CHECK THAT ALL FLAGS ARE CLEARED.
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T17:  JSR    R1,CHECK
      MOV    #340,PS
      MOV    #T17,LOOP      ;LOOP TESTS
      TST   @XCINT          ;CLEAR INTERRUPT FLAGS. SHORT LOOP,SECOND CHANCE
      MOV    #000400,@XCSR  ;CLEAR RECEIVE FLAG
      ;TEST SHORT LOOP INTERRUPT FLAG FOR BEING CLEARED
      .
T18:  JSR    R1,CHECK
      TST   @XCSR           ;TEST BIT 15 OF CSR
      BPL   T19             ;OK GO ON
      JSR   R5,ERROR        ;CHECK FOR REPORT OF ERROR
      MOV   #EE18,MES       ;SET ERROR PRINT
      JSR   R3,PRINT
      JSR   R5,SCOPE
      HLT
      JMP   T17            ;SHORT LOOP FLAG FAILED TO CLEAR
                          ;LOOP TO TEST 17 ON KEY "CONT"
      .
      ;TEST WARNING FLAG (BIT 7) FOR BEING CLEAR
      .
T19:  JSR    R1,CHECK
      TSTB  @XCSR           ;TEST BIT 07 OF CSR
      BPL   T20
      JSR   R5,ERROR        ;CHECK FOR ERROR REPORT
      MOV   #EE19,MES       ;SET ERROR PRINT
      JSR   R3,PRINT
      JSR   R5,SCOPE
      HLT
      JMP   T17            ;LOOP TO TEST 17 ON KEY "CONT"
      .
      ;TEST ALARM RECEIVE (BIT 14) FOR BEING CLEAR
      .
T20:  JSR    R1,CHECK
      BIT   #040000,@XCSR   ;TEST BIT 14 OF CSR
      BEQ   T21
      JSR   R5,ERROR        ;CHECK FOR ERROR REPORT
      MOV   #EE20,MES       ;SET PRINT ERROR T20
      JSR   R3,PRINT
      JSR   R5,SCOPE
      HLT
      JMP   17             ;BIT 14 OF CSR FAILED TO A CLR
                          ;LOOP TO TEST 17 ON CONT
      .
      ;ENABLE ALARM OUT SIGNAL (PROGRAM CONTROL) AND TEST
      ;THAT TIME OUT OF T3 WILL SET ALARM RECEIVE FLOP (BIT 14)
      ;THE ALARM RECEIVE SIGNAL MUST BE CONNECTED TO THE ALARM OUT
      ;AND THE PROGRAM CONTROLLED "RESET" STRAP MUST BE CONNECTED
      .
T21:  JSR    R1,CHECK
      MOV    #T21,LOOP
      MOV    #340,PS
      MOV    #3,@XCSR       ;START TIMER AND ENABLE "ALARM OUT"
      JSR   R2,TOUT         ;TIME OUT DELAYS
      BIT   #040000,@XCSR  ;CHECK BIT 14 FOR BEING SET
      BEQ   .+6
      JMP   T22
      JSR   R5,ERROR

```

```
MOV    #EE21,MES      ;SET ERROR PRINTOUT
JSR    R3,PRINT
JSR    R5,SCOPE
HLT
JMP    T21            ;RECEIVE ALARM FLOP FAILED TO SET
                        ;LOOP ON TEST 21
;
;CLEAR INTERRUPT FLAGS AND CHECK THAT "ALARM RECEIVE"
;FLAG WAS CLEARED
T22:   JSR    R1,CHECK
MOV    #340,2XCSR
MOV    #T22,LOOP      ;SET SCOPE RETURN
MOV    #000400,2XCSR  ;CLEAR ALARM RECEIVE FLAG
BIT    #040000,2XCSR  ;TEST BIT 14 FOR BEING CLEAR
BEQ    T23            ;FLAG CLEAR GO ON
```

```

JSR    R5,ERROR
MOV    #EE22,MES
JSR    R3,PRINT
JSR    R5,SCOPE
HLT
JMP    T22
;BIT 14 OF CSR FAILED TO CLEAR
;CHECK "LOCKOUT" FEATURE OF "ALARM OUT" AFTER AN ALARM
;OUT SIGNAL HAS BEEN GENERATED.
T23: JSR    R1,CHECK
MOV    #340,PS
MOV    #T23,LOOP
MOV    #1,@XCSR
JSR    R2,TOUT
JSR    R2,WAITX
BIT    #040000,@XCSR
BEQ    T24
JSR    R5,ERROR
MOV    #EE23,MES
JSR    R3,PRINT
JSR    R5,SCOPE
HLT
JMP    T23
;START TIMING
;TIME OUT DELAYS
;WAIT FOR REC TO -SET
;TEST THAT LOCK OUT PREVENTED
;BIT 14 FROM BEING SET
;CLEAR ERROR FAILED TO ENABLE FLOP
;ALARM OUT SIGNAL
;DROP PROCESSOR STATUS TO 6 AND CHECK THAT WARNING FLAG WILL GIVE AN
;INTERRUPT AT VECTOR 170
T24: TST    @XCINT
MOV    #000400,@XCSR
JSR    R1,CHECK
MOV    #T25,R4
MOV    #WRNG,R5
MOV    #T24,LOOP
MOV    #101,@XCSR
JSR    R2,TOUT
MOV    PPRIV,PS
NOP
NOP
MOV    #340,PS
JSR    R5,ERROR
MOV    #EE24,MES
JSR    R3,PRINT
JSR    R5,SCOPE
HLT
JMP    T24
;CLEAR SHORT LOOP, SECOND CHANCE
;CLEAR RECEIVE FLAG
;SET INTERRUPT RETURN
;SET FOR INTERRUPT AT WRONG VECTOR
;SET STATUS TO PPRIV
;WAIT FOR INTERRUPT
;SHOULD HAVE INTERRUPTED
;SET STATUS BACK TO SEVEN
;WARNING FLAG (BIT 07) FAILED
;TO PRODUCE AN INTERRUPT
;CLEAR FLAGS AND SET THE SHORT LOOP
;FLAG TO CHECK FOR AN INTERRUPT

```



