



ASSEMBLY MANUAL

KM3KM LDMOS mercuryIII's Amplifier Kit

mercuryIII's
LDMOS POWER AMPLIFIER KIT

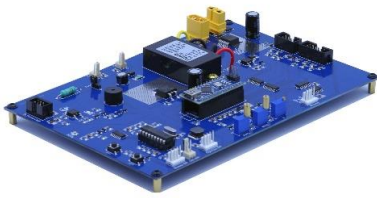
Designed and Manufactured in the USA
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KM3KM PARTS



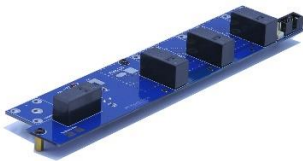
CONTROLLER



LOW PASS FILTER



POWER UNIT



ANTENNA SWITCH



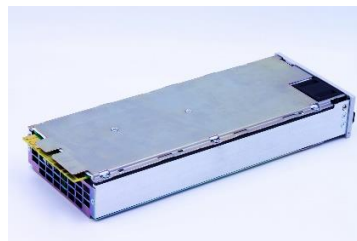
CASE



HARDWARE



DISPLAY



POWER SUPPLY

Recommendations

Before you begin your project, if you have any questions or concerns, **PLEASE** contact me at km3kmcontact@gmail.com. I appreciate your ideas and suggestions. (Some parts in your kit may be slightly different than pictured, ie: Cables etc.)

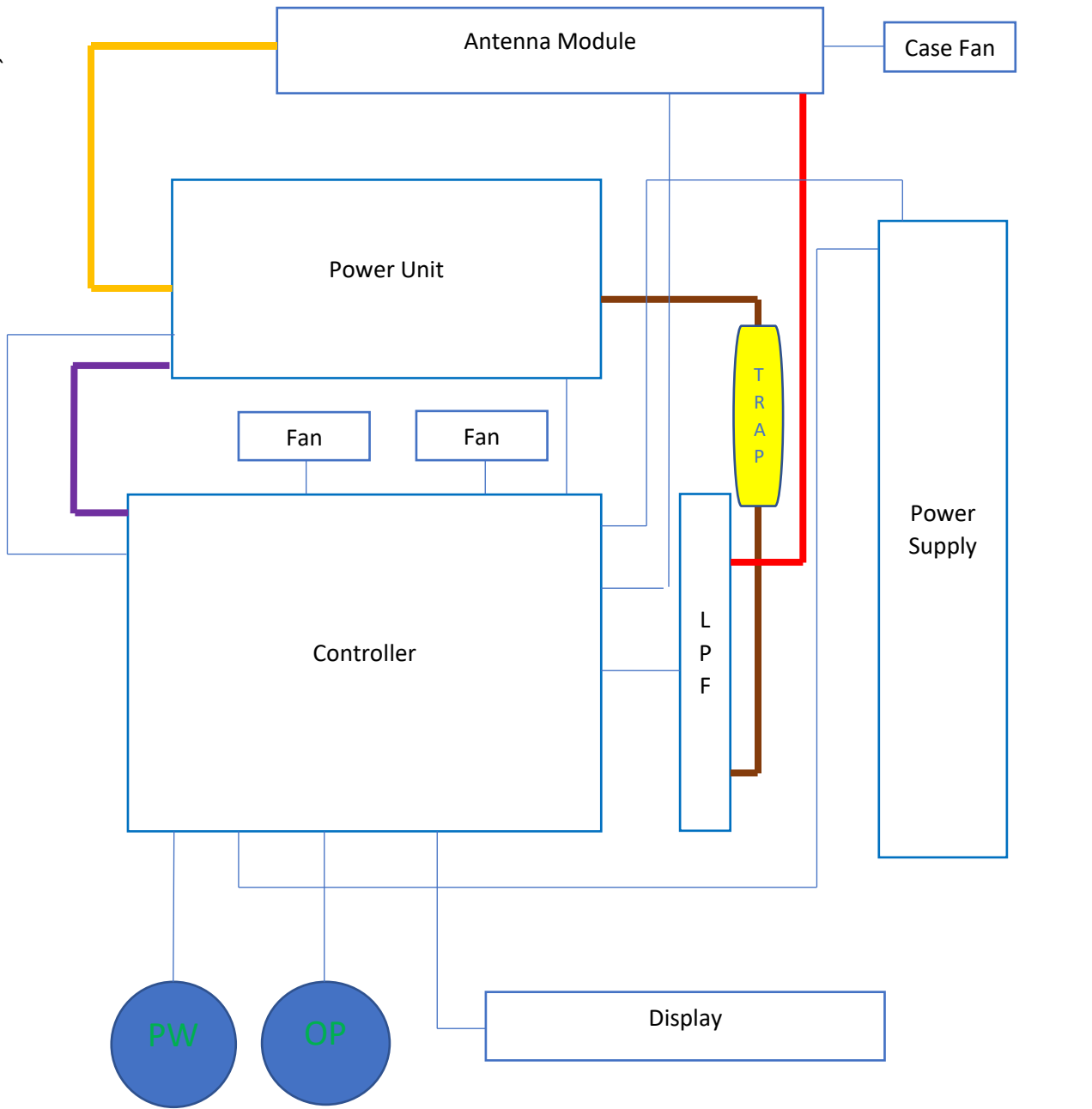
- Read this guide before you start.
- Watch videos and pictures on the included Thumb Drive.
- Wear an anti-static wrist strap.
- Use a grounded soldering iron.
- Handle the boards by the edges.
- Do not move turns on the coils.
- Read the User Manual.

Special tools needed:

- Hex Key Allen.
- Soldering Iron with wide tip or welding gun (120 watts or greater).
- Anti-static wrist strap.



Block diagram:



- | | | | |
|-------------------------|---|---------------------------|---|
| RG-316 6.5 Inch (RF In) |  | RG-142 15.5 Inch (RF Out) |  |
| IPX U. FL (RF Sample) |  | RG-142 (PA Out) |  |
| DC Cable/IDC Connectors |  | Coax Trap |  |

ASSEMBLY DIRECTIONS

Step 1: Antenna Switch Board Installation – Preparation:

When you receive your Kit the Power Unit Heatsink and Fan Bracket are attached to the chassis for safe shipping. **DO NOT DETACH COPPER PLATE;** (Thermal compound already applied)

A- Removing the Power Unit and Heat sink will provide room for the installation of the antenna section of the AMP on the rear of the chassis - including installing the S0-239's (4) and the RCA Plugs (2).

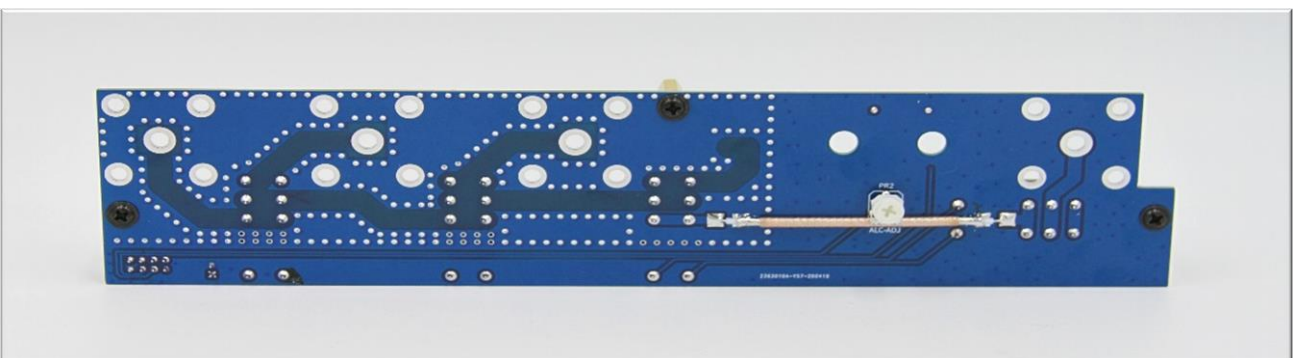
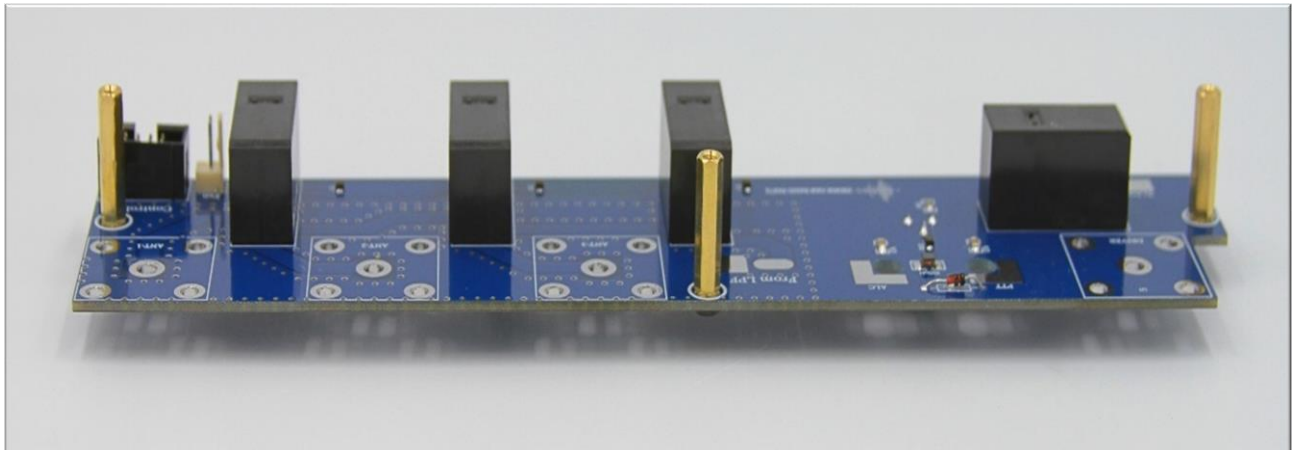
B- Remove screws from bottom of chassis and retain. Remove thumbscrew from Fan Bracket.

Step 2: Antenna Module Board Standoff placement:

Hardware needed:

- M3 x 20 mm Standoff (3)
- M3 Screw (3)

A- Attach each of the three standoffs to the Antenna Module Board in the configuration pictured here



Step 3: SO-239 and RCA placement:

Hardware needed:

- SO-239 Connector (4)
- 4-40 x 1/2 Screw (8)
- 4-40 Nut (24)
- RCA Female Plug (2)

A- Install Antenna SO-239's through the inside of the chassis (as pictured)

Note: Use **TWO** nuts for each 4-40 screw.

B- If the holes do not align: Loosen, align and retighten.

C- Install RCA Female Plugs.

Note: Do not overtighten as the RCA jacks will break.



