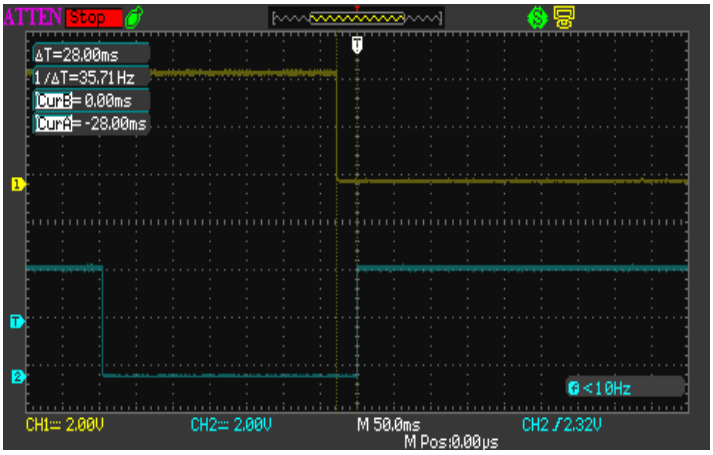
Orion 2 encoder replacement

Friday, March 31, 2023 11:54 AM

On My O2 both Multi and Main AF need changing.
When you look at typical working life of these mechanical encoders this doesn't seem unreasonable.
One thing that was noted from schematic of the Keypad was that no filtering was seen. It may be that clock is so slow so it's not necessary?



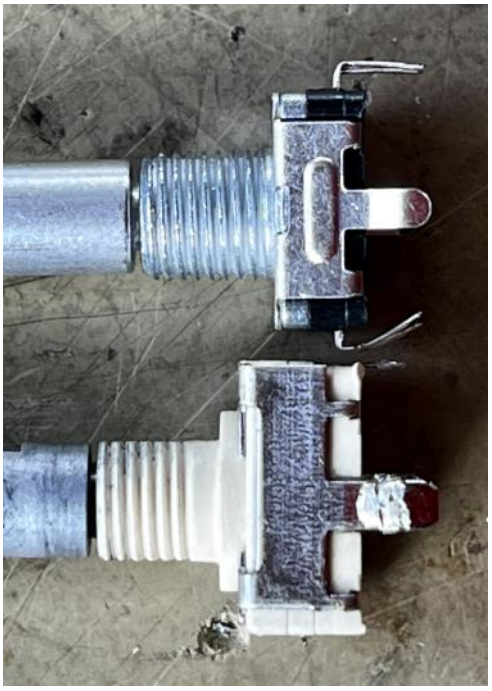
DISCLAIMER
This is requires considerable disassembly skills and medium advance soldering skills.
These Ten Tec O2's are getting rarer and many parts are not available, If you are not confident to carry out this work , please use a suitable Ham Radio repair centre.

This shows that connection B in CW direction leads

Encoders are made by DDM and are range 427
Looks like this one??

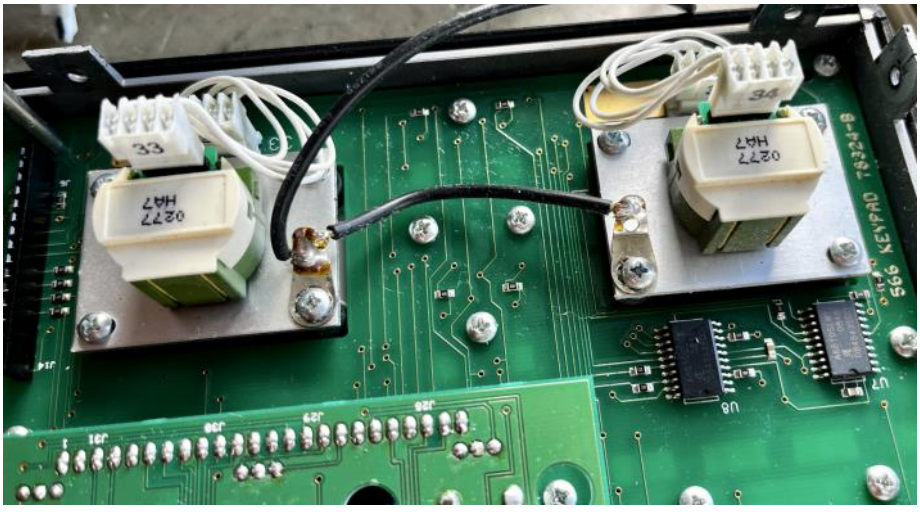
DDM 427-A-1-1-AL-0-0-0
Codes are:-
A= Indent 30
1=switch
1=standard torque
AL=Aluminium shaft

I used a bourns PEC11L-4225F-S0015
From Mouser
Codes are:-
4=Horizontal pins
2=30 indents (15) pulses
25=25mm length
F=metal flatted shaft
S=momentary switch
0015=15 pulses per 360 deg rotation.

