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 read out; 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 2 sec. 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:

\[
\begin{align*}
\text{TRACK A} & : 3 \text{ BCD DIGITS} = \text{LSB (127), MSB (127), HSB (127)} \\
\text{TRACK B} & : 1 \text{ BCD DIGIT} \quad \text{WITH "HOME", "USES"} \\
\text{DISK A} & : 2 \text{ BCD DIGITS} = \text{LSB (127), MSB (127)} \quad \text{USED TO BE 80 POSSIBLE} \\
\text{DISK B} & : 1 \text{ BCD DIGIT} \quad \text{BCD CODES}
\end{align*}
\]

FUNCTION SWITCH - 16-PIN FROM SIMPLE POLE 12 POS SN 9 : NOW USES 128X256 CODES BUT COULD BE CHANGED TO 12X256 WITH MORE HARDWARE IN BOX - WHAT USE FOR OTHER 4 LINES?

DISPLAY - 8 LEADS

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

THE 8 ADDRESSES ARE:

\[
\begin{align*}
\text{FOR BUS} & : \text{[TRACK A HSB'S, TRACK B HSB'S, TRACK A LSB'S AND MSB'S]} \quad \text{[TRACK B LSB'S AND MSB'S]} \\
\text{DISK A LSB'S AND MSB'S} & : \text{[DISK B LSB'S AND MSB'S]} \\
\text{[SPARE]} & : \text{[NO-OP]}
\end{align*}
\]

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 ~ \(\mu\text{s}\) OR MIN POSSIBLE ON SWITCH CLOSURE (WILL DRIVE A LATCH)

DELAY (SLIDER?) TO GIVE ADJUSTABLE PULSE OF 10\(\mu\text{s}\) TO 2 SECONDS 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, motor 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 PLD1 and 1 register in PLD2. 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 PLD2 which also transfers the data from the registers in PLD1 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 PCs 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 42 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.