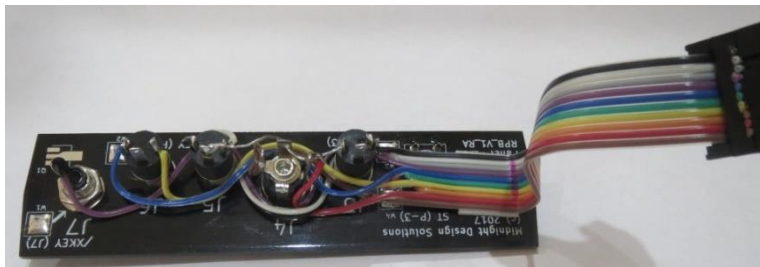


MUK REAR PANEL ASSEMBLY (Rev B)

ASSEMBLY INSTRUCTIONS

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The Midnight Ultimate Keyer (MUK) consists of two functional assemblies:

- **Rear Panel** containing the interface and power connectors and a volume control for the side tone.
- **Front Panel** containing the basic keyer electronics, the four-character 7-segment display, all manual controls, and the miniature speaker.

The rear panel assembly is used to supply power to the front panel during testing so it should be assembled before assembling the front panel. The front panel assembly instructions are covered elsewhere.

This document provides step-by-step instructions for assembling the MUK rear panel assembly. The rear panel assembly is built on a PCB that replaces the standard rear panel included with the MUK enclosure. The rear panel assembly process consists of mounting five connectors and a mini-pot and wiring a ribbon cable assembly to the connectors.