Step 4: Install the case fan:

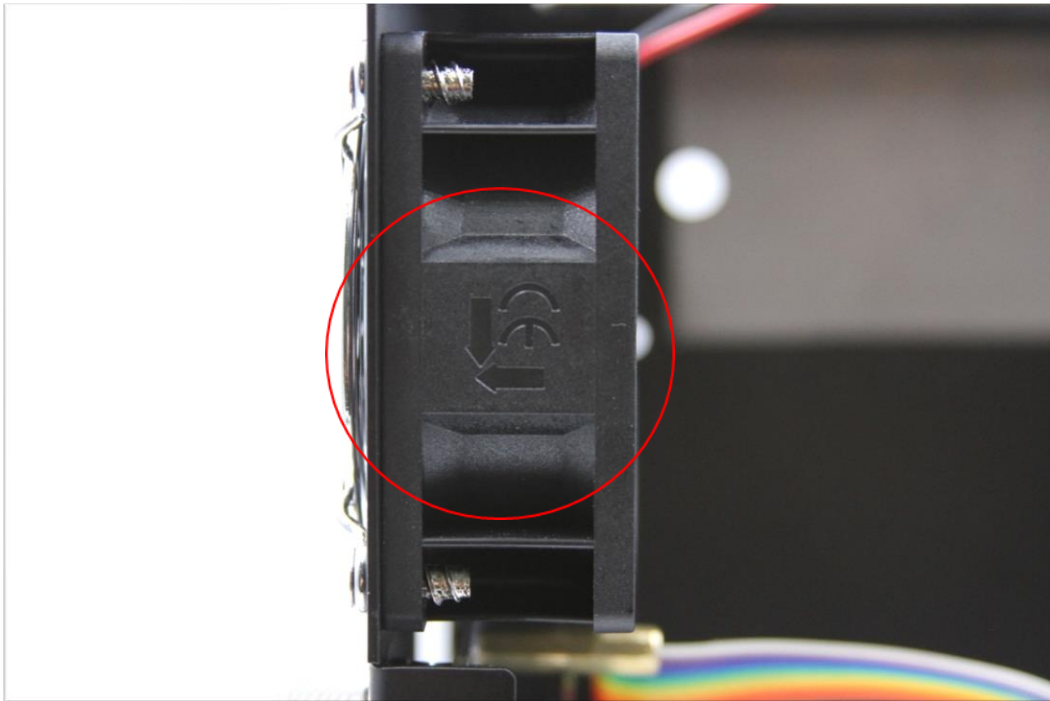
Hardware needed:

- Case fan (1)
- Fan Screw (4)
- Protector Grid (1)

A- Remove the silver Protector Grid by removing the 4 screws.

B- Mount the fan on the inside of the chassis with the Protector Grid on the outside and insert screws.

C- Position fan airflow arrows pointing to the rear.



Step 5: Soldering of the input/output coaxes:

Hardware needed:

- Rg316 6.5 inch (1)
- Rg142 15.5 inch (1)

A- Solder each of the coax cables into place as shown.

Note: All photos show you the correct direction of the coax placement.

B- After soldering the coax, check with a multimeter for isolation between center pin and ground.

Note: Before soldering we recommend you watch the video “Coax Welds” on the Thumb Drive.



Step 6: Install the Antenna Module Board to the chassis:

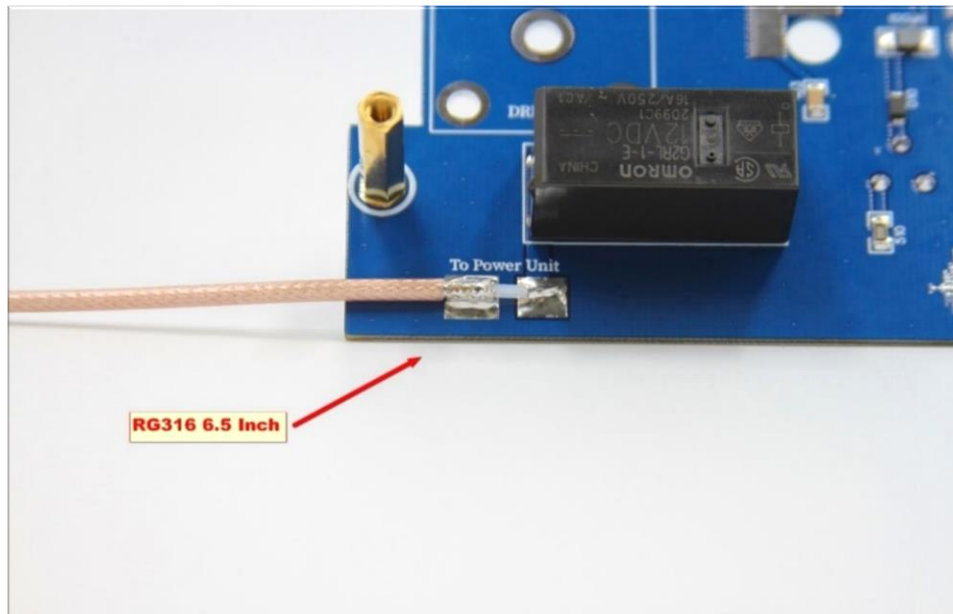
A- Mount the Antenna board to the chassis using the remaining 4-40 Nuts (8)

Note: We always send an extra 4-40 screw and nut.

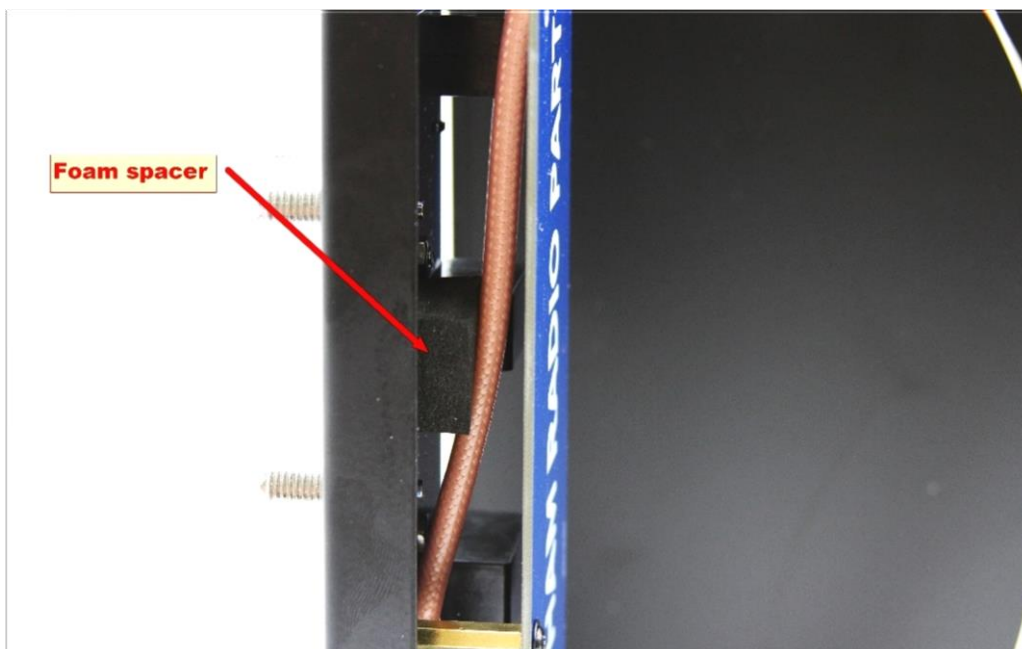
B- Solder the center contacts of the SO239's and the RCA jacks to the board.

Note: You will have to carefully bend over the RCA jack center contacts to facilitate this solderjoint.

C- After soldering the SO-239 connectors in place, check with a multimeter for isolation between center pin and ground



D- Separate the coaxial from the SO-239's by placing it atop the foam spacer which is on the antenna board.



Step 7: Install the Antenna Module board Shield:

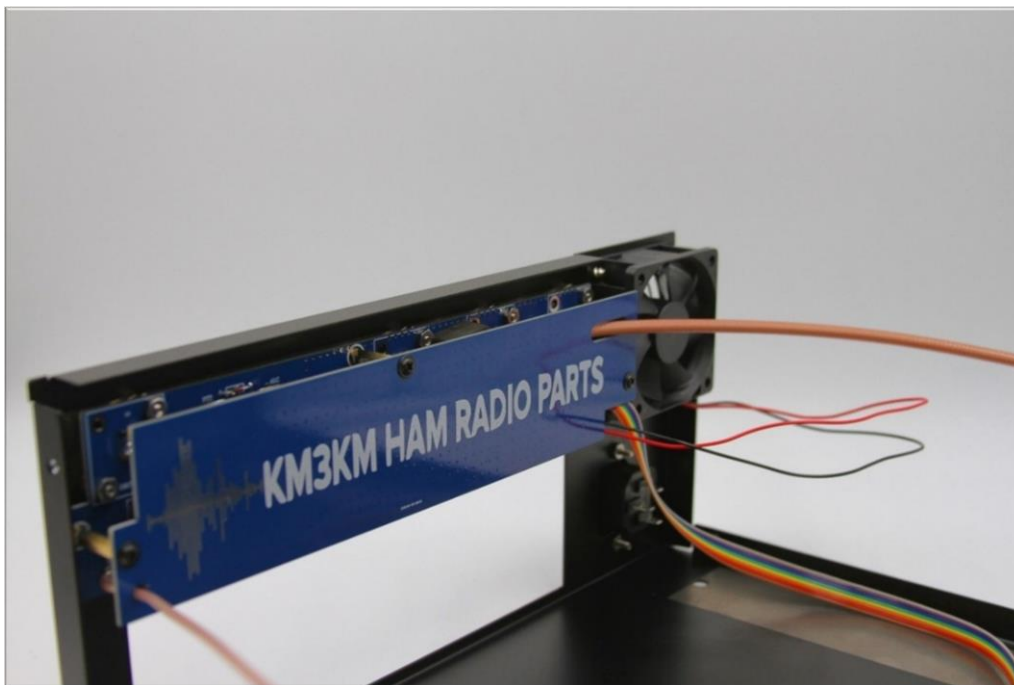
Hardware needed:

- Antenna Module Board Shield (1)
- M3 Screw (3)

A- Run the LPF Coax, Power Unit Coax, IDC ribbon cable and Case Fan cable through the shield as shown below.

B- Plug the Case Fan and IDC antenna ribbon connector into the antenna Module Board.

C- Mount the shield to the 3 standoffs with the provided screws that came with them.



