THE KA7OEI FT-817 PAGES ERRATA AND OMISSIONS OF THE OPERATING AND SERVICE MANUALS AND OTHER FT-817 “QUIRKS”

November 8, 2020 Israel Banini Technology Leave a comment

Credit: KA7OEI

Important Notice – Please read this warning:

This document describes procedures that could result in voiding of the warranty of your radio.

TOP POSTS & PAGES


The KA7OEI FT-817 pages Errata and omissions of the operating and service manuals and other FT-817 "quirks"


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Scary things that can happen at sea


SLOW COOKER CHEESY BACON RANCH POTATOES

It also describes procedures and modifications that, if not precisely and properly carried out, could result in a radio that does not work or is damaged.

Furthermore, while reasonable efforts have been made to assure the accuracy of this information, it is possible that there are some errors, or that your (or my) radio is of a slightly different version and thus, differences may exist.

It is assumed that anyone following suggestions made on this page is already thoroughly familiar with the technologies and techniques involved and possesses the necessary skill and knowledge to make their own judgment as to the appropriateness and validity of the the information.

If you choose to do any of the procedures outlined, you do so at your own risk. You are solely responsible for any damage, voiding of warranty, or other harm that may come about by following these procedures.

Further information – The following technical information may be found at this site:

- **FT-817 Schematics.** These schematics are translated from the .PDF files originally found on the FCC web site.
- **Circuit description of the FT-817.** This is a version of the circuit description, different from that found in the ‘817s service manual.
- **FT-817 Radio modifications.** This page details some minor modifications to the FT-817. *(Some of the information contained on that page was formerly on this page.)*

For reference, my FT-817 is the standard USA version with the first 4 serial number characters being **1D21**.

Abstract:


Heavy Weather Strategies When Sailing a Catamaran


Options for mastering your Band-in-a-Box album


Yaesu FT-857D Review - STILL Best Mobile Transceiver?


Instant Pot Pot Roast


FT-857: HF Mobiling - N6PET - My Ham Radio Journal

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Anyone who has taken a close look at the FT-817 operating or service manual has likely noticed that there are a number of errors. This is particularly noticeable in the service manual where, if the printed instructions were followed to the letter, the result would likely be a radio that functioned poorly.

Also to be included are a few operational “issues” having to do with possible design and/or manufacturing defects, or just a few things that don’t work as one might expect that they should. These include:

- The presence of birdies in the FT-817’s receiver.
- ***(I’m sure that this list will get bigger. Send an email to me if you wish to contribute…)***

Service Manual Errata:

Note: This section will probably be expanded as more information is gathered. This information is with respect to the manual printed in 2000 with the bar-code number (on the back cover) of E13779000. The number “0011G-0K” also appears in the lower-left corner on this same cover.

Another note: Yaesu has apparently revised their service manual. I would appreciate knowing how some of the procedures in the revised manual have been changed. Also, let me know if there are some new, improved errors in the revision.

Alignment Errata and comments:

- Pg. 16 – **Carrier Balance Adjustment, step 2:** This step is easily done by monitoring on *another* SSB/CW receiver that is loosely coupled to the FT-817’s output. *Do not connect the receiver directly to the FT-817’s output!*

- Pg. 16 – **SSB IF Adjustment, step 5:** Adjust for **MINIMUM** voltage
- ***Comment:*** If the **SSB IF Adjustment** step was completed, the next step, **FM IF ALIGNMENT** is unnecessary.
- Pg. 17 – **Noise Blanker Adjustment, step 2:** Adjust for **MAXIMUM** voltage. ***See below for additional information and a revised procedure.***
- Pg. 18 – **CM Coupler Balance Adjustment, all steps:** These steps may be done using FM. Use high power.
- Pg. 18 – **CM Coupler Balance Adjustment, steps 2 and 3:** To assure best performance on HF and 6 meters, it is suggested that once **TC3003** is adjusted, that re-does this step on 6 meters and other HF bands, as well as observe the reading on the front panel (with the meter switched to **SWR** mode) to make sure that the reading is minimized. It should be possible, after a bit of trial and error, to find a setting of **TC3003** that provides a reasonable compromise on all HF bands ***and*** 6 meters.