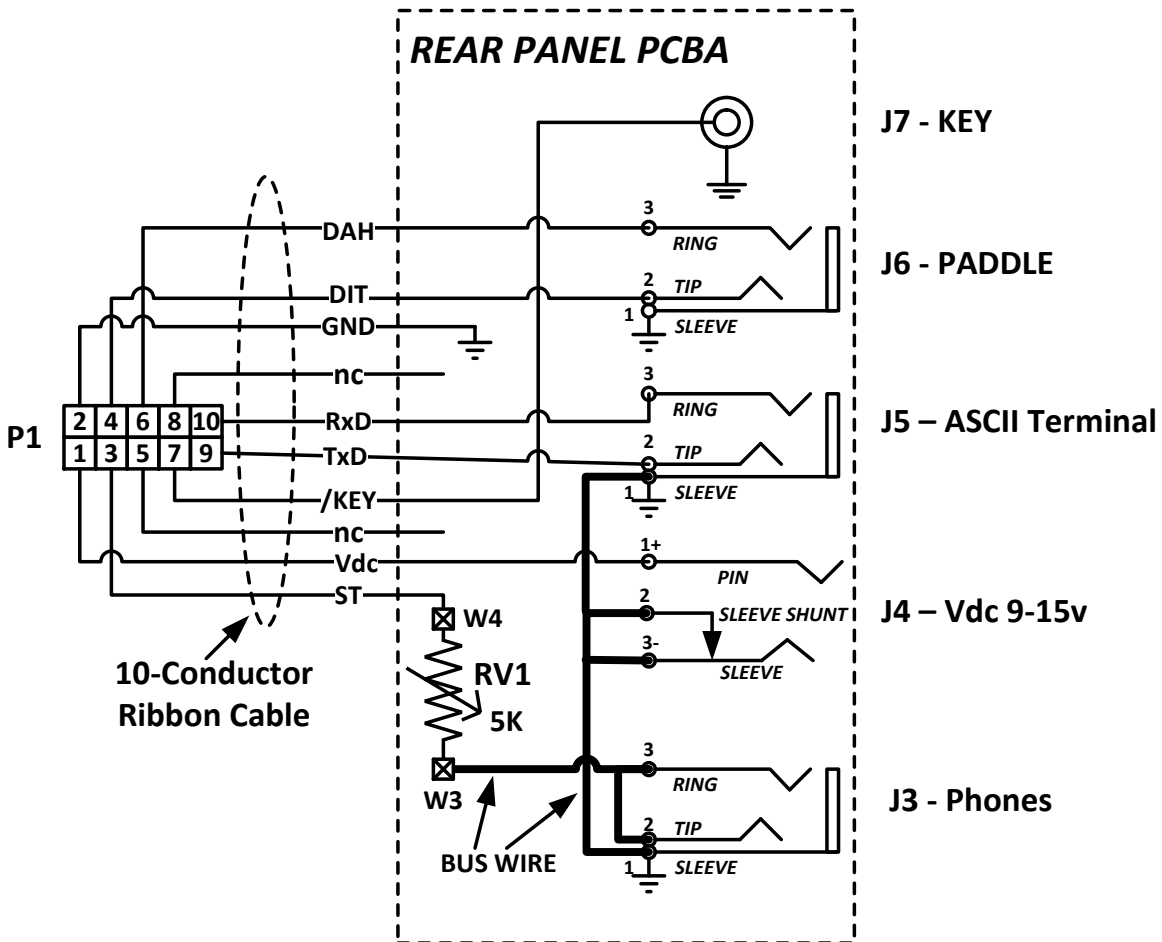
REVISION HISTORY

	2017-05-10	Initial Release
Rev. A	2017-06-11	Added Phones/Audio Out Connector and updated several pictures.
Rev. B	2017-12-05	Rewrite to cover PCB-based rear panel assembly.

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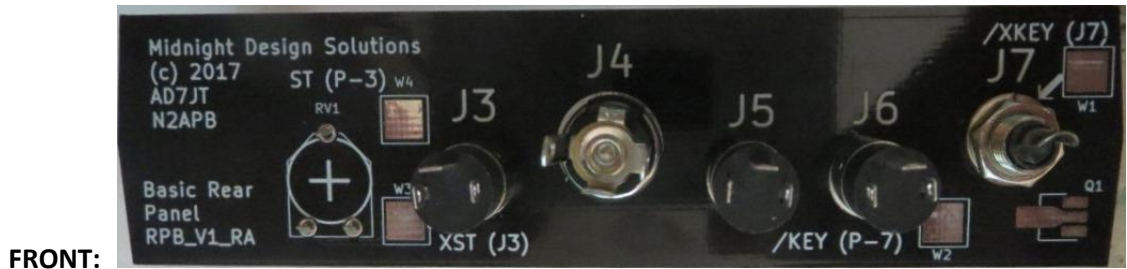
GENERAL DESCRIPTION

The rear panel consists of a PCBA with five connectors, one 5K potentiometer, and a 10-conductor ribbon cable assembly. The ribbon cable ends in a 2x5 female, IDC header that plugs into P1 of the MUK front panel assembly. The ribbon cable is wired directly to connectors mounted on the rear panel PCBA as shown in the pictures on page one of this document. The rear panel interconnect is show in the following schematic:



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The PCB is a double-sided board silk screened on both sides. The rear (outside) side has pictorial legends identifying the connector functions. The connectors are all panel-mount type identified by the front (inside) silk string. The board has ground planes on both sides that tie the connector grounds together. The front (inside) side of the board also includes the etch runs and pads (W3 and W4) to help connect to the side tone volume control (RV1).



ASSEMBLED
(missing the RV1 trimpot for Volume)

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1. INVENTORY KIT PARTS

Following is the Bill of Material for the rear panel assembly. The sources are provided should it be necessary to replace a component. The parts in the kit may be from other sources. In some cases, the connector pin number assignments may differ so when replacing a component, check the part specs carefully.

BOM MUK - BASIC REAR PANEL ASSEMBLY V2RA						
#	Ref.	Qty	Value	Supplier	Part Number	Footprint
		1	PCB, Double-sided, 4.18"x1.06"	MDS	MUK-RPV2RA	1.062"x 4.173"(W)
1	J4	1	2.1mm coaxial DC power jack	Mouser	502-PC722A	5/16" panel mount
2	J3, J5, J6	3	3.5mm stereo audio jack	Digi-Key	486-3419-ND	1/4" panel mount
3	J7	1	RCA Jack, Panel Mount	Mouser	490-RCJ-031	1/4" panel mount
4	RV1	1	Trimmer 5K, 1, Through-hole	Digi-Key	3319P-502-ND	11.5x9mm, PCB mt.
5	P1	1	IDC 2.54mm, header, Female	Mouser	710-61201023021	2x5
6		1	10-conductor ribbon cable	Mouser	517-3365/10FT	8"
7		1	Foam Mounting Tape	3M	108-SML	1/2" x 1/2"

This picture shows the components laid out for assembly:



Make sure all parts are in you kit before starting assembly.

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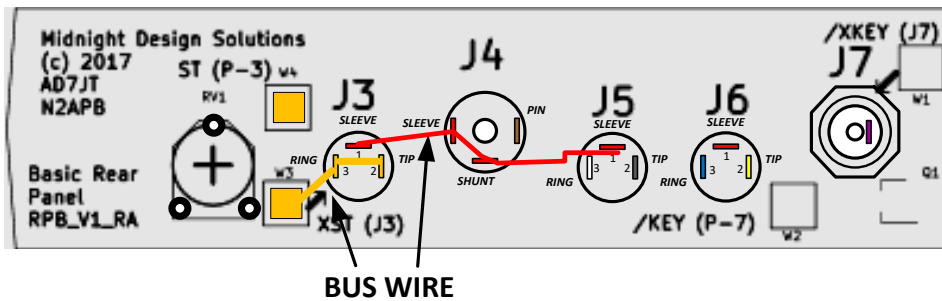
2. INSTALL THE CONNECTORS (BOM items 1, 2, and 3)

Install the connectors oriented as shown here and tighten the retaining nuts. Note, normally it should only be necessary to snug the nuts down, over tightening can damage some components.



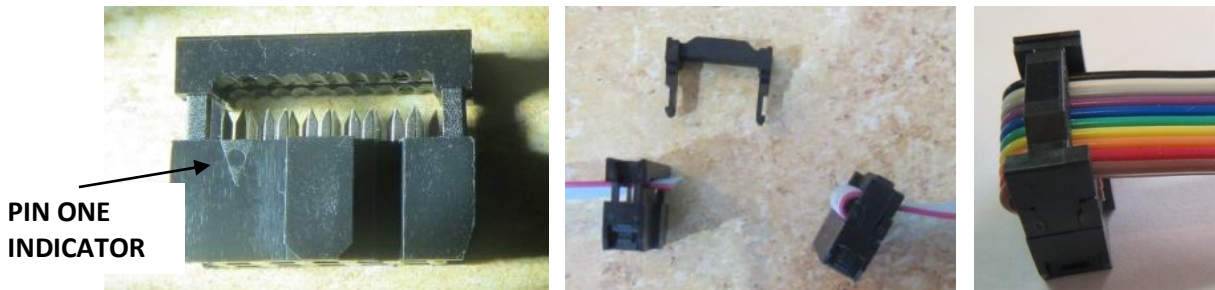
3. BUS WIRING

The DC power connector (J4) does not reliably connect to ground therefore a ground bus must be installed using non-insulated bus wire. A jumper is also needed to connect the volume control to the phone jack (J3). A solder pad (W3) is provided for the potentiometer connection. Install both jumpers at this time referencing the following figure.



4. INTERFACE CABLE ASSEMBLY (BOM items 5, 6, and 7)

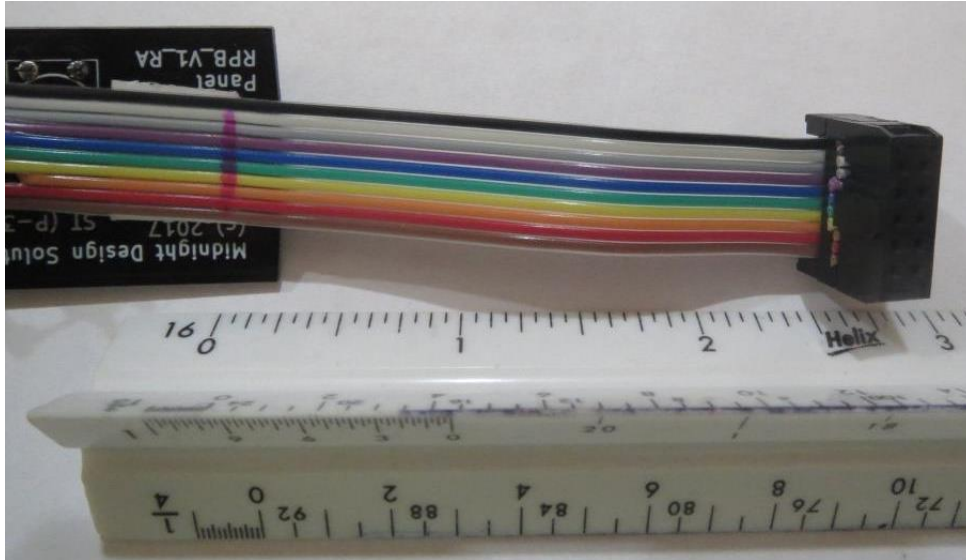
Locate pin one on the IDCs ribbon cable connector (pin 1 is normally marked with a triangle molded in the housing). Insert the ribbon cable in the housing with the number one conductor (brown) over pin 1 of the connector. Squeeze the connector in a vice to push the top piece down on the cable and force it into the IDC contact pins. Fold the cable over the top of the connector and press the strain-relief clip down over the cable until the two ends snap into the holes at ends of the connector housing.



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5. ATTACH INTERFACE CABLE TO REAR PANEL

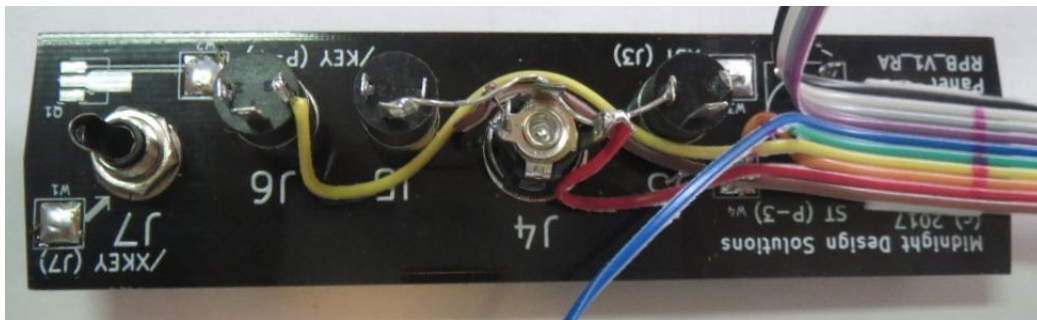
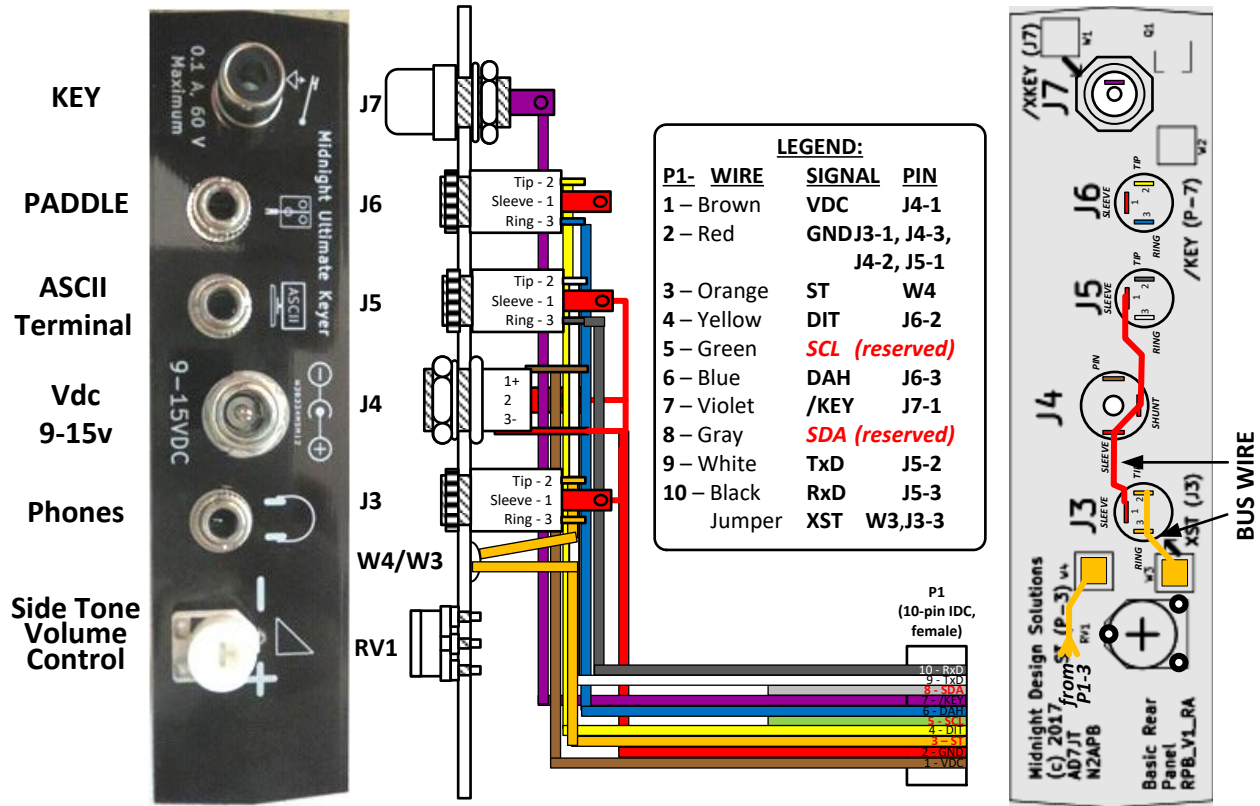
Mark the cable 2-1/2 inches from the connector. Remove the backing and attach the piece of foam mounting tape (BOM item 6) to the rear panel about 1/2 inch from the end of the panel, centered vertically. Peel the cover from the tape and attach the cable assembly so that the 2-1/2 inch mark lines up with the right edge of the mounting tape. Press the tape firmly and hold for about 30 seconds.