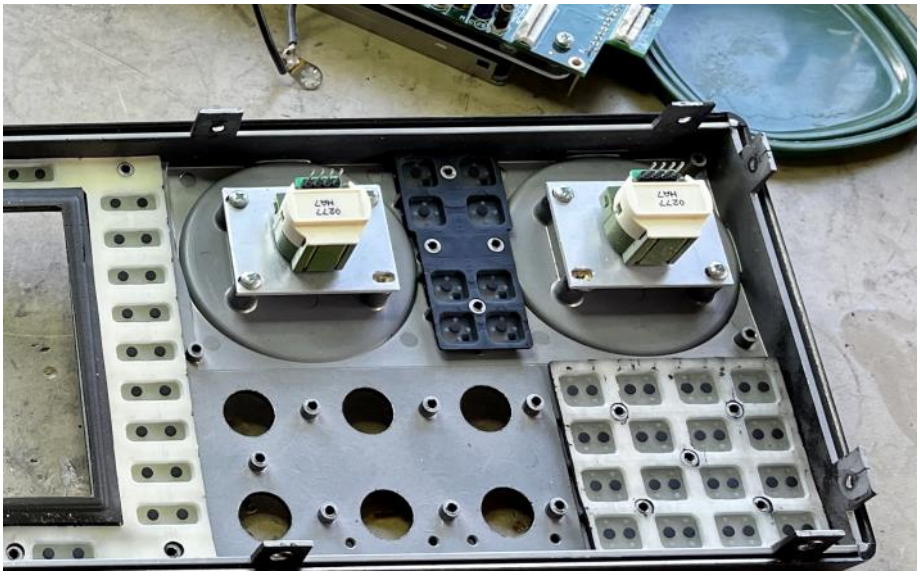


New bourns one is at top and DDM 427 original at bottom
A 1.5mm spacer is needed in addition to the original white collar to make the distance from the encoder PCB to the Keypad PCB.

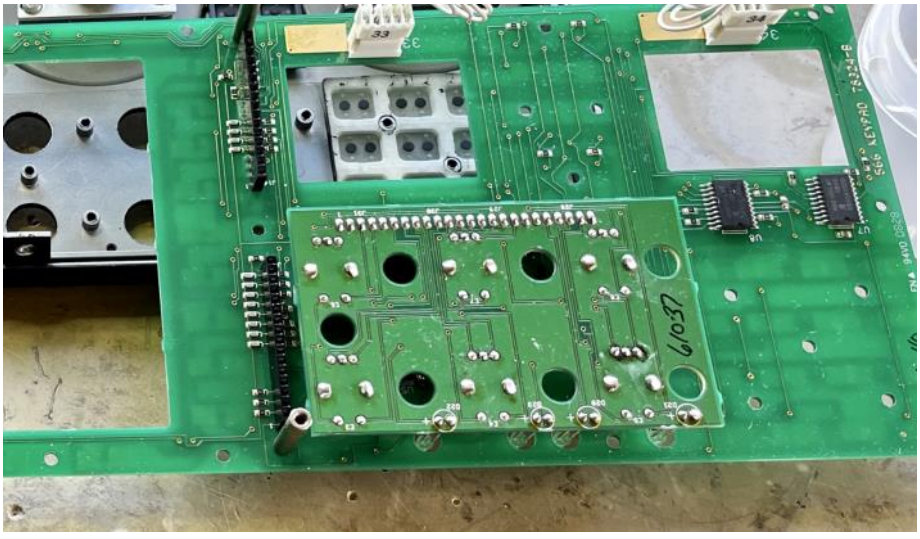
Remove Display and processor board making sure to mark the two ribbon cables Left and Right.
Also unsolder the MIC socket earth to the chassis.
Make a careful note on where the coax and other cables go. YOUR PHONE IS YOUR FRIEND