```

T25:   JSR      R1,CHECK
      RESET
      TST      @XCINT           ;CLEAR INTERRUPTS
      MOV      #AA4,R4         ;SET INTERRUPT RETURN
      MOV      #WRNG,R5       ;SETFOR WRONG VECTOR
      MOV      #T25,LOOP      ;SET SCOPE MODE
      MOV      PPRIV,PS       ;GET STATUS DOWN TO PPRIV
      BIS      #102,@XCSR     ;INT.EN +EXT.EN
      INC      @XCSR          ;SET SHORT LOOP
      INC      @XCSR
      NOP
      NOP                     ;SHOULD INT HERE
      MOV      #340,PS        ;NO INT.GET STATUS BACK UP
      JSR      R5,ERROR
      MOV      #EE25,MES      ;SET ERROR PRINT
      JSR      R3,PRINT
      JSR      R5,SCOPE
      HLT
      JMP      T25           ;SHORT LOOP FLAG FAILED TO RAISE A
      ;INTERRUPT
AA4:   JSR      R2,WAITX       ;WAIT FOR TIME OUT CLR ERROR
      TST      @XCINT         ;CLEAR FLAGS SHORT LOOP, SECOND CHANCE
      MOV      #000400,@XCSR  ;CLEAR RECEIVE FLAG
      JMP      T26
      ;
      ;CHECK FOR ALARM RECEIVE FLAG TO GENERATE AN INTERRUPT
      ;BY CLEARING THE WARNING FLAG BEFORE THE RECEIVE
      ;FLAG IS SET. T3>T2 BY AT LEAST 50 MIRC0. SEC.
      ;
T26:   JSR      R1,CHECK
      MOV      #340,PS        ;SET PROCESSOR STATUS TO 7
      MOV      #AA5,R5       ;SET INTERRUPT RETURN
      MOV      #WRNG,R4     ;SET FOR WRONG VECTOR
      MOV      #AA4,LOOP    ;SET SCOPE
      MOV      #3,@XCSR     ;START TIMING, ENABLE ALARM OUT
      TSTB    @XCSR         ;WAIT FOR WARNING
      BPL     -4
      TST      @XCINT       ;CLEAR BIT 7 OF CSR
      BIT      #040000,@XCSR ;WAIT FOR ALARM RECEIVE FLAG
      BEQ     -6
      BIS      #100,@XCSR   ;ENABLE INT.-2L
      MOV      PPRIV,PS     ;SET STATUS TO PPRIV
      NOP
      NOP                     ;SHOULD INT. HERE
      MOV      #340,PS      ;FAILED TO INT. SET STATUS TO 7
      JSR      R5,ERROR     ;CHECK FOR ERROR REPORT
      MOV      #EE26,MES
      JSR      R3,PRINT
      JSR      R5,SCOPE     ;CHECK FOR SCOPE ROUTINE
      HLT
      JMP      AA4          ;CLR FLAGSBEFORE LOOP
AA5:   JSR      R2,TOUT       ;CLEAR POSSIBILITY OF SHORT LOOP
      MOV      #000400,@XCSR ;CLEAR RECEIVE FLAG
      JMP      T27         ;T 27
      ;
      ;

```

```

;CHECK LOCK OUT OF SHORT LOOP BY FIRST CAUSING A
;SHORT LOOP FLAG THEN READING STATUS OF RECEIVE TO CHECK
;THAT T3 HAS BEEN TERMINATED

```

```

T27: JSR    R1,CHECK
      MOV    #AAS,LOOP
      MOV    #340,PS
      TST    @XCINT
      CLR    @XCSR
      MOV    #3,@XCSR      ;SET SHORT LOOP
      INC    @XCSR
      JSR    R2,WAITX      ;5.MILLI.SEC.CLEAR LOCK AND ENABLE
      BIT    #040000,@XCSR
      BNE    T28
      JSR    R5,ERROR
      MOV    #EE27,MES
      JSR    R3,PRINT
      JSR    R5,SCOPE
      HLT
      JMP    AAS           ;SHORT LOOP LOCK FAILED TO TERMINATE T3

```

```

;TEST THAT T2 WAS TERMINATED BY A SHORT LOOP LOCK BY
;TESTING STATUS OF T2

```

```

T28: JSR    R1,CHECK
      MOV    #T28,LOOP
      JSR    R2,TOUT
      MOV    #000400,@XCSR ;CLEAR RECEIVE FLAG
      TST    @XCINT        ;CLR FLAGS SHORT LOOP, SECOND CHANCE
      MOV    #3,@XCSR      ;EXT EN. SET S.LOOP
      INC    @XCSR
      TSTB   @XCSR         ;TEST BIT 7
      BPL    T29
      JSR    R5,ERROR
      MOV    #EE28,MES
      JSR    R3,PRINT
      JSR    R3,SCOPE
      HLT
      JMP    T28          ;LOCK FAILED TO TERMINATE T2
                          ;LOOP ONTEST 28

```

```

;WAIT 5 MILLI SEC. FOR CLEAR ERROR TO RELEASE
;THE LOCK FLOP AND PASS T2 TO BUS

```

```

T29: JSR    R1,CHECK
      JSR    R2,WAITX
      TSTB   @XCSR
      BMI    T30
      JSR    R5,ERROR
      MOV    #EE29,MES
      JSR    R3,PRINT
      JSR    R5,SCOPE
      HLT
      JMP    T28          ;LOCK DIDNT RELEASE T2 TO BUS
                          ;LOOP ON TEST 28

```

```

:
:CHECK THAT LOCK FROM SHORT LOOP FLAG
:LOCKS PULSE ING OF TIMER BY ATTEMPTING TO SET SHORT
:LOOP FLAG AFTER A PREVIOUS SHORT LOOP
:
T30: JSR      R1,CHECK
      MOV      #340,PS
      MOV      #T30,LOOP
      TST      @XCINT          ;CLEAR FLAGS SHORT LOOP,SECOND CHANCE
      INC      @XCSR
      INC      @XCSR
      TST      @XCINT          ;CLR FLAGS SHORT LOOP,SECOND CHANCE
      INC      @XCSR
      INC      @XCSR
      TST      @XCSR
      BPL      PTR
      JSR      R5,ERROR
      MOV      #EE30,MES
      JSR      R3,PRINT
      JSR      R5,SCOPE
      HLT
      JMP      T30          ;SHORT LOOP LOCK FAILED TO LOCK TIMER
:                                ;LOOP ON TEST 30
:
PTR:  MOV      #2,@XCSR
      JSR      R2,WAITX      ;CLR ERROR
      TST      @XCINT          ;CLEAR FLAGS SHORT LOOP,SECOND CHANCE
:
:GENERATE A SHORT LOOP COMMAND AND CHECK THAT INITIALIZE
:WILL CLEAR THE SHORT LOOP FLAG.
:
T31: JSR      R1,CHECK
      MOV      #T31,LOOP
      INC      @XCSR          ;SET A SHORT LOOP
      INC      @XCSR
      RESET
      TST      @XCSR          ;TEST SHORT LOOP FLAG FOR CLEAR
      BPL      T32
      JSR      R5,ERROR
      MOV      #EE31,MES
      JSR      R3,PRINT
      JSR      R5,SCOPE
      HLT
      JMP      T31          ;INITIALIZE FAILED TO CLEAR SHORT
:                                ;LOOP FLAG
:
:ENABLE THE EXTERNAL WORLD AND ALLOW THE RECIEVE
:FLAG TO SET THEN CHECK THAT THE INITIALIZE
:CLEARED RECEIVE FLAG.
:
T32: JSR      R1,CHECK
      MOV      #T32,LOOP
      MOV      #2,@XCSR
      JSR      R2,WAITX      ;5.MILLI SEC SET REC
      RESET

```