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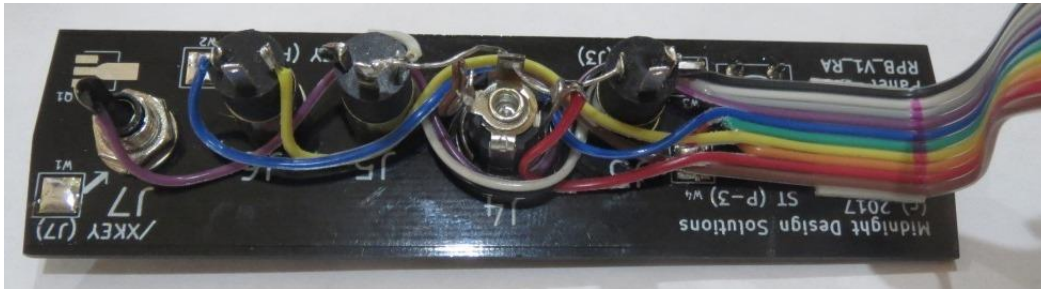
6. CONNECT CABLE TO REAR PANEL JACKS

- Use a diagonal or flush cutter to separate the ends of the conductors at the free end of ribbon cable to make them easier to separate (zip).
- Isolate conductor 3 (orange), trim, strip, tin, and solder to pad W3.
- Starting with conductor number one (brown), solder each lead according to the following diagram and wire list. Zip each conductor back as far as necessary, cut the conductor to length, strip the end, and solder it to the tab on the connector. Solder conductor number two (red) to the ground bus. Cut the two unused conductors (5-green and 8-gray) about even with W4. When finished, set the rear panel assembly aside until needed to test the front panel assembly.



