;;============================================================================

;; File: software.psm

;; This is the PicoBlaze example game program for EE178 Lab #8.

;; No guarantee this is bug-free but it is a playable example.

;;============================================================================

;; Ports and related constants.

;;============================================================================

CONSTANT stax , 00 ; port for 8-bit start-x

CONSTANT stay , 01 ; port for 8-bit start-y

CONSTANT endx , 02 ; port for 8-bit end-x

CONSTANT endy , 03 ; port for 8-bit end-y

CONSTANT busy , 04 ; port for 8-bit busy

CONSTANT beam , 05 ; port for 8-bit beam

CONSTANT mode , 06 ; port for 8-bit mode

CONSTANT prng , 07 ; port for 8-bit prng

CONSTANT leds\_lo , 08 ; port for 8-bit led data out

CONSTANT leds\_hi , 09 ; port for 8-bit led data out

CONSTANT qssd\_lo , 0a ; port for 8-bit qssd data out

CONSTANT qssd\_hi , 0b ; port for 8-bit qssd data out

CONSTANT qssd\_dp , 0c ; port for 8-bit qssd data out

CONSTANT switches\_lo , 0d ; port for 8-bit switch input

CONSTANT switches\_hi , 0e ; port for 8-bit switch input

CONSTANT buttons , 0f ; port for 8-bit button input

CONSTANT second , 10 ; port for second counter

CONSTANT minute , 11 ; port for second counter

CONSTANT hour , 12 ; port for second counter

CONSTANT busy\_go , 01 ; go command and busy status

CONSTANT beam\_hi , 0f ; beam high intensity

CONSTANT beam\_md , 07 ; beam med intensity

CONSTANT beam\_lo , 03 ; beam low intensity

CONSTANT mode\_hld , 00 ; mode hold framebuffer

CONSTANT mode\_clr , 01 ; mode clear framebuffer

CONSTANT mode\_lin , 02 ; mode linear decay

CONSTANT mode\_exp , 03 ; mode exponential decay

CONSTANT buttons\_ct , 10 ; center

CONSTANT buttons\_up , 08 ; up

CONSTANT buttons\_dn , 04 ; down

CONSTANT buttons\_lf , 02 ; left

CONSTANT buttons\_rt , 01 ; right

;;============================================================================

;; Game state declarations.

;;============================================================================

NAMEREG s0, gs\_major

CONSTANT gs\_major\_attrone, 00 ; state assignment

CONSTANT gs\_major\_attrtwo, 01 ; state assignment

CONSTANT gs\_major\_playing, 02 ; state assignment

CONSTANT gs\_major\_gameend, 03 ; state assignment

NAMEREG s1, gs\_minor

CONSTANT gs\_minor\_begins , 00 ; counter initialize

CONSTANT gs\_minor\_twosec , 78 ; frame count about 2.0 secs

CONSTANT gs\_minor\_onesec , 3c ; frame count about 1.0 secs

CONSTANT gs\_minor\_getrdy , 1e ; frame count about 0.5 secs

NAMEREG s2, gs\_ballx

NAMEREG s3, gs\_bally

NAMEREG s4, gs\_balldx

NAMEREG s5, gs\_balldy

CONSTANT gs\_ball\_xdim , 08 ; it's this plus 1

CONSTANT gs\_ball\_ydim , 08 ; it's this plus 1

CONSTANT gs\_ball\_speed , 03 ; pixels per frame

NAMEREG s6, gs\_padlx

CONSTANT gs\_padly , d0 ; paddle y location

CONSTANT gs\_padl\_xdim , 20 ; it's this plus 1

CONSTANT gs\_padl\_ydim , 08 ; it's this plus 1

CONSTANT gs\_padl\_speed , 04 ; pixels per frame

;;============================================================================

;; Global variables.

;;============================================================================

NAMEREG s7, resvd1 ; reserved

NAMEREG s8, resvd2 ; reserved

NAMEREG s9, xpos ; for drawing routines

NAMEREG sA, ypos ; for drawing routines

NAMEREG sB, swlsamp ; switch lo sample

NAMEREG sC, swhsamp ; switch hi sample

NAMEREG sD, btnsamp ; button sample

NAMEREG sE, loopvar ; for loops

NAMEREG sF, scratch ; for scratch

;;============================================================================

;; Other stuff.

;;============================================================================

CONSTANT minusone , ff ; minusone

CONSTANT minusmax , 80 ; minus 128

CONSTANT plusmax , 7f ; plus 127

CONSTANT zero , 00 ; zero

CONSTANT one , 01 ; one

;;============================================================================

;; Boot.

;; This performs one-time initialization of the hardware and the game state.

;;============================================================================

boot: CALL hw\_init ; initial hardware setup

CALL gs\_init ; set initial game state

ENABLE INTERRUPT ; enable vblnk interrupt

;;============================================================================

;; Main.

;; This is an empty loop, does nothing, waiting for interrupts to occur.

;;============================================================================

main: JUMP main ; empty loop, does nothing

;;============================================================================

isr: LOAD resvd1, zero;

CALL user\_input ; get the user input

RETURNI ENABLE ; return with enable

;;============================================================================

hw\_init: LOAD scratch, zero ; going to use lot of zero

OUTPUT scratch, leds\_lo ; turn off lo leds

OUTPUT scratch, leds\_hi ; turn off hi leds

OUTPUT scratch, qssd\_lo ; zeroize qssd lo

OUTPUT scratch, qssd\_hi ; zeroize qssd hi

OUTPUT scratch, qssd\_dp ; turn off qssd dots

LOAD scratch, mode\_exp ; load desired mode

OUTPUT scratch, mode ; program the framebuffer

LOAD scratch, beam\_hi ; load desired beam

OUTPUT scratch, beam ; program the framebuffer

hw\_init\_wait: INPUT scratch, busy ; get framebuffer busy

COMPARE scratch, busy\_go ; check framebuffer busy

JUMP Z, hw\_init\_wait ; back to wait if busy

RETURN ; return

;;============================================================================

gs\_init: LOAD gs\_major, gs\_major\_attrone ; start in attract mdoe

LOAD gs\_minor, gs\_minor\_begins ; start with counter zero

LOAD gs\_ballx, zero ; doesn't really matter

LOAD gs\_bally, zero ; doesn't really matter

LOAD gs\_padlx, zero ; doesn't really matter

LOAD gs\_balldx, zero ; doesn't really matter

LOAD gs\_balldy, zero ; doesn't really matter

RETURN ; return

;;============================================================================

user\_input: CALL main\_dis;

RETURN

main\_dis: LOAD resvd1, 00;

INPUT resvd1, switches\_hi;

AND resvd1, 30;

COMPARE resvd1, 10;

JUMP Z, analog\_clock;

COMPARE resvd1, 30;

JUMP Z, digital\_clock;

RETURN;

;;-----------------------------------------------------------------------------------------------------

analog\_clock: CALL dis\_ana\_three;

CALL dis\_ana\_twelve;

CALL dis\_ana\_six;

CALL dis\_ana\_nine;

CALL dis\_sec\_unit;

CALL dis\_min\_unit;

CALL dis\_hr\_unit;

