Some preliminary pictures of construction which will be properly annotated in future (as part of my MB-6582 photoset on Flickr):

http://www.flickr.com/photos/wilba/2101969719/in/set-72157594358133094/

I still have not fully completed the control surface construction guide.

I advise people NOT TO SOLDER ANYTHING to the control surface PCB until you read the finished control surface construction guide.

The reason for this is that you should use an UNSOLDERED control surface PCB as a guide for:

- marking on the frontpanel where to put blobs of JB-Weld (for gluing threaded spacers to the frontpanel). You put panel and PCB together and use a pencil through the holes where the screws go.

- holding the screws and threaded spacers in exact alignment with the PCB when gluing them to the frontpanel.

Then after you have a frontpanel with screws and threaded spacers attached with JB-Weld, it is best to solder the tactile switches FIRST and then use these (along with the PCB and panel attached) to aligning the LEDs in the panel holes so they stick out from the panel the same amount as the shafts of the tactile switches. (This is how I constructed mine).

If I have not explained myself enough, then please wait for a more detailed explanation in the construction guide.

Avoid JB-Kwik PLEASE! Get the original JB-Weld! Do not get cheap imitations!

Even the normal JB-Weld gets really tacky and gooey within a few minutes.

It takes a while to put a blob of JB-Weld on 23 spots on the panel, making sure the blob is neither too big or too small, and even with the non-Kwik stuff, towards the end the JB-Weld was a bit too gooey, like peanut butter instead of like honey.

Don't be impatient, you've just spent lots of money on these nice panels, you don't want to feel rushed in this construction stage when you're trying to be ultra careful not to make a big mess and connect the PCB and panels together slowly. I cannot imagine having a 4-minute countdown on my head trying to do 23 blobs on the panel AND THEN put the panel and PCB together. An extra 20+20 hours of just waiting (yes you need to do two separate gluing stages) might be torture but it is worth it in the end. Trust me, follow what I know works and there will be less that could go wrong.

WARNING!! JB-Weld does not stick well to the panels from the first bulk order! This may be solved by sanding (roughening) the places where the JB-Weld should go. Please wait until someone has tried this method before gluing to the panel. Watch this space!

THE GUIDE

mark on panel where the threaded spacers will attach (put PCB and panel together).

It may be required to prepare the places where JB-Weld should go, by sanding (roughening) the surface (I have not needed to do this with any panels I've done already).

attach all the threaded spacers to the PCB with screws

temporarily insert the “Filter Cutoff” and “Env. Depth” encoders… the threaded spacers that go next to these are very close, so check for clearance.

insert some switches to PCB

put the countersunk screws into corners of PCB (with nut between screw head and PCB)

put PCB and panel together

hold together with four clamps

make sure thinks are aligned perfectly (check switches on panel)

JB-Weld the screws in the corners to the panel (use nut to hold it in place)

Check alignment of screws in the PCB holes

Leave to cure 24 hours

Take apart

Now is a good time to fix up the overlap between the SID “R” LED hole and the PT-10 case mount. Trim the case mount with a knife so the hole is not overlapped at all. Test inserting a LED into the hole.

put small blobs of JB-Weld on panel where the threaded spacers should go

put together panel and PCB (with the spacers still attached) using screws to hold it together. Use clamps also if PCB isn't flat enough.

Leave to cure 24 hours

Take apart

Insert diodes. **CHECK ORIENTATION! BLACK MARK GOES TO POINT OF DIODE SYMBOL ON PCB!**

Solder diodes. **The diode to the left of the switch labelled “SHIFT” on the panel is too close and can prevent proper positioning of the switch. Temporarily insert the switch to make sure it will fit after soldering this diode**

ALSO the diodes that overlap the LCD must be soldered on the TOP LAYER ONLY and then the leads on the bottom layer cut as close to the PCB as possible.*

Insert switches.