Step 8: Heatsink Fans Placement:

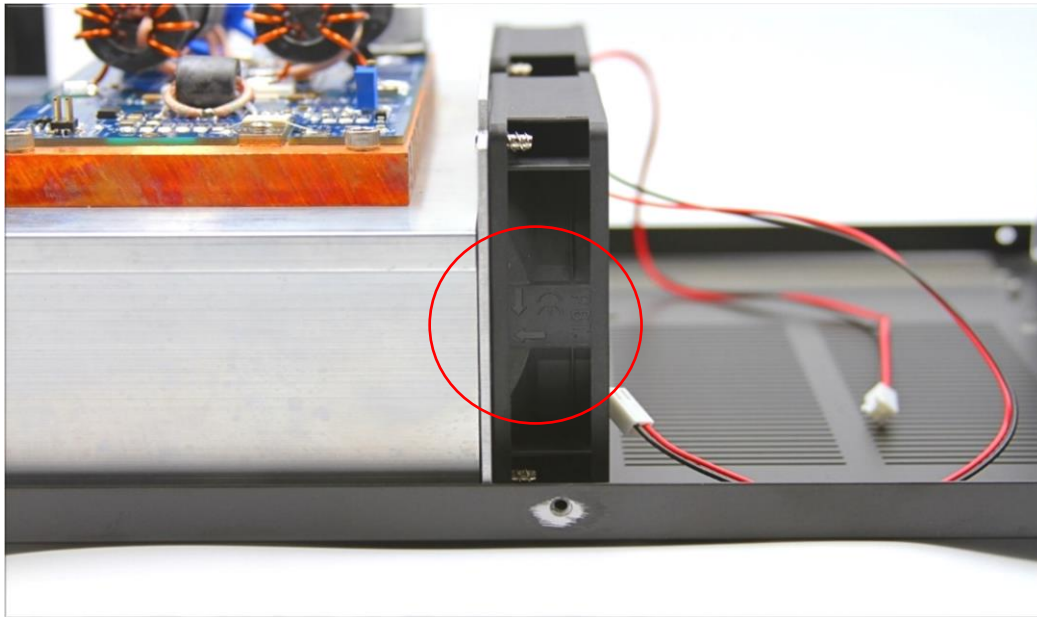
Hardware needed:

- Heatsink Fans (2)
- Fan bracket (1)
- Fan screws (8)

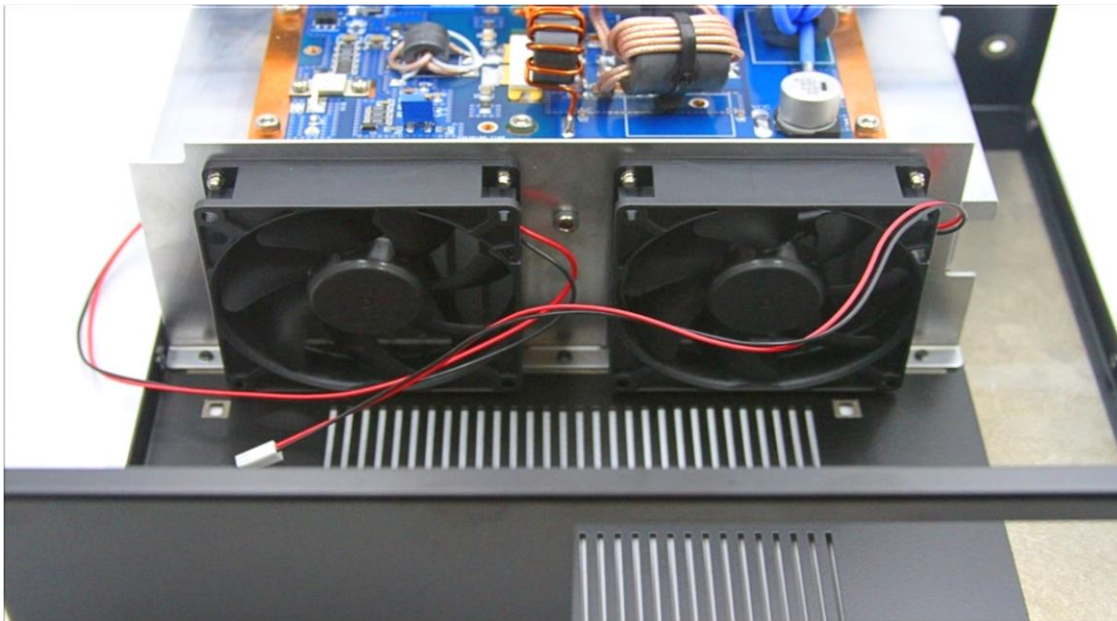
A- If you haven't already detached the Fan Bracket from the Power Unit Heatsink, do it now.
B- Install both fans to the fan bracket using the provided screws.



C- Be sure airflow is towards the rear of the chassis. As with the case fan, the direction of flow is depicted by the arrow on the side of the fan.



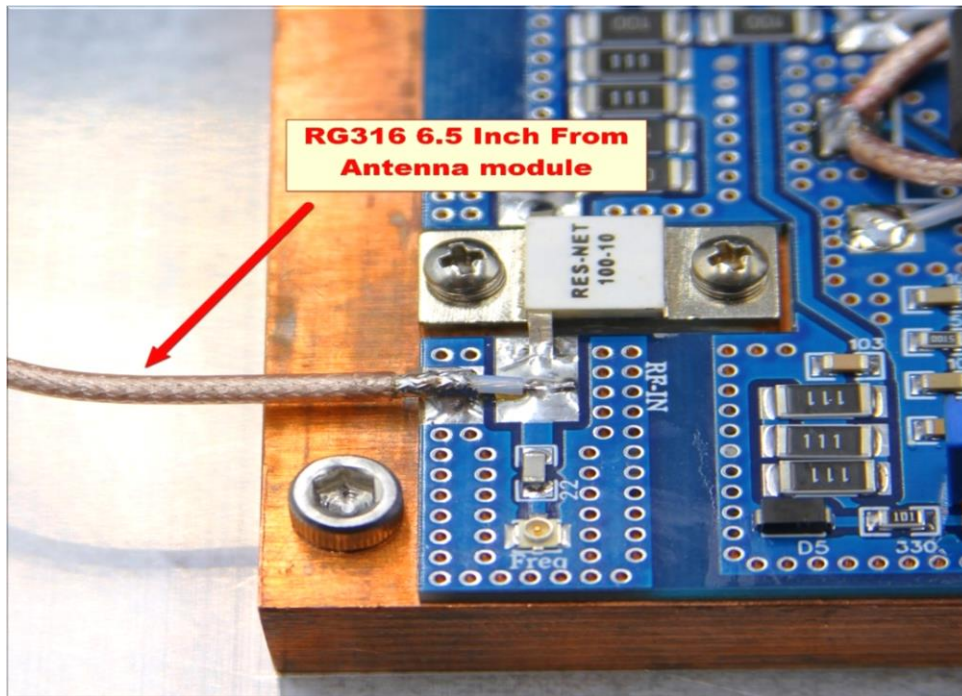
D- Carefully reinsert the Power Unit/Heatsink into the chassis below the Antenna Module Board.
E- Insert the Fan Bracket and secure with the Thumb screw into the Heatsink.
F- Secure the Power Unit Heatsink and the Fan Bracket with the 5 screws that were previously removed in Step 1-A.
Note: The Power Unit is attached on top of the heatsink when shipped. **DO NOT DETACH IT** (The thermal compound has already been applied).



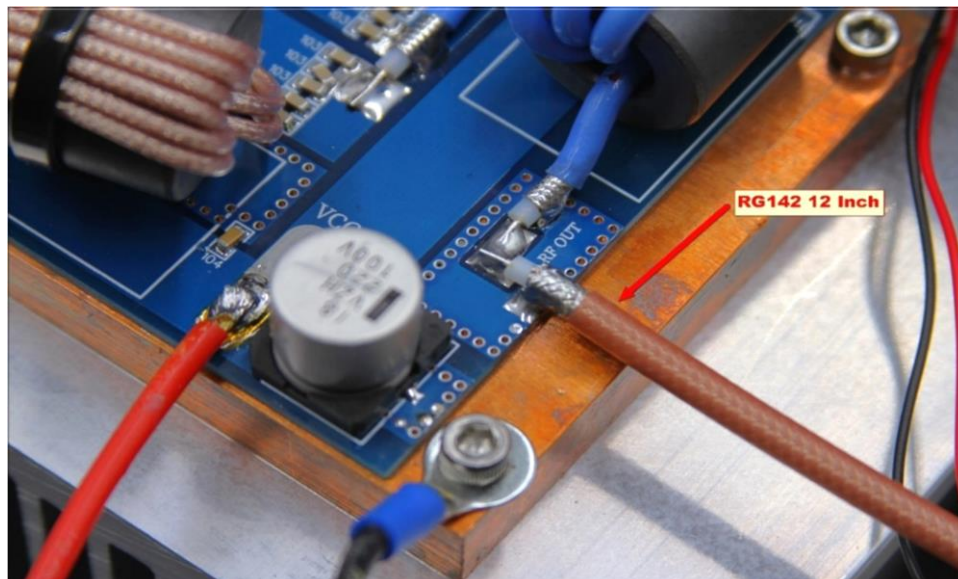
Step 9: Power Unit Coaxial input/output soldering:

A- Solder the RG316 6.5-inch coaxial cable from the Antenna Module Board to the Power Unit as shown.

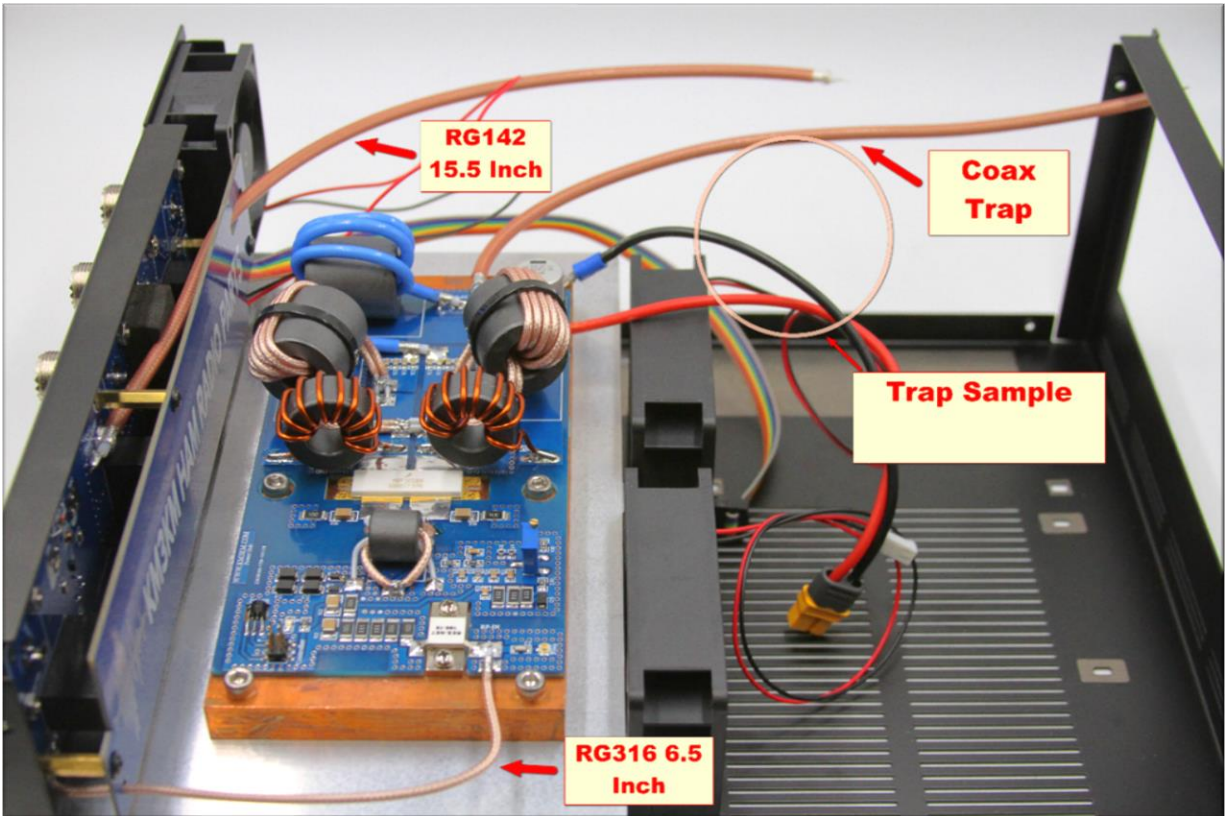
Note: The resistance between the input pad to GND is 48-50 Ohms (Use the ohms scale on the meter)



B- Solder the RG142 Coax Loop cable to the Power Unit as shown.



D- When the RG316 and RG142 have been soldered in place, carefully check that there are no solder bridges between the center conductor and the shield.
Note: If you test with a meter, you will see continuity. This is normal, you must **VISUALLY** inspect that there are no solder bridges.



