

Figure 1: Front panel view of the controller

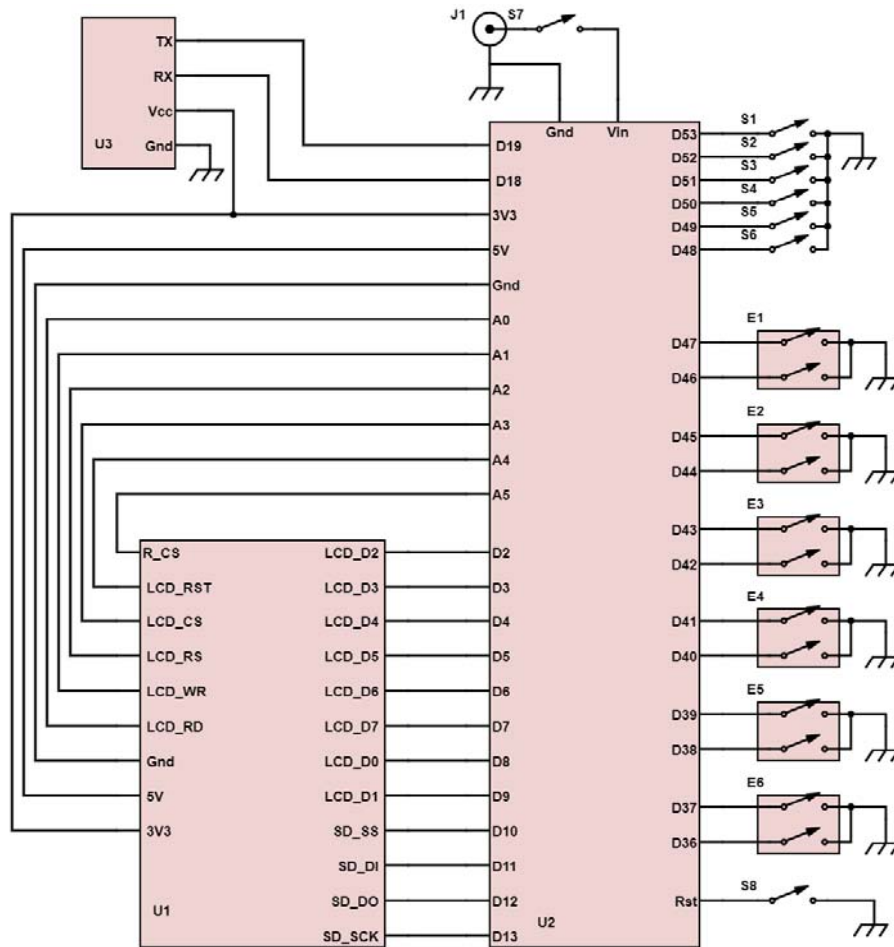


The diagram shows a microcontroller (U1) interfaced with several components:

- Power and Grounding:** A power supply section at the top left includes a diode (D2), resistors (R1, R2, R3, R4), and transistors (Q1, Q2) for voltage regulation. A switch (S7) and a potentiometer (J1) are also shown.
- Microcontroller (U1):** The central component with pins for power (3V3, 5V, Gnd), address (A0-A5), data (D2-D13), and control signals (R_CS, LCD_RST, LCD_CS, LCD_RS, LCD_WR, LCD_RD).
- Memory (U2):** A memory module connected to the microcontroller's data bus (D2-D13) and address lines (A0-A5). It includes pins for chip select (D19, D18), power (3V3, 5V, Gnd), and control signals (D53-D50, D49-D48).
- Input/Output Devices:**
 - Switches (S1-S6):** Connected to the microcontroller's data bus (D53-D48).
 - Encoders (E1-E6):** Connected to the microcontroller's data bus (D47-D42).
 - Reset Switch (S8):** Connected to the microcontroller's Rst pin.

R1-R4: 10 k Ω $\frac{1}{4}$ W resistor
D2: 1N4148 Switching diode
Q1-Q2: 2N7000 MOSFET
U1: Kuman 3.5 inch touch screen Model 8541612321 (Amazon.com)
U2: Arduino Due microcomputer
S1-S6: SPST Tactile pushbutton switch
S7: SPST Toggle switch
J1: 5.5 mm x 2.1 mm Coaxial power jack (30V – available from Amazon.com)
J2: 1/8 inch mono or stereo phone jack
E1-E6: Incremental rotary encoder (DigiKey PEC11R-4220K-S0024-ND)
S8: SPST Tactile pushbutton switch – or use one of the switches on the rotary encoders.

Figure 2a: Schematic for Yaesu or Kenwood Radios – Recommended for Supplementary Material Only



Parts List

- R1-R4: 10 k Ω ¼ W resistor
- D2: 1N4148 Switching diode
- Q1-Q2: 2N7000 MOSFET
- U1: Kuman 3.5 inch touch screen Model 8541612321 (Amazon.com)
- U2: Arduino Due microcomputer
- U3: Anmbest MAX3232 converter (Amazon.com)
- S1-S6: SPST Tactile pushbutton switch
- S7: SPST Toggle switch
- J1: 5.5 mm x 2.1 mm Coaxial power jack (30V – available from Amazon.com)
- J2: 1/8 inch mono or stereo phone jack
- E1-E6: Incremental rotary encoder (DigiKey PEC11R-4220K-S0024-ND)
- S8: SPST Tactile pushbutton switch – or use one of the switches on the rotary encoders.

Note, you may need to reverse the TX and RX lines on U3. This circuit was not tested on Yaesu or Kenwood radios.

Figure 3: Command structure for Icom and Yaesu/Kenwood computer control

Icom CIV command structure: Binary and BCD

FE	FE	Xcvr	Ctl	Cmd	Scmd	Data Area	FD
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FE FE = Header

FD = End of Message

Xcvr = Transceiver CIV address (e.g. 98)

Ctl = Controller CIV address (e.g. E0)

Cmd = Command

Scmd = Subcommand

Yaesu / Kenwood CAT command structure: Serial text

Cmd	Data Area	;
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Cmd = Command