Solder switches. **Some switches overlap the LCD PCB! You must solder these on the top first then trim leads as close as possible.**

Insert LEDs. **CHECK THEY ARE IN CORRECTLY ALIGNED**

The flat side of the LED should match the flat side of the symbol on the PCB. The flat side has the cathode. Also the shorter lead is the cathode. http://en.wikipedia.org/wiki/LED#Considerations_in_use

Put the PCB in the PT-10 case top where the panel would normally go, so the LEDs can be put in without bending the leads.

Put the panel on top of the PCB, guiding it onto the PCB **gently** with the screws as a guide. Then **gently** lift up the PCB until the switch shafts go into the holes. It is best to do this bit before flipping the panel/PCB panel side down. Once they are together, you can use the nuts on the screws to hold it together.

Turn the PCB/panel panel face down on VERY FLAT SURFACE. I use the front panel that comes with the PT-10 case, this is very flat, and you can rotate it to see the gap around the edge, i.e. how high the switch shafts are holding the frontpanel above the surface.

Put screws in all the threaded spacers and screw it together tight!!! If you want to be professional about it, put all the screws in the spacers first, without screwing them in fully, then tighten them starting with the middle ones and moving out to the edges.

Put the LEDs in the panel holes. Most of these would have fallen into the panel holes already, you should check them all... you can lift the LED by the leads and let it drop into the hole and hear the tapping sound when it hits the surface. The aim here is to make the LEDs poke out the same distance above the panel as the switch shafts. This is only possible if the switch shafts are all the same height (which will happen if you've screwed the PCB and panel together with screws in **all** the threaded spacers).

If the LED leads are really long, you can trim all the LED leads to 5mm above PCB, to make soldering easier. However, this might affect your ability to adjust LED positions later if some LEDs were not correctly aligned in the panel holes.

Solder **ONE** lead of each LED... I solder the shorter lead first, so that the longer lead can be used to move the LED if you need to adjust the LED position later. This joint doesn't have to be perfect, just enough to hold it in place, you can do a proper joint later.

Turn it panel side up, check all the LEDs are at the right height. If any are not correct, you can heat up the joint and position the LED with pliers holding the lead, or a finger adjusting the unsoldered lead.

Turn it PCB side up, trim the leads to 1mm above PCB, and solder the second lead of each LED, and also do a proper solder joint on the first lead (if it wasn't done properly the first time).

***the hard bit is over...** *

REMINDER: HAVE YOU REMOVED THE DETENTS from the ones that aren't the “menu encoder”? Removing detents is really just squashing the little bump inside the encoder. The process is explained here.

If you are crazy and want to do illuminated knobs, NOW is the time to solder LEDs to the rotary encoders.

Mount the rotary encoders, check the right ones are non-detented.

Solder the rotary encoders... just the pins, not the tabs on the sides, do that after testing encoders.

If you are crazy and want to do illuminated knobs, NOW is the time to solder wires between the LEDs on each rotary encoder.

Test LEDs now if you wish... make sure you use a 1k resistor in series with 5v supply! You can use the J2 port which already has a resistor to ground.

FIT TEST PCB/PANEL AND PT-10 CASE

At this point, you'll need to trim a little bit off the top-left mount because it overlaps with the “SID R” LED. Place the panel on the PT-10 case, turn it over and see where it overlaps. Trim the mount until the hole is not overlapped.

Mount the panel to the PT-10 case, using nuts to hold it on, then attach the PCB. Depending on the amount of JB-Weld used on the corner screws, you might need to trim the PT-10 mount holes, making them like countersunk screw holes (tapered out). This will make the panel sit flush with the PT-10 case top.

SOLDERING RIBBON CABLE BETWEEN BASE AND CS PCBS

This is a slightly difficult process, so I'll give as much advice as possible.

