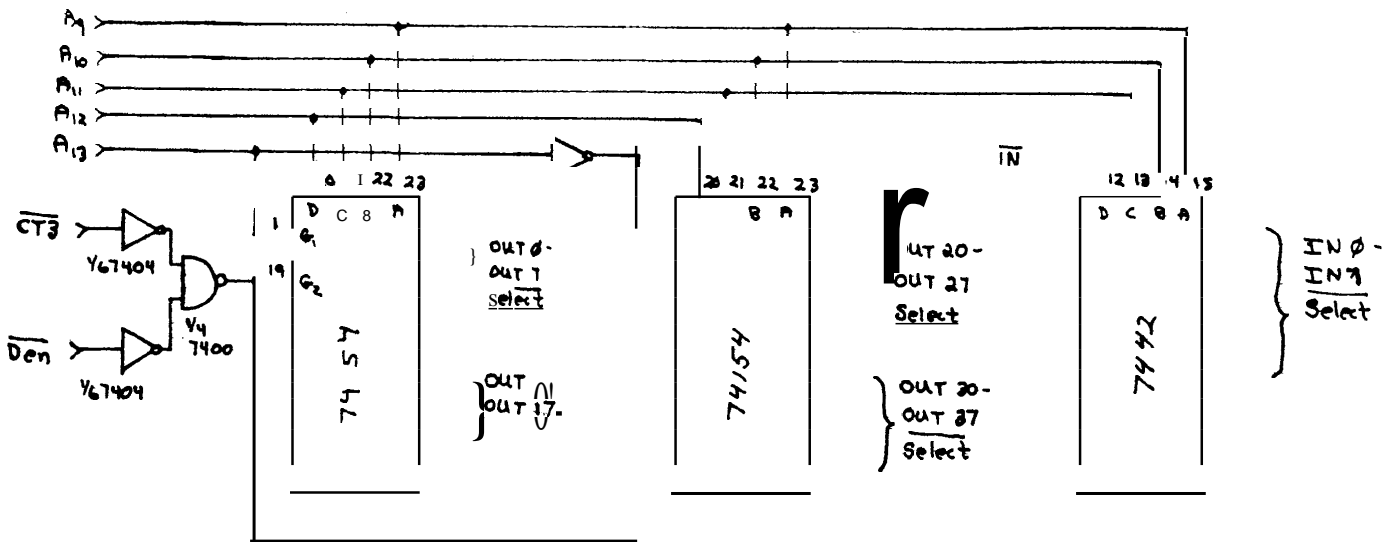


MARK 8 I/O EXPANSION

The following is a brief description of the modifications I've made to my Mark 8 to provide full decoding of the device codes and convenient connection of peripheral devices.

- I. The following circuit decodes the 01 RRR MM1 input and output instructions to provide 8 input, 24 regular output and 8 special output ports which transfer data from the accumulator to an output device on state t3 of an INO-IN7 instruction.



Note:  $\overline{CT3} = \overline{T3 + (\overline{Sync} \cdot \phi_2)} \equiv \overline{T3 \cdot (\overline{Sync} \cdot \phi_2)}$

*This is easily derived on the CPU board by NANDing the outputs of IC17 (pin 3) and IC19 (pin 8).*

The idea of using INO-IN7 to also do output should be credited to MP Publishing Co. ECS-5 presentation.

- II. Now that we have the port select lines (all active low, by the way) what is the best way to present them to the outside world? For convenience when it comes to changing device assignments and quickly connecting new devices, I've built the following patch board with 40-16 pin DIP IC sockets, 16-DMA095 tri state AND gates, 2-7404 inverters, and 8- 7437 Quad 2-input NAND Buffers, and what seemed like several miles of wire. A PC board would have been nice, but expensive to produce. The IC sockets can be easily attached to 0.1" perfboard with hot melt glue.

Finally, if you're with me so far, modifications should be made to the Mark 8 input MUX board as follows:

- 1) Remove the old 7442 decoder
- 2) Rewire the existing 7400 and 7402 gates as follows:



WILLIAM E. SEVERANCE, JR.

TELEPHONE  
207 925-2271

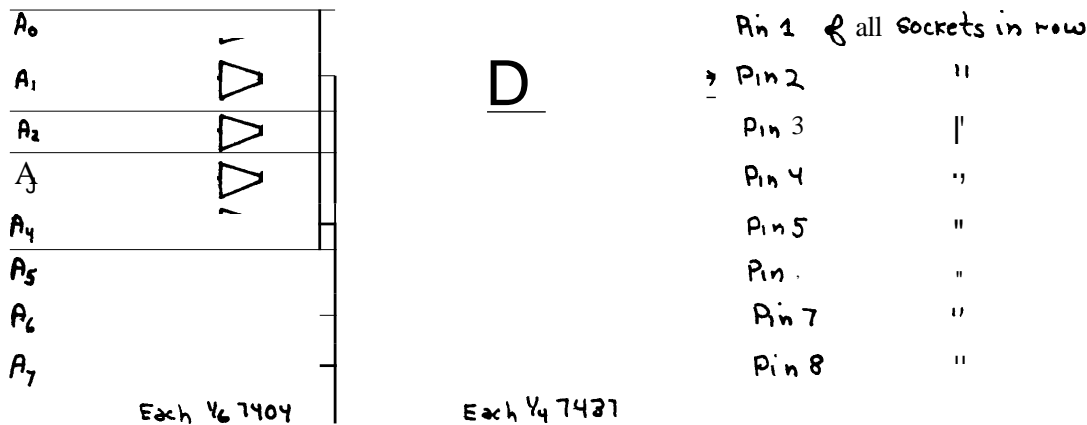
MAIN STREET  
CENTER LOVELL, MAINE 04016

Oh yes, I forgot to mention that connections to the I/O patch panel are made with 16 pin dip plugs (James Electronics has nice ones) attached to 16 conductor ribbon cable. I've used up to 6' runs to the TVT and Calculator interface with no drive problems.

Each output port socket has the following pin designations:

|                  |   |
|------------------|---|
| 1-Data Bus Out 0 | 16-Ground   |
| 2-Data Bus Out 1 | 15- +5volts                                       |
| 3-Data Bus Out 2 | 14- -12volts                                      |
| 4-Data Bus Out 3 | 13- +12volts                                      |
| 5-Data Bus Out 4 | 12-Output Port Select Strobe (From above decoder) |
| 6-Data Bus Out 5 | 11-Interrupt Request (Channel 0-7)                |
| 7-Data Bus Out 6 | 10-   |
| a-Data Bus Out 7 | 9-  |

Each row of output port sockets is buffered by the 7437 NAND gates as follows:



To 7437's of other output socket rows.

Each input port socket has the following pin designations:

|             |  |
|-------------|--|
| 1-Data in 0 | 16-Ground  |
| 2-Data in 1 | 15- +5volts                                      |
| 3-Data in 2 | 14- -12volts                                     |
| 4-Data in 3 | 13- +12volts                                     |
| 5-Data in 4 | 12-Input Port Select Strobe (From above decoder) |
| 6-Data in 5 | 11-Interrupt Request (Channel 0-7)               |
| 7-Data in 6 | 10-  |
| a-Data in 7 | 9-   |

WILLIAM E. SEVERANCE, JR.

TELEPHONE  
207 925-2271

MAIN STREET  
CENTER LOVELL, MAINE 04016

The input ports are wired using the DM8095's as follows:

