KIM

SOFTWARE

KIM Memory test
Siep de Vries
--- PROGRAMMER: SIEP DE VRIES
WESTVRIES COMPUTER CONSULTING
POSTBOX 20
OOSTZAAN, HOLLAND

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--- THE PURPOSE OF THIS PROGRAM IS TO TEST ANY
ARBITRARY CONSECUTIVE PART OF RAM-MEMORY IN
A KIM-SYSTEM OF ANY SIZE.

--- THE PROGRAM WILL TEST ALL LOCATIONS IN THE
AREA ASSIGNED FOR TEST WITH ALL POSSIBLE (256)
BITCOMBINATIONS AND CHECKS IF EACH LOCATION
CAN CONTAIN ANY OF THE POSSIBLE BITCOMBINATIONS.
- THE TEST IS BEING DONE IN SUCH A WAY, THAT NOT
ONLY BIT-ERRORS ARE DETECTED, BUT ALSO SELECTION
ERRORS, THAT CAUSE THE MEMORY TO HAVE MORE THAN ONE
ADDRESS FOR THE SAME PHYSICAL LOCATION.
--- THE METHOD USED HERE IS TO WRITE INTO ALL
LOCATIONS A TESTPATTERN, THAT IS BEING INCREMENTED
AFTER IT HAS BEEN WRITTEN AWAY. IF THIS HAS BEEN
DONE 256 TIMES, ONE EXTRA INCREMENT IS GIVEN.
AFTER THE WHOLE AREA IS WRITTEN, EACH LOCATION
IS READ AND ITS VALUE COMPARED TO THE VALUE THAT
CAN BE EXPECTED TO RESIDE IN THAT LOCATION.
- THE RESULT IS, THAT THE LOCATIONS FROM 0-FF
CONTAIN A PATTERN FROM 0-FF, THE LOCATIONS FROM
100-1FF CONTAIN A PATTERN FROM 1-00, THE LOCATIONS
FROM 200-2FF CONTAIN A PATTERN FROM 2-01 ETC.
- THIS IS REPEATED OVER THE INDICATED AREA 256 TIMES.
WHERE THE STARTING VALUE FOR EACH PASS IS EACH TIME
1 HIGHER THAN THE PREVIOUS PASS.

--- PROCEDURE TO RUN THE TEST:

- CONNECT THE MEMORY TO THE KIM-SYSTEM.

- READ THE PROGRAM INTO THE KIM-MEMORY.
- THE PROGRAM OCCUPIES LOCATIONS 200-3FF AND
USES PAGE ZERO LOCATIONS DF-FB.

- SELECT THE AREA TO BE TESTED. THE LOCATIONS
THAT CONTAIN THE ADDRESSES OF THE AREA ARE THE
FOLLOWING:
17F5 = LOW ORDER PART OF FIRST
LOCATION IN TESTAREA
17F6 = HIGH ORDER PART OF FIRST
LOCATION IN TESTAREA
17F7 = LOW ORDER PART OF LAST
LOCATION+1 IN TESTAREA
17F8 = HIGHER ORDER PART OF LAST
LOCATION+1 IN TESTAREA

EXAMPLE: THE TEST HAS TO BE APPLIED TO LOCATION
1200-17FF. THEN LOC. 17F5 = 00
LOC. 17F6 = 12
LOC. 17F7 = 00
LOC. 17F8 = 18

- START THE TEST PROGRAM AT 0200.
THE TEST CAN WORK EITHER WITH THE KIM-DISPLAY,
OR WITH THE TELETYP. THIS DEPENDS UPON THE
TELETYPE: IF NO ERRORS ARE DETECTED, THE TYPEOUT "TEST DONE" OCCURS. ERRORS ARE TYPED AS:
PASS, ADDRESS, VALUE READ, EXPECTED VALUE IS SIGNALED BY THE DISPLAY OFF THE LOCATIONS ADDRESS AND THE PASS-NUMBER. THEN THE USER CAN PRESS DA IN ORDER TO GET READ VALUE AND EXPECTED VALUE ON THE DISPLAY IN THE RIGHT 4 DIGITS. PRESSING AD SHOWS AGAIN THE ADDRESS AND PASS-NUMBER.
THE TEST WILL CONTINUE IF GO IS PREssed.
IF THE TEST IS FINISHED, IT CAN BE REPEATED, BY PRESSING ANY KEY OF THE KEYBOARD IN USE.

INDICATION OF SPEED: ONE COMPLETE 256-PASS RUN FOR A 4K AREA TAKES 130 SECONDS.
THE TIME TO TEST AN AREA IS PROPORTIONAL TO THE SIZE OF THE AREA UNDER TEST.

--- NOTE: THE TEST IS NOT AWARE OF THE FACT THAT IT IS ORDERED TO DESTROY ITSELF IF THIS IS WANTED. THUS THE PARAMETERS MAY NOT BE SET IN ONE OF THE AREA'S OCCUPIED BY THE TEST.
; --- DEFINITIONS OF KIM
4017 SAD=$1740  TTY-BIT
F217 SPEED=$17F2  TTY-SPEED LOCATIONS
2F1E CRFL=$1E2F  PRINT A CARRIAGE RETURN-LINEFEED
3B1E PRSTBYT=$1E3B  PRINT A IN HEX
0F1F PRSTPA=$1E0E  PRINT ONE SPACE
A01E OUTCH=$1EA0  PRINT CHARACTER IN A
5A1E GETCH=$1E5A  READ CHARACTER FROM TTY
1F1F SCANDS=$1F1F  DISPLAY CONTENTS OF $F9 ETC
6A1F GETKEY=$1F6A  READ KIM-KEYBOARD
FE17 INTVEC=$17FE  INTERRUPTVECTOR
FA17 STPVEC=$17FA  NMIVECTOR
FE1E ONEKEY=$1EFE  TEST IF KIM-KEY PRESSED
F517 FIRST=$17F5  FIRST ADDRESS TO BE TESTED
F717 LAST=$17F7  LAST ADDRESS + 1 TO BE TESTED

; --- DEFINED CONSTANTS
1C00 STPHI=$1C  STOPADDRESS. 2 BYTES
0000 STPLD=0
0200 DELAYH=2  TTY-SPEED DELAY FOR 110 BAUD. 2 BYTES
8000 DELAYL=$80
0000 RREV = 0  FIRST TESTPATTERN
1000 AD=$10  VALUE FOR AD-KEY
1100 DA=$11  VALUE FOR DA-KEY
1300 GD=$13  VALUE FOR GD-KEY

; --- PAGE ZERO LOCATIONS
F900 POINT=$F9  DISPLAY AREA
E200 TSTAD=$E2  ADDRESS OF LOCATION TO TEST
E100 TSTVAL=$E1  INITIAL VALUE OF PASS
E000 HUPLP=$E0U  TEMPORARY PATTERN
DF00 TSTCNT=$DF  TO INCREMENT PATTERN AFTER 256 LOC'S
; TEST INITIALISATION

0200 78 INIT SEI Disable Interrupt
     CLD Clear Decimal Mode
     LDA $DELAY Set TTY-Speed
     STA SPEED
     STA $DELAYH
     STA SPEED+1
     LDA $STPL0
     STA STPVEC
     STA INTVEC
     LDA $STPHI
     STA STPVEC+1
     STA INTVEC+1
     LDA $BEGVAL Initialize First Value
     STA TSTVAL
     LDA $1 Test if TTY Present
     BIT SAD
     BNE JMPTST Branch if no
     JSR CRLF Yes, initial message
     LDX $0
     LDAX INMSG,X
     JSR DUTCH
     INX
     CPX #$INTSZ
     BNE INTWER
     JSR ONEKEY Wait until GOKEY released
     BNE JMPTST
     JMP TST1
; --- START OF THE TEST

$02 00000

024A 208502 TEST1 JSR TSTINT INITIALIZE A PASS
"D 20A202 WRITS1 JSR WRITLUC WRITE NEXT LOCATION
0250 20BB02 JSR TSTEND DONE?
3 F0F8 REA WRITS1 BRANCH IF NO