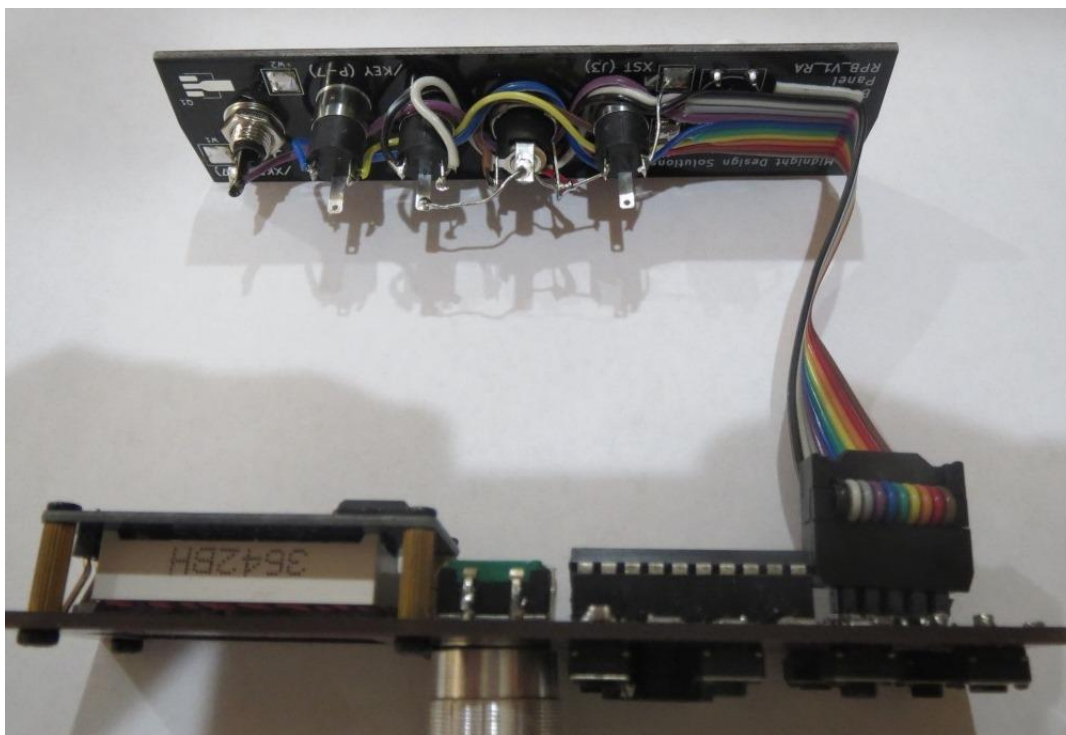
7. FINAL ASSEMBLY

The final rear panel assembly should look something like this:



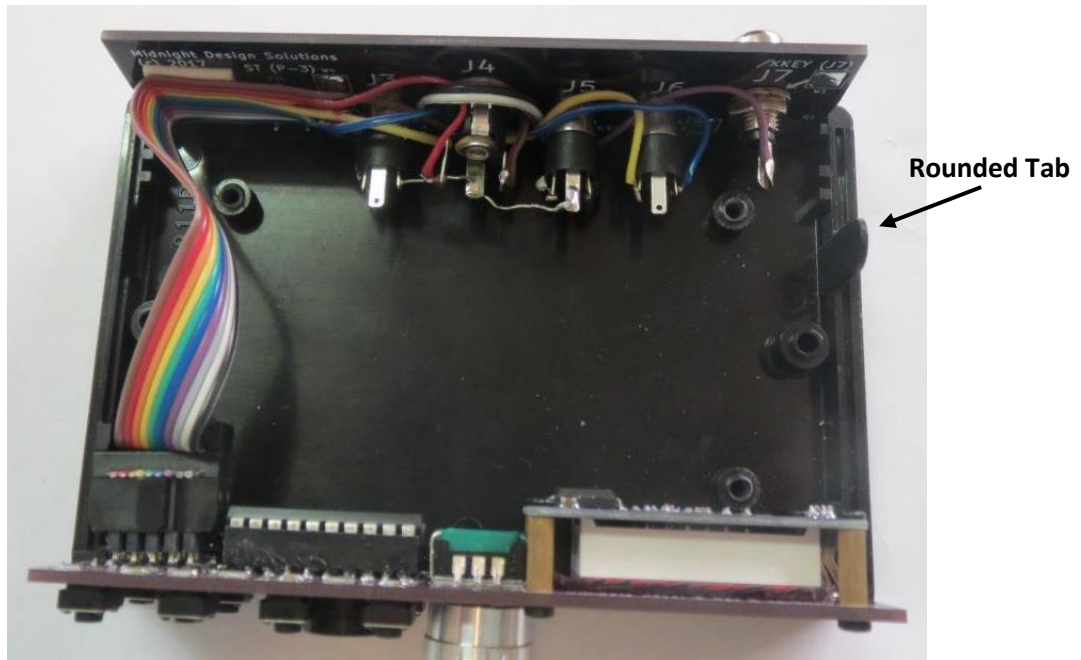
Proceed as follows to complete the MUK assembly:

- a. Remove the front panel from the enclosure and attach the rear panel ribbon cable to the P1 connector on the front panel. Pin one (brown) of the connector is located nearest the edge of the front panel PCB (away from the MCU).

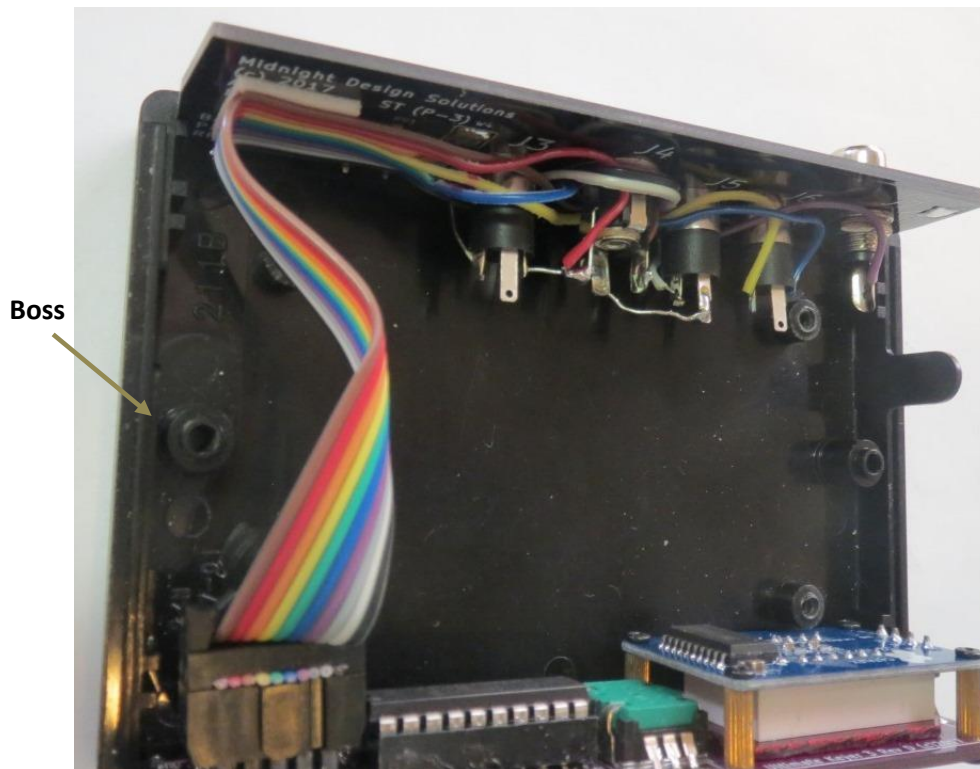


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- b. Insert the front and rear panels in the slots in the enclosure base with the rounded tab positioned at the display end.



- c. Position the ribbon cable so it avoids the large boss to avoid interference with the boss on the cover.