```

TST      2XCINT      ;CLEAR SHORT LOOP SECOND CHANCE
MOV      #000400,2XCSR ;CLEAR RECEIVE FLAG
;
;PULSE TIMER AND ISSUE A RESET INSTRUCTION
;WAIT FOR POSSIBLE TIME-OUT OF T2 THEN READ
;STATUS OF T2 TO TEST THAT INITIALIZE
;TERMINATED T2.
T35:    JSR      R1,CHECK
MOV      #T35,LOOP
MOV      #3,2XCSR
RESET
JSR      R2,TOUT      ;WAIT FOR DELAYS TO TIME OUT
TSTB     2XCSR        ;TEST BIT 7
BPL      PTX3
TST      2XCINT      ;CLEAR FLAGS
JSR      R5,ERROR
MOV      #EE35,MES
JSR      R3,PRINT
JSR      R5,SCOPE
HLT      ;INITIALIZE FAILED TO TERMINATE T2
JMP      T35
PTX3:   TST      2XCINT ;CLEAR FLAGS SHORT LOOP, SECOND CHANCE
MOV      #000400,2XCSR ;CLEAR RECEIVE FLAG
;
;TEST STATUS A&B AND TEST THAT BITS 7 & 15 ARE COMPLEMENTS
;15=1 AND 7=0 FROM A RESET CONDITION
T36:    JSR      R1,CHECK
RESET
MOV      #340,PS
MOV      #T36,LOOP
TST      2XCSR        ;CHECK BIT 15 OF ECSR
BPL      TILT
TSTB     2XCSR        ;CHECK BIT 7 OF EXT CSR 15=1
BMI      TILT        ;REPORT ERROR BOTH SAME
JMP      T37        ;OK 15=1 7=0
TILT:   NOP
JSR      R5,ERROR
MOV      #EE36,MES
JSR      R3,PRINT
JSR      R5,SCOPE
HLT      ;INCORRECT STATUS IN EXT. CSR
JMP      T36
;
;ISSUE A RESET INSTRUCTION AND TEST THAT STATUS
;OF THE EXT. CSR DOESNT CHANGE (NEUTRAL+POSITION):
T37:    JSR      R1,CHECK
MOV      2XCSR,PPL      ;SAVE EXT STATUS
MOV      #T37,LOOP
RESET
JSR      R2,WAITX      ;WAIT FO RELAY
ADD      2XCSR,PPL      ;TEST FOR STATUS CHANGE
BPL      T38
JSR      R5,ERROR

```

```

MOV      #EE37,MES
JSR      R3,PRINT
JSR      RS,SCOPE
HLT
JMP      T37          ;RESET INSTRUCTION CHANGED STATUS
                    ;OF EXT CSR

```

```

:WITH LATCH IN NEUTRAL POSITION SWITCH BUSS AND
:CHECK FOR CHANGE OF STATUS IN EXT. CSR

```

```

T38:     JSR      R1,CHECK
        RESET
        MOV      #T38,LOOP
        MOV      #EE38S,MES
        MOV      @XCSR,PPL          ;SAVE EXT. STATUS
        INC      @XSWBU            ;SWITCH BUSS
        JSR      R2,WAITX
        JSR      R3,OPP            ;CHECK THAT BITS ARE OF OPPOSITE
        ADD      @XCSR,PPL          ;POLARITY
        BMI      T39
        JSR      RS,ERROR
        MOV      #EE38,MES
        JSR      R3,PRINT
        JSR      RS,SCOPE
        HLT
        JMP      T38          ;SWITCHING BUSS FAILED

```

```

:WITH BUS SWITCHED CHECK THAT LATCH WILL DE-ENERGIZE RELAY ON
:A SECOND SWITCHING OF THE BUS
:TEST THAT STATUS CHANGED (NEUTRAL POSITION)

```

```

T39:     JSR      R1,CHECK
        MOV      #T39,LOOP
        MOV      @XCSR,PPL          ;SAVE EXT STATUS
        INC      @XSWBU            ;ATTEMPT TO SWITCH BUSS
        JSR      R2,WAITX          ;WAIT FOR RELAY
        ADD      @XCSR,PPL          ;WAS BUSS STATUS CHANGED
        BMI      T40
        JSR      RS,ERROR
        MOV      #EE39,MES
        JSR      R3,PRINT
        JSR      RS,SCOPE
        HLT
        JMP      T39          ;LATCH FAILED TO PREVENT BUSS CHANGE

```

```

:ISSUE A SWITCH BUS COMMAND AND CHECK THAT STATUS
:A & B CHANGED TO NEXT LATCH

```

```

T40:     JSR      R1,CHECK
        MOV      #T40,LOOP
        MOV      @XCSR,PPL
        INC      @XSWBU            ;SWITCH BUS
        JSR      R2,WAITX          ;5 MILLI SEC FOR RELAY

```

```

MOV      #EE40S,MES
JSR      R3,OPP          ;TEST FOR POL.CHANGE
ADD      @XCSR,PPL      ;TEST THAT STATUS CHANGED
BMI      T41
JSR      RS,ERROR
MOV      #EE40,MES
JSR      R3,PRINT
JSR      RS,SCOPE
HLT
JMP      T40          ;BUS FAILED TO SWITCH TO 2ND LATCH

:
:
:ENABLE EXTERNAL WORLD AND ALLOW DELAYS TO TIME
:OUT TO CHECK THAT TERMINATION OF T3 WILL RELEASE THE LATCH
:
T41:     JSR      R1,CHECK
MOV      @T40,LOOP
MOV      @XCSR,PPL      ;SAVE STATUS A&B
MOV      #3,@XCSR      ;ALLOW FOR CLEAR ERROR
JSR      R2,TOUT        ;TIME OUT ALL DELAYS
JSR      R2,WAITX       ;5 MILLI.SEC FOR RELAYS
MOV      #E41S,MES     ;SET SUBTEST PRINT
JSR      R3,OPP        ;SUBTEST
ADD      @XCSR,PPL
BMI      T42          ;IF STATUS CHANGED GO ON
JSR      RS,ERROR
MOV      #EE41,MES
JSR      R3,PRINT
JSR      RS,SCOPE
HLT
JMP      T41          ;BUSS FAILED TO SWITCH TO SECOND LATCH

:
:
:ISSUE A SECOND SWITCH BUSS COMAND AND CHECK THAT SWBU (164006)
:WILL SWITCH BUS
:
T42:     JSR      R1,CHECK
MOV      @T42,LOOP
MOV      @XCSR,PPL
INC      @XSWBU        ;ATTEMPT TO SWITCH BUSS
JSR      R2,WAITX       ;5 MILLI SEC FOR RELAY
ADD      @XCSR,PPL     ;DID STATUS CHANGE
BMI      T43          ;IF MINUS STATUS CHANGED
JSR      RS,ERROR
MOV      #EE42,MES
JSR      R3,PRINT
JSR      RS,SCOPE
HLT
JMP      T42          ;LATCH FAILED TO PREVENT BUSS FROM
:                          ;SWITCHING

