

Improving the Frequency Stability of the IC-9700 Without an External 10 MHz Reference

by

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Parts Needed

- Fan 80X80X25 mm, 12vdc .2 amp...Search Amazon or EBay for 8025 fan.
- DIN Plug 8 pin
- 50 Ohm 2-watt resistor, or something around that value.
- Screws, M4 X 55mm, 4 needed. (Amazon or EBay)

Discussion and Instructions

There are two ways to improve the frequency stability of the IC-9700.

- Fix 1 requires going into the radio. You must install a 6.8V Zener diode in the radio. This fix, however, may void the warranty. See <https://www.mods.dk/> if interested in the diode fix.
- Fix 2 This does not require going into the radio. My idea was to add an additional fan on the back of the radio fan to accomplish the same results. The second fan is powered from the 8 pin ACC socket on the back of the 9700. A 50? ohm 2-watt resistor is placed in series with the +13.8vdc on pin 7 of the ACC connector. This will supply voltage to the fan around 6vdc. The value of the resistor may need to be adjusted for the loading of your fan to obtain the 6 volts drop across the resistor. The fan will be very quiet at the lower speed, but it will help stabilize the radios reference oscillator during transmit (see *test results*). The main fan on the radio will work as designed, as no change has been made to the radio circuit.

See IC-9700 basic manual page 13-1 for the pinout of the ACC connector. Pin 2 ground, pin 7 13.8vdc.

With a 10 MHz External Reference or GPS disciplined

An external reference oscillator is the best option to fix the stability problem, but **both the external