Software Menu Alignment Errata and comments:

Signal in dBu	Signal in dbm	Signal in uV		Signal in dBu	Signal in dbm	Signal in uV
3	-110	0.71		25	-88	8.9
5	-108	0.89		32	-81	20.0
6	-107	1.0		36	-77	31.5
9	-104	1.4		39	-74	44.6
10	-103	1.6		86	-27	1000
12	-101	2.0				

- **Before going through this procedure, record *each of the 76 settings*. If you screw things up, this will allow you to restore them to what they were before you started.**
- **Note that just by reading menu item #17 you will likely screw up your voltmeter calibration!** Be prepared to re-calibrate the radio’s voltmeter ***if*** you press the “F” key. If you do not wish to change the voltmeter calibration, exit the menu by shutting off the ‘817.
- Before starting this procedure, it is recommended that you go to the following bands and set the following frequencies. This

will save you from having to go into and out of the alignment menu to adjust them later:

- 1.909 MHz
- 7.010 MHz
- 21.105 MHz
- 51.050 MHz
- 145.940 MHz
- 440.000 MHz

- Note carefully that some steps require pressing the **A** key to set/calculate/save a setting. Note also that when done with the entire alignment, one must press the **F**unction key to save the settings: Turning off the power without doing this can result in lost settings.
- Yaesu (and other Japanese manufacturers) use a signal calibration based on dBu where 0dBu represents 1.0 microvolts. To convert dBu to dbm, **subtract 107** from dbu. Refer to the table for a handy list of dBu versus dbm/microvolt values.
- Pg 19 – **FM S-Meter Adjustment:** As described, this alignment will result in the FM S-Meter having a useful range of 15-20 db. The circuitry (on my ‘817, at least) is capable of much more than that, so I used a setting of **39 dBu (-68 dbm)** for step 3. It may be worth verifying that the S-meter range is not “compressed” at the higher signal levels (i.e. more db per step.)
- Pg. 19 – **FM Center Meter Adjustment, steps 1-2:** This step is rather confusing, so do it this way instead:
  - Tune the receiver to 145.940 (where you already set it)
  - Set the signal generator to 145.937. (Note that any frequency may be used – except 76-108 MHz – as long as the signal generator is set 3 KHz *below* the receive frequency.)
  - On step 3, press the **A** key several times and note the “average” value from several key presses and use it. Note that you can set any value you like by rotating the tuning knob.
- Pg. 20 – **FM Center Meter Adjustment, steps 3-4:** Do as in steps 1-2, except set the signal generator 3 KHz *above* the receive frequency.
- Pg. 20 – **FM Squelch Adjustment:** Again, I would recommend pressing the A button several times and setting the average.
- Pg. 20 – **FM Squelch Adjustment – Note:** If you want to increase the range of the squelch control (that is, if you want to be able to fully open the squelch all of the time) then settings of menu items 15/16 may be decreased slightly.
- Pg. 20 – **Power Supply Voltage Adjustment – Note:** This step does ***not*** require that you operate the radio from precisely 13.8 volts. It does, however, require that you accurately know

the supply voltage. To perform this step, multiply the voltage by 10 and round to the nearest integer and set this parameter to that number. For example, for 10.37 volts this would be 103.7 which is rounded up to 104.

- ***Note:*** *If you use the supplied power cord for the FT-817, it is of light enough gauge that the voltage reaching the radio may be 0.1 volts or so low, causing the display to read slightly high when a heavier cable is used.* This isn't a big problem, but it is something of which you should be aware.