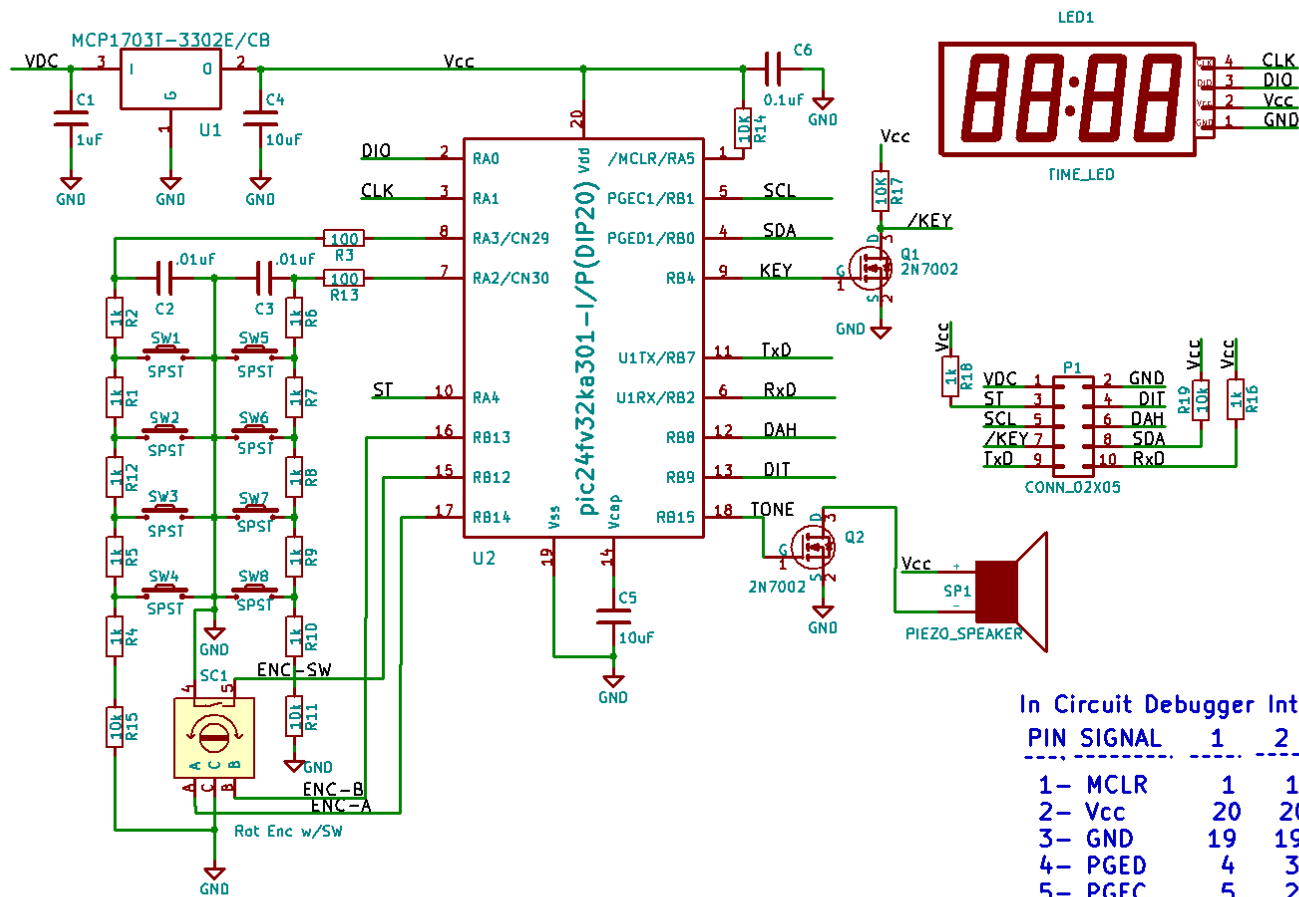


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- d. Position the enclosure with the rounded tab cutout at the same end as the rounded tab in the enclosure base. carefully align the front and rear panels with the groove in the enclosure top and carefully slide the top down to mate with the enclosure base. Use the two self-threading screws to connect the enclosure halves together.



MUK SCHEMATIC (V3Rd)



In Circuit Debugger Interfaces

PIN	SIGNAL	1	2	3
1-	MCLR	1	1	1
2-	Vcc	20	20	20
3-	GND	19	19	19
4-	PGED	4	3	9
5-	PGEC	5	2	10
6-	N.C.	-	-	-