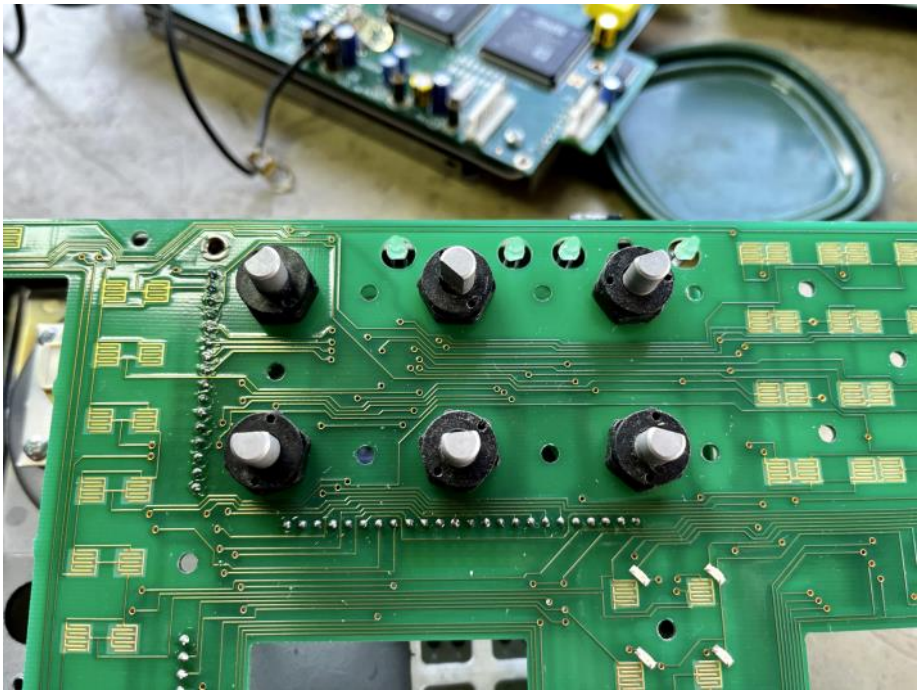


Remove the earth cable from chassis over on the right and two from the encoders.
NOTE..
Put screws away with black earth cable. Don't get them mixed up with the 35 keypad PCB screws! (Two have threads whereas the 35 are self-
tapping

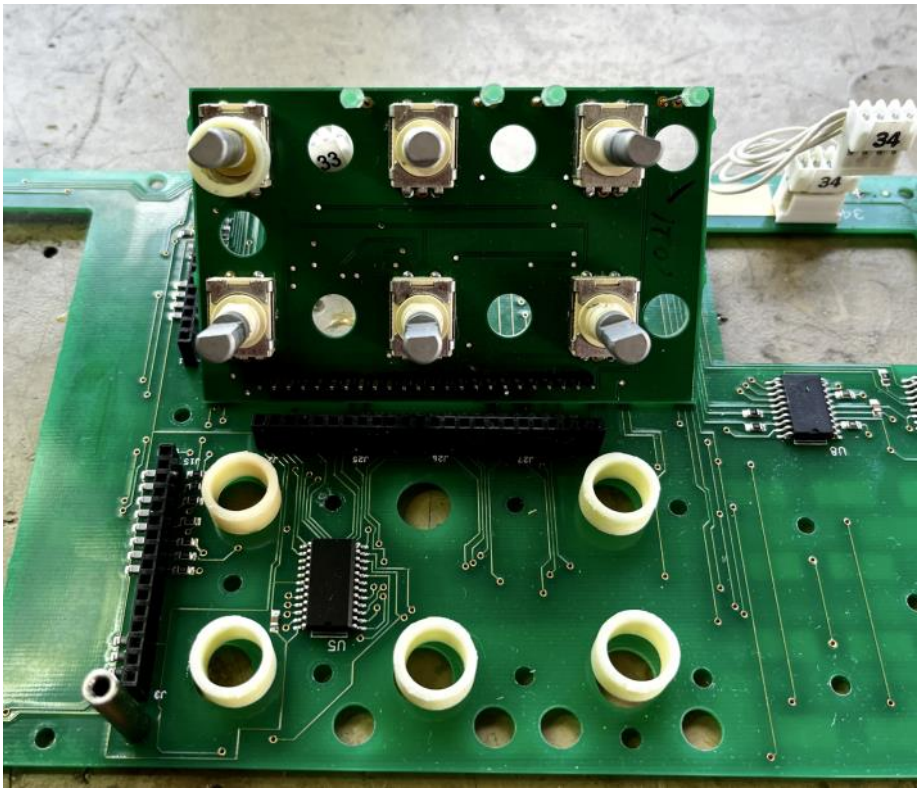


Leave encoders in situ, No need to remove them or their knobs
Also leave all the buttons in place.
Remove the 35 self-tapping screws and the two holding the meter in place.
Also remove small plastic meter spacer.
Remove meter.
When all done, carefully lift up keypad PCB with encoder PCB still fitted.
This will be removed in next operation.
When done the main front panel will look like this.
Put carefully aside. Don't invert as all the key top membranes will fall out.