RETURN;

dis\_ana\_six: LOAD xpos, 7B ; draw second 6

LOAD ypos, C8

CALL moveto

LOAD xpos, 7E

LOAD ypos, D2

CALL drawto

LOAD xpos, 81

LOAD ypos, C8

CALL drawto

LOAD xpos, 83

LOAD ypos, C8

CALL moveto

LOAD xpos, 89

LOAD ypos, C8

CALL drawto

LOAD xpos, 83

LOAD ypos, D2

CALL moveto

LOAD xpos, 89

LOAD ypos, D2

CALL drawto

LOAD xpos, 86

LOAD ypos, C8

CALL moveto

LOAD xpos, 86

LOAD ypos, D2

CALL drawto

RETURN

dis\_ana\_nine: LOAD xpos, 30 ; draw second 9

LOAD ypos, 7D

CALL moveto

LOAD xpos, 35

LOAD ypos, 7D

CALL drawto

LOAD xpos, 30

LOAD ypos, 87

CALL moveto

LOAD xpos, 35

LOAD ypos, 87

CALL drawto

LOAD xpos, 33

LOAD ypos, 7D

CALL moveto

LOAD xpos, 33

LOAD ypos, 87

CALL drawto

LOAD xpos, 37

LOAD ypos, 7D

CALL moveto

LOAD xpos, 3C

LOAD ypos, 87

CALL drawto

LOAD xpos, 3C

LOAD ypos, 7D

CALL moveto

LOAD xpos, 37

LOAD ypos, 87

CALL drawto

RETURN

dis\_ana\_twelve: LOAD xpos, 7B ; draw second 12

LOAD ypos, 32

CALL moveto

LOAD xpos, 81

LOAD ypos, 3C

CALL drawto

LOAD xpos, 81

LOAD ypos, 32

CALL moveto

LOAD xpos, 7B

LOAD ypos, 3C

CALL drawto

LOAD xpos, 83

LOAD ypos, 32

CALL moveto

LOAD xpos, 89

LOAD ypos, 32

CALL drawto

LOAD xpos, 83

LOAD ypos, 3C

CALL moveto

LOAD xpos, 89

LOAD ypos, 3C

CALL drawto

LOAD xpos, 85

LOAD ypos, 32

CALL moveto

LOAD xpos, 85

LOAD ypos, 3C

CALL drawto

LOAD xpos, 87

LOAD ypos, 32

CALL moveto

LOAD xpos, 87

LOAD ypos, 3C

CALL drawto

RETURN

dis\_ana\_three: LOAD xpos, C8 ; draw second 3

LOAD ypos, 7D

CALL moveto

LOAD xpos, D2

LOAD ypos, 7D

CALL drawto

LOAD xpos, C8

LOAD ypos, 87

CALL moveto

LOAD xpos, D2

LOAD ypos, 87

CALL drawto

LOAD xpos, CA

LOAD ypos, 7D

CALL moveto

LOAD xpos, CA

LOAD ypos, 87

CALL drawto

LOAD xpos, CD

LOAD ypos, 7D

CALL moveto

LOAD xpos, CD

LOAD ypos, 87

CALL drawto

LOAD xpos, D0

LOAD ypos, 7D

CALL moveto

LOAD xpos, D0

LOAD ypos, 87

CALL drawto

RETURN

dis\_sec\_unit: LOAD resvd1, zero;

INPUT resvd1, second;

AND resvd1, FF;

COMPARE resvd1, 00;

JUMP Z, sec\_unit\_0;

COMPARE resvd1, 01;

JUMP Z, sec\_unit\_1;

COMPARE resvd1, 02;

JUMP Z, sec\_unit\_2;

COMPARE resvd1, 03;

JUMP Z, sec\_unit\_3;

COMPARE resvd1, 04;

JUMP Z, sec\_unit\_4;

COMPARE resvd1, 05;

JUMP Z, sec\_unit\_5;

COMPARE resvd1, 06;

JUMP Z, sec\_unit\_6;

COMPARE resvd1, 07;

JUMP Z, sec\_unit\_7;

COMPARE resvd1, 08;

JUMP Z, sec\_unit\_8;

COMPARE resvd1, 09;

JUMP Z, sec\_unit\_9;

COMPARE resvd1, 10;

JUMP Z, sec\_unit\_10;

COMPARE resvd1, 11;

JUMP Z, sec\_unit\_11;

COMPARE resvd1, 12;

JUMP Z, sec\_unit\_12;

COMPARE resvd1, 13;

JUMP Z, sec\_unit\_13;

COMPARE resvd1, 14;

JUMP Z, sec\_unit\_14;

COMPARE resvd1, 15;

JUMP Z, sec\_unit\_15;

COMPARE resvd1, 16;

JUMP Z, sec\_unit\_16;

COMPARE resvd1, 17;

JUMP Z, sec\_unit\_17;

COMPARE resvd1, 18;

JUMP Z, sec\_unit\_18;

COMPARE resvd1, 19;

JUMP Z, sec\_unit\_19;

COMPARE resvd1, 20;

JUMP Z, sec\_unit\_20;

COMPARE resvd1, 21;

JUMP Z, sec\_unit\_21;

COMPARE resvd1, 22;

JUMP Z, sec\_unit\_22;

COMPARE resvd1, 23;

JUMP Z, sec\_unit\_23;

COMPARE resvd1, 24;

JUMP Z, sec\_unit\_24;

COMPARE resvd1, 25;

JUMP Z, sec\_unit\_25;

COMPARE resvd1, 26;

JUMP Z, sec\_unit\_26;

COMPARE resvd1, 27;

JUMP Z, sec\_unit\_27;

COMPARE resvd1, 28;

JUMP Z, sec\_unit\_28;

COMPARE resvd1, 29;

JUMP Z, sec\_unit\_29;

COMPARE resvd1, 30;

JUMP Z, sec\_unit\_30;

COMPARE resvd1, 31;

JUMP Z, sec\_unit\_31;

COMPARE resvd1, 32;

JUMP Z, sec\_unit\_32;

COMPARE resvd1, 33;

JUMP Z, sec\_unit\_33;

COMPARE resvd1, 34;

JUMP Z, sec\_unit\_34;

COMPARE resvd1, 35;

JUMP Z, sec\_unit\_35;

COMPARE resvd1, 36;

JUMP Z, sec\_unit\_36;

COMPARE resvd1, 37;

JUMP Z, sec\_unit\_37;

COMPARE resvd1, 38;

JUMP Z, sec\_unit\_38;

COMPARE resvd1, 39;

JUMP Z, sec\_unit\_39;

COMPARE resvd1, 40;

JUMP Z, sec\_unit\_40;

COMPARE resvd1, 41;

JUMP Z, sec\_unit\_41;

COMPARE resvd1, 42;

JUMP Z, sec\_unit\_42;

COMPARE resvd1, 43;

JUMP Z, sec\_unit\_43;

COMPARE resvd1, 44;

JUMP Z, sec\_unit\_44;

COMPARE resvd1, 45;

JUMP Z, sec\_unit\_45;

COMPARE resvd1, 46;

JUMP Z, sec\_unit\_46;

COMPARE resvd1, 47;