:
:ISSUE A "RESET" INSTRUCTION AND TEST THAT
:LATCH GETS CLEARED

```

```

T43: JSR R1,CHECK
      MOV #T43,LOOP
      MOV @XCSR,PPL ;SAVE STATUS
      MOV #EE43S,MES ;SET SUBTEST PRINT
      RESET ;CLEAR LATCH
      JSR R2,WAITX ;WAIT FOR RELAY
      JSR R3,OPP
      ADD @XCSR,PPL ;TEST FOR STATUS CHANGE
      BMI T44 ;IF MINUS STATUS CHANGED
      JSR R5,ERROR
      MOV #EE43,MES
      JSR R3,PRINT
      JSR R5,SCOPE
      HLT ;RESET FAILED TO RELEASE LATCH
      JMP T43
      :
      :
PPL: 0 ;TEST DATA POINT
      :
      :
      :TEST THAT "MANUAL" EXTERNAL ENABLE CIRCUITRY FUNCTIONS
      :BY SETTING THE ENABLE FLOP FROM A SWITCHING OF THE BUS
      :(VIA TEST CONNECTOR)
      :
T44: JSR R1,CHECK
      MOV #T44,LOOP
      MOV #3,@XCSR
      JSR R2,TOUT ;CLEAR ANY ERROR CONDITIONS
      TST @XCINT ;CLEAR FLAGS SHORT LOOP,SECOND CHANCE
      MOV #000400,@XCSR ;CLEAR RECEIVE FLAG
      INC @XSWEU
      JSR R2,WAITX ;SWITCH BUS& WAIT FOR RELAY
      INC @XCSR ;GENERATE A SHORT LOOP ERROR,RECEIVE FLAG SHOULD
      INC @XCSR ;GET SET WITH EXTERNAL ENABLE SET BY SWITCH BUS COMMAND
      JSR R2,WAITX
      BIT #40000,@XCSR
      BNE INIT
      JSR R5,ERROR
      MOV #EE44,MES
      JSR R3,PRINT
      JSR R5,SCOPE
      HLT ;MANUAL ENABLE INPUT CIRCUITRY FAILED
      JMP T44
      :
      :
      :INITIALIZE THE WORLD AND PRINT PASS FOR EACH
      :PASS OF TEST CHECK TELETYPE FOR COMMAND INSTRUCTIONS
      :
INIT: RESET ;INITIALIZE WORLD
EOP: MOV #50.,TEMP2
IS: RESET
DEC TEMP2

```



```

BNE      1$
BIT      #SW06,SR
BEQ      2$
2$:      JSR      PC,EOPHLT
MOV      #PASS,MES      ;SET PASS PRINT
JSR      R3,PRINT
JSR      R1,CHECK      ;CHECK FOR TELTYPE COMMANDS
MOV      #STACK,SP
JMP      T1
TEMP2:   .WORD 0
:
:
:SUBROUTINE TO TEST THAT STATUS A&B ARE OF ADJACENT
:POLARITY. THIS ROUTINE IS USED AS A SUBTEST.
:
OPP:     †TST      @XECR      ;TEST BIT 15 OF ESCR
BPL      .+12
TSTB     @XECR      ;BIT 15=1 TEST BIT 7
BMI      .+14      ;REPORT A&B SAME
RTS      R3
TSTB     @XECR      ;15=1 7=0
BPL      .+4      ;REPORT BOTH SAME
RTS      R3
JSR      R5,ERROR
NOP
NOP
NOP
JSR      R3,PRINT
JSR      R5,SCOPE
HLT
JMP      @LOOP      ;LOOP ON FAILING TEST
RTS      R3          ;OK 15=1 7=0
TSTB     @XECR      ;15=0 TEST 7
BPL      .+4      ;REPORT BOTH SAME
RTS      R3          ;OK 15=0 7=1
JSR      R5,ERROR   ;CHECK FOR ERROR REPORT
NOP
NOP
NOP
JSR      R2,PRINT
JSR      R5,SCOPE
HLT
JMP      @LOOP      ;LOOP ON FAILING TEST
:
:

```

```

*****
: DELAY ADJUSTMENT TEST
*****
DELAY:  MOV      #340,PS          ;KEEP STATUS AT 7 FOR ENTIRE TEST
        NULL
        RESET
        NULL
        MOV      #DELTST,MES     ;PRINT "DELAY ADJUST TEST"
        JSR      R3,PRINT
LREP:   MOV      #ASK,MES        ;ASK FOR DELAY 1, 2
        JSR      R3,PRINT
        JSR      R1,REC          ;RECIEVE ONE CHARACTER FROM TELE
        JSR      R3,ECHO         ;ECHO CHARACTER
        BIT      #SW01,SR        ;IS THERE A TTY?
        BEQ      2$
        BIT      #SW05,SR        ;ASK FOR DELAY 1 OR 2
        BNE      1$             ;IF SW05 UP,RUN DELAY 1
        MOV      #262,HLD
        BR       2$
1$:     MOV      #261,HLD
2$:     CMP      HLD,#261
        BEQ      D1             ;RUN DELAY 1 (RECEIVE) TIMING TEST
        CMP      HLD,#262
        BEQ      D2             ;RUN DELAY 2 (WARNING & S.L.) TIMING TEST
        MOV      #QU,MES        ;PRINT A ?
        JSR      R3,PRINT
        JMP      LREP           ;REPEAT LINE
:
D1:     MOV      #340,PS
        MOV      #000400,@XCSR   ;CLEAR RECEIVE FLAG
        MOV      #3,@XCSR        ;PULSE WARNING FLAG DELAY
        BIT      #040000,@XCSR   ;MONITOR BIT 14
        BEQ      -6
        JSR      R2,TOUT         ;WAIT APPROX 10.-6 SEC
        JSR      R1,CHECK
        JMP      D1
        ;RUN WARNING FLAG & SHORT LOOP DELAY TIMING TESTS
:
D2:     MOV      #340,PS
        TST      @XCINT          ;CLEAR FLAG
        MOV      #1,@XCSR        ;PULSE ALARM DELAY
        TSTB     @XCSR           ;TEST BIT 7
        BPL      -4
        JSR      R2,WAITX
        JSR      R1,CHECK        ;CHECK FOR TELETYPE COMMANDS
        JMP      D2             ;RECYCLE
:
:

```

```

:
:*****
: DYNAMIC SYSTEM TEST
:*****
:
DYMAN:  MOV    #DYTST,MES
        JSR    R3,PRINT
        NULL
        RESET
DYX:    JSR    R1,CHECK
        MOV    @XCSR,SIRE ;SAVE STATUS
        MOV    #340,PS ;SET STATUS
        MOV    #HORN,R4 ;SET INT. RETURN
        MOV    #HORN,R5
        MOV    #120,COUNT ;SET COUNTER FOR 100 PASSES
PT:     MOV    #103,@XCSR ;START TIMING, ENABLE ALARM OUT
        MOV    PPRIV,PS ;STATUS=6
        NOP
        JMP    .-2 ;STAY HERE WAIT FOR INTERRUPT
HERE:   MOV    #SLF,MES ;SHORT LOOP FLAG SET
        JSR    R3,PRINT
        JSR    R2,TOUT ;TIME OUT DELAYS
        TST    @XCINT ;CLEAR FLAGS
        JMP    PT ;RECYCLE TEST
HORN:   TST    @XCSR ;FIND WHO GAVE INTERRUPT
        BMI    HERE
        TSTB   @XCSR ;CHECK BIT 7
        BMI    OKK ;ALL RIGHT GO
        BIT    #040000,@XCSR ;NOT BIT 7 SO TRY 14
        BEQ    ERR ;ILLEGAL INT.
        TSTB   @XCSR
        BPL    .-4
OKK:    BIT    #40000,@XCSR ;BIT 7=1 WAIT FOR !4
        BEQ    .-6
        TST    @XCINT ;CLEAR FLAGS SHORT LOOP, SECOND CHANCE
        MOV    #000400,@XCSR ;CLEAR RECEIVE FLAG
        INC    @XSWBU ;SWITCH BUS
        JSR    R2,WAITX
        ADD    @XCSR,SIRE
        BMI    CLST ;BR IF STATUS CHANGED
        NULL
        MOV    #BBS,MES ;REPORT EXT. STATUS BAD
        JSR    R3,PRINT
        JMP    DYX
CLST:   MOV    @XCSR,SIRE ;CLEAR LATCH
        RESET
        JSR    R2,WAITX
        ADD    @XCSR,SIRE
        BMI    TIKE
        NULL
        MOV    #BBS,MES
        JSR    R3,PRINT
        JMP    DYX
TIKE:   DEC    COUNT

```


K03

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	JMP	HEADER	; ILLEGAL CHARACTER TRY AGAIN
TA:	JMP	LOGIC	; LOGIC TEST
TB:	JMP	DELAY	; DELAY TIME LOOP
TC:	JMP	DYMAN	; DYNAMIC TEST
HLD:	0		; HOLD TEST DESIRED

