ATLAS 210X LIMITED EDITION REPAIR AND RESTORATION
A VERY INTERESING PROJECT !

By SV9DRU

A new used radio purchase.

About a month ago I got an "unknown condition – estate find" Atlas 210x LE from ebay-US with the hopes of it being in a reasonably fixable condition. Shipping time worked in such a way that I ended up receiving it just 10 minutes before having to leave for catching a flight to UAE where I was to spent the next 3 weeks for QRL.....
Despite my specific instructions for very good packing, to my dismay, the radio arrived within a thin paper box, about 2 times its packed size , with the radio being wrapped in a few layers of bubble wrap which was not even secured with tape ! The box itself was somewhat "rounded" from handling and the radio had a large moving space.
I barely had enough time to unpack and take a quick look at it, and as expected there was some damage from shipping to the audio gain knob, the frequency dial was "frozen", the bottom feet were missing and there was a "rattling" noise from loose parts inside. Not a very optimistic first impression, but I had to place the radio on my desk and head to the airport.....

A closer look at the "old patient"
3 weeks later, with much lower expectations I had the chance of more detailed inspection and testing:
After opening up the case, a loose screw and a loose IC (LM380N) fell out.
The Hi current line was showing a dead short to ground (so was not connected to power).
With power connected to the Lo current line I got only the 2 main dial lights working. Absolutely no sound from the speaker. The dial mechanism was mechanically intact being very stiff but movable from the inside.
Since the loose IC happened to be the AF amp section, I thought that maybe replacing it could at least restore some life to that section of the receiver. Being a very common part, I was able to purchase an LM380N from a local store and install it. But to no avail, the radio continued to be dead just like before the replacement.

At this point several thoughts came to my mind: Since clearly restoring this rig was not going to be a straight forward feat by any means (if at all possible), I could either recycle it through ebay for parts or find someone else with the necessary knowledge and access to replacement Atlas parts for restoration. My previous experience with an Atlas 350XL (which I ended up giving to a friend) was very positive in terms of receiver performance and that together with the fact that the 210x had an equally good reputation combined with the fact that I actually had the limited edition version which is much harder to come by and enhanced vs the garden-variety 210x, made me decide to pursue the second option.
But here came the next difficulty: That Atlas expert was no where to be found, since requests at eham elmers forum and the Atlas yahoo group, produced no results in recommending a service place. So it seemed that keeping the rig as a parts sourse was my only option.

Nevertheless, my ham curiosity and interest in this specific model, after reviewing the manual and the schematics, decided to give it another try at fixing it myself. Besides, I would have little to loose. Starting with a dead radio, things could only improve or stay the same. Fortunately, due to the summer season, my local QRL has been flexible enough over the last 2 weeks in the SV1 land, that I could spend considerable time in the project.

Following is the list of the individual symptoms, findings and eventual cure that I encountered in the process which to my pleasant surprise transformed the 210x from a “basket case” to a wonderful little radio worthy of every penny spent on it and every single minute of time devoted in fixing and upgrading it.
Since these radios are frequently sold in need of TLC or may develop technical issues after being in service for so many years, my description may give some helpful hints to other hams faced with similar problems when attempting to service and /or restore a 210x radio.

Problem #1 No audio in Rx and the AF amp IC (LM380N) getting too hot in the touch. **Cause**: Shorted 2,2µF tantalum cap C321 to ground (PC-300D). Replacing it brought the audio back.

Problem #2 Shorted Hi Curr line to ground: Shorted C516 and C508, both 15µF tantalum caps at the PA board (PC-500D). This had in turn led to some firework show and smoke coming from a burned L503 RFC, that for sure wold have created quite an impression in the previous unfortunate operator witnessing the failure !
Cure : Replacing both caps with 10µF/100V electrolytics (since I had to choose between 22 and 10µF values only). Fixed that. Also replaced the L503 with an identical hand-wound RFC using small caliber enameled wire salvaged from a damaged computer screen transformer. A similar RFC with large enough caliber wire to handle the Driver transistor's collector current, was nowhere to be found at the local electronics stores.

Problem #3 No Rx even with the audio section functioning: **Dirty band switch**. Liberal use of Silicone lubricating spray (in my experience an excellent plastic friendly contact cleaner-lubricator), in ALL sections of the band switch, both in the main radio compartment and the section within the LPF compartment, solved that. Also the Relay on PC-120 was uncovered and its contacts cleaned with a piece of paper soaked in silicone lubricant.

Problem #4 Low Rx sensitivity and Tx output in all bands, no SSB output with CW output present. **Solution**: Tuning and properly adjusting the RF and IF sections per the manual (available via the yahoo group site), and thorough cleaning of all three PC boards and their respective sockets.

Problem #5 No S-meter indication in RX with ok reading in TX. **Cause**: Bad S-meter amp IC (CA3086). Replacing it brought the S-meter to life. The AGC was then adjusted, which in this 210x LE is probably an improved version, since it has excellent behavior for both weak AND very strong signals, despite the AGC circuit having a bad reputation in handling strong signals per the various reports from other users.

Problem #6 Stiff tuning dial **Solution** Disassembling the string mechanism and lubricating both the tuning shaft on the chassis and the tuning moving parts on the cap itself.