- Pg. 20 – **Over-Current Protection Adjustment – Note:** The procedure described does ***not*** work as described ***unless*** you first do the following for each of the “bands” (i.e. HF1, HF2, HF3, 50M, VHF, and UHF):
  - Go to the “Hi” power adjustment for the band in question (i.e. #24 HF1-HI, etc. in the **RF Power Adjustment** step) and note the setting (which you should have already done before you started.) Set this value to 255.
  - Then, go to the corresponding TX Gain adjustment (i.e. #48 HF1TXG, etc. in the **TX Gain Adjustment Step**) and note its value – then set it to 255 also. (This “Hi” and gain adjustment is also required for the corresponding settings on HF2, HF3, 50M, VHF, and UHF.) This allows the FT-817 to run “wide open.” If this is not done, you cannot get enough RF output in order to “trigger” the overcurrent protection.
  - **Note:** It is possible to overdrive some of the RF amplifier stages with excess gain. If you can't get the 7.0 watts out on a particular band, adjust the appropriate gain parameter (e.g. HF1TXG) downwards a bit and see if excess drive is causing the amplifier chain to “fold back.” ***Warning: It is possible to get up to 15 watts out of the radio during this procedure, so be aware that you may be stressing components! Minimize the amount of time during which you are running such high power!***
  - After doing the **Over-Current Protection Adjustment** procedure, proceed with the **RF Power Adjustment** and **TX Gain Adjustment** procedures – or reset them to their original values.
  - ***Note:*** Although the procedure calls out keying the transmitter using CW, it is possible to change the mode to FM while in “calibrate” mode and key the transmitter with the microphone to accomplish this step.
  - ***Comment:*** The preliminary version of the FT-817 service manual specifies setting the output power at which the overcurrent protection is set as being 6.0 watts. *(Would*

someone please let me know what the revised version of the manual says?)

- Pg. 20 – **RF Power Adjustment:** Although the procedure calls out keying the transmitter using CW, it is possible to change the mode to FM and key the transmitter with the microphone to accomplish this step.

- Pg. 20 – **TX Gain Adjustment:** Although the procedure calls out keying the transmitter using CW, it is possible to change the mode to FM and key the transmitter with the microphone to accomplish this step.
- Pg. 20 – **Power Meter Sensitivity Adjustment:** Although the procedure calls out keying the transmitter using CW, it is possible to change the mode to FM and key the transmitter with the microphone to accomplish this step.
- Pg. 21 – **Reverse ALC Adjustment:** Although the procedure calls out keying the transmitter using CW, it is possible to change the mode to FM and key the transmitter with the microphone to accomplish this step.

Birdies in the FT-817:

Like any radio in which multiple frequency sources are used, the FT-817 has its fair share of “birdies”. “Birdies” are (usually) weak signals that may appear in the receiver on various frequencies – generated within the receiver itself – and they usually take the form of a CW carrier. This section isn’t intended to provide an excuse for them, but rather to (somewhat) explain their existence and how to minimize them.

These birdies are a result of the (inevitable) interaction between various circuits within the radio. While careful design and attention to shielding, bypassing, and layout can reduce these, it is nearly impossible to build a modern receiver that is completely devoid of them. The small size of the ‘817 makes avoidance of birdies even more of a challenge than with “full-sized” rigs.

It should be noted that some later production runs (at least those serial numbers starting with 1D21 – maybe earlier) of the ‘817 include some minor component additions (usually chip capacitors) that reduce the intensity of many of the birdies.

Fortunately, very few truly strong birdies exist within amateur bands on the ‘817. ***How*** you operate your ‘817 can ***greatly*** influence how many birdies you can hear and how strong they are.

Here are a few tips on <u>maximizing</u> your annoyance with birdies:

- Use an antenna connected directly to the radio. There are a few birdies that are (apparently) generated by the microprocessor (a.k.a. CPU) in the radio – and the CPU on *this* radio is in the front panel. If you insist on connecting an antenna directly to the front of the radio, ***you will*** hear *more* birdies than otherwise. An example of this is the noise near 36.82 MHz (plus or minus a few 10’s of KHz – you might have to look for it.) If you tune this noise in and then connect the rubber duck antenna to the front connector (don’t forget to select it, first…) it will become remarkably stronger! Why? The CPU and antenna are within ***inches*** of each other.
- Place your antenna as close as possible to the ‘817. A number of the birdies don’t actually get into the internal circuitry of the radio: They can “escape” through the microphone connector/cord, power cable, and any accessory/data cables. If you insist on running your ‘817 right next to your antenna, ***you will*** pick up some of these birdies. The fact that you probably won’t have a very good ground plane when operating in the manner probably doesn’t help things.
- Tune around on the ‘817 in CW/USB/LSB mode (with no antenna connected) and see how many weak birdies you can hear. You will be amazed! Now, try this with ***any other*** modern HF rig. You will be amazed! Birdies come with the territory, unfortunately.

