Midi Retrofit Instruction Sheet

The Mungo Enterprises Juno Midi Retrofit provides midi connectivity to the Roland Juno series of synthesisers combining a complete keyboard emulator and arpeggiator clock. Although designed as a plug in upgrade for the Juno 6/60 the kit is also compatible with the Jupiter series and can be adapted to many other pre-midi polysynths, for further details see the Other Keyboards section at the end of this document.

Bill of Materials:

Item	Quantity	Digikey part number
Atmel 90S2313	1	(Supplied)
74HC374	8	568-1440-5-ND
74HC138	1	568-1398-5-ND
CD4051	1	296-2057-5-ND
6N138	1	6N138QT-ND
8MHz Crystal	1	CTX406-ND
100nF Capacitor	9	BC1165CT-ND
220uF Capacitor	1	P13477-ND
22pF Capacitor	2	490-4219-ND
1N4148 Diode	9	568-1360-1-ND
220R Resistor	1	220QBK-ND
1K2 Resistor	1	1.2KQBK-ND
8 Way Header	2	A19435-ND
8 Way Socket	2	A19496-ND
Crimp Pins For 8 Way Socket	16	A19520-ND
5 Pin DIN socket	1	CP-1250-ND

It may be cheaper to obtain some of these items from local electronics stores, and it will definitely be cheaper for the purchase of the switches (listed below).

Also required:
- Several metres of insulated 24-26AWG cable.
- 55cm of 0.5-0.6mm diameter tinned copper wire.

Optional switches for:
- Midi Channel Select (4x SPST toggle or a single hex encoding)
- Arp Rate (1x SPST toggle)
- Arp Select (1x SPDT toggle)