Comments: **a)** After having 3 tantalum caps shorted in this radio, I went ahead replacing almost every tantalum cap (at least all that were easily accessible) with hi voltage electrolytics.
b) The ICs removed in the process of troubleshooting and repair were remounted in sockets, which would make any future replacement easy, without risk of destroying the PC boards from overheating. None of them was in the RF or IF strip, so adding a little to their connecting leads through the mounting sockets did not risk degrading their performance.

My 210x in the middle of the project: There seem to be good glimpse of hope for this radio to be restored, I was thinking at the time !

Additional straight forward easy restoration steps:

First Repainted the outer case, replaced the missing feet and the AF, RF, BAND and MODE knobs. Cleaned with mild soap and water everything that needed cleaning. Replaced the burned 12V S-meter bulb. This brought the radio into LIKE NEW cosmetic condition.

The result of the repair and the Rx performance was so impressive that I decided to proceed with the following upgrades:

1) **Added a simple 1 transistor mic amplifier** to PC-200D according to the instructions found in the yahoo group. That gave a moderate increase of mic gain which took the optimal position of the mic gain on the front panel from fully CW to 3/4CW, when using my D-104 Astatic (not amplified) mic. This hi z mic seems to work best with the Atlas in my experience.

2) **Added the Cumbria designs VFO stabilizer**, following the recommendations of PA0FRI and OZ2QL (http://www.xs4all.nl/~pa0fri/Mods/Atlas215/AtlasEng.htm). I ended up using a modified mounting method proposed by PA0FRI inside the chassis, which is completely and easily removable without any new hardware modifications to the radio. Choosing the wiring method proposed from OZ2QL (direct connection to the VFO cap via a 2,2 pF cap).

   Would like to thank PA0FRI for his very helpful info on the subject, but in my experience, installing the BC 547 amplifier in its input created frequency instability and loss of frequency lock on voice peaks in the 10m band. Simply feeding the VFO stabilizer directly from the Atlas 210x VFO output (from the ext osc socket) solved the problem without any adverse effects.

   In my other Atlas 210M, the control circuit was installed in parallel to the "Dial Set" front panel variable cap. This makes the process much simpler since one does not have to open the VFO compartment.
   In both rigs, the stabilizer LED was installed so as to show at the left upper corner of the VFO display, which looks pretty good and does not require any irreversible hardware mod to the radio.

   Note: Even before adding this upgrade, the VFO in my unit was truly impressively stable after a few minutes warm up. It was **at least as stable as the VFO of my TR4 radio**, but came to stability after 5 minutes operation compared to the TR4 needing at least 30 minutes of warm up for similar behavior. Anyone owning a TR4 knows how stable that rig's VFO is after warm up, better than the one in the later TR7 model ! In any case, improving this to a rock solid crystal controlled VFO through the X-lock only made it perfect.

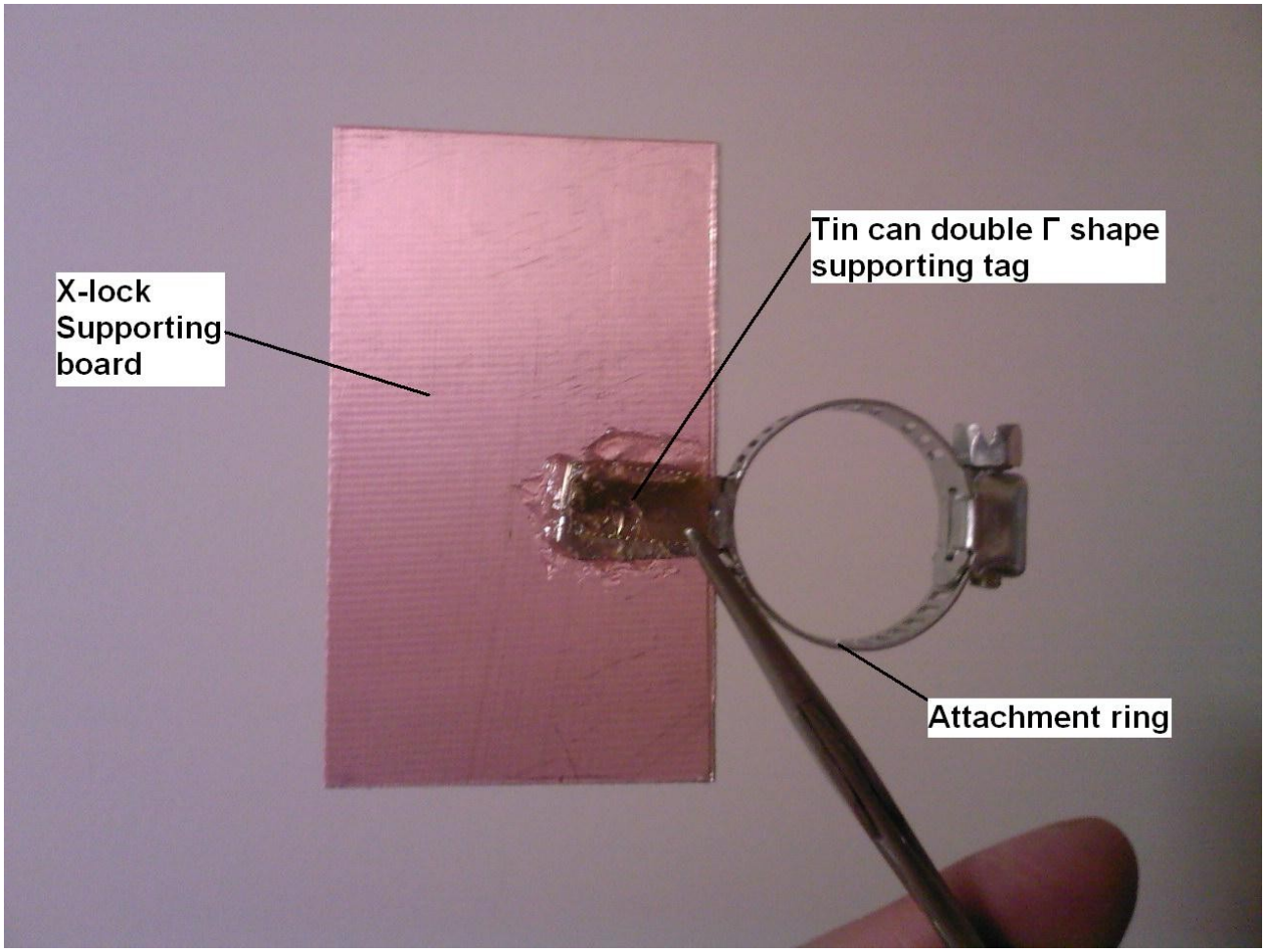
3) **Replaced the 1N4148** diodes in the 1st and 2nd mixers with 1N5711 Scotchy ones. This made a very significant difference in improving the signal to noise in Rx, especially the change of the 1st mixer diodes.