; --- READ PATTERN BACK.
5 208502 JSR TSTINT INITIALIZE READ
8 85E0 STA HULP SAVE PATTERN
A C6E0 DEC HULP
C 20E102 RETS1 JSR READMN READ NEXT LOCATION
F C5E0 CMP HULP COMPARE READ AND EXPECTED

0261 F003 BEQ READOK BRANCH IF OK
3 20F602 JSR ERROR TOO BAD. REPORT THE PROBLEM
6 20BB02 READOK JSR TSTEND FINISHED WITH PASS?
9 F0F1 BEQ RETSI BRANCH IF NO

; --- END OF A PASS
B E6E1 INC TSTVAL
D D0DB BNE TEST1

; --- THE FULL TEST IS COMPLETE
F 207703 JSR TSTFIN
0272 4C0002 JMP INIT
; --- SUBROUTINES
; --- INITIALIZE A READ OR WRITE PASS.
; TSTAD WILL CONTAIN FIRST ADDRESS
; A WILL CONTAIN FIRST PATTERN
; X WILL CONTAIN ZERO

$502   **=$285
$285   ADF517  TSTINT  LDA FIRST  PRESET ADDRESS
  8 $5E2   STA TSTAD
  A ADF617  LDA #FSTHI
  D $5E3   STA TSTAD+1
  F A5E1   LDA TSTVAL  VALUE
0 291   A200   LDX #0
  3 $6DF   STX TSTCNT
  5 60    RTS
; --- WRITE PATTERN IN A INTO THE
; LOCATION WHOSE ADDRESS IS IN "TSTAD"
; INC A

$2A2   **=$2A2
$2A2   81E2   WRTLOC  STA (TSTAD,X)  X ASSUMED TO BE ZERO
  4 18    CLC
  5 6901  ADC #1   INC PATTERN
  7 60    RTS
; --- TEST FOR END OF ONE PASS.
; "TSTAD" IS INCREMENTED. ON LEAVE ZERO MEANS NOT DONE
; A AND X ARE RETURNED

$2B8   **=$2B8
$2B8   6E2   TSTEND  INC TSTAD
  A D002  BNE NOHI
  C E6E3  INC TSTAD+1
  E A4E2  NOHI  LDY TSTAD
0 2C0   CCF717  CPY LAST
  3 D00A  BNE NOTEND
  5 A6E3  LDY TSTAD+1
  7 CCF817  CPY LAST+1
  A D009  BNE NOTEND
  C A0FF  LDY #$FF
  E 60    RTS
F C6DF  NOTEND  DEC TSTCNT
0 2D1   D005  PMR HNPS
  3 E6E0  INS HNPS
  5 18   CLC
  6 6901  ADC #1
  8 A000  NOPS  LDY #0
  A 60    RTS
; --- READ NEXT LOCATION

$2E1   **=$2E1
$2E1   6E8   READHW  INC HULP  NEXT PATTERN
  3 A1E2   LDA (TSTAD,X)  READ THE CELL
  5 60    RTS
; --- ERROR HANDLING
;
; --- REPORT AN ERROR.
; ON ENTRY A CONTAINS READ PATTERN, 'HULP' CONTAINS
; EXPECTED PATTERN.
; A, X AND Y REMAIN UNCHANGED.