JUMP Z, sec\_unit\_47;

COMPARE resvd1, 48;

JUMP Z, sec\_unit\_48;

COMPARE resvd1, 49;

JUMP Z, sec\_unit\_49;

COMPARE resvd1, 50;

JUMP Z, sec\_unit\_50;

COMPARE resvd1, 51;

JUMP Z, sec\_unit\_51;

COMPARE resvd1, 52;

JUMP Z, sec\_unit\_52;

COMPARE resvd1, 53;

JUMP Z, sec\_unit\_53;

COMPARE resvd1, 54;

JUMP Z, sec\_unit\_54;

COMPARE resvd1, 55;

JUMP Z, sec\_unit\_55;

COMPARE resvd1, 56;

JUMP Z, sec\_unit\_56;

COMPARE resvd1, 57;

JUMP Z, sec\_unit\_57;

COMPARE resvd1, 58;

JUMP Z, sec\_unit\_58;

COMPARE resvd1, 59;

JUMP Z, sec\_unit\_59;

RETURN;

sec\_unit\_0 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 82

LOAD ypos, 41

CALL drawto

RETURN

sec\_unit\_1 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 89

LOAD ypos, 41

CALL drawto

RETURN

sec\_unit\_2 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 90

LOAD ypos, 42

CALL drawto

RETURN

sec\_unit\_3 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 96

LOAD ypos, 44

CALL drawto

RETURN

sec\_unit\_4 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 9C

LOAD ypos, 47

CALL drawto

RETURN

sec\_unit\_5 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, A3

LOAD ypos, 4A

CALL drawto

RETURN

sec\_unit\_6 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, A8

LOAD ypos, 4D

CALL drawto

RETURN

sec\_unit\_7 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, AD

LOAD ypos, 52

CALL drawto

RETURN

sec\_unit\_8 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, B2

LOAD ypos, 57

CALL drawto

RETURN

sec\_unit\_9 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, B7

LOAD ypos, 5C

CALL drawto

RETURN

sec\_unit\_10 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, BA

LOAD ypos, 62

CALL drawto

RETURN

sec\_unit\_11 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, BD

LOAD ypos, 68

CALL drawto

RETURN

sec\_unit\_12 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, C0

LOAD ypos, 6D

CALL drawto

RETURN

sec\_unit\_13 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, C1

LOAD ypos, 74

CALL drawto

RETURN

sec\_unit\_14 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, C2

LOAD ypos, 7B

CALL drawto

RETURN

sec\_unit\_15 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, C3

LOAD ypos, 82

CALL drawto

RETURN

sec\_unit\_16 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, C2

LOAD ypos, 88

CALL drawto

RETURN

sec\_unit\_17 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, C1

LOAD ypos, 8F

CALL drawto

RETURN

sec\_unit\_18 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, C0

LOAD ypos, 96

CALL drawto

RETURN

sec\_unit\_19 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, BD

LOAD ypos, 9C

CALL drawto

RETURN

sec\_unit\_20 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, BA

LOAD ypos, A2

CALL drawto

RETURN

sec\_unit\_21 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, B7

LOAD ypos, A8

CALL drawto

RETURN

sec\_unit\_22 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, B2

LOAD ypos, AD

CALL drawto

RETURN

sec\_unit\_23 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, AD

LOAD ypos, B2

CALL drawto

RETURN

sec\_unit\_24 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, A8

LOAD ypos, B6

CALL drawto

RETURN

sec\_unit\_25 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, A3

LOAD ypos, BA

CALL drawto

RETURN

sec\_unit\_26 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 9C

LOAD ypos, BD

CALL drawto

RETURN

sec\_unit\_27 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 96

LOAD ypos, C0

CALL drawto

RETURN

sec\_unit\_28 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 90

LOAD ypos, C1

CALL drawto

RETURN

sec\_unit\_29 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 89

LOAD ypos, C2

CALL drawto

RETURN

sec\_unit\_30 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 82

LOAD ypos, C3

CALL drawto

RETURN

sec\_unit\_31 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 7B

LOAD ypos, C2

CALL drawto

RETURN

sec\_unit\_32 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 74

LOAD ypos, C1

CALL drawto

RETURN

sec\_unit\_33 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 6E

LOAD ypos, C0

CALL drawto

RETURN

sec\_unit\_34 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 67

LOAD ypos, BD

CALL drawto

RETURN

sec\_unit\_35 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 61

LOAD ypos, BA

CALL drawto

RETURN

sec\_unit\_36 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 5C

LOAD ypos, B6

CALL drawto

RETURN

sec\_unit\_37 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 56

LOAD ypos, B2

CALL drawto

RETURN

sec\_unit\_38 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 52

LOAD ypos, AD

CALL drawto

RETURN

sec\_unit\_39 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 4D

LOAD ypos, A8

CALL drawto

RETURN

sec\_unit\_40 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 4A

LOAD ypos, A2

CALL drawto

RETURN

sec\_unit\_41 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 47

LOAD ypos, 9C

CALL drawto

RETURN

sec\_unit\_42 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 44

LOAD ypos, 96

CALL drawto

RETURN

sec\_unit\_43 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 43

LOAD ypos, 8F

CALL drawto

RETURN

sec\_unit\_44 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 42

LOAD ypos, 88

CALL drawto

RETURN

sec\_unit\_45 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 41

LOAD ypos, 82

CALL drawto

RETURN

sec\_unit\_46 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 42

LOAD ypos, 7B

CALL drawto

RETURN

sec\_unit\_47 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 43

LOAD ypos, 74

CALL drawto

RETURN

sec\_unit\_48 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 44

LOAD ypos, 6D

CALL drawto

RETURN

sec\_unit\_49 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 47

LOAD ypos, 68

CALL drawto

RETURN

sec\_unit\_50 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 4A

LOAD ypos, 62

CALL drawto

RETURN

sec\_unit\_51 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 4D

LOAD ypos, 5C

CALL drawto

RETURN

sec\_unit\_52 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 52

LOAD ypos, 57

CALL drawto

RETURN

sec\_unit\_53 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 56

LOAD ypos, 52

CALL drawto

RETURN

sec\_unit\_54 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 5C

LOAD ypos, 4D

CALL drawto

RETURN

sec\_unit\_55 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 61

LOAD ypos, 4A

CALL drawto

RETURN

sec\_unit\_56 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 67

LOAD ypos, 47

CALL drawto

RETURN

sec\_unit\_57 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 6E

LOAD ypos, 44

CALL drawto

RETURN

sec\_unit\_58 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 74

LOAD ypos, 42

CALL drawto

RETURN

sec\_unit\_59 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 7B

LOAD ypos, 41

CALL drawto

RETURN

dis\_min\_unit: LOAD resvd1, zero;

INPUT resvd1, minute;

AND resvd1, FF;

COMPARE resvd1, 00;

JUMP Z, sec\_unit\_0;

COMPARE resvd1, 01;

JUMP Z, sec\_unit\_1;

COMPARE resvd1, 02;

JUMP Z, sec\_unit\_2;

COMPARE resvd1, 03;

JUMP Z, sec\_unit\_3;

COMPARE resvd1, 04;

