



THE I/O DISPLAY BOX IS ALL HUMAN RESPONSE TIME AND ALL LOGIC LEVEL SIGNALS ONLY -- INITIALLY AN ALL HARDWARE BOX, BUT WOULD LIKE TO INTERCHANGE ITS 25 PIN D-SUB CABLE AT ANY TIME WITH A PC FOR A MORE "PROFESSIONAL" AND UP-TO-DATE KEYBOARD AND DIGITAL DISPLAY. IN THE BOX, ROTARY SWITCHES ARE BOTH INPUT AND READOUT; IN ADDITION THERE ARE START, STOP MOMENTARY PUSH BUTTONS AND A 1 TURN LOG TAPER POT DRIVING A SINGLE SHOT FOR ADJUSTABLE "BETWEEN REPETITIVE SEEK DELAY" WITH RANGE OF ABOUT 10MS TO 2SEC. DETAILS ARE ON NEXT SHEET.

CONTROLS IN HARDWARE BOX 'I' HOPE TO DIRECTLY EMULATE AT THE CABLE LOGIC LINES, SO THE BOX AND COMPUTER CAN BE INTERCHANGED AT ANY TIME:

TRACK A - 3 BCD DIGITS - LSB 1248, MSB 1248, HSB 124 } WITH "HOME" USES  
 TRACK B - " " " " " " " " } 141 OF 256 CODES

DISK A - 2 BCD DIGITS - LSB 1248, MSB 124 } USES 50 OF 80 POSSIBLE  
 DISK B - " " " " " " " " } BCD CODES

FUNCTION SWITCH - 16/12 FROM SINGLE POLE 12POS SW: NOW USES 12 OF 256 CODES BUT  
 COULD BE CHANGED TO 12 OF 16  
 WITH MORE HARDWARE IN BOX -  
 WHAT USE FOR OTHER 4 LINES?

DISPLAY - 8 LEDs

ALL ABOVE MULTIPLEXED WITH 3 LINE ADDRESS BUS, CONTROLLING AN  
 8bit INPUT BUS AND 1 bit OUTPUT LINE:

THE 8 ADDRESSES ARE:

FOR BUS: [TRACK A HSB'S, TRACK B HSB'S] [TRACK A LSB'S AND MSB'S] [TRACK B LSB'S AND MSB'S]  
 [DISK A LSB'S AND MSB'S] [DISK B LSB'S AND MSB'S] [12 FUNCTION SWITCH POSITIONS]  
 [SPACE] [NO-OP]

FOR DATA LINE: A 74x259 ADDRESSABLE LATCH, AN LED ON EACH OUTPUT

START SWITCH - A PULSE OF WIDTH = 2 COMPLETE CYCLES OF ADDRESS BUS ON SWITCH  
 CLOSURE AND RELEASE

STOP SWITCH - A "CLEAN" PULSE OF WIDTH  $\sim 1 \mu s$  OR MIN POSSIBLE ON SWITCH  
 CLOSURE (WILL DRIVE A LATCH)

DELAY (SLIDER?) TO GIVE ADJUSTABLE PULSE OF 10ms TO 2 SECOND BEGINNING AT  
 MOTION COMPLETE

NON-MULTIPLEXED INDICATORS FOR: MOTION COMPLETE, ERROR

THUS THERE ARE 10 OUTPUTS FROM BOX:

8 bit BUS, START/DELAY PULSE, STOP PULSE

AND 6 INPUTS TO THE BOX:

3 line ADDRESS, 1 line (LED) DATA, MOTION COMPLETE, ERROR

FOR A TOTAL OF 16 DIGITAL LOGIC LEVEL LINES IN USE IN THE CABLE; REMAINDER CAN: PROVIDE POWER AND GROUND, A HARD CODED INDICATION OF WHAT TYPE OF BOX IS PLUGGED, ETC.

THINGS TO NOTE:

- (1) THE BOX FUNCTION IS ONLY TO LOAD INFORMATION INTO 4 REGISTERS IN PLD<sub>1</sub> AND 1 REGISTER IN PLD<sub>2</sub> WITH THE "SLOW" MUX'D BUS AS SET UP BEFORE AN OPERATION IS STARTED; ONCE STARTED ALL CONTROL IS IN HIGH SPEED ASYNCHRONOUS HARDWARE SEQUENCER IMPLEMENTED IN PLD<sub>2</sub> WHICH ALSO TRANSFERS THE DATA FROM THE REGISTERS IN PLD<sub>1</sub> TO THE POT POSITIONING LOGIC TREE AT THE INSTANT IT IS NEEDED, AS WELL AS CONTROLLING THE CLUTCHES, SOLENOIDS, DETENTS, R/W GATES, ETC AS REQUIRED
- (2) MUX CLOCK RATE CAN BE WHAT EVER IS POSSIBLE WITH PC SO LONG AS IT IS NOT OBVIOUSLY PERCEIVED AS "SLOW" BY THE OPERATOR
- (3) I HAVE TRIED TO KEEP THE TOTAL NUMBER OF LINES TO 16, EVEN THOUGH UP TO N22 COULD BE USED BY THE HARDWARE BOX
- (4) MY ORIGINAL IDEA WAS TO USE THE STANDARD BIDIRECTIONAL PC PARALLEL/PRINTER PORT AND ASSEMBLY CODE, BUT 16 LINES FROM A USB CARD MIGHT BE EASIER TO PROGRAM?
- (5) ALL LINES ARE LOGIC (NO ANALOG) WITH 5V TTL LEVELS, BUT 3V CMOS POSSIBLE.