F602 =>52F6
02F6 48 ERROR PHA SAVE ALL REGISTERS
  7 8A TXA
  8 48 PHA
  9 8A TYA
 A A8 PHA
B AD4017 LDA SAD TEST WHICH DEVICE TO USE
E 2001 AND #1
0300 F032 BEQ ITSTTY ; --- THE KIM-DISPLAY AND KEYBOARD ARE USED
 ; DISPLAY ADDRESS OF CELL IN: ERROR AND PASSNUMBER
  2 A5E1 ADPASS LDA TSTVAL MOVE DATA TO DISPLAYAREA
  4 85F9 STA POINT
  6 A5E2 LDA TSTAD
  8 85FA STA POINT+1
 A A5E3 LDA TSTAD+1
 C 85F3 STA POINT+2
E 209903 DISPUM JSR READSS DISPLAY AND READ
0311 C910 CMP #AD AD-KEY PRESSED?
  3 F0ED BEQ ADPASS
  5 C911 CMP #DA DA-KEY PRESSED
  7 F00A BEQ BIT
  9 C913 CMP #GO GO-KEY PRESSED?
 B D0F1 BNE DISPUM IF NONE, IGNORE
D 68 LEAVE PLA GO-KEY, RETURN
E A8 TAY
 F 68 PLA
0320 AA TAX
  1 68 PLA
  2 60 RTS
 ; --- DISPLAY DESIRED AND READ PATTERN
  3 A900 BITS LDA #0
  5 85FB STA POINT+2
  7 BA TSX
  8 BD0201 LDA 5103,X GET SAVED ACC FROM STACK
 B 85FA STA POINT+1
 D A5E0 LDA HULP
F 85F3 STA POINT
0331 4C0E03 JMP DISPUM
 ; --- PRINT ON TTY:
; PASS ADRS VAL EXP
; -----------------------
  4 209E1E ITSTTY JSR CRLF
  7 209E1E JSR PRTPSA
A 209E1E JSR PRTPSA
D A5E1 LDA TSTVAL
F 203B1E JSR PRTPBYT
0342 209E1E JSR PRTPSA
  5 A5E3 LDA TSTAD+1
  7 203B1E JSR PRTPBYT
A A5E2 LDA TSTAD
C 203B1E JSR PRTPBYT
 F 209E1E JSR PRTPSA
0352 209E1E JSR PRTPSA
  5 EA TSX
  6 BD0301 LDA $103,X
  9 203B1E JSR PRTPBYT
 C 209E1E JSR PRTPSA
F A5E0    LDA HULP
0361 203E1E  JSR PRTBYT
44C1D03    JMP LEAVE
PAGE 009  KIM MEMORY TEST FOR ANY ADDRESSES. 11 JUNE 1977

; --- MISCELLANEOUS ROUTINES
; --- FINAL SUBROUTINE.
; DISPLAY ALL ZERODES OR PRINT 'TEST DONE'
;
7703  **$777
0377  AD4017  TSTFIN  LDA $AD
   2901  AND #1
   F00E  BEQ TYEND
   E900  LDA #0
   0380  B5F9  STA POINT
   2BFA  STA POINT+1
   4BFB  STA POINT+2
   6201F1  DISPEN  JSR SCANDS
   9F0F  BEQ DISPEN  BRANCH IF NO KEY PRESSED
   B60  RTS  KEY PRESSED. START AGAIN
   C20F1E  TYEND  JSR CRTL
   F020  LDX #0
   0391  BDA003  WEREND  LDA ENDMES,X
   420A01E  JSR DUTCH
   7E8  INX
   8E09  CPX #ENDSIZ
   A D0F5  BNE WEREND
   C205A1E  JSR GETCH  WAIT UNTILL X-Y PRESSED
   F60  RTS

03A0  544553  ENDMES  TEXT "TEST DONE"
3 542044FAE45
0900  ENDSIZ==ENDMES
; --- DISPLAY ON THE KIM-DISPAY
; RETURN TO CALLER AS SSDN AS A KEY HAS BEEN
; PRESSED. RETURN WITH KEY-CODE IN A.
B903  **$3B9
03B9  48  READD3  PHA
   A201F1  PRESCA  JSR SCANDS
   D0F0  BEQ PRESCA
   F 206A1F  JSR GETKEY
03C2  B0  TSX
   3 9D0101  STA $101,X
   6201F1  VOKAL  JSR SCANDS
   9D0F  BNE VOKAL
   B68  PLA
   C60  RTS
DD03  **$3DD
03DD  504453  INTMSG  TEXT "PASS ADRS VAL EXP"
03E0  53204144253256414C20555850
1100  INTSIZ==INTMSG
   .END