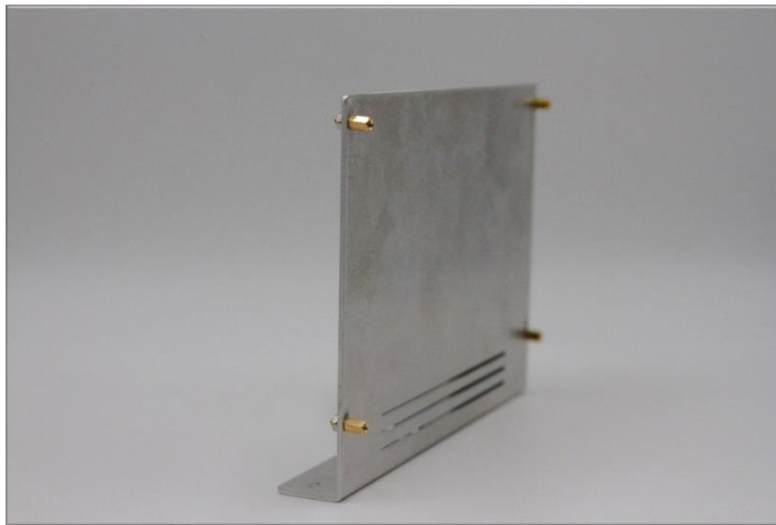
Note: In the photos above, we drew in the trap loop. The next photos show the trap loop held by shrink tube.

Step 10: Install the Display:

Hardware needed:

- Display Bracket (1)
- M3 x 7mm Standoff (4)
- M3 Nut (4)
- 6-32 x 3/8 Screw (2)
- 6-32 Lock Nut (2)
- Display Connector (1)

A- Install Standoffs to the Display Bracket as pictured.



B- Carefully attach the Display to the Display Bracket as shown.
Note: Remember to remove the protective plastic from the Display.

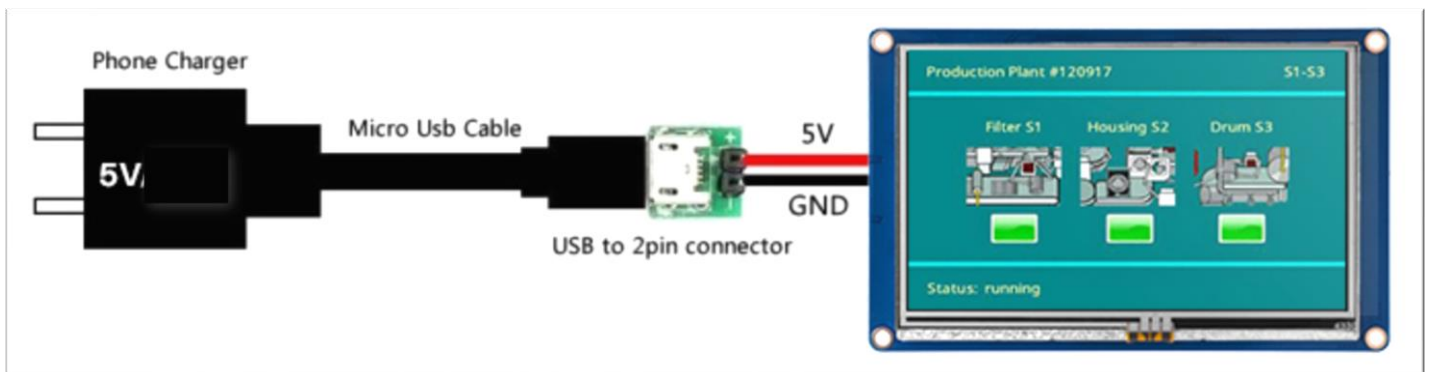


C- Loosely install the Display Bracket assembly to the chassis using the (2) 6-32 screws and nuts.
Note: The alignment of the Display on the chassis is very important as if it is not correct, the touch functions of the Display may not work. The next steps will enable correct alignment.

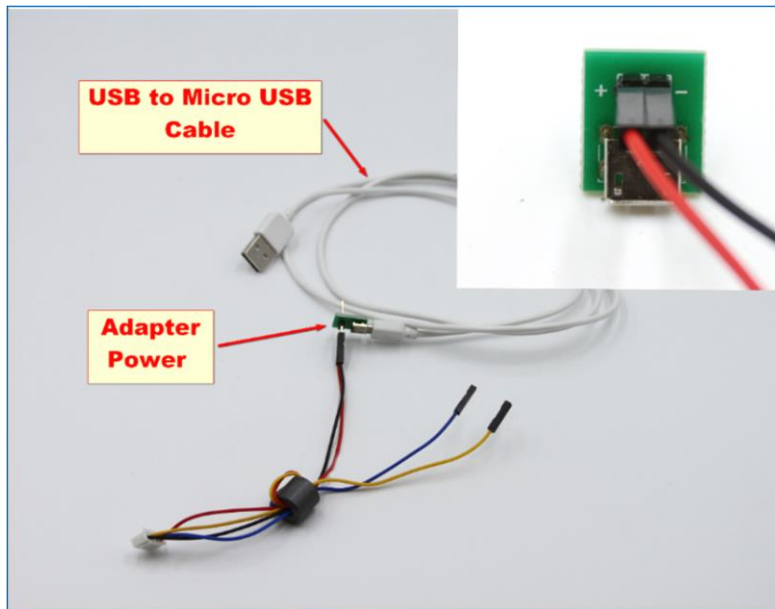


Step 11: Align the display:

A- Connect the Display Cable to the Display.
B- A power adapter was included in the display box. Attach this adapter to the Display Cable. This cable has four wires (Red, Black, Yellow and Blue) Use only the Red and Black wires.



Warning: Be sure to connect the **Red wire** to the + terminal and the Black to the – terminal on the adapter. **If the cables are reversed, the display will be damaged and must be replaced.**



Note: Please don't let this warning discourage you from this step as it will ensure success in the alignment of the display.

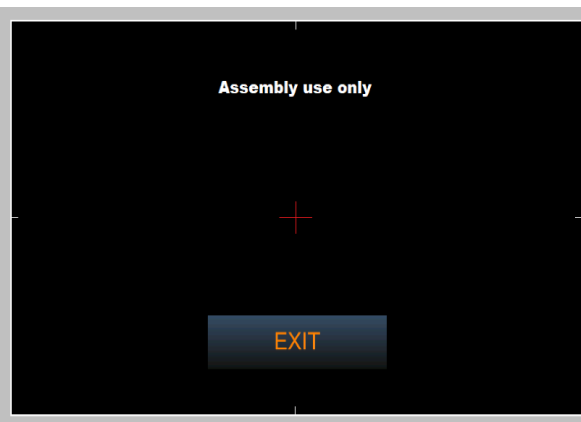
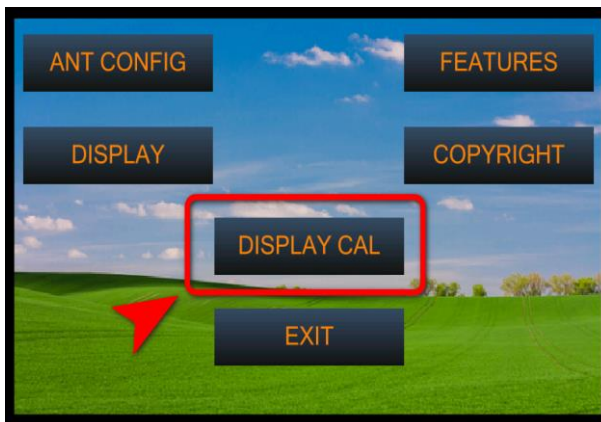
C- Connect a cell phone USB to Micro USB cable to the power adapter and plug the cell phone cable into a cell phone charger to provide the 5v needed to light the display.

D- Once the Display on, press the following buttons SETUP then DISPLAY CAL (see pictures below)

E- Once the alignment screen is displayed, position it up and down using the nuts on the back of the bracket and side to side using the screws/nuts on the bottom. The white rectangle must be parallel to the opening of the Case.

F- After tightening all of the screws/nuts check the touch screen functions to be sure they work on the display. If they do not work, continue alignment until they work.

Note: This should be a simple process.



Step 12: Install the Low Pass Filter (LPF):

Hardware required:

- M4 x 30mm standoff (4)
- M4 x 10mm Screw (8)
- M4 x 50mm standoff (4)
- LPF shield (1)
- M3 x 7mm standoff (4)
- M3 Nut (4)

A- Install the M4 x 30mm standoffs to the bottom of the chassis as shown in the next photo.

B- Loosely install the LPF onto the standoffs.

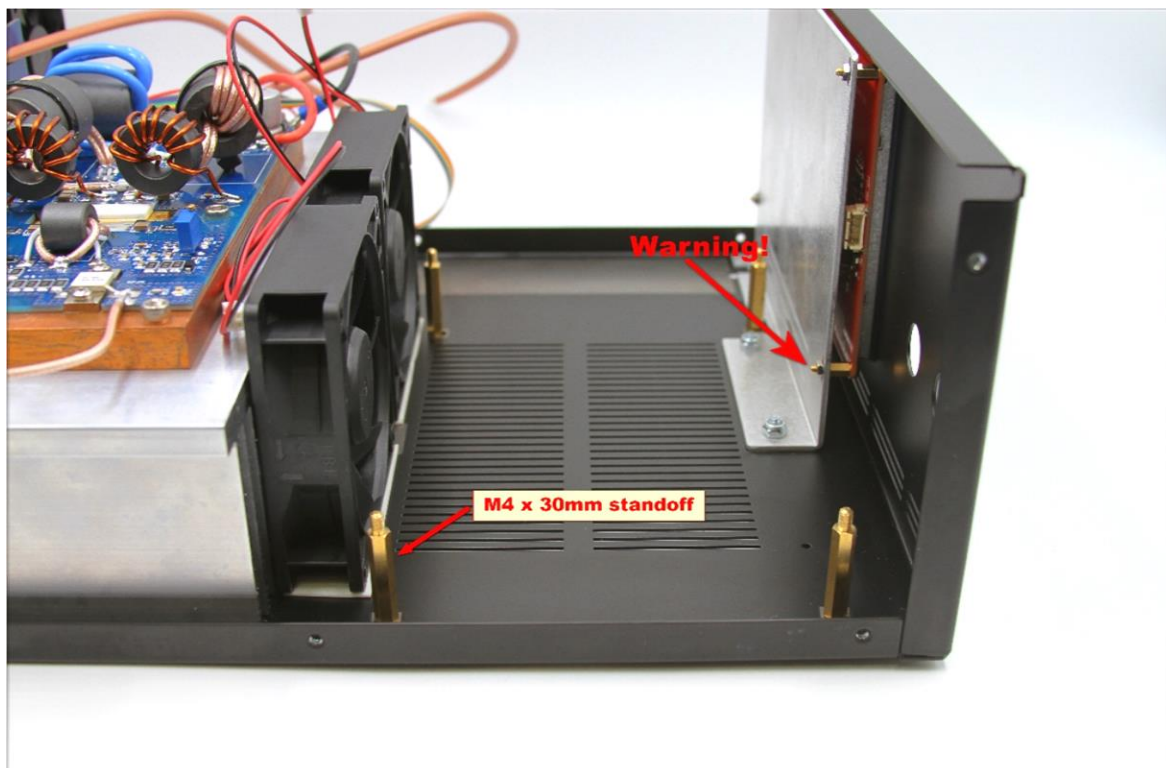
Note: During shipment the LPF coils may have moved, make sure the coils are not touching each other and are about 1/4 inch apart.