JUMP Z, sec\_unit\_4;

COMPARE resvd1, 05;

JUMP Z, sec\_unit\_5;

COMPARE resvd1, 06;

JUMP Z, sec\_unit\_6;

COMPARE resvd1, 07;

JUMP Z, sec\_unit\_7;

COMPARE resvd1, 08;

JUMP Z, sec\_unit\_8;

COMPARE resvd1, 09;

JUMP Z, sec\_unit\_9;

COMPARE resvd1, 10;

JUMP Z, sec\_unit\_10;

COMPARE resvd1, 11;

JUMP Z, sec\_unit\_11;

COMPARE resvd1, 12;

JUMP Z, sec\_unit\_12;

COMPARE resvd1, 13;

JUMP Z, sec\_unit\_13;

COMPARE resvd1, 14;

JUMP Z, sec\_unit\_14;

COMPARE resvd1, 15;

JUMP Z, sec\_unit\_15;

COMPARE resvd1, 16;

JUMP Z, sec\_unit\_16;

COMPARE resvd1, 17;

JUMP Z, sec\_unit\_17;

COMPARE resvd1, 18;

JUMP Z, sec\_unit\_18;

COMPARE resvd1, 19;

JUMP Z, sec\_unit\_19;

COMPARE resvd1, 20;

JUMP Z, sec\_unit\_20;

COMPARE resvd1, 21;

JUMP Z, sec\_unit\_21;

COMPARE resvd1, 22;

JUMP Z, sec\_unit\_22;

COMPARE resvd1, 23;

JUMP Z, sec\_unit\_23;

COMPARE resvd1, 24;

JUMP Z, sec\_unit\_24;

COMPARE resvd1, 25;

JUMP Z, sec\_unit\_25;

COMPARE resvd1, 26;

JUMP Z, sec\_unit\_26;

COMPARE resvd1, 27;

JUMP Z, sec\_unit\_27;

COMPARE resvd1, 28;

JUMP Z, sec\_unit\_28;

COMPARE resvd1, 29;

JUMP Z, sec\_unit\_29;

COMPARE resvd1, 30;

JUMP Z, sec\_unit\_30;

COMPARE resvd1, 31;

JUMP Z, sec\_unit\_31;

COMPARE resvd1, 32;

JUMP Z, sec\_unit\_32;

COMPARE resvd1, 33;

JUMP Z, sec\_unit\_33;

COMPARE resvd1, 34;

JUMP Z, sec\_unit\_34;

COMPARE resvd1, 35;

JUMP Z, sec\_unit\_35;

COMPARE resvd1, 36;

JUMP Z, sec\_unit\_36;

COMPARE resvd1, 37;

JUMP Z, sec\_unit\_37;

COMPARE resvd1, 38;

JUMP Z, sec\_unit\_38;

COMPARE resvd1, 39;

JUMP Z, sec\_unit\_39;

COMPARE resvd1, 40;

JUMP Z, sec\_unit\_40;

COMPARE resvd1, 41;

JUMP Z, sec\_unit\_41;

COMPARE resvd1, 42;

JUMP Z, sec\_unit\_42;

COMPARE resvd1, 43;

JUMP Z, sec\_unit\_43;

COMPARE resvd1, 44;

JUMP Z, sec\_unit\_44;

COMPARE resvd1, 45;

JUMP Z, sec\_unit\_45;

COMPARE resvd1, 46;

JUMP Z, sec\_unit\_46;

COMPARE resvd1, 47;

JUMP Z, sec\_unit\_47;

COMPARE resvd1, 48;

JUMP Z, sec\_unit\_48;

COMPARE resvd1, 49;

JUMP Z, sec\_unit\_49;

COMPARE resvd1, 50;

JUMP Z, sec\_unit\_50;

COMPARE resvd1, 51;

JUMP Z, sec\_unit\_51;

COMPARE resvd1, 52;

JUMP Z, sec\_unit\_52;

COMPARE resvd1, 53;

JUMP Z, sec\_unit\_53;

COMPARE resvd1, 54;

JUMP Z, sec\_unit\_54;

COMPARE resvd1, 55;

JUMP Z, sec\_unit\_55;

COMPARE resvd1, 56;

JUMP Z, sec\_unit\_56;

COMPARE resvd1, 57;

JUMP Z, sec\_unit\_57;

COMPARE resvd1, 58;

JUMP Z, sec\_unit\_58;

COMPARE resvd1, 59;

JUMP Z, sec\_unit\_59;

RETURN;

dis\_hr\_unit: LOAD resvd1, zero;

INPUT resvd1, hour;

AND resvd1, FF;

COMPARE resvd1, 00;

JUMP Z, hr\_unit\_0;

COMPARE resvd1, 01;

JUMP Z, hr\_unit\_1;

COMPARE resvd1, 02;

JUMP Z, hr\_unit\_2;

COMPARE resvd1, 03;

JUMP Z, hr\_unit\_3;

COMPARE resvd1, 04;

JUMP Z, hr\_unit\_4;

COMPARE resvd1, 05;

JUMP Z, hr\_unit\_5;

COMPARE resvd1, 06;

JUMP Z, hr\_unit\_6;

COMPARE resvd1, 07;

JUMP Z, hr\_unit\_7;

COMPARE resvd1, 08;

JUMP Z, hr\_unit\_8;

COMPARE resvd1, 09;

JUMP Z, hr\_unit\_9;

COMPARE resvd1, 10;

JUMP Z, hr\_unit\_10;

COMPARE resvd1, 11;

JUMP Z, hr\_unit\_11;

COMPARE resvd1, 12;

JUMP Z, hr\_unit\_0;

COMPARE resvd1, 13;

JUMP Z, hr\_unit\_1;

COMPARE resvd1, 14;

JUMP Z, hr\_unit\_2;

COMPARE resvd1, 15;

JUMP Z, hr\_unit\_3;

COMPARE resvd1, 16;

JUMP Z, hr\_unit\_4;

COMPARE resvd1, 17;

JUMP Z, hr\_unit\_5;

COMPARE resvd1, 18;

JUMP Z, hr\_unit\_6;

COMPARE resvd1, 19;

JUMP Z, hr\_unit\_7;

COMPARE resvd1, 20;

JUMP Z, hr\_unit\_8;

COMPARE resvd1, 21;

JUMP Z, hr\_unit\_9;

COMPARE resvd1, 22;

JUMP Z, hr\_unit\_10;

COMPARE resvd1, 23;

JUMP Z, hr\_unit\_11;

RETURN;

hr\_unit\_0 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 82

LOAD ypos, 55

CALL drawto

RETURN

hr\_unit\_1 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 98

LOAD ypos, 5B

CALL drawto

RETURN

hr\_unit\_2 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, A9

LOAD ypos, 6B

CALL drawto

RETURN

hr\_unit\_3 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, AF

LOAD ypos, 82

CALL drawto

RETURN

hr\_unit\_4 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, A9

LOAD ypos, 98

CALL drawto

RETURN

hr\_unit\_5 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 98

LOAD ypos, A9

CALL drawto

RETURN

hr\_unit\_6 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 82

LOAD ypos, AF

CALL drawto

RETURN

hr\_unit\_7 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 6B

LOAD ypos, A9

CALL drawto

RETURN

hr\_unit\_8 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 5B

LOAD ypos, 98

CALL drawto

RETURN

hr\_unit\_9 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 55

LOAD ypos, 82

CALL drawto

RETURN

hr\_unit\_10 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 5B

LOAD ypos, 6B

CALL drawto

RETURN

hr\_unit\_11 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 82

CALL moveto

LOAD xpos, 6B

LOAD ypos, 5B

CALL drawto

RETURN

digital\_clock: CALL disgi\_sec\_unit;

CALL disgi\_sec\_ten;

CALL disgi\_min\_unit;

CALL disgi\_min\_ten;

CALL disgi\_hr\_unit;

CALL disgi\_hr\_ten;

CALL disgi\_dot\_1;

CALL disgi\_dot\_2;

CALL disgi\_dot\_3;

CALL disgi\_dot\_4;

RETURN

disgi\_dot\_1 : LOAD xpos, 4F ; draw second 0

LOAD ypos, 55

CALL moveto

LOAD xpos, 4F

LOAD ypos, 65

CALL drawto

LOAD xpos, 59

LOAD ypos, 65

CALL drawto

LOAD xpos, 59

LOAD ypos, 55

CALL drawto

LOAD xpos, 4F

LOAD ypos, 55

CALL drawto

LOAD xpos, 4F

LOAD ypos, 65

CALL drawto

RETURN

disgi\_dot\_2 : LOAD xpos, 4F ; draw second 0

LOAD ypos, 75

CALL moveto

LOAD xpos, 4F

LOAD ypos, 85

CALL drawto

LOAD xpos, 59

LOAD ypos, 85

CALL drawto

LOAD xpos, 59

LOAD ypos, 75

CALL drawto

LOAD xpos, 4F

LOAD ypos, 75

CALL drawto

LOAD xpos, 4F

LOAD ypos, 85

CALL drawto

RETURN

disgi\_dot\_3 : LOAD xpos, A1 ; draw second 0

LOAD ypos, 55

CALL moveto

LOAD xpos, A1

LOAD ypos, 65

CALL drawto

LOAD xpos, AB

LOAD ypos, 65

CALL drawto

LOAD xpos, AB

LOAD ypos, 55

CALL drawto

LOAD xpos, A1

LOAD ypos, 55

CALL drawto

LOAD xpos, A1

LOAD ypos, 65

CALL drawto

RETURN

disgi\_dot\_4 : LOAD xpos, A1 ; draw second 0

LOAD ypos, 75

CALL moveto

LOAD xpos, A1

LOAD ypos, 85

CALL drawto

LOAD xpos, AB

LOAD ypos, 85

CALL drawto

LOAD xpos, AB

LOAD ypos, 75

CALL drawto

LOAD xpos, A1

LOAD ypos, 75

CALL drawto

LOAD xpos, A1

LOAD ypos, 85

CALL drawto

RETURN

disgi\_sec\_unit: LOAD resvd1, zero;

INPUT resvd1, second;

AND resvd1, 0F;

COMPARE resvd1, 00;

JUMP Z, secgi\_unit\_0;

COMPARE resvd1, 01;

JUMP Z, secgi\_unit\_1;

COMPARE resvd1, 02;

JUMP Z, secgi\_unit\_2;

COMPARE resvd1, 03;

JUMP Z, secgi\_unit\_3;

COMPARE resvd1, 04;

JUMP Z, secgi\_unit\_4;

COMPARE resvd1, 05;

JUMP Z, secgi\_unit\_5;

COMPARE resvd1, 06;

JUMP Z, secgi\_unit\_6;

COMPARE resvd1, 07;

JUMP Z, secgi\_unit\_7;

COMPARE resvd1, 08;

JUMP Z, secgi\_unit\_8;

COMPARE resvd1, 09;

JUMP Z, secgi\_unit\_9;

RETURN;

secgi\_unit\_0 : LOAD xpos, D4 ; draw second 0

LOAD ypos, 50

CALL moveto

LOAD xpos, D4

LOAD ypos, 90

CALL drawto

LOAD xpos, ED

LOAD ypos, 90

CALL drawto

LOAD xpos, ED

LOAD ypos, 50

CALL drawto

LOAD xpos, D4

LOAD ypos, 50

CALL drawto

LOAD xpos, D4

LOAD ypos, 90

CALL drawto

RETURN

secgi\_unit\_1 : LOAD xpos, ED ; draw second 1

LOAD ypos, 50

CALL moveto

LOAD xpos, ED

LOAD ypos, 90

CALL drawto

RETURN

secgi\_unit\_2 : LOAD xpos, D4 ; draw second 2

LOAD ypos, 50

CALL moveto

LOAD xpos, ED

LOAD ypos, 50

CALL drawto

LOAD xpos, ED

LOAD ypos, 70

CALL drawto

LOAD xpos, D4

LOAD ypos, 70

CALL drawto

LOAD xpos, D4

LOAD ypos, 90

CALL drawto

LOAD xpos, ED

LOAD ypos, 90

CALL drawto

RETURN

secgi\_unit\_3 : LOAD xpos, D4 ; draw second 3

LOAD ypos, 50

CALL moveto

LOAD xpos, ED

LOAD ypos, 50

CALL drawto

LOAD xpos, ED

LOAD ypos, 90

CALL drawto

LOAD xpos, D4

LOAD ypos, 90

CALL drawto

LOAD xpos, ED

LOAD ypos, 70

CALL moveto

LOAD xpos, D4

LOAD ypos, 70

CALL drawto

RETURN

secgi\_unit\_4 : LOAD xpos, D4 ; draw second 4

LOAD ypos, 50

CALL moveto

LOAD xpos, D4

LOAD ypos, 70

CALL drawto

LOAD xpos, ED

LOAD ypos, 70

CALL drawto

LOAD xpos, ED

LOAD ypos, 50

CALL moveto

LOAD xpos, ED

LOAD ypos, 90

CALL drawto

RETURN

secgi\_unit\_5 : LOAD xpos, ED

LOAD ypos, 50

CALL moveto

LOAD xpos, D4

LOAD ypos, 50

CALL drawto

LOAD xpos, D4

LOAD ypos, 70

CALL drawto

LOAD xpos, ED

LOAD ypos, 70

CALL drawto

LOAD xpos, ED

LOAD ypos, 90

CALL drawto

LOAD xpos, D4

LOAD ypos, 90

CALL drawto

RETURN

secgi\_unit\_6 : LOAD xpos, D4

LOAD ypos, 50

CALL moveto

LOAD xpos, D4

LOAD ypos, 90

CALL drawto

LOAD xpos, ED

LOAD ypos, 90

CALL drawto

LOAD xpos, ED

LOAD ypos, 70

CALL drawto

LOAD xpos, D4

LOAD ypos, 70

CALL drawto

RETURN

secgi\_unit\_7 : LOAD xpos, D4

LOAD ypos, 50

CALL moveto

LOAD xpos, ED

LOAD ypos, 50

CALL drawto

LOAD xpos, ED

LOAD ypos, 90

CALL drawto

RETURN

secgi\_unit\_8 : LOAD xpos, D4

LOAD ypos, 50

CALL moveto

LOAD xpos, D4

LOAD ypos, 90

CALL drawto

LOAD xpos, ED

LOAD ypos, 90

CALL drawto

LOAD xpos, ED

LOAD ypos, 50

CALL drawto

LOAD xpos, D4

LOAD ypos, 50

CALL drawto

LOAD xpos, D4

LOAD ypos, 70

CALL moveto

LOAD xpos, ED

LOAD ypos, 70

CALL drawto

RETURN

secgi\_unit\_9 : LOAD xpos, ED

LOAD ypos, 50

CALL moveto

LOAD xpos, D4

LOAD ypos, 50

CALL drawto

LOAD xpos, D4

LOAD ypos, 70

CALL drawto

LOAD xpos, ED

LOAD ypos, 70

CALL drawto

LOAD xpos, ED

LOAD ypos, 50

CALL moveto

LOAD xpos, ED

LOAD ypos, 90

CALL drawto

RETURN

disgi\_sec\_ten: LOAD resvd1, zero;