Some people have been disappointed with the ‘817 in terms of the number of birdies that it appears to have. I would suspect that some of the worst effects are experience by those using an HF/6 Meter/VHF/UHF antennas that connects directly to the ‘817 on the front BNC connector. As mentioned above, this is the ***worst case*** scenario for hearing birdies on this, or ***any*** radio. I’ll bet that if you were to take your “home” HF rig and slap an antenna right on it (with no ground plane to speak of…) you’d

hear more birdies on that, too (not to mention “birdies” from your computer, your TV, your VCR, your…)

One thing to keep in mind about birdies on HF frequencies is that they are usually so weak that normal atmospheric noise will cover them enough that they won’t cause difficulty with communications. Let’s take as an example the well-known birdie on 40 meters on approximately 7.238 MHz (how’s ***that*** for a band with no undesired carriers?) When tuning this in with no antenna connected, this birdie sounds quite strong. But (on my ‘817, at least) it is under 1 microvolt in equivalent strength (less than S1.) If I connect the radio to an antenna, this birdie is pretty much lost under atmospheric noise.

Now, were I using a mobile antenna or one of those collapsible whips that attach directly to the ‘817, the birdie would seem to be much stronger. Why? Two possible reasons: The relatively poor antenna (face it, you aren’t going to get a mobile or a collapsible BNC-mounted antenna that works anywhere near as well as a full-sized dipole) doesn’t hear the signals on the band as well as a full-sized antenna – including atmospheric noise. Also, an antenna that is mounted directly to the radio (besides being inefficient…) is more likely to pick up signals emanating directly ***from*** the radio.

Speaking of the ‘7238 birdie, where does it come from? It would appear to emanate from the BFO synthesizer, Q1031. The fact that adjusting the PBT causes this birdie to shift would tend to validate this theory. Another theory proposes that this signal is somehow related to harmonic of the 22.625 MHz reference oscillator interacting with the LO/IF in some manner.

No significant birdies were noted in the 2 meter band. Here are a few more of the stronger birdies and their possible sources. Note: These were noted using CW mode :

- 21.71344 MHz, S7. This is 910 KHz below the reference frequency – suspiciously twice the 2nd IF away.
- 22.625 MHz, below S1. This ***is*** the master reference frequency in the radio.
- 35.3916 and 36.8136. These are both at least S4. Judging by their sound, these would appear to be generated by the CPU itself.
- 39.641, S8. I’m not sure where this one comes from, but I’m glad it isn’t in a ham band…
- Starting at approx. 108.00678 and extending through 142 MHz or so there are some very weak birdies every 285 KHz. These

appear to be related to Q1031 as they shift frequency with a change in the PBT setting.

- 113.125, S5. This is the 5th harmonic of the 22.625 MHz reference.
- 135.750, <S1. The 6th harmonic of the 22.625 MHz reference.
- 429.875, <S1, The 19th harmonic of the 22.625 MHz reference
- 436.0272 – S4, 113.8847, 150.3275, 426.134 – S1, 128.8333, 130.4496, 134.8385, 424.0823, 424.8587 – <S1, ‘Dunno…
- Starting at approx. 420.2346 there are some very weak birdies approximately every 768 KHz. These may also be related to Q1031.
- There are certainly others, but I think that this covers the ones that are likely to be annoying. If you want to add some to the list, then send an email to me.

What do I think about the ‘817?

Despite what has been said on this page, I ***really do*** like my ‘817 – warts and all. I might point out that like any complicated piece of equipment, it is unreasonable for anyone to “get it all right” the very first time – and I’m not overly concerned. Also, one must keep in mind that this is ***not*** the top-of-the-line radio. Cramming thus much “stuff” into such a small volume is likely to require a few compromises. No if someone ***doesn’t*** learn from feedback and/or their mistakes and improve their future products, *then* I start to worry…

Work continues on this page – please revisit soon!

Yet another notice: The information contained on this and related pages is believed to be accurate, but no guarantees are expressed or implied. The information on this and related pages should be considered to be “as-is” and the user is completely responsible for the way this information is used. If you find information that you believe to be incorrect, please report it in the comments section.

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