Figures

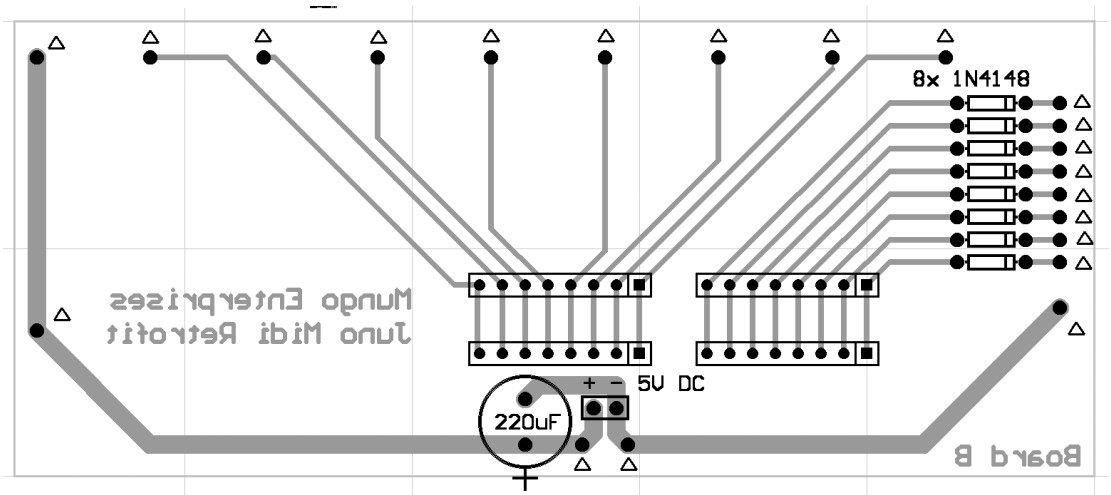

Figure 1

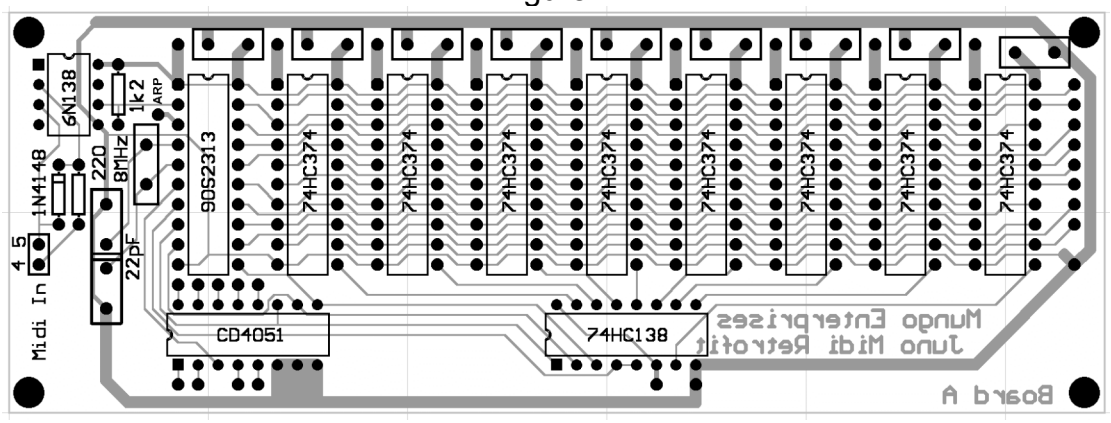

Figure 2

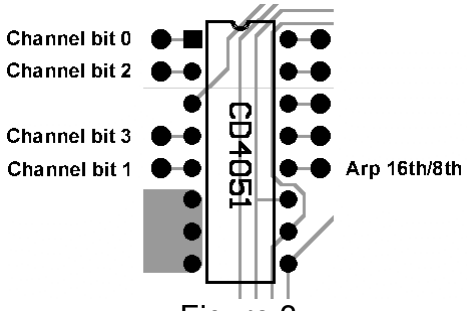

Figure 3

Assembly

Board B:

1. Place the board copper side up and solder a 25mm piece of tinned copper wire vertically in each of the 21 points designated with a triangle in Figure 1. These will provide the link between the two boards when fully assembled.

2. Install the 8x diodes, 220uF capacitor, and power connection. Either use a 2 pin header socket for the 5V power connection or solder cables directly to the board, leave 30cm or more length in the cables to reach the connection on the main board of the keyboard.

3. Install the 8-way headers noting pin 1 has to be closest to the diodes on both connectors and the headers should be in the set of holes furthest from the edge of the board.

4. Build the pass through cables for the keyboard connection using the 8-way plugs, 10-15cm is a good length for these. Solder these into position in the set of holes closest to the edge of the board being careful to get the pins in the correct order so when the plug is connected to the socket all the pins loop back on themselves.

Board A:

1. Install all the chips being careful when soldering the memory array (74HC374) that none of the traces become shorted.

2. Install the other components; 220R resistor, 1K2 resistor, 8MHz crystal, 2x 22pF capacitors, 1N4148 diode, and 9x 100nF capacitors (unlabelled component above each chip).

3. Connect cables from the required switch connections around the CD4051 shown in detail in figure 3, the length will vary depending on the exact position of the switches but 40-50cm is a typical length. For now, do not connect the switches and leave the ends of the wires loose.

4. Connect a cable from the arpeggiator clock output pad (next to the crystal), this needs to run all the way down to the external arpeggiator socket at the other end of the keyboard and is typically 80-100cm long.

5. Connect cables for the midi socket to the midi input, again the exact length will depend on the location chosen for the socket and leave the ends loose until the board is installed.

6. Now Board B can be installed on top, fit the wires protruding from Board B fit into Board A and adjust the gap between the boards to ensure there is no contact between any components before soldering in place.

Installation

1. Drill appropriate holes for the required switches and midi socket. The blank section to the right of the chorus controls is an ideal place for the midi channel and arpeggiator clock rate switches. If a switch is desired to change between midi and internal clocks for the arpeggiator this is best installed above the external clock input socket.

2. Screw/Bolt the switches and midi socket in place and clean up all metal the metal fragments left inside the keyboard.

3. Inside the Juno disconnect the two 8 pin cables connecting the keyboard to the far right end of the CPU board, this is where the retrofit will be installed. One of the connectors is labelled 0-7 while the other is 10-17, the connector on the retrofit closest to the diodes connects to the 10-17 pins. Attach the keyboard plugs to the retrofit to so they are connected through the retrofit to their original positions.

4. A place to attach the power connections can be found above the keyboard connectors on the end of the CPU board.

5. Connect the cables for the switches and wire all the switches together as a common ground then run one cable back to ground. Note here that the switches are connected to a pull up resistor and pulling the line low equates to a logical 1.

6. Connect the cables for the midi socket. Polarity is important here so be careful to double-check it is the correct way around.

7. Find the arpeggiator clock signal running from Panel Board A to the Jack Board. Run both this and the new arpeggiator clock signal from the retrofit to a switch to select between the two and then onto the Jack Board.

9. Power up the keyboard and test operation. Once midi control has been confirmed program the key offset using the hex sysex string `F0 7D xx F7` where xx is the offset, this should be 36 (`24h`) for a Juno.

Other Keybaords

This retrofit works on the byte wide “matrix scanned” keyboard found in most polysynths (and some monosynths like the SH-101). A suitable keyboard will have active low logic sequentially driving a keyboard 8 notes at a time.

Warning: Some very early synths (such as the Yamaha SK series) don’t use 5V logic and they require level translators to be installed between the retrofit and the keyboard to prevent damage. However, it can be done and an SK20 is currently running this retrofit.