```

; ECHO CHARACTER IN TELETYPE BUFFER REGISTER
ECHO:  MOV   TKB, TYDB      ; READER BUFFER TO PRINTER BUFFER
      TSTB  @TYSR        ; TEST PRINTER STATUS
      BPL   .-4
      RTS   R3
; PRINT DATA SPECIFIED BY LEADING ADDRESS IN REGISTER 4
; UNTIL TERMINATED BY (2)
PRINT: NULL
      MOV   MES, R4
      MOV   #ERRST, R2
      MOV   MES, (R2)+
      CLR   (R2)
15:   MOVB  (R4)+, DBUF
      CMPB  #100, DBUF
      BEQ   DONE
      CMPB  #45, DBUF
      BNE   OUT
      JSR   R2, LFCR
      JMP   15
OUT:   JSR   RS, PRT
      BR    PRINT+16
PRT:   MOVB  DBUF, TYDB
      TSTB  @TYSR
      BPL   .-4
      RTS   R5
DONE:  NULL
      RTS   R3
DBUF:  0
MES:   0
TEMP1: .WORD 0
;
; RECEIVE ONE CHARACTER FROM TELETYPE READER
; BUFFER AND STORE IN LOC. "HLD"
REC:   MOV   HOLD, (PC)+
15:   .WORD 0
25:   TSTB  TKS          ; WAIT FOR KEYBOARD
      BMI   35
      INC  #0
      BNE  25
      DEC  15
      BNE  25
      MOVB #215, HLD
      BR   45
35:   MOV   TKB, HLD      ; MOV DATA TO LOC. HLD
45:   RTS   R1
HOLD:  20
;
; 5 MILLI-SEC LOOP
WAIT:  MOV   #1750, TIMI
      DEC  TIMI

```

```

      BNE      .-4
      RTS      R2
      ;WAIT 5 MILLI SEC.
WAITX: MOV      SPEED,TIMI      ;LOAD FOR 5 MILLI SEC
      DEC      TIMI
      BNE      .-4
      RTS      R2
SPEED: 177777      ;5 MILLI SEC CONSTT
      ;RETURN FROM SHORT LOOP & WARNING INTERRUPTS
WAOG:  MOV      #STACK,SP      ;FORCE INTERRUPT RETURN OF SHORTLOOP & WARNING
      MOV      R4,PC
      HLT
      ;SHOULD NEVER GET HERE
      ;RETURN FROM RECIEVE FLAG INTERRUPTS
RECF:  MOV      #STACK,SP
      MOV      R5,PC      ;FORCE INT RET OF REC
      HLT
      ;CHECK FOR COMMANDS TO MONITOR
      ;TEST REQUIRED
CHECK: BIT      #1,SF
      BNE      .+4
      RTS      R1
      MOV      #3,@XCSR
      JSR      R2,TOUT1
      RESET
      TST      @XCINT      ;CLEAR FLAGS
      JMP      HEADER
      ;WHEN VECTORS 170 & 174 ARE INCORRECTLY ASSERTED
      ;ENTER ROUTINE, REPORT ERROR AND RETURN TO FAILING TEST
WRNG: MOV      #WRONG,MES
      JSR      R3,PRINT
      TST      (SP)+
      MOV      #340,@(SP)      ;SET RETURN STATUS TO 7
      TST      -(SP)
      RTI
      ;BUSS TIME-OUT ERROR SUBROUTINE

```



```

ADD      #2, VADDR
MOV      #340, @VADDR
STRBA:  MOV      #ASK3, MES      ;ASK FOR VECTOR LEVEL
        JSR      R3, PRINT
        JSR      R1, REC        ;REC ONE CHARACTERS
        JSR      R3, ECHO
        BIT      #SW01, SR      ;IS THERE A TTY?
        BEQ     IS
        MOV      DPRIV, HLD     ;IF NO TTY
IS:      CMP      #264, HLD     ;CHECK FOR A 4
        BNE     .+12
        MOV      #140, PPRIV    ;SET PRIORITY AT 3
        BR      PROTIM
        CMP      #265, HLD
        BNE     .+12
        MOV      #200, PPRIV
        BR      PROTIM
        CMP      #266, HLD
        BNE     .+12
        MOV      #240, PPRIV
        BR      PROTIM
        CMP      #267, HLD
        BNE     .+12
        MOV      #300, PPRIV
        BR      PROTIM
        MOV      #QU, MES
        JSR      R3, PRINT
        JMP     STRBA          ;TRY AGAIN
PROTIM:  MOV      #ASK4, MES
        JSR      R3, PRINT
        JSR      R1, REC
        JSR      R3, ECHO
        BIT      #SW01, SR      ;IS THERE A TTY ?
        BEQ     IS
        MOV      PDP11, HLD    ;PDP11-05 OR WHATEVER
IS:      CMP      #301, HLD
        BNE     .+12
        MOV      #1500, SPEED
        BR      KA
        CMP      #302, HLD
        BNE     .+12
        MOV      #3000, SPEED
        BR      KA
        CMP      #303, HLD
        BNE     .+12
        MOV      #6000, SPEED
KA:      RTS      RS
        MOV      #QU, MES
        JSR      R3, PRINT
        JMP     PROTIM

;
ADDRES:  0
VADDR:  0

```

```

TIMEX:  MOV    #STACK, SP      ;REINITIALIZE THE STACK
        MOV    (R4), PC       ;FORCE RETURN FROM INTERRUPT
        HLT                    ;SHOULD NEVER GET HERE

        ;RUN DELAY TIME OUTS, TOTAL TIME AS PER
        ;PROCESSOR TIME 05=4SEC.+ 40=3 SEC+

TOUT:   TSTB   SR
        BR     TOUT1          ;CHANGE TO BPL TO RUN A FAST MODE FOR
RA:     MOV    #12, CNTIM     ;T1, T2, T3<50 MILLI-SEC
        MOV    SPEED, TIMI    ;50 MILLI SEC. WORTH
        DEC   TIMI
        BNE   .-4
        DEC   CNTIM
        BNE   RA
        RTS   R2              ;GO WHEN DONE
TOUT1:  MOV    #5, TIMI       ;RUN LONG TIME OUT FOR ALL DELAYS HERE
        JSR   R4, TIME        ;SET COUNT TIME
        RTS   R2
CNTIM:  0
TIMI:   0
        ;
NULPRT: NOP
        TSTB  @TYSR
        BPL  .-4
        CLR  TYDB
        TSTB @TYSR
        BPL  .-4
        CLR  TYDB
        TSTB @TYSR
        BPL  .-4
        RTI

LFCR:  MOV    #215, TYDB      ;CARRIAGE RET.
        TSTB @TYSR
        BPL  .-4
        MOV  #212, TYDB
        TSTB @TYSR
        BPL  .-4
        RTS   R2
        ;
        ;
ERROR:  ;CHECK FOR ERROR PRINT OUT (BIT 13 OF SWITCH REG.)
        BIT   #20000, SR
        BEQ  .+6              ;IF BIT 13=0 PRINT ERROR
        ADD  #12, R5          ;ADD VALUE TO OMIT ERROR PRINT
        RTS   R5
        ;
SCOPE:  ;CHECK FOR SCOPE LOOP (BIT 14 OF SWITCH REG.)
        MOV  SR, ESTAT

```

```

BIT      #04CC30,ESTAT ;TEST BIT 14 OF SWITCH REGISTER
BEQ      +12           ;IF BIT 14=1 RUN SCOPE
MOV      #STACK,SP
MOV      LOOP,PC      ;FORCE RETURN TO TEST
RTS      RS           ;RETURN AND HLT

ESTAT:   0
LOOP:    0

;RUN TIME INCREMENTS IN VALUES STORED IN TIMI
TIME:    CLR      XES
          INC      XES           ;COUNT LOOP
          BNE     -4           ;↑
          DEC     TIMI         ;NUMBER OF COUNT LOOPS
          BNE     -12
          RTS      R4