C- Position the LPF equidistant between the Display and the Fans.

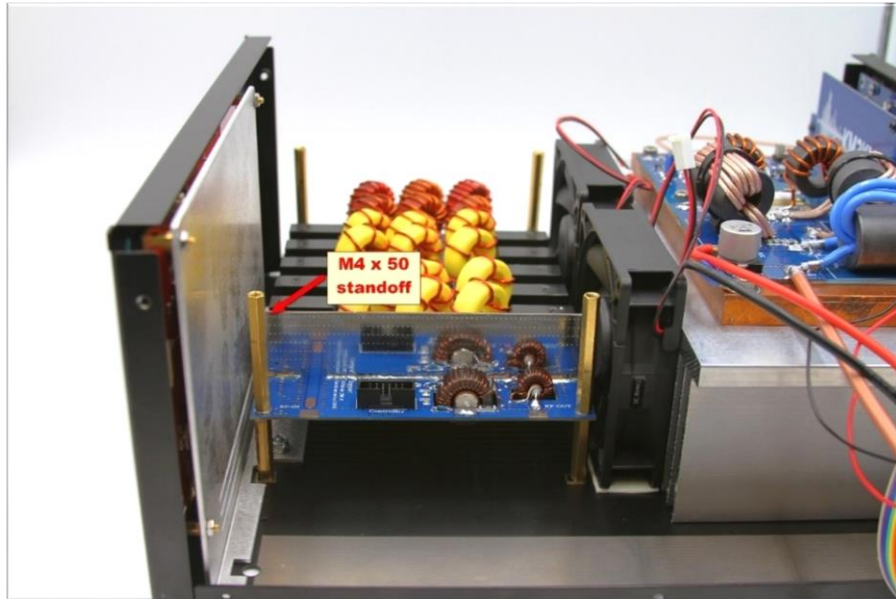
D- Make sure that the fan blades do NOT touch the board. **If they touch the LPF board this can add noise.**

E- Finally, tighten the chassis floor screws.

WARNING! Ensure that the lower right Display standoff bolt and nut is kept away from the LPF and not touching, as this can cause a malfunction.



F- Remove the screws from the 4 M4 x 50mm standoff's and screw these standoffs into the top of the LPF board securing it into place.

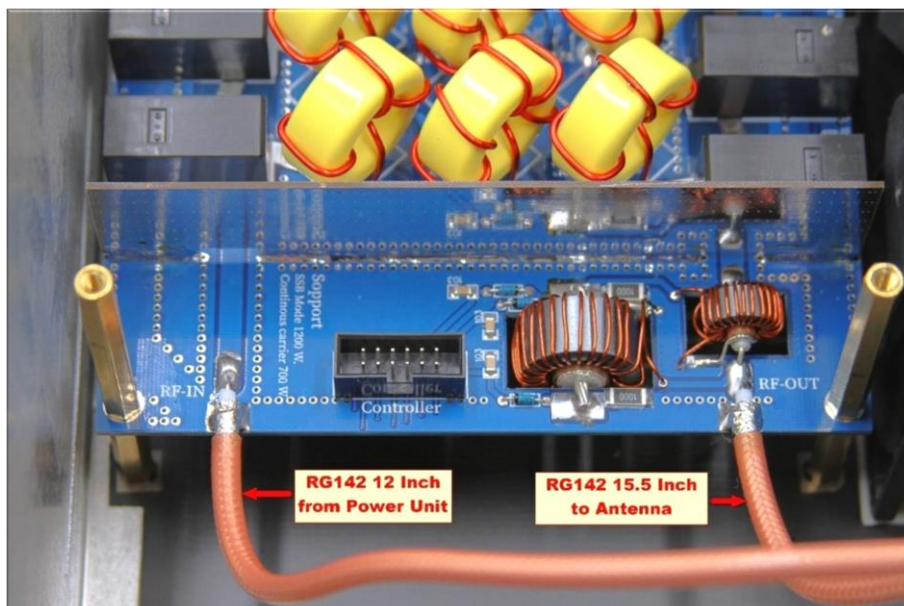


Step 13: Solder the Low Pass Filter RF-IN and RF-OUT Coax's:

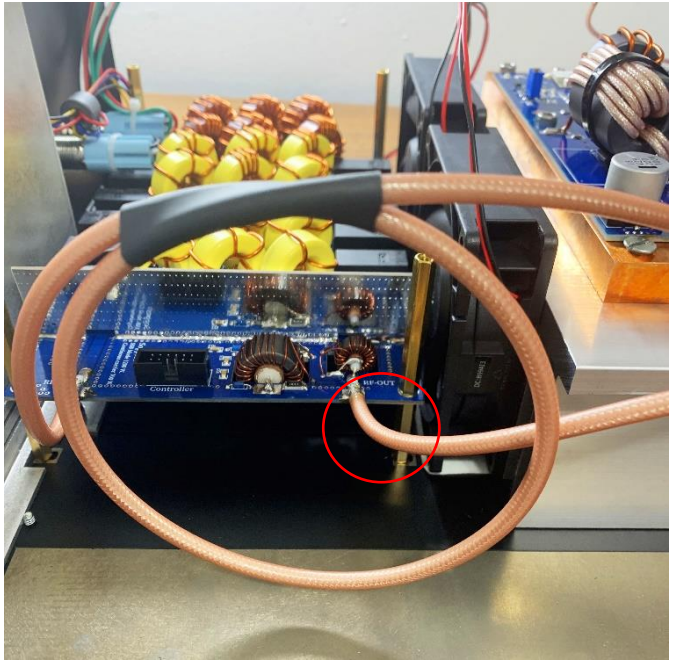
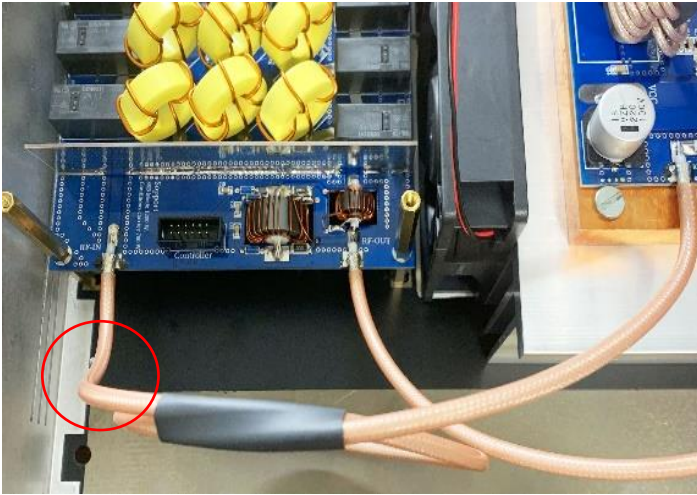
A- Solder the RG142 (Coax Loop) from the Power Unit to the RF-IN on LPF.

Note: Again, pre-bending this coax will greatly remove stress from this solder joint later when the power supply is installed.

B- Solder the RG142 15.5-inch coax (from the Antenna Switch Board) to the RF-OUT.



C- Again, notice the need to gently pre-bend the coax to take stress off the solder joints.



Note: These photos have been upgraded to show the trap. Other photos in these instructions do not show this trap.

Note: Check visually for solder bridges, if you check continuity at the center and ground of the RF-IN and RF-OUT you will get short readings, due to the coupler coils being grounded. **THIS IS NORMAL.**

Step 14: Install the front chassis switches:

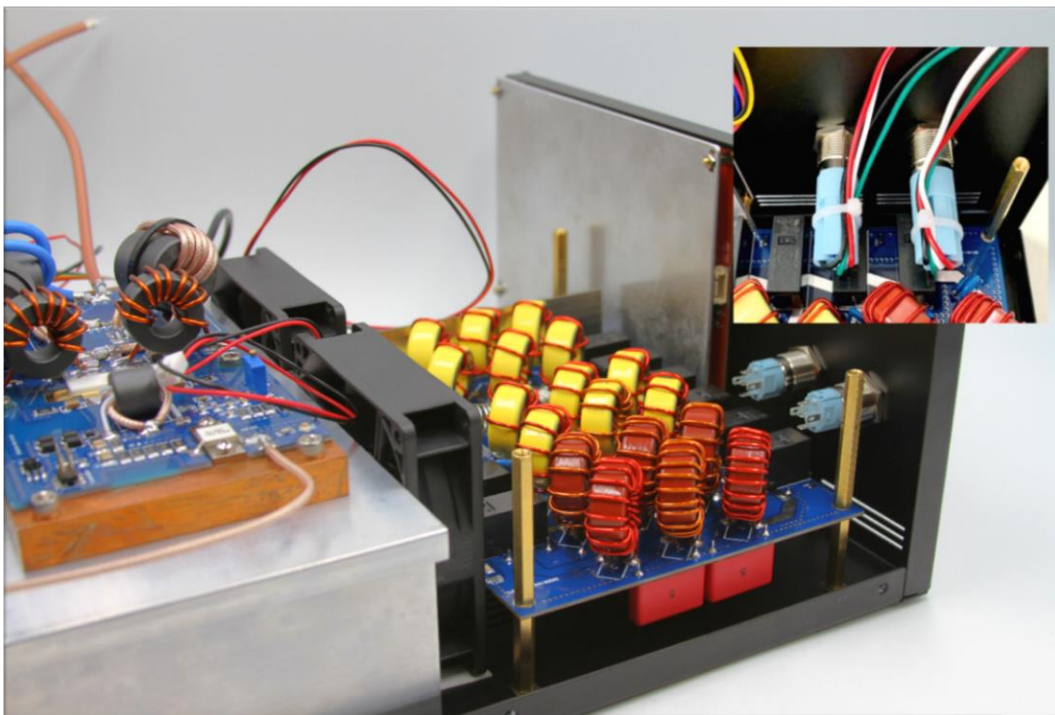
A- Separate the switches from the blue socket.

Note: The **RED** marks coincide on both pieces of the switch. After installing switches, make sure, that the **RED** marks on the switch and socket align. If the marks do not coincide the switches will not work.

B- Fit the silver half of the switches through the holes in the front of the chassis, put the hex nuts on a turn or two. (This will give you room to attach the plugs)

C- Plug in the blue plugs aligning the red marks and finish finger-tightening the hex nuts.

D- Fold the cables back, secure with a supplied tie wrap to separate them from the Toroids.