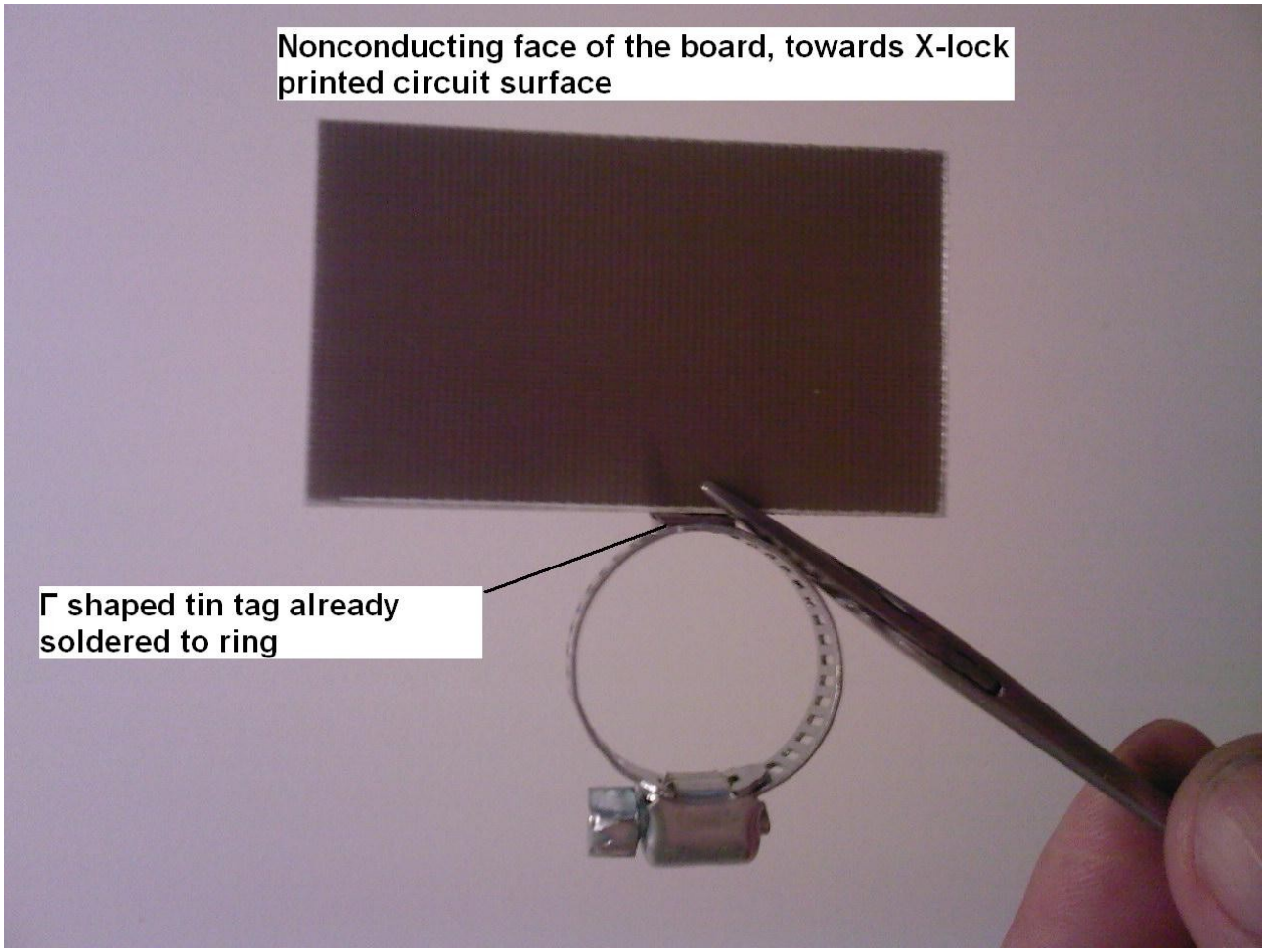
To aid the use – installation of this X-lock circuit for other interested hams, given the limited “free” space there is within the 210x and the need to do it in a way as friendly as possible to the radio's originality while still in a secure and circuit safe way, I am attaching some self explanatory photos of the project in my 210x LE. For an introduction to the X-lock design, circuit and installation instructions, please refer to the original article by PA0FRI at
http://www.xs4all.nl/~pa0fri/Mods/Atlas215/AtlasEng.htm