I use 100mil spacing ribbon cable. (Part Number: **606162-F0** @ Conrad)

This cable is stiffer than common 50mil spacing ribbon cable (i.e. the stuff you use with IDC connectors), and constructed differently. One side is “flat” and the other side is “ribbed” (you can see each separate wire covering).

The ideal length to use when connecting the PCBs and using a PT-10 case is around 42mm-43mm between the holes/pads on each PCB. This means you should first cut lengths of 50mm and then strip 5mm of insulation of either end, and then bend the ends of the wires 90 degrees about 2mm from the insulation, towards the ribbed side.

The best way to strip the insulation from the wires is to **lightly** score with a knife on the flat side, i.e. cut half-way through the insulation, **not** cutting to the wire, then do small cuts between each wire (from the score line to the end), then pull off each little bit of insulation with pliers, being careful not to grip the wire too much and pull the wire out. What you do not want to do is cut, scratch, dent, damage the wire in any way, because if you do, the wire will break when bending. Then use the holes of the PCB to bend the ends of the wire - insert cable so 2mm of wire (about the thickness of the PCB) is visible between the top of the PCB and the start of the insulation, then bend 90 degrees. I bend it so the ribbed side of the cable will be on the inside.

The cables should be connected so the cable sits flat against the **top** side of the CS PCB and the **bottom** side of the base PCB, so the solder joints are on the **inside** of the bent cable. This makes for a very strong connection with little stress on the solder joints or the exposed wire.

The easiest way to solder the cables:

Place CS PCB face up, turned 90 degrees anticlockwise, so the pads to solder on the right side.

Attach rear panel to base PCB via the stereo socket nuts.

Place base PCB face down, with the pads to solder on the left side.

For each cable, insert it from the top into the pads on both sides, checking it is perpendicular to both PCBs and maintaining both PCBs are parallel. **Make sure you do not put cable in the extra**

“GND” pads Put all eight 8-wire cables in, plus the single 2-wire cable.

Make a very small solder joint on the first and last wire of each cable. Ideally you should not make a raised solder joint on this side, only get solder to be sucked into the hole, to hold the cables in place so you can do proper solder joints on the other side.

Once all the cables are held to the PCBs with small joints, **attach the panel to the CS PCB to protect the LEDs*** and then turn the PCBs over. At this point, you'll need to raise the base PCB so it is level with the CS PCB and panel (the rotary encoder knobs will raise this off the work surface). Do proper solder joints of all the pads.

Continuity check the ribbon cable. Make sure there are NO SHORTS between any two adjacent pins of the ribbon cable joints. Make sure GND and 5V are not connected (the single 2-wire cable).

***Note** Bugfight created a detachable solution by using Right Angled SIL Headers on the base PCB in this thread.

Click here for Wilba's advice before considering this alternative strategy.

woohoo! nearly finished!

You should have already tested the base PCB before now, so after inserting the master PIC and the 74HC595 and 74HC165 and connecting the LCD, you can turn it on and see if the switches and rotary encoders work. If the rotary encoders work, you can now solder their tabs now.

Note Please see Wilbas post here, for advice on how to connect the LCD to the control surface.

Here is a guide to soldering the wires to the LCD. I suggest “rounding” the cable afterwards, it's easier to identify which wire goes to which pin when it's still a flat ribbon. Also, don't solder the wires INTO the holes, strip, tin and solder tinned ends flat against the pads.

http://www.midibox.org/users/jim_henry/building_a_midibox_lcd_cable.pdf

I've suggested **not** soldering R40-R55 until now. Now you can take a 220 Ohm resistor and insert it into one set of pads of R40-R55 and see how bright the LEDs are. For SmashTV LEDs, 1K will probably be best. If you are using some ultrabright or superbright LEDs, blue or white LEDs, etc. you may want to try 2K, 3K or higher resistors. **Keep in mind, what looks like a good brightness as a single LED might become too bright and too much glare when there are many lit at once. It is best to choose a resistor that makes the LEDs a little less bright than the brightest you can handle.**

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