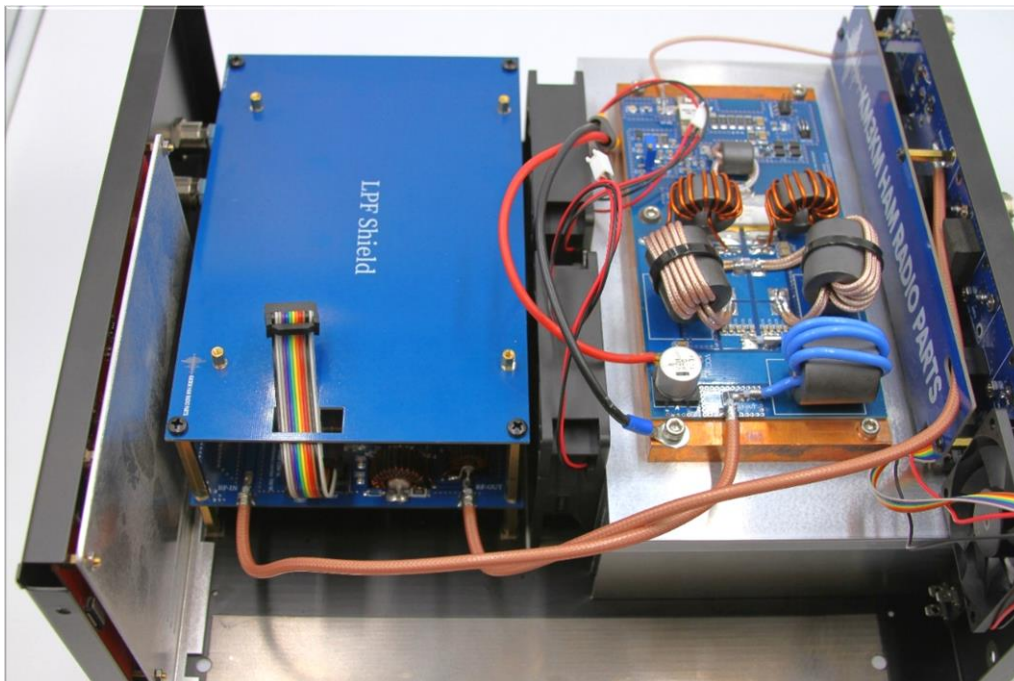
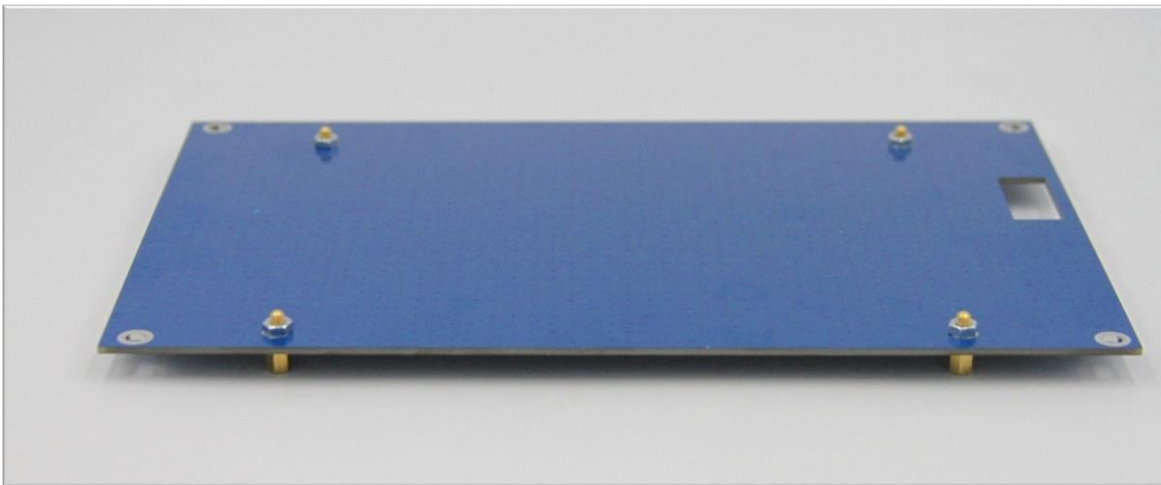
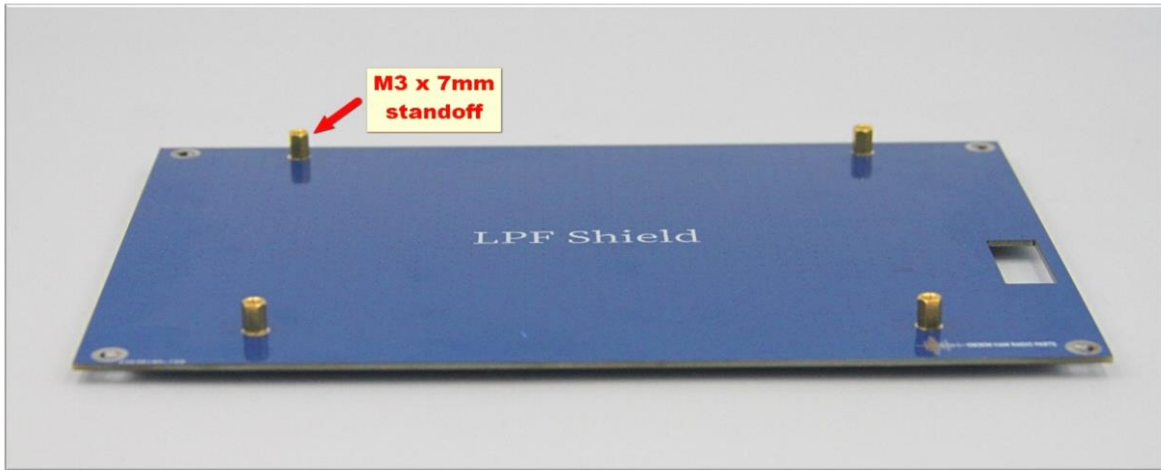


Step 15: Install the Low Pass Filter Shield (LPF):

A- Install the (4) M3 x 7mm standoffs to the Low Pass Filter Shield as shown on the next page.

B- Plug in the 12 pin Controller Ribbon Cable into the Low Pass Filter and thread it through the LPF Shield.

C- Attach the LPF Shield to the 4 4M x 50mm standoffs with the screws removed earlier.



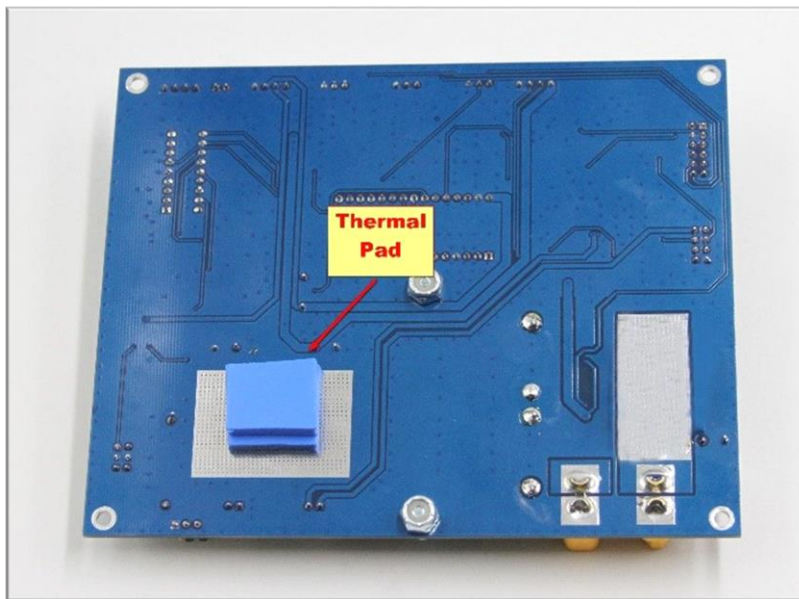
Note: LPF Shield in place with the ribbon cable positioned for next step.

Step 16: Install the Controller Board

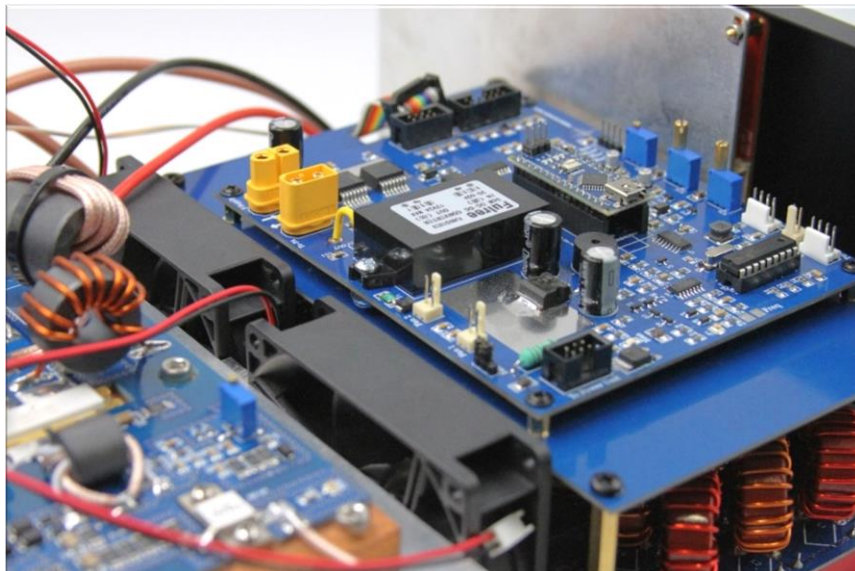
Hardware needed:

- M3 x 5mm Screw (4)
- 4mm Thermal pad (2)

A- Place the two Thermal Pads provided on the underside of the board beneath the LM7805.
Note: Remember to remove the protective plastic from the pad.



B- Install the Controller Board onto the LPF shield's M3 x 5mm standoffs with screws as pictured.

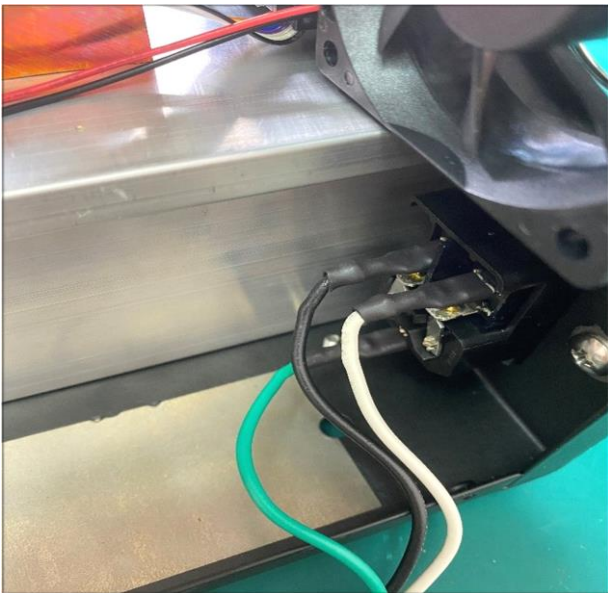
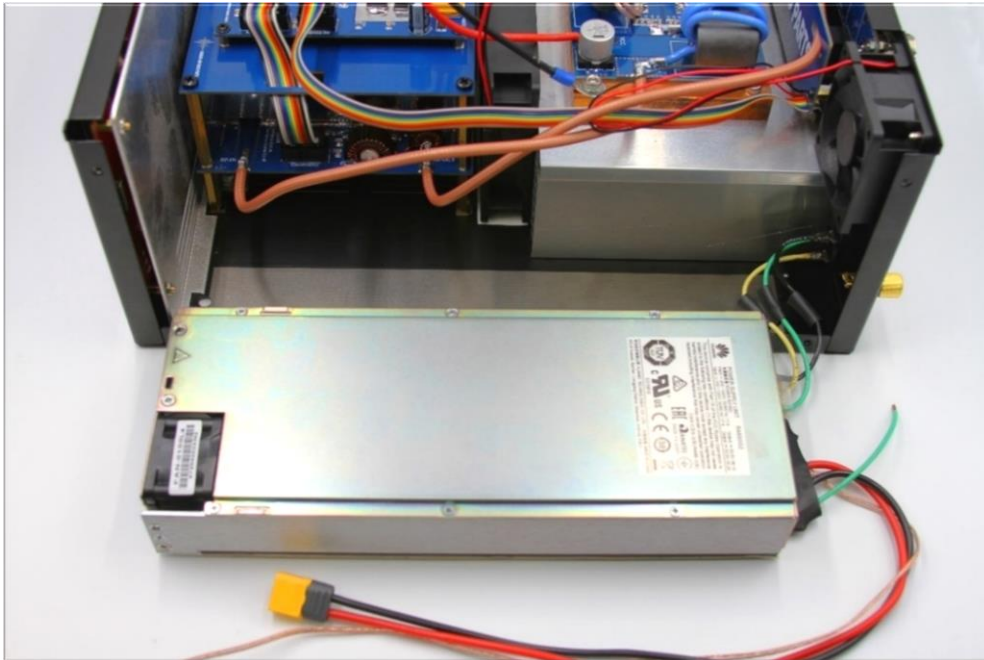