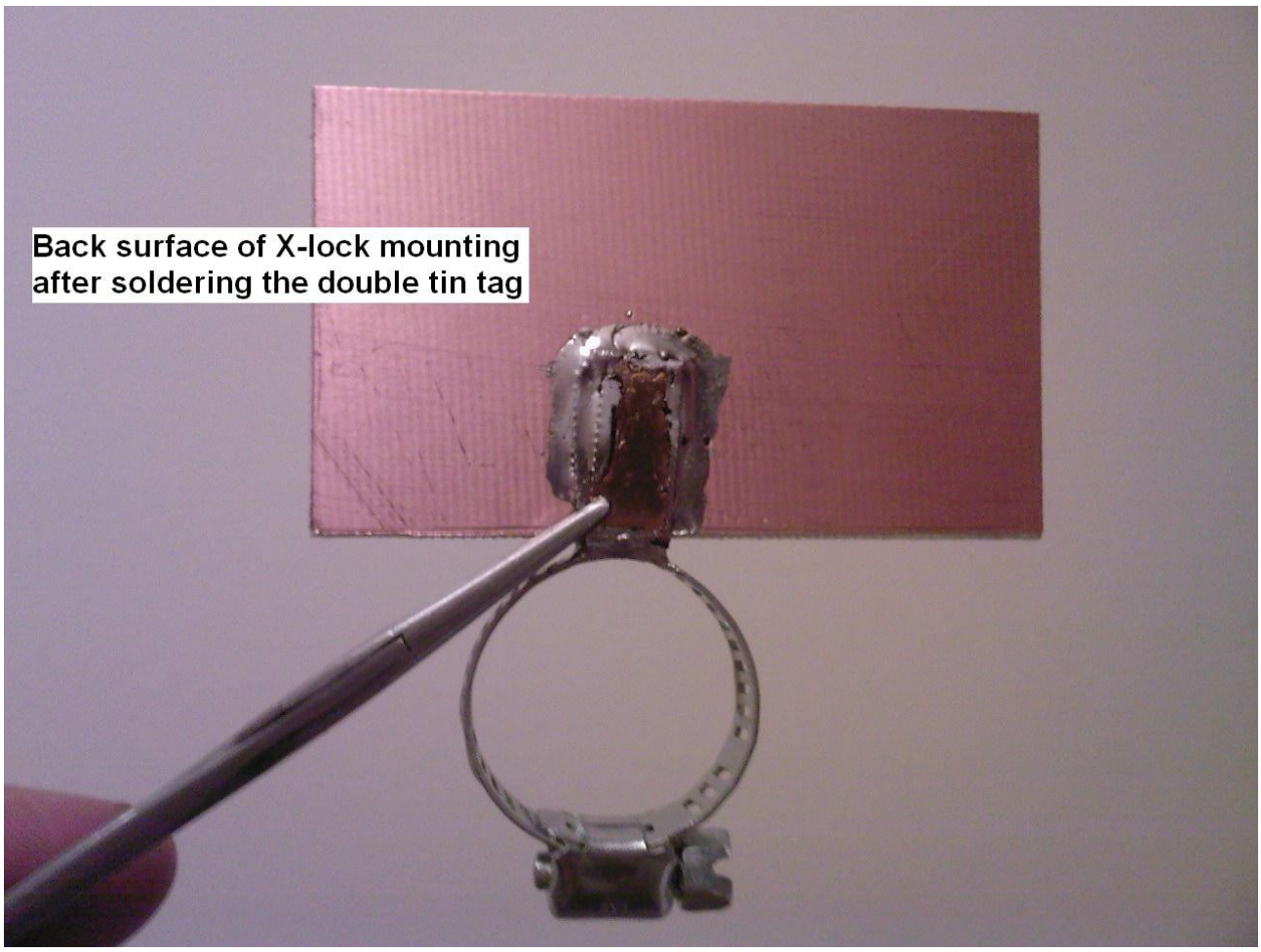
Conclusion: The atlas 210x is a very capable radio which despite its age can be restored and enhanced with relatively limited technical equipment and knowledge available to the average ham due to its simplicity of design and readily available parts.
The proud owner will be rewarded with a solid Rx-Tx which can provide many more years of good service without the useless gadgets of present day radios. Sometimes these little wonder boxes can be purchased for a.....song!!
I would like to thank everyone providing support for this project, especially the people at the Atlas yahoo group http://groups.yahoo.com/group/atlas210x-215x/messages ,and
http://atlas.wireless.org.uk/manuals.htm who over the years have made their technical expertise and other resources (manuals, service bulletins etc) available for public use.