INPUT resvd1, second;

AND resvd1, F0;

COMPARE resvd1, 00;

JUMP Z, secgi\_ten\_0;

COMPARE resvd1, 10;

JUMP Z, secgi\_ten\_1;

COMPARE resvd1, 20;

JUMP Z, secgi\_ten\_2;

COMPARE resvd1, 30;

JUMP Z, secgi\_ten\_3;

COMPARE resvd1, 40;

JUMP Z, secgi\_ten\_4;

COMPARE resvd1, 50;

JUMP Z, secgi\_ten\_5;

COMPARE resvd1, 60;

JUMP Z, secgi\_ten\_6;

RETURN;

secgi\_ten\_0 : LOAD xpos, B1 ; draw second 0

LOAD ypos, 50

CALL moveto

LOAD xpos, B1

LOAD ypos, 90

CALL drawto

LOAD xpos, CA

LOAD ypos, 90

CALL drawto

LOAD xpos, CA

LOAD ypos, 50

CALL drawto

LOAD xpos, B1

LOAD ypos, 50

CALL drawto

LOAD xpos, B1

LOAD ypos, 90

CALL drawto

RETURN

secgi\_ten\_1 : LOAD xpos, CA ; draw second 1

LOAD ypos, 50

CALL moveto

LOAD xpos, CA

LOAD ypos, 90

CALL drawto

RETURN

secgi\_ten\_2 : LOAD xpos, B1 ; draw second 2

LOAD ypos, 50

CALL moveto

LOAD xpos, CA

LOAD ypos, 50

CALL drawto

LOAD xpos, CA

LOAD ypos, 70

CALL drawto

LOAD xpos, B1

LOAD ypos, 70

CALL drawto

LOAD xpos, B1

LOAD ypos, 90

CALL drawto

LOAD xpos, CA

LOAD ypos, 90

CALL drawto

RETURN

secgi\_ten\_3 : LOAD xpos, B1 ; draw second 3

LOAD ypos, 50

CALL moveto

LOAD xpos, CA

LOAD ypos, 50

CALL drawto

LOAD xpos, CA

LOAD ypos, 90

CALL drawto

LOAD xpos, B1

LOAD ypos, 90

CALL drawto

LOAD xpos, CA

LOAD ypos, 70

CALL moveto

LOAD xpos, B1

LOAD ypos, 70

CALL drawto

RETURN

secgi\_ten\_4 : LOAD xpos, B1 ; draw second 4

LOAD ypos, 50

CALL moveto

LOAD xpos, B1

LOAD ypos, 70

CALL drawto

LOAD xpos, CA

LOAD ypos, 70

CALL drawto

LOAD xpos, CA

LOAD ypos, 50

CALL moveto

LOAD xpos, CA

LOAD ypos, 90

CALL drawto

RETURN

secgi\_ten\_5 : LOAD xpos, CA

LOAD ypos, 50

CALL moveto

LOAD xpos, B1

LOAD ypos, 50

CALL drawto

LOAD xpos, B1

LOAD ypos, 70

CALL drawto

LOAD xpos, CA

LOAD ypos, 70

CALL drawto

LOAD xpos, CA

LOAD ypos, 90

CALL drawto

LOAD xpos, B1

LOAD ypos, 90

CALL drawto

RETURN

secgi\_ten\_6 : LOAD xpos, B1

LOAD ypos, 50

CALL moveto

LOAD xpos, B1

LOAD ypos, 90

CALL drawto

LOAD xpos, CA

LOAD ypos, 90

CALL drawto

LOAD xpos, CA

LOAD ypos, 70

CALL drawto

LOAD xpos, B1

LOAD ypos, 70

CALL drawto

RETURN

disgi\_min\_unit: LOAD resvd1, zero;

INPUT resvd1, minute;

AND resvd1, 0F;

COMPARE resvd1, 00;

JUMP Z, mingi\_unit\_0;

COMPARE resvd1, 01;

JUMP Z, mingi\_unit\_1;

COMPARE resvd1, 02;

JUMP Z, mingi\_unit\_2;

COMPARE resvd1, 03;

JUMP Z, mingi\_unit\_3;

COMPARE resvd1, 04;

JUMP Z, mingi\_unit\_4;

COMPARE resvd1, 05;

JUMP Z, mingi\_unit\_5;

COMPARE resvd1, 06;

JUMP Z, mingi\_unit\_6;

COMPARE resvd1, 07;

JUMP Z, mingi\_unit\_7;

COMPARE resvd1, 08;

JUMP Z, mingi\_unit\_8;

COMPARE resvd1, 09;

JUMP Z, mingi\_unit\_9;

RETURN;