Step 17: Installing the Power Supply:

Hardware needed:

- 11.25-inch angle bracket (1)
- 10-32 x 4.5 Inch Philips screw (2)

- A-** For detailed installation instructions, please view the video “Power Supply Placement” on the enclosed Thumb Drive
- B-** Firmly insert the connectors of the Power Supply to the pins of the external AC connector on the rear of the chassis. Press firmly until it stops. There is some pressure that you will need to apply



Color locations:

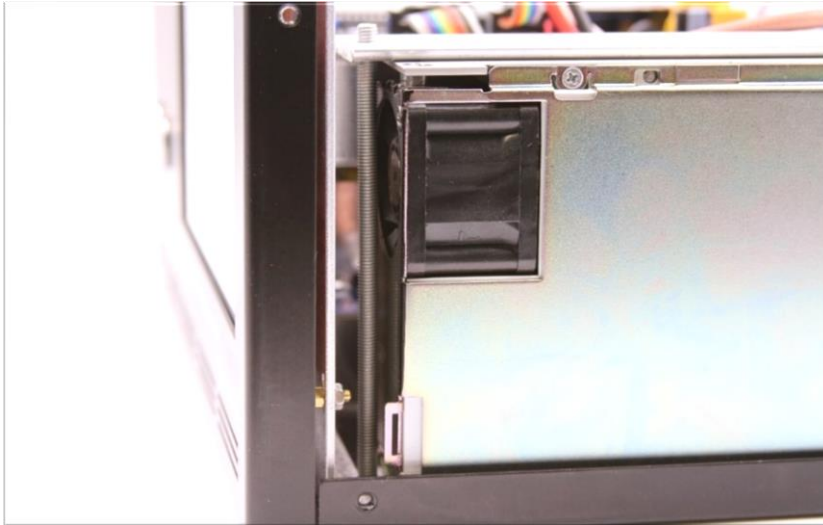
- Green on the bottom
- Black on the left (center side of case)
- White on the right (outer side of case)

C- Carefully push the RF and power cables out of the way.

D- Pass the power supply's DC Power and Switch cables on the inner side of the Power Supply and through the notch on the Fan Bracket being careful to avoid pinching them when the Power Supply is in place.

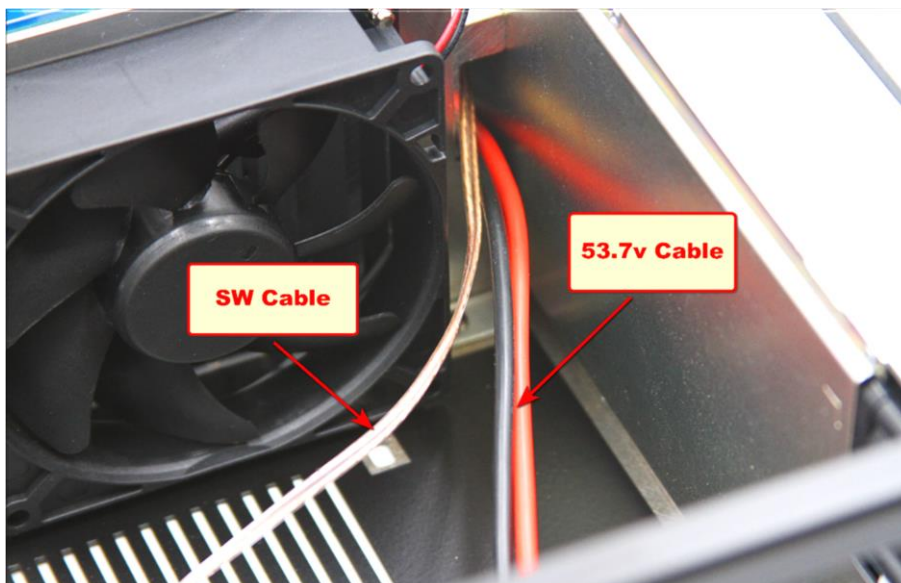
E- Set the Power Supply into the chassis and place the angle bracket on the top/inside of the Power Supply.

Note: The angle bracket should be kept away from, and not touch the Chassis Fan

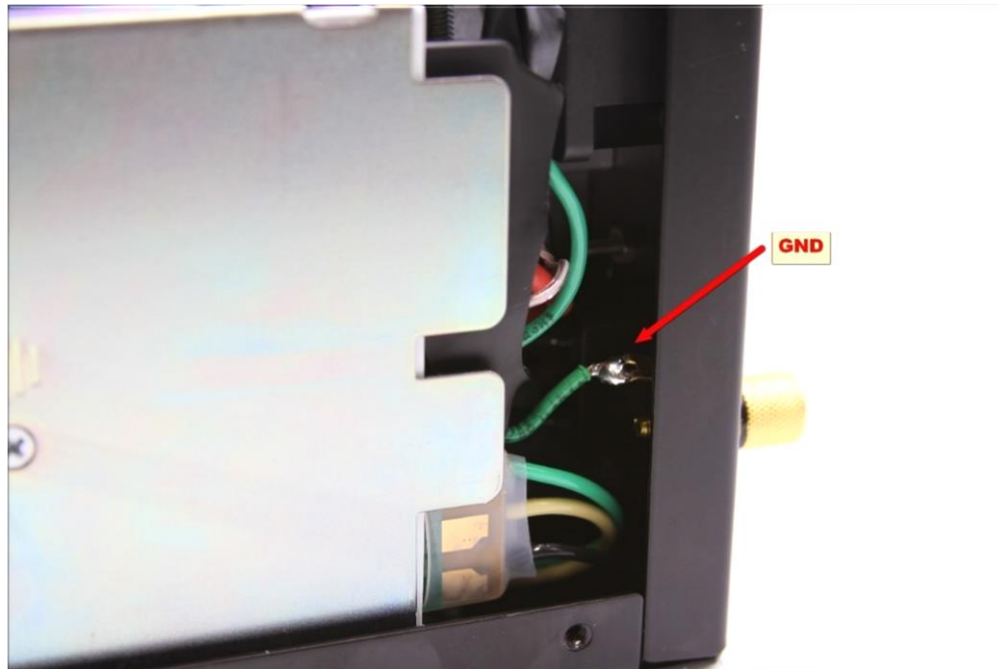


F- Position the right side of the chassis slightly off of the table to enable inserting the support bolts through the bottom of the chassis, screwing into the angle bracket. Tighten but do not over-tighten.

G- Double check that the switch and power cables move freely and are not pinched.

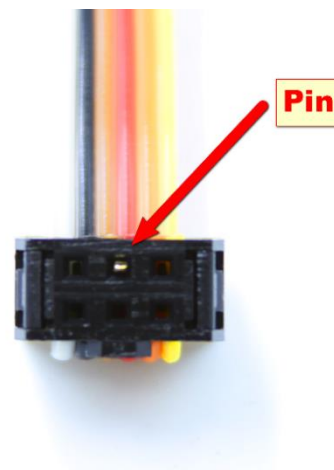
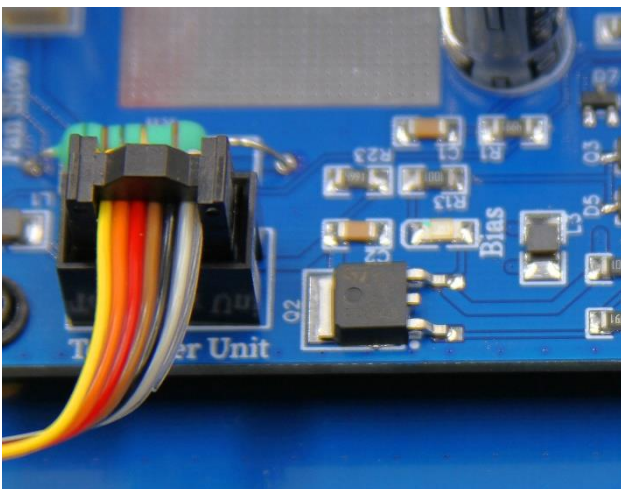


- H- Finally, solder the Power Supply ground wire to the chassis ground post.
- I- Plug the DC Power cable into the controller board making sure it does NOT pass through the coax loop.

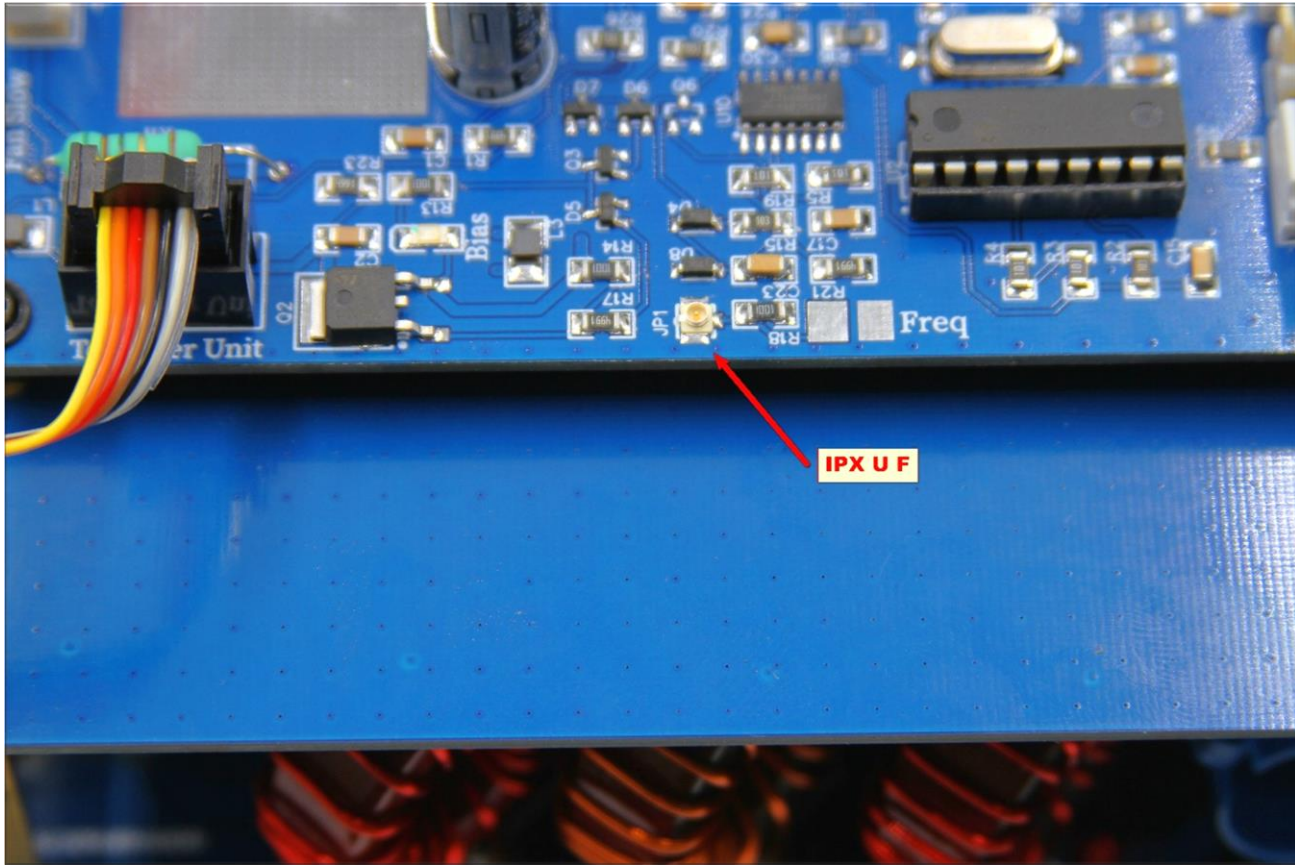


Step 18: Install all remaining connections:

Note: The IDC 3X2 Ribbon Cable from Controller to Power Unit is unidirectional. The end with the inserted pin is connected only to the Power Unit.