73 to all,
Marinos, sv9dru / ki4gin

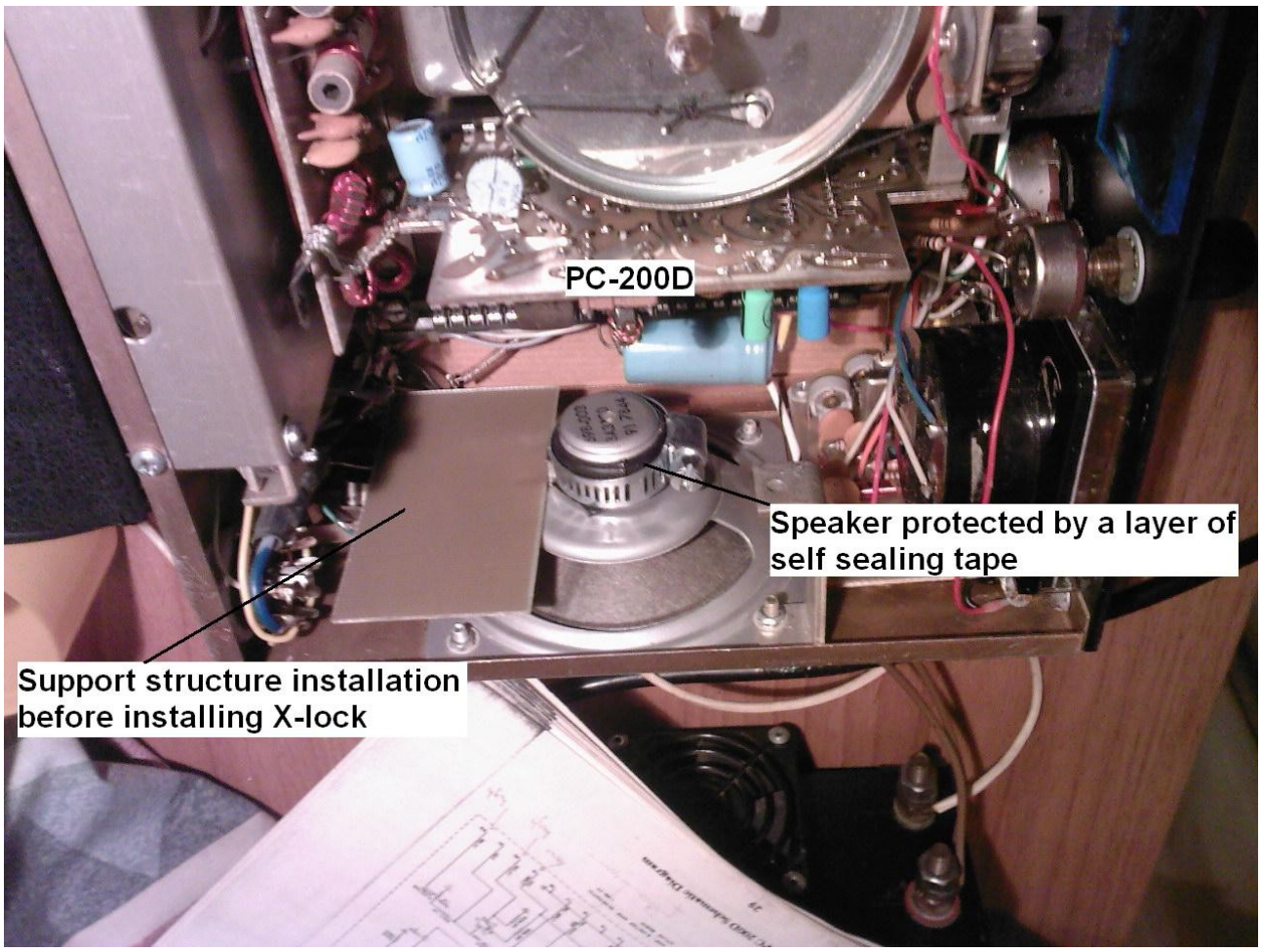
Installing the Cumbria designs X-lock stabilizer to the 210x. A Greek twist to the PA0FRI project.