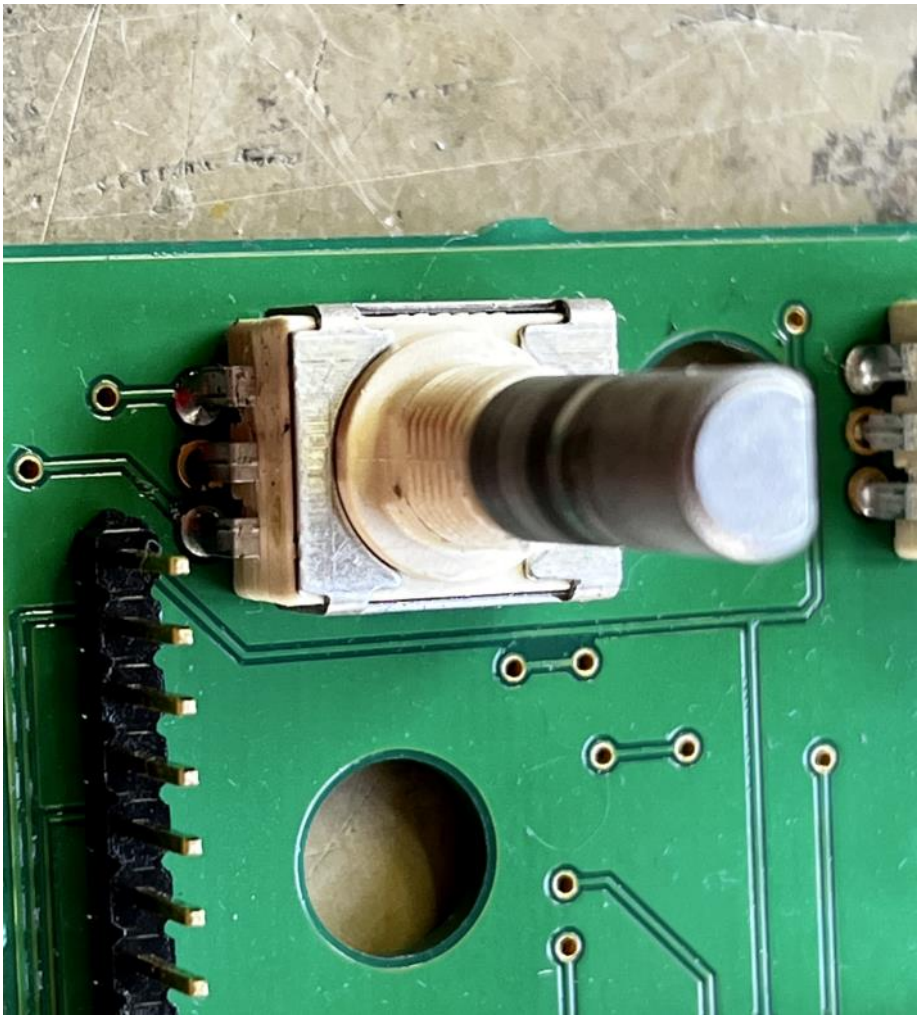




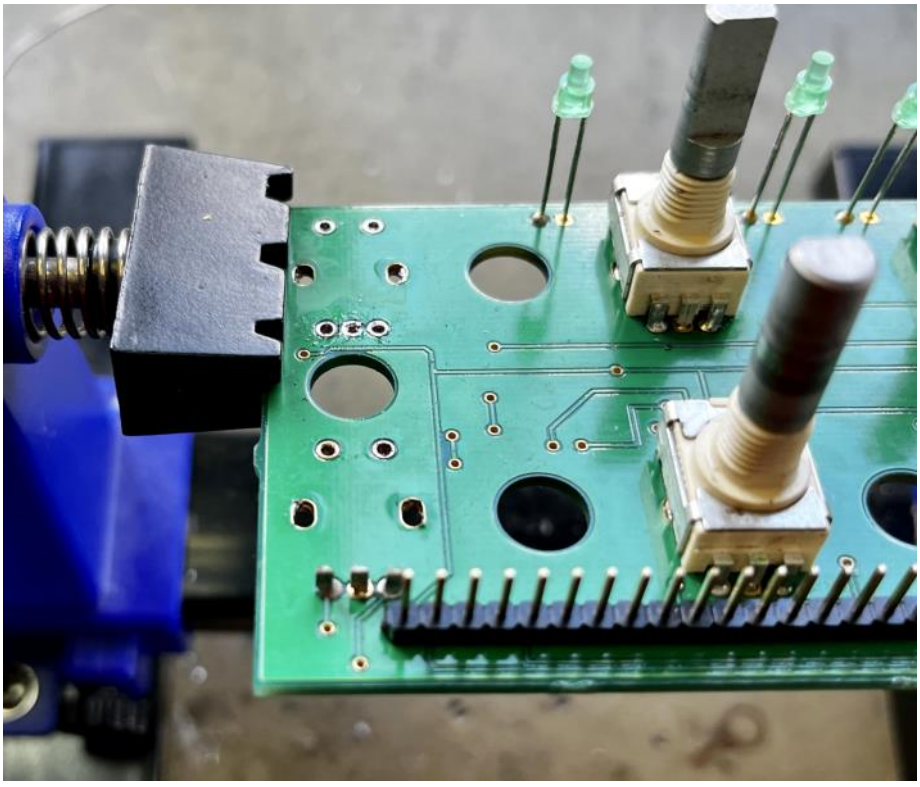
You now need to remove the plastic nuts which screw to the encoder shafts
Use a 1/2 inch/13mm spanner and be careful of the LEDS which are on the board.



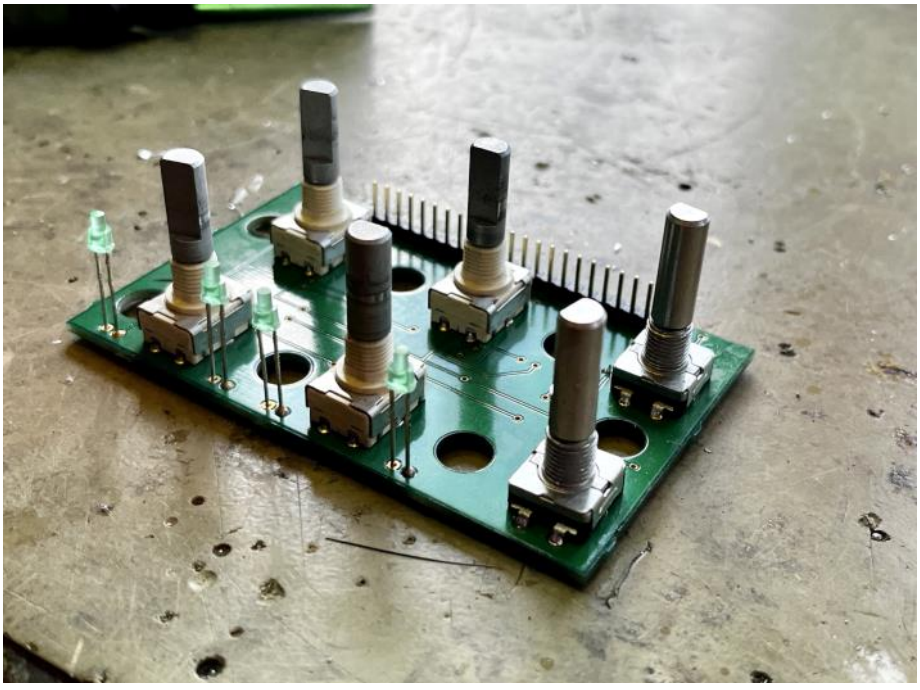
Now carefully pull the encoder board away from the keypad PCB.
NOTE… from this point on DO NOT TOUCH THE KEY POSITION WHERE THE CAPS REST ON. Dirt or grease on these will stop them working entailing a strip down to rectify.
As can be seen, six white spacers are also fitted. These do have a top and bottom and the correct way round will go right over the encoder shaft .