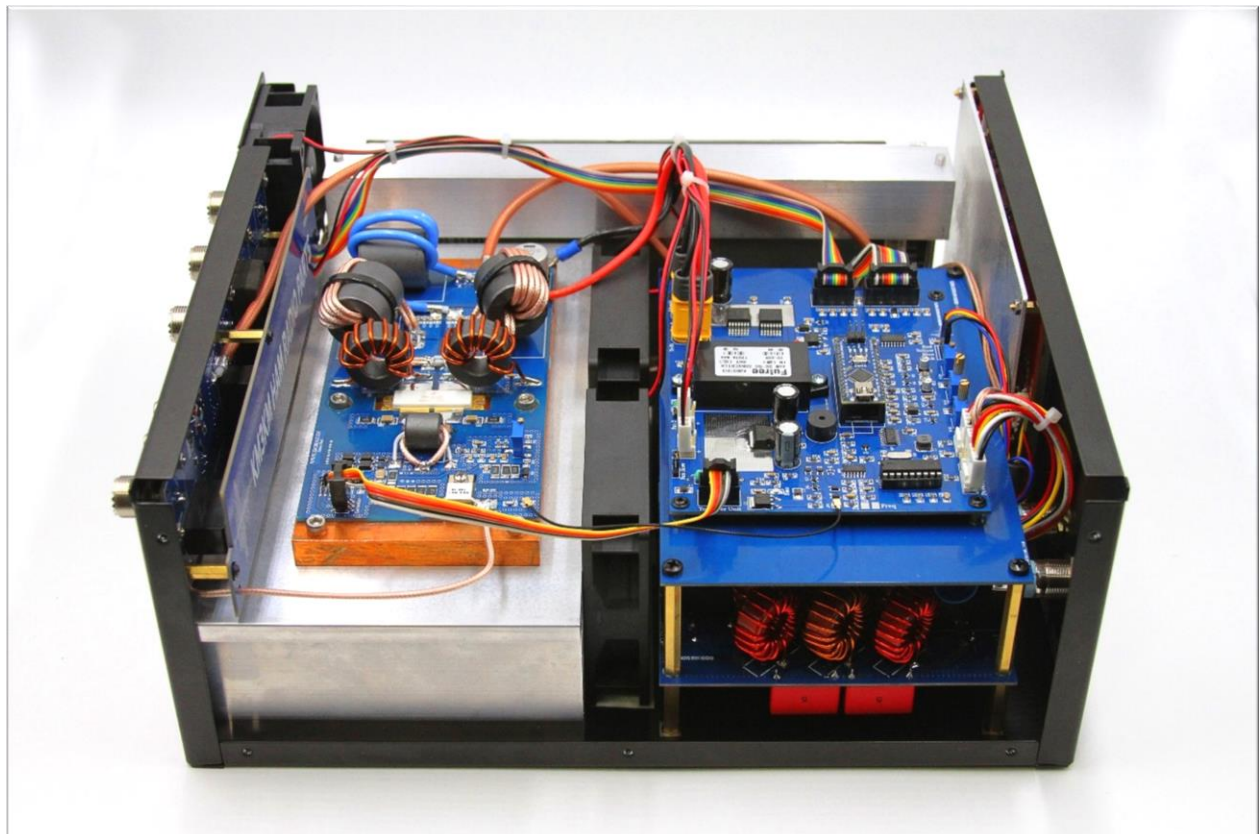
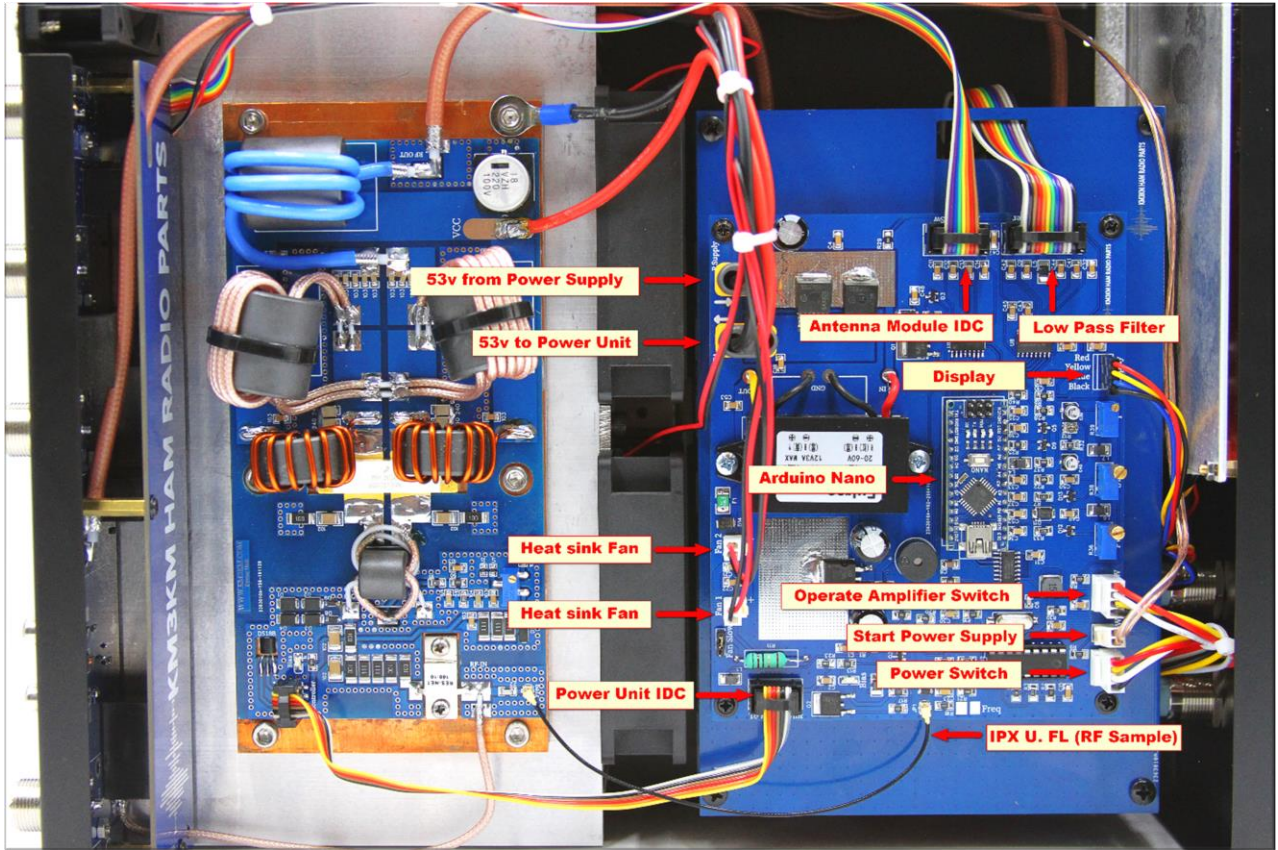
Note: The IPX U. FL connector can be easily damaged, be careful when placing it, sometimes it is difficult.



Checklist of Connections:

- 53V from Power Supply
- 53v to Power Unit
- Heatsink Fan 1
- Heatsink Fan 2
- Power Unit IDC (Uni-directional)
- Antenna Module IDC
- Low Pass Filter IDC
- Display (Controller Board 4 wire RD, YL, BL, BK)
- Operate/Standby Switch
- Power Switch
- IPX U. FL (RF Sample)

Final View:



Congratulations! You have finished the assembly and are ready to test.

Step 19: First Test:

- A-** Please check that all soldering and connections are as indicated before energizing the power source.
- B-** Do not install the outer cover. Perform all tests at 1-watt input, RTTY or FM mode and 40 meters on the radio to get the output wattage described in the manual. If you use a different band the results may vary, but this test is designed to see output.
- C-** Follow the next steps:
- 1- Connect the send cable from the radio to the amplifier **PTT Plug**. Do not connect the ALC cable at this time.
 - 2- Connect an antenna or dummy load to **ANTENNA 1** of the amplifier.
 - 3- Connect the RF output from the radio to the amplifier **RF IN SO239**.
 - 4- Press the PTT and see if the amplifier displays the **[ON AIR]** indicator.
 - 5- Look at the output meter on the amplifier. It should read **30-60 watts** on the 40 meter band. **Never turn up more than 1 watt** If the output is 0 watts, check all connections again, for faulty solder or incorrect placement. If you do not easily find the problem, contact us immediately.
 - 6- Check that the fans run 100% speed when you press the **[FAN AUTO]** button.
 - 7- Select the band **[AUTO]** button (default), then send a modulated signal in different bands . Check that the automatic band selector is working. (If the band does not change automatically make sure the IPX U. FL cable is properly seated. Also, refer to page 7 of the User's Manual for more details.)
 - 8- **Attach the cover and increase the input power up to 30 watts.** Use in normal bands, remember that your KIT is not designed for output over 700 watts continuous carrier, or 1200 watts SSB.

If you follow this assembly guide carefully, making sure all solder joints and connections are correct, this kit will work as described as all parts are tested before they leave our facilities. If you are unsure or have questions as stated before, please ask. The following are parameters and some alarm limits that will trigger a reset request when in use....73

- **AC TOTAL CONSUMPTION – 1750 WATTS**
- **AC Line – 120V 14A, 240V 8A**
- **CW MODE – 240V AC LINE REQUIRED**
- **OUTPUT LIMIT PEP – 1300 WATTS***
- **DIGI-MODE LIMIT – 700 WATTS***
- **OPERATE INPUT LIMIT – 80 WATTS, STANDBY INPUT LIMIT – 100 WATTS**
- **REFLECTED POWER LIMIT – 125 WATTS***
- **DRAIN CURRENT LIMIT – 41A***
- **TEMPERATURE LIMIT – 65 °C***

* These items are those that trigger alarm limits.

Thank You
Steve Bennion (W7DJ)
Dave Jensen (W7DGJ)
For the collaboration and help with this manual.