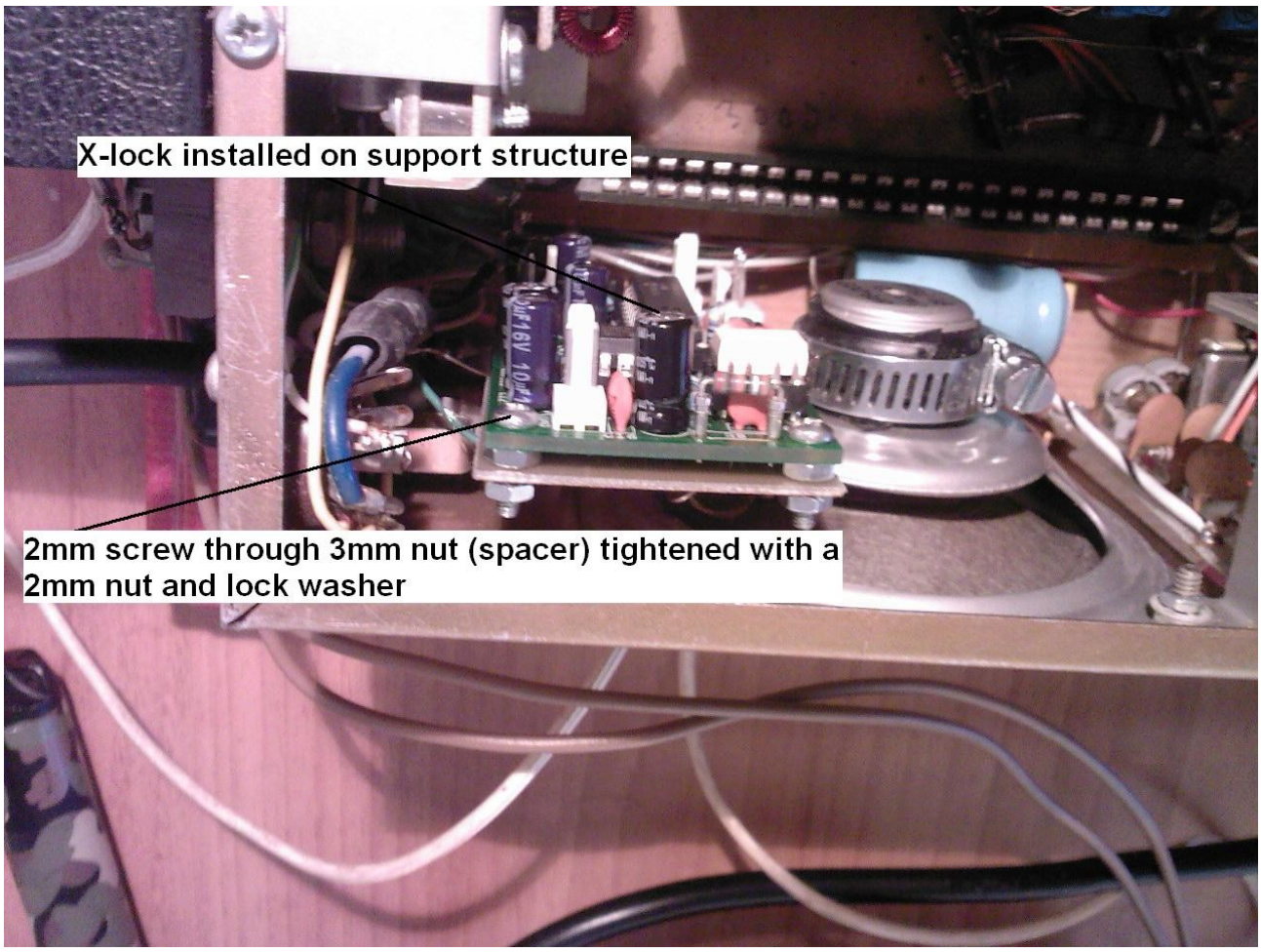


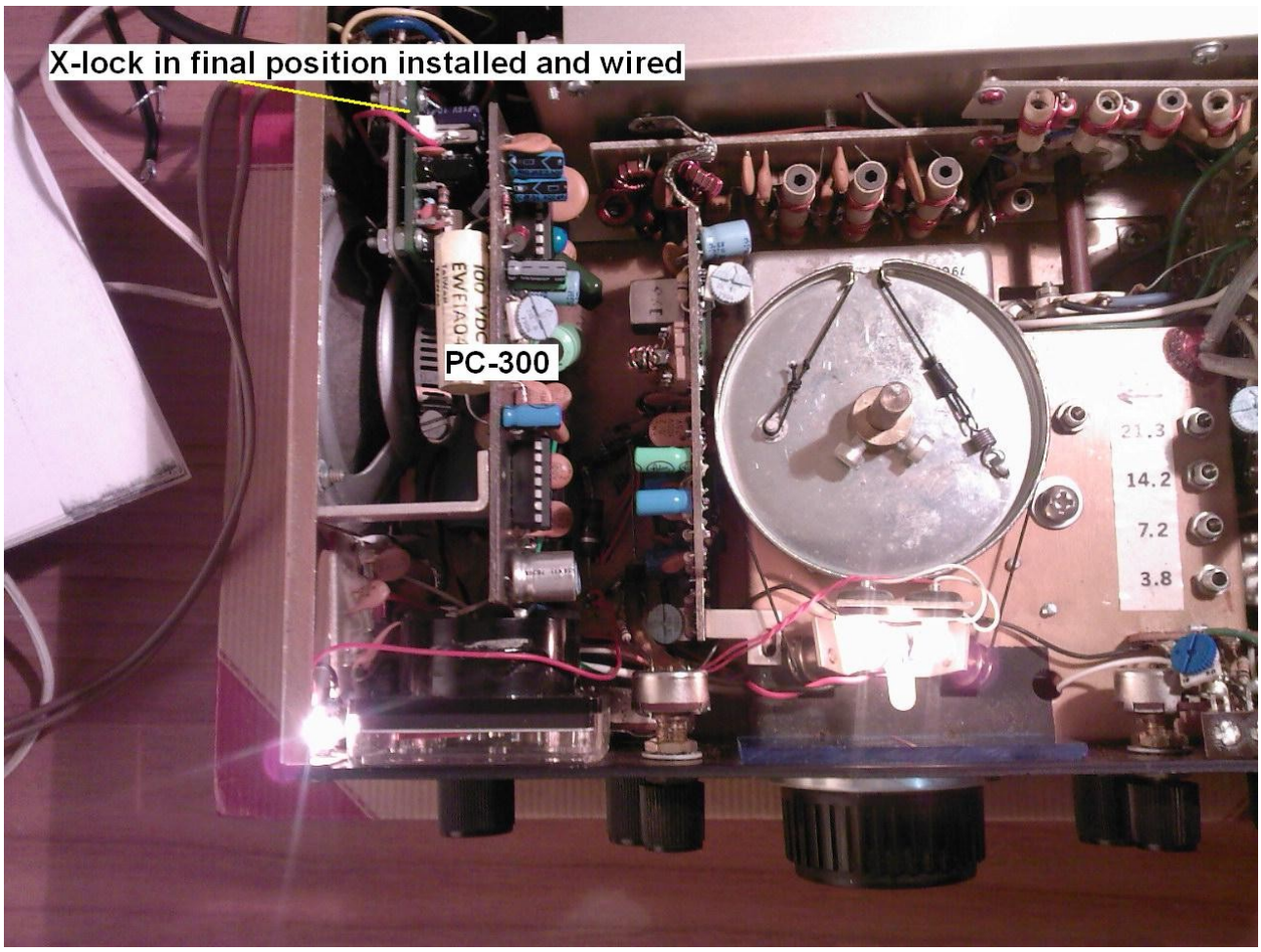

Nonconducting face of the board, towards X-lock printed circuit surface
Γ shaped tin tag already soldered to ring