YES:     0
;MESSAGES
;BYTE
LT:      .ASCII  /%LOGIC TEST%/

EE1:     .ASCII  /T1%/
EE2:     .ASCII  /T2%/
EE3:     .ASCII  /T3%/
EE4:     .ASCII  /T4%/
EE5:     .ASCII  /T5%/
EE6:     .ASCII  /T6%/
EE7:     .ASCII  /T7%/
EE8:     .ASCII  /T8%/
EE9:     .ASCII  /T9%/
EE10:    .ASCII  /T10%/
EE11:    .ASCII  /T11%/
EE12:    .ASCII  /T12%/
EE13:    .ASCII  /T13%/
EE14:    .ASCII  /T14%/
EE15:    .ASCII  /T15%/
EE16:    .ASCII  /T16%/
EE17:    .ASCII  /T17%/
EE18:    .ASCII  /T18%/

```

EE19: .ASCII /T19%2/
EE20: .ASCII /T20%2/
EE21: .ASCII /T21%2/
EE22: .ASCII /T22%2/
EE23: .ASCII /T23%2/
EE24: .ASCII /T24%2/
EE25: .ASCII /T25%2/
EE26: .ASCII /T26%2/
EE27: .ASCII /T27%2/
EE28: .ASCII /T28%2/
EE29: .ASCII /T29%2/
EE30: .ASCII /T30%2/
EE31: .ASCII /T31%2/
EE32: .ASCII /T32%2/
EE33: .ASCII /T33%2/
EE34: .ASCII /T34%2/
EE35: .ASCII /T35%2/
EE36: .ASCII /T36%2/
EE37: .ASCII /T37%2/
EE38: .ASCII /T38%2/
EE39: .ASCII /T39%2/
EE40: .ASCII /T40%2/
EE41: .ASCII /T41%2/
EE42: .ASCII /T42%2/
EE43: .ASCII /T43%2/
EE44: .ASCII /T44%2/
EE385: .ASCII /T385%2/

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DDKWB.A.P11

EE40S: .ASCII /T40S%a/

EE41S: .ASCII /T41S%a/

EE43S: .ASCII /T41S%a/

TOER: .ASCII /BUS ERROR TIME-OUT%a/

PASS: .ASCII /PASS%a/

WRONG: .ASCII /TRAPPED TO WRONG INT. VECTOR%a/

DELTST: .ASCII /%DELAY ADJUSTMENT TEST%a/

ASK: .ASCII /DELAY:(1)WATCHDOG.(2)WARNING & SHORT LOOP%a/

QU: .ASCII /?%a/

HEAD: .ASCII /%LOGIC TEST(1),DELAY TEST(2),DYNAMIC TEST(3)%a/

DYTST: .ASCII /%DYNAMIC TEST%a/

SLF: .ASCII /SHORT LOOP FLAG SET%a/

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DDKWBA.P11

IINT: .ASCII /ILLEGAL INTERRUPT%a/

BBS: .ASCII /EXT.BUS STATUS BAD%a/

ASK1: .ASCII /%FIRST DEVICE ADDRESS=a/

ASK2: .ASCII /%FIRST INT. VECTOR=a/

ASK3: .ASCII /%PRIORITY INT. LEVEL=a/

ASK4: .ASCII /%PDP-11 (A)=05,10,20 (B)=35,40 (C)=45,50 a/

ERRST: .EVEN
 .=017400
 .BLKW 5
 .END

LOGIC	001000	563#	1640											
LOOP	011070	582*	596*	610*	626*	670*	685*	703*	736*	752*	766*	782*	860*	905*
		925*	942*	963*	987*	1014*	1042*	1062*	1101*	1127*	1145*	1167*	1189*	1214*
		1236*	1255*	1273*	1295*	1313*	1335*	1357*	1375*	1400*	1459	1471	1925	1928#
LREP	006302	1487#	1504											
LT	011117	573	1940#											
MES	007514	573*	586*	601*	615*	636*	659*	674*	691*	710*	723*	742*	757*	771*
		791*	805*	821*	841*	869*	881*	893*	913*	931*	949*	971*	996*	1027*
		1052*	1071*	1087*	1111*	1134*	1152*	1176*	1199*	1222*	1244*	1261*	1274*	1282*
		1302*	1317*	1322*	1340*	1345*	1364*	1377*	1384*	1413*	1433*	1485*	1487*	1502*
		1534*	1548*	1570*	1579*	1588*	1601*	1627*	1637*	1653	1655	1674#	1747*	1758*
		1767*	1790*	1814*	1837*	1840*	1859*							
MOD	007774	1770#	1779											
MODA	010150	1793#	1802											
NOP	= 000240	364#												
NULL	= 104000	363#	564	566	1482	1484	1536	1569	1578	1587	1590	1652	1671	
MULPRT	010730	517	1892#											
OKK	006706	1556	1561#											
OPP	006134	1278	1318	1341	1380	1444#								
OUT	007462	1661	1664#											
PASS	011533	1433	1588	2048#										
PC	=%000007	380#	544*	1432*	1599*	1681*	1715*	1720*	1868*	1925*				
PDP11	000520	539#	1846											
PPL	005724	1254*	1258*	1275*	1279*	1296*	1299*	1314*	1319*	1336*	1342*	1358*	1361*	1376*
		1381*	1392#											
PPRIV	000516	538#	630	652	966	988	1022	1545	1823*	1827*	1831*	1835*		
PRINT	007406	574	587	602	616	638	660	675	692	711	724	743	758	772
		792	806	822	842	870	882	894	914	932	950	972	997	1028
		1053	1072	1088	1112	1135	1153	1177	1200	1223	1245	1262	1283	1303
		1323	1346	1365	1385	1414	1434	1456	1468	1486	1488	1503	1535	1549
		1571	1580	1589	1602	1628	1638	1652#	1665	1748	1759	1768	1791	1815
		1838	1841	1860										
PROTIM	010476	1824	1828	1832	1836	1840#	1861							
PRT	007470	1664	1667#											
PS	= 177776	354#	581*	630*	633*	648*	652*	655*	704*	781*	816*	859*	906*	941*
		966*	969*	988*	994*	1011*	1022*	1025*	1043*	1100*	1235*	1481*	1507*	1517*
		1540*	1545*	1586*										
PT	006604	1544#	1552	1585	1606									
PTR	004226	1109	1117#											
PTX1	004506	1174	1181#											
PTX2	004624	1195	1204#											
PTX3	004732	1219	1227#											
QU	011702	1502	1637	1837	1859	2073#								
RA	010664	1878#	1882											
REC	007520	1489	1629	1681#	1770	1793	1816	1842						
RECF	007640	525	1719#	1811										
RO	=%000000	373#												
R1	=%000001	374#	580*	595*	609*	625*	647*	669*	684*	702*	719*	735*	751*	765*
		780*	801*	815*	833*	858*	865*	877*	889*	904*	923*	940*	960*	982*
		1010*	1041*	1061*	1082*	1099*	1126*	1144*	1166*	1189*	1213*	1233*	1253*	1271*
		1294*	1312*	1334*	1356*	1374*	1399*	1435*	1489*	1513*	1523*	1538*	1584*	1629*
		1692*	1733*	1770*	1793*	1816*	1842*							
R2	=%000002	375#	649*	687*	706*	738*	788*	817*	835*	837*	847*	908*	944*	945*
		965*	1001*	1032*	1048*	1063*	1083*	1118*	1147*	1182*	1193*	1196*	1204*	1217*
		1257*	1277*	1298*	1316*	1338*	1339*	1360*	1379*	1402*	1406*	1409*	1468*	1512*
		1522*	1550*	1566*	1575*	1591*	1592*	1603*	1654*	1655*	1656*	1662*	1701*	1708*

TOER	011507	1758	2043#											
TOUT	010650	649	687	706	788	837	908	944	965	1032	1063	1196	1204	1217
		1338	1402	1512	1550	1591	1592	1603	1875#					
TOUT1	010710	1735	1876	1885#										
TYDB	= 177566	357#	1646*	1667*	1895*	1898*	1904*	1907*						
TYSA	000500	531#	1647	1668	1893	1896	1899	1905	1908					
T1	001030	580#	582	590	1437									
T10	001752	721	735#											
T11	002036	740	751#	752	761	766								
T12	002112	755	765#	775										
T13	002172	769	780#	851										
T14	002277	789	801#											
T15	002	803	815#											
T16	002410	819	833#											
T17	002526	839	858#	860	873	885								
T18	002560	865#												
T19	002622	867	877#											
T2	001110	584	595#	596	605									
T20	002664	879	889#											
T21	002730	891	904#	905	917									
T22	003026	911	923#	925	935									
T23	003114	928	940#	942	953									
T24	003212	947	958#	963	975									
T25	003330	961	982#	987	1000									
T26	003470	1004	1010#											
T27	003644	1034	1041#											
T28	003752	1050	1061#	1062	1075	1091								
T29	004052	1069	1082#											
T3	001170	599	609#	610	619									
T30	004120	1085	1099#	1101	1115									
T31	004244	1126#	1127	1138										
T32	004326	1132	1144#	1145	1156									
T33	004414	1150	1166#	1167	1180									
T34	004520	1188#	1189	1203										
T35	004642	1213#	1214	1226										
T36	004744	1233#	1236	1248										
T37	005040	1241	1253#	1255	1265									
T38	005126	1259	1271#	1273	1286									
T39	005232	1280	1294#	1295	1306									
T4	001246	613	625#	626	641									
T40	005322	1300	1312#	1313	1326	1335								
T41	005424	1320	1334#	1349										
T42	005534	1343	1356#	1357	1368									
T43	005624	1362	1374#	1375	1388									
T44	005726	1382	1399#	1400	1417									
T5	001352	634	647#	663										
T6	001462	657	669#	670	678									
T7	001534	672	684#	685	695									
T8	001616	689	702#	703	714	736	746							
T9	001706	708	719#	727										
VADDR	U10636	1792*	1797*	1798*	1799*	1801*	1803	1805*	1806*	1807*	1808*	1809*	1810*	1811*
		1812*	1813*	1865#										
VADRS	000512	536#	1805											
WAIT	007572	1698#												
WAITX	007610	738	817	835	847	945	1001	1048	1083	1118	1147	1182	1193	1257
		1277	1298	1316	1339	1360	1379	1406	1409	1522	1566	1575	1705#	

WAOG	007630	523	1714*	1807											