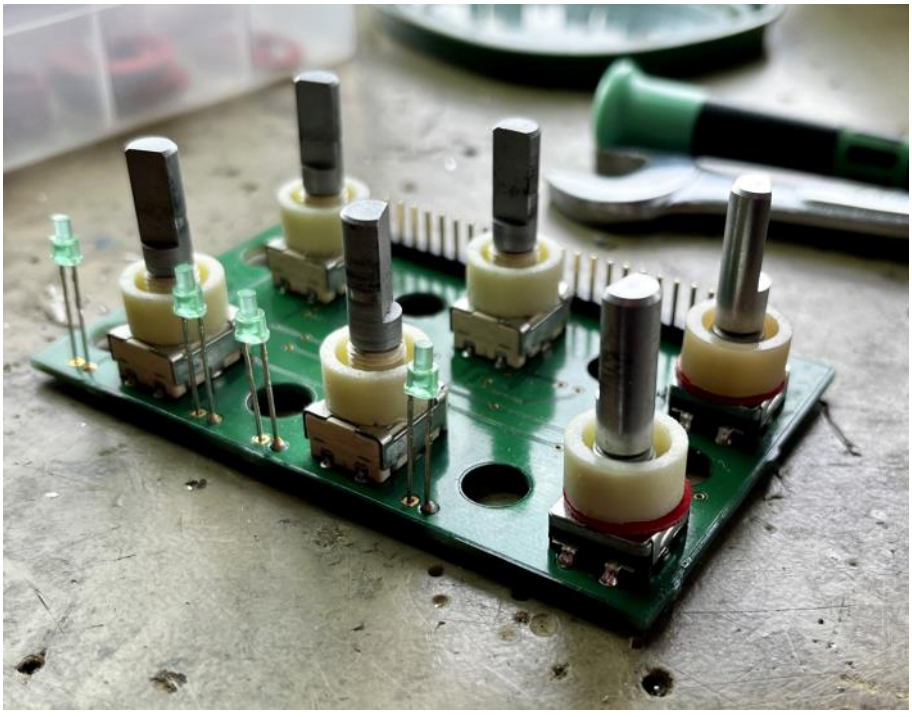
Cut the three encoder legs as far from PCB as possible. This will give you enough to pull on while heating the other side with the iron.
Do the same with the two switch connections although these leave little to hold on to.
Now comes the tricky bit.
You need a 80-100w iron to get sufficient heat to fully melt the solder around the main holding tabs.
Using a desoldering tool or a solder sucker , remove excess solder.
Gentle pull the encoder one side at a time and it should come free.
Clean up the holes.
De-solder all other connections pulling with pliers if you can see enough of the cut connection.
Clean out all holes.



Here can be seen the "Multi" and "Main AF" encoder removed ready for the new encoder fitting
I have mounted the encoder PCB in a PCB holding fixture. Very useful as it can be rotated to see both sides of the pcb. (Cheap from Ebay).



Her are the two new encoders installed prior to adding two small 1.5mm washers to bring them to same height as originals



This how they look prior to refitting to the Keypad PCB.
Note the extra washers in red.

Now carefully place the mating Keypad PSB on top, lining up the plug/ socket.
Gently add the locking black plastic encoder nuts making sure that all the white plastic and any additional spacers,(seen in red), have seated properly. (if not, you might need to turn them through 180 degrees to get the larger opening next to the encoder.
When all are seated , carefully tighten the black nuts finger tight and nip up the last bit with spanner.. PLEASE NOTE… There is no requirement to tighten these down with any force!
Make sure that all shafts now rotate with no binding.
Check all LEDS are central to their holes on the Keypad PCB.
Replace the Whole assembly on to the front panel and add some screws in each corner and a couple in the centre, loosely so that you can turn the panel over and make sure all the key tops are in situ.
If all is well continue to reinstall the 35 self-tapping screws. Bear in mind these are screwed in to plastic posts so are easily overtightened!
Once again only very light tightening is necessary.
Re install the meter and the Self tapping screw on the left and the spacer and long screw on the right.
Resolder the left and right hand chassis earths and also install the encoder earth tabs with the two threaded screws.
Now install all the coax connectors and rectangular plugs, most are marked on the plug and PCB. If necessary, consult your phone pictures.
Install both A and B ribbon cables.
Carefully check all your work.
With the front panel still loose turn on power and check operation of all encoders and pushbuttons.
If all ok, then refit panel being careful to make sure the small copper earthing spring is inside the chassis.
Well done!! Another O2 carries on the great Ten Tec tradition.

73
De M0MWS 06/04/2023
PS, Feel free to distribute to the ham community