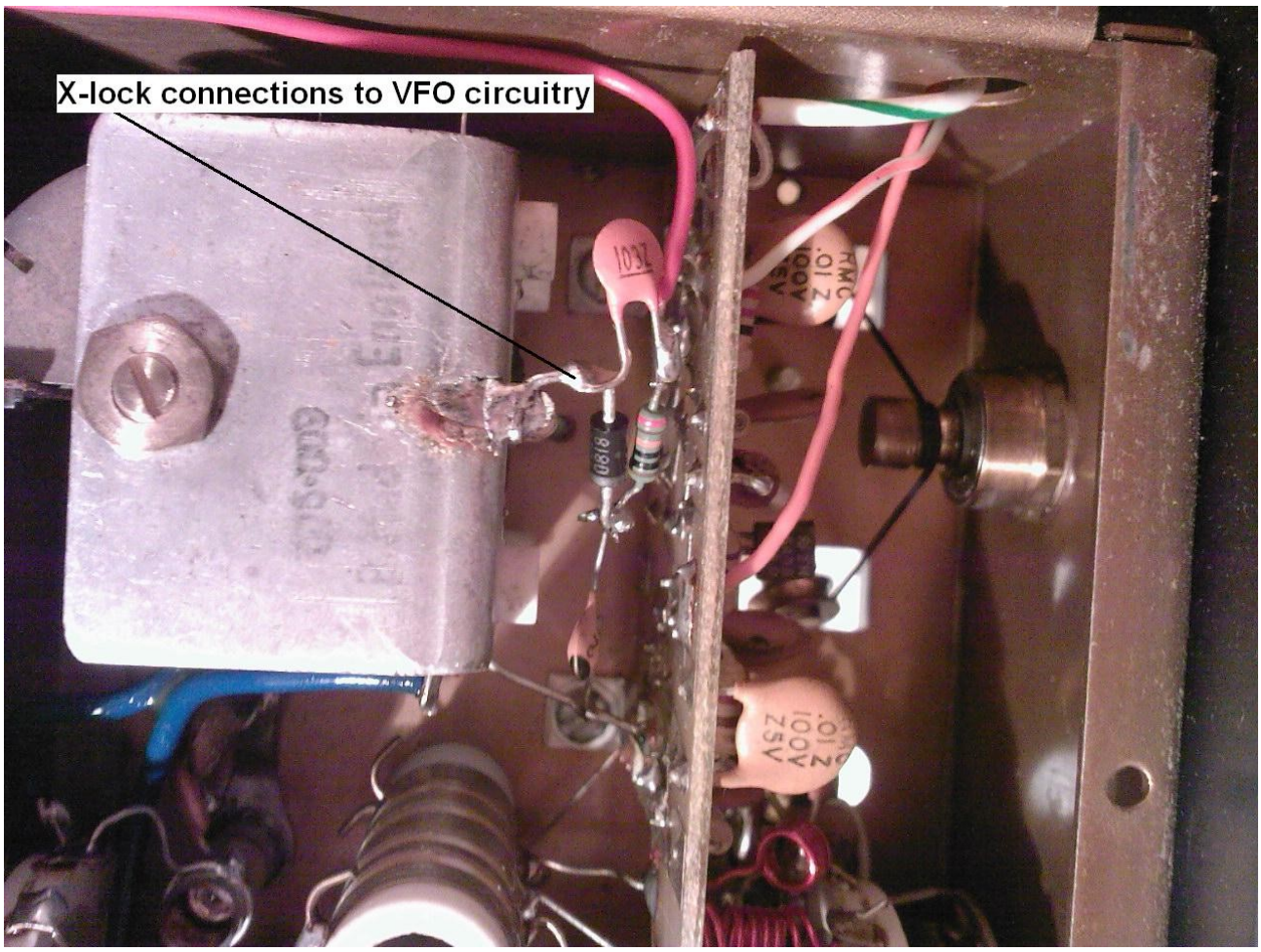

Back surface of X-lock mounting
after soldering the double tin tag

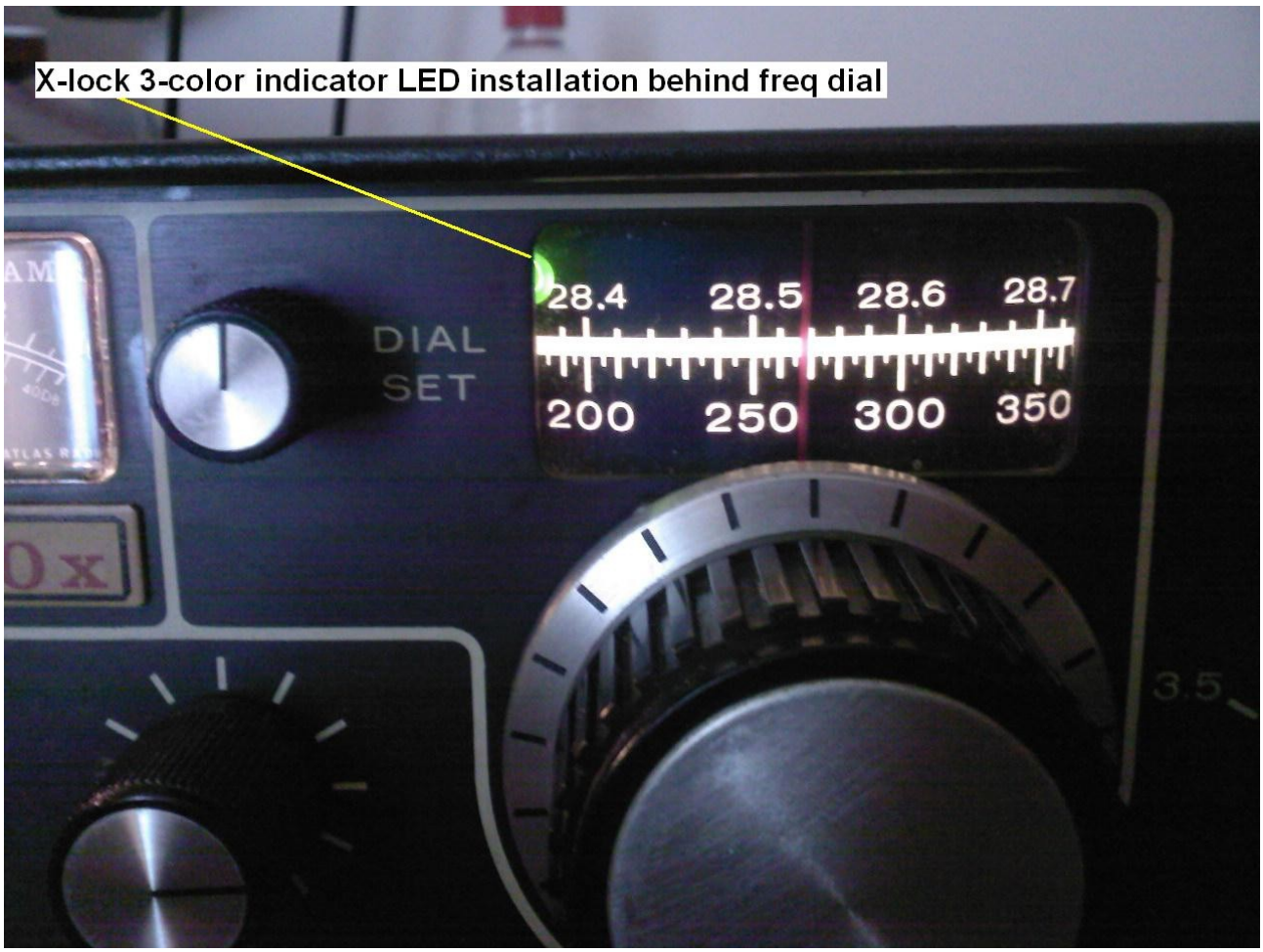
Simple tools used for making the X-lock support


PC-200D
Speaker protected by a layer of self sealing tape
Support structure installation before installing X-lock


X-lock installed on support structure
2mm screw through 3mm nut (spacer) tightened with a
2mm nut and lock washer


X-lock in final position installed and wired
PC-300
21.3
14.2
7.2
3.8


X-lock connections to VFO circuitry


X-lock 3-color indicator LED installation behind freq dial
DIAL
SET
28.4
28.5
28.6
28.7
200
250
300
350
3.5

Atlas 210x Limited Edition after repair and restoration. Excellent Rx-Tx in a small package