WRNG	007706	962	986	1013	1747*										
WRONG	011541	1747	2051*												
XCINT	000504	533*	686	753	848	861	958	984	1002	1018	1044	1065	1102	1105	
XCSR	000502	1119	1197	1205	1220	1227	1403	1518	1551	1563	1604	1737	1784*		
		532*	583	597*	598	611*	612	629*	656*	671	688	705*	707	720	
		737*	739	754	767*	768	783*	784*	785	802	818	834*	836*	838	
		846*	849*	862*	866	878	890	907*	909	924*	926*	927	943*	946	
		959*	954*	989*	990*	991*	1003*	1015*	1016	1019	1021*	1033*	1045*	1046*	
		1047*	1049	1064*	1066*	1067*	1068	1084	1103*	1104*	1106*	1107*	1108	1117*	
		1128*	1129*	1131	1146*	1149	1168*	1169*	1171*	1172*	1173	1181*	1190*	1192*	
		1194	1206*	1215*	1218	1228*	1337*	1401*	1404*	1407*	1408*	1410	1508*	1509*	
		1510	1519*	1520	1544*	1553	1555	1557	1559	1561	1564*	1605*	1734*	1782*	
XECSR	000506	534*	1237	1239	1254	1258	1275	1279	1296	1299	1314	1319	1336	1342	
		1358	1361	1375	1381	1444	1446	1449	1461	1539	1567	1573	1576	1786*	
XES	011114	1931*	1932*	1937*											
XSWBU	000510	535*	1276*	1297*	1315*	1359*	1405*	1565*	1788*						
.	= 017412	383*	384	386	388	390	392	394	396	398	400	402	404	406	
		408	410	412	414	416	418	420	422	424	426	428	430	432	
		434	436	438	440	442	444	446	448	450	452	454	456	458	
		460	462	464	466	468	470	472	474	476	478	480	482	484	
		486	488	490	492	494	496	498	500	502	504	506	508	510	
		513*	516*	522*	530*	542*	547*	549*	554*	558*	562*	787	910	1017	
		1020	1445	1447	1450	1462	1511	1521	1547	1560	1562	1583	1648	1669	
		1700	1707	1732	1822	1826	1830	1834	1848	1852	1856	1880	1894	1897	
		1900	1906	1909	1916	1923	1933	1935	2126*	2127*	2128*				

ADD	1258	1279	1299	1319	1342	1361	1381	1567	1576	1778	1783	1785	1787	1801	1808
ASL	1810	1812	1917												
BEQ	1774	1775	1776	1797	1798	1799									
BIC	584	613	672	689	721	769	819	891	910	928	947	1020	1150	1431	1492
BIS	1499	1501	1511	1558	1562	1583	1598	1616	1632	1634	1636	1659	1773	1781	1796
BIT	1819	1845	1916	1923											
BMI	656	1777	1800	1806											
BNE	629	989	1021												
BPL	583	598	612	671	688	720	739	768	818	890	909	927	946	1019	1049
BR	1149	1194	1410	1430	1491	1493	1510	1557	1561	1597	1615	1617	1619	1621	1623
CLR	1731	1818	1844	1915	1922										
CMP	708	839	1085	1174	1240	1280	1300	1320	1343	1362	1382	1447	1554	1556	1568
CMPB	1577	1684													
DEC	599	740	1050	1195	1411	1429	1494	1596	1618	1620	1622	1624	1661	1686	1688
HALT	1700	1707	1732	1804	1822	1826	1830	1834	1848	1852	1856	1880	1882	1933	1935
INC	755	787	803	867	879	1017	1069	1109	1132	1219	1238	1259	1445	1450	1462
JMP	1521	1560	1648	1669	1894	1897	1900	1906	1909						
JSR	1496	1665	1690	1824	1828	1832	1836	1850	1854	1876					
MOV	611	1045	1626	1656	1769	1792	1895	1898	1931						
	1498	1500	1631	1633	1635	1772	1795	1821	1825	1829	1833	1847	1851	1855	
	1658	1660													
	1428	1582	1595	1687	1699	1706	1879	1881	1934						
	543	1625													
	783	784	836	990	991	1047	1067	1103	1104	1106	1107	1128	1129	1168	1169
	1171	1172	1276	1297	1315	1359	1405	1407	1408	1565	1685	1932			
	552	556	560	567	590	605	619	634	641	657	663	673	695	714	727
	746	761	775	789	795	809	825	845	851	873	885	897	911	917	935
	953	975	1000	1004	1031	1034	1056	1075	1091	1115	1138	1156	1190	1203	1226
	1241	1248	1265	1286	1306	1326	1349	1368	1388	1417	1437	1459	1471	1504	1514
	1524	1547	1552	1572	1581	1585	1600	1606	1639	1640	1641	1642	1663	1738	1779
	1772	1833	1861												
	551	574	580	585	587	588	595	600	602	603	609	614	616	617	625
	635	638	639	647	649	658	660	661	669	673	675	676	684	687	690
	692	693	702	706	709	711	712	719	722	724	725	735	738	741	743
	744	751	756	758	759	765	770	772	773	780	788	790	792	793	801
	804	806	807	815	817	820	822	823	833	835	837	840	842	843	847
	858	865	868	870	671	877	880	882	883	889	892	894	895	904	908
	912	914	915	923	930	932	933	940	944	945	948	950	951	960	965
	970	972	973	982	995	997	998	1001	1010	1026	1028	1029	1032	1041	1048
	1051	1053	1054	1061	1063	1070	1072	1073	1082	1083	1086	1088	1089	1099	1110
	1112	1113	1118	1126	1133	1135	1136	1144	1147	1151	1153	1154	1166	1175	1177
	1178	1182	1188	1193	1196	1198	1200	1201	1204	1213	1217	1221	1223	1224	1233
	1243	1245	1246	1253	1257	1260	1262	1263	1271	1277	1278	1281	1283	1284	1294
	1298	1301	1303	1304	1312	1316	1318	1321	1323	1324	1334	1338	1339	1341	1344
	1346	1347	1356	1360	1363	1365	1366	1374	1379	1380	1383	1385	1386	1399	1402
	1406	1409	1412	1414	1415	1432	1434	1435	1452	1456	1457	1464	1468	1469	1486
	1488	1489	1490	1503	1512	1513	1522	1523	1535	1538	1549	1550	1566	1571	1575
	1580	1584	1589	1591	1592	1599	1602	1603	1628	1629	1630	1638	1662	1664	1735
	1748	1757	1759	1768	1770	1771	1791	1793	1794	1815	1816	1817	1838	1841	1842
	1843	1860	1886												
	550	555	559	563	573	581	582	586	596	597	601	610	615	626	627
	628	630	633	636	648	650	651	652	655	659	670	674	685	691	703
	704	705	710	723	736	737	742	752	757	766	767	771	781	782	791
	805	816	821	834	841	846	849	859	860	862	869	881	893	905	906
	907	913	924	925	926	931	941	942	943	949	959	961	962	963	964
	966	969	971	985	985	987	988	994	996	1003	1011	1012	1013	1014	1015

	1022	1025	1027	1033	1042	1043	1046	1052	1062	1064	1066	1071	1087	1100	1101
	1111	1117	1127	1134	1145	1146	1152	1167	1176	1181	1189	1190	1192	1199	1206
	1214	1215	1222	1228	1235	1236	1244	1254	1255	1261	1273	1274	1275	1282	1295
	1296	1302	1313	1314	1317	1322	1335	1336	1337	1340	1345	1357	1358	1364	1375
	1376	1377	1384	1400	1401	1404	1413	1426	1433	1436	1481	1485	1487	1495	1497
	1502	1507	1508	1509	1517	1519	1534	1539	1540	1541	1542	1543	1544	1545	1548
	1564	1570	1573	1579	1586	1588	1593	1601	1605	1627	1637	1646	1653	1654	1655
	1681	1691	1698	1705	1714	1715	1719	1720	1734	1747	1750	1758	1767	1782	1784
	1786	1788	1790	1805	1807	1809	1811	1813	1814	1820	1823	1827	1831	1835	1837
	1840	1846	1849	1853	1857	1859	1867	1868	1877	1878	1885	1904	1907	1921	1924
	1925														
MOV8	1657	1667	1689												
NOF	631	632	653	654	967	968	992	993	1023	1024	1242	1453	1454	1455	1465
RESET	1466	1467	1546	1760	1789	1892									
	565	850	983	1130	1148	1170	1191	1216	1234	1256	1272	1378	1425	1427	1483
	1537	1574	1594	1736											
RTI	1752	1761	1901												
RTS	544	1448	1451	1460	1463	1649	1670	1672	1692	1701	1708	1733	1858	1883	1887
TST	1910	1918	1926	1936											
	686	753	785	848	861	866	958	984	1002	1018	1044	1055	1102	1105	1108
	1119	1131	1173	1197	1205	1220	1227	1237	1403	1444	1518	1551	1553	1563	1604
	1737	1749	1751	1790	1803										
TSTB	707	754	802	838	878	1016	1068	1084	1218	1239	1446	1449	1461	1520	1555
	1559	1647	1668	1683	1875	1893	1896	1899	1905	1908					
.ASCII	1940	1943	1945	1947	1949	1951	1953	1955	1957	1959	1961	1963	1965	1967	1969
	1971	1973	1975	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999
	2001	2003	2005	2007	2009	2011	2013	2015	2017	2019	2021	2023	2025	2027	2029
	2031	2034	2037	2040	2043	2048	2051	2058	2064	2073	2075	2084	2088	2093	2098
	2103	2108	2113	2117											
.BLKW	2128														
.BYTE	1939														
.ENABL	4														
.END	2129														
.EVEN	2126														
.LIST	4														
.MLIST	4														
.REN	5														
.REPT	384														
.WORD	1438	1675	1682												

ERRORS DETECTED: 0
 DEFAULT GLOBALS GENERATED: 0

*DOKWBA DOKWBA SEQ/SOL/CRF/DS:ERFZ/EN:ABS=DSKM:DOKWBA.P11
 RUN-TIME: 5 9 3 SECONDS
 RUN-TIME RATIO: 30/18=1.6
 CORE USED: BK (15 PAGES)