mingi\_unit\_0 : LOAD xpos, 82 ; draw second 0

LOAD ypos, 50

CALL moveto

LOAD xpos, 82

LOAD ypos, 90

CALL drawto

LOAD xpos, 9B

LOAD ypos, 90

CALL drawto

LOAD xpos, 9B

LOAD ypos, 50

CALL drawto

LOAD xpos, 82

LOAD ypos, 50

CALL drawto

LOAD xpos, 82

LOAD ypos, 90

CALL drawto

RETURN

mingi\_unit\_1 : LOAD xpos, 9B ; draw second 1

LOAD ypos, 50

CALL moveto

LOAD xpos, 9B

LOAD ypos, 90

CALL drawto

RETURN

mingi\_unit\_2 : LOAD xpos, 82 ; draw second 2

LOAD ypos, 50

CALL moveto

LOAD xpos, 9B

LOAD ypos, 50

CALL drawto

LOAD xpos, 9B

LOAD ypos, 70

CALL drawto

LOAD xpos, 82

LOAD ypos, 70

CALL drawto

LOAD xpos, 82

LOAD ypos, 90

CALL drawto

LOAD xpos, 9B

LOAD ypos, 90

CALL drawto

RETURN

mingi\_unit\_3 : LOAD xpos, 82 ; draw second 3

LOAD ypos, 50

CALL moveto

LOAD xpos, 9B

LOAD ypos, 50

CALL drawto

LOAD xpos, 9B

LOAD ypos, 90

CALL drawto

LOAD xpos, 82

LOAD ypos, 90

CALL drawto

LOAD xpos, 9B

LOAD ypos, 70

CALL moveto

LOAD xpos, 82

LOAD ypos, 70

CALL drawto

RETURN

mingi\_unit\_4 : LOAD xpos, 82 ; draw second 4

LOAD ypos, 50

CALL moveto

LOAD xpos, 82

LOAD ypos, 70

CALL drawto

LOAD xpos, 9B

LOAD ypos, 70

CALL drawto

LOAD xpos, 9B

LOAD ypos, 50

CALL moveto

LOAD xpos, 9B

LOAD ypos, 90

CALL drawto

RETURN

mingi\_unit\_5 : LOAD xpos, 9B

LOAD ypos, 50

CALL moveto

LOAD xpos, 82

LOAD ypos, 50

CALL drawto

LOAD xpos, 82

LOAD ypos, 70

CALL drawto

LOAD xpos, 9B

LOAD ypos, 70

CALL drawto

LOAD xpos, 9B

LOAD ypos, 90

CALL drawto

LOAD xpos, 82

LOAD ypos, 90

CALL drawto

RETURN

mingi\_unit\_6 : LOAD xpos, 82

LOAD ypos, 50

CALL moveto

LOAD xpos, 82

LOAD ypos, 90

CALL drawto

LOAD xpos, 9B

LOAD ypos, 90

CALL drawto

LOAD xpos, 9B

LOAD ypos, 70

CALL drawto

LOAD xpos, 82

LOAD ypos, 70

CALL drawto

RETURN

mingi\_unit\_7 : LOAD xpos, 82

LOAD ypos, 50

CALL moveto

LOAD xpos, 9B

LOAD ypos, 50

CALL drawto

LOAD xpos, 9B

LOAD ypos, 90

CALL drawto

RETURN

mingi\_unit\_8 : LOAD xpos, 82

LOAD ypos, 50

CALL moveto

LOAD xpos, 82

LOAD ypos, 90

CALL drawto

LOAD xpos, 9B

LOAD ypos, 90

CALL drawto

LOAD xpos, 9B

LOAD ypos, 50

CALL drawto

LOAD xpos, 82

LOAD ypos, 50

CALL drawto

LOAD xpos, 82

LOAD ypos, 70

CALL moveto

LOAD xpos, 9B

LOAD ypos, 70

CALL drawto

RETURN

mingi\_unit\_9 : LOAD xpos, 9B

LOAD ypos, 50

CALL moveto

LOAD xpos, 82

LOAD ypos, 50

CALL drawto

LOAD xpos, 82

LOAD ypos, 70

CALL drawto

LOAD xpos, 9B

LOAD ypos, 70

CALL drawto

LOAD xpos, 9B

LOAD ypos, 50

CALL moveto

LOAD xpos, 9B

LOAD ypos, 90

CALL drawto

RETURN

disgi\_min\_ten: LOAD resvd1, zero;

INPUT resvd1, minute;

AND resvd1, F0;

COMPARE resvd1, 00;

JUMP Z, mingi\_ten\_0;

COMPARE resvd1, 10;

JUMP Z, mingi\_ten\_1;

COMPARE resvd1, 20;

JUMP Z, mingi\_ten\_2;

COMPARE resvd1, 30;

JUMP Z, mingi\_ten\_3;

COMPARE resvd1, 40;

JUMP Z, mingi\_ten\_4;

COMPARE resvd1, 50;

JUMP Z, mingi\_ten\_5;

COMPARE resvd1, 60;

JUMP Z, mingi\_ten\_6;

RETURN;

mingi\_ten\_0 : LOAD xpos, 5F ; draw second 0

LOAD ypos, 50

CALL moveto

LOAD xpos, 5F

LOAD ypos, 90

CALL drawto

LOAD xpos, 78

LOAD ypos, 90

CALL drawto

LOAD xpos, 78

LOAD ypos, 50

CALL drawto

LOAD xpos, 5F

LOAD ypos, 50

CALL drawto

LOAD xpos, 5F

LOAD ypos, 90

CALL drawto

RETURN

mingi\_ten\_1 : LOAD xpos, 78 ; draw second 1

LOAD ypos, 50

CALL moveto

LOAD xpos, 78

LOAD ypos, 90

CALL drawto

RETURN

mingi\_ten\_2 : LOAD xpos, 5F ; draw second 2

LOAD ypos, 50

CALL moveto

LOAD xpos, 78

LOAD ypos, 50

CALL drawto

LOAD xpos, 78

LOAD ypos, 70

CALL drawto

LOAD xpos, 5F

LOAD ypos, 70

CALL drawto

LOAD xpos, 5F

LOAD ypos, 90

CALL drawto

LOAD xpos, 78

LOAD ypos, 90

CALL drawto

RETURN

mingi\_ten\_3 : LOAD xpos, 5F ; draw second 3

LOAD ypos, 50

CALL moveto

LOAD xpos, 78

LOAD ypos, 50

CALL drawto

LOAD xpos, 78

LOAD ypos, 90

CALL drawto

LOAD xpos, 5F

LOAD ypos, 90

CALL drawto

LOAD xpos, 78

LOAD ypos, 70

CALL moveto

LOAD xpos, 5F

LOAD ypos, 70

CALL drawto

RETURN

mingi\_ten\_4 : LOAD xpos, 5F ; draw second 4

LOAD ypos, 50

CALL moveto

LOAD xpos, 5F

LOAD ypos, 70

CALL drawto

LOAD xpos, 78

LOAD ypos, 70

CALL drawto

LOAD xpos, 78

LOAD ypos, 50

CALL moveto

LOAD xpos, 78

LOAD ypos, 90

CALL drawto

RETURN

mingi\_ten\_5 : LOAD xpos, 78

LOAD ypos, 50

CALL moveto

LOAD xpos, 5F

LOAD ypos, 50

CALL drawto

LOAD xpos, 5F

LOAD ypos, 70

CALL drawto

LOAD xpos, 78

LOAD ypos, 70

CALL drawto

LOAD xpos, 78

LOAD ypos, 90

CALL drawto

LOAD xpos, 5F

LOAD ypos, 90

CALL drawto

RETURN

mingi\_ten\_6 : LOAD xpos, 5F

LOAD ypos, 50

CALL moveto

LOAD xpos, 5F

LOAD ypos, 90

CALL drawto

LOAD xpos, 78

LOAD ypos, 90

CALL drawto

LOAD xpos, 78

LOAD ypos, 70

CALL drawto

LOAD xpos, 5F

LOAD ypos, 70

CALL drawto

RETURN

disgi\_hr\_unit: LOAD resvd1, zero;

INPUT resvd1, hour;

AND resvd1, 0F;

COMPARE resvd1, 00;

JUMP Z, hrgi\_unit\_0;

COMPARE resvd1, 01;

JUMP Z, hrgi\_unit\_1;

COMPARE resvd1, 02;

JUMP Z, hrgi\_unit\_2;

COMPARE resvd1, 03;

JUMP Z, hrgi\_unit\_3;

COMPARE resvd1, 04;

JUMP Z, hrgi\_unit\_4;

COMPARE resvd1, 05;

JUMP Z, hrgi\_unit\_5;

COMPARE resvd1, 06;

JUMP Z, hrgi\_unit\_6;

COMPARE resvd1, 07;

JUMP Z, hrgi\_unit\_7;

COMPARE resvd1, 08;

JUMP Z, hrgi\_unit\_8;

COMPARE resvd1, 09;

JUMP Z, hrgi\_unit\_9;

RETURN;

hrgi\_unit\_0 : LOAD xpos, 30 ; draw second 0

LOAD ypos, 50

CALL moveto

LOAD xpos, 30

LOAD ypos, 90

CALL drawto

LOAD xpos, 49

LOAD ypos, 90

CALL drawto

LOAD xpos, 49

LOAD ypos, 50

CALL drawto

LOAD xpos, 30

LOAD ypos, 50

CALL drawto

LOAD xpos, 30

LOAD ypos, 90

CALL drawto

RETURN

hrgi\_unit\_1 : LOAD xpos, 49 ; draw second 1

LOAD ypos, 50

CALL moveto

LOAD xpos, 49

LOAD ypos, 90

CALL drawto

RETURN

hrgi\_unit\_2 : LOAD xpos, 30 ; draw second 2

LOAD ypos, 50

CALL moveto

LOAD xpos, 49

LOAD ypos, 50

CALL drawto

LOAD xpos, 49

LOAD ypos, 70

CALL drawto

LOAD xpos, 30

LOAD ypos, 70

CALL drawto

LOAD xpos, 30

LOAD ypos, 90

CALL drawto

LOAD xpos, 49

LOAD ypos, 90

CALL drawto

RETURN

hrgi\_unit\_3 : LOAD xpos, 30 ; draw second 3

LOAD ypos, 50

CALL moveto

LOAD xpos, 49

LOAD ypos, 50

CALL drawto

LOAD xpos, 49

LOAD ypos, 90

CALL drawto

LOAD xpos, 30

LOAD ypos, 90

CALL drawto

LOAD xpos, 49

LOAD ypos, 70

CALL moveto

LOAD xpos, 30

LOAD ypos, 70

CALL drawto

RETURN

hrgi\_unit\_4 : LOAD xpos, 30 ; draw second 4

LOAD ypos, 50

CALL moveto

LOAD xpos, 30

LOAD ypos, 70

CALL drawto

LOAD xpos, 49

LOAD ypos, 70

CALL drawto

LOAD xpos, 49

LOAD ypos, 50

CALL moveto

LOAD xpos, 49

LOAD ypos, 90

CALL drawto

RETURN

hrgi\_unit\_5 : LOAD xpos, 49

LOAD ypos, 50

CALL moveto

LOAD xpos, 30

LOAD ypos, 50

CALL drawto

LOAD xpos, 30

LOAD ypos, 70

CALL drawto

LOAD xpos, 49

LOAD ypos, 70

CALL drawto

LOAD xpos, 49

LOAD ypos, 90

CALL drawto

LOAD xpos, 30

LOAD ypos, 90

CALL drawto

RETURN

hrgi\_unit\_6 : LOAD xpos, 30

LOAD ypos, 50

CALL moveto

LOAD xpos, 30

LOAD ypos, 90

CALL drawto

LOAD xpos, 49

LOAD ypos, 90

CALL drawto

LOAD xpos, 49

LOAD ypos, 70

CALL drawto

LOAD xpos, 30

LOAD ypos, 70

CALL drawto

RETURN

hrgi\_unit\_7 : LOAD xpos, 30

LOAD ypos, 50

CALL moveto

LOAD xpos, 49

LOAD ypos, 50

CALL drawto

LOAD xpos, 49

LOAD ypos, 90

CALL drawto

RETURN

hrgi\_unit\_8 : LOAD xpos, 30

LOAD ypos, 50

CALL moveto

LOAD xpos, 30

LOAD ypos, 90

CALL drawto

LOAD xpos, 49

LOAD ypos, 90

CALL drawto

LOAD xpos, 49

LOAD ypos, 50

CALL drawto

LOAD xpos, 30

LOAD ypos, 50

CALL drawto

LOAD xpos, 30

LOAD ypos, 70

CALL moveto

LOAD xpos, 49

LOAD ypos, 70

CALL drawto

RETURN

hrgi\_unit\_9 : LOAD xpos, 49

LOAD ypos, 50

CALL moveto

LOAD xpos, 30

LOAD ypos, 50

CALL drawto

LOAD xpos, 30

LOAD ypos, 70

CALL drawto

LOAD xpos, 49

LOAD ypos, 70

CALL drawto

LOAD xpos, 49

LOAD ypos, 50

CALL moveto

LOAD xpos, 49

LOAD ypos, 90

CALL drawto

RETURN

disgi\_hr\_ten: LOAD resvd1, zero;

INPUT resvd1, hour;

AND resvd1, F0;

COMPARE resvd1, 00;

JUMP Z, hrgi\_ten\_0;

COMPARE resvd1, 10;

JUMP Z, hrgi\_ten\_1;

COMPARE resvd1, 20;

JUMP Z, hrgi\_ten\_2;

RETURN;

hrgi\_ten\_0 : LOAD xpos, 0D ; draw second 0

LOAD ypos, 50

CALL moveto

LOAD xpos, 0D

LOAD ypos, 90

CALL drawto

LOAD xpos, 26

LOAD ypos, 90

CALL drawto

LOAD xpos, 26

LOAD ypos, 50

CALL drawto

LOAD xpos, 0D

LOAD ypos, 50

CALL drawto

LOAD xpos, 0D

LOAD ypos, 90

CALL drawto

RETURN

hrgi\_ten\_1 : LOAD xpos, 26 ; draw second 1

LOAD ypos, 50

CALL moveto

LOAD xpos, 26

LOAD ypos, 90

CALL drawto

RETURN

hrgi\_ten\_2 : LOAD xpos, 0D ; draw second 2

LOAD ypos, 50

CALL moveto

LOAD xpos, 26

LOAD ypos, 50

CALL drawto

LOAD xpos, 26

LOAD ypos, 70

CALL drawto

LOAD xpos, 0D

LOAD ypos, 70

CALL drawto

LOAD xpos, 0D

LOAD ypos, 90

CALL drawto

LOAD xpos, 26

LOAD ypos, 90

CALL drawto

RETURN

;;============================================================================

moveto: OUTPUT xpos, endx ; copy global to hardware

OUTPUT ypos, endy ; copy global to hardware

RETURN ; return

drawto: INPUT scratch, endx ; read hardware

OUTPUT scratch, stax ; write hardware

OUTPUT xpos, endx ; copy global to hardware

INPUT scratch, endy ; read hardware

OUTPUT scratch, stay ; write hardware

OUTPUT ypos, endy ; copy global to hardware

LOAD scratch, busy\_go ; prepare the command

OUTPUT scratch, busy ; send the command

CALL hw\_init\_wait ; wait line draw done

RETURN ; return

;;============================================================================

;; Interrupt - Vector.

;;============================================================================

ADDRESS 7FF ; must be located here

isr\_vector: JUMP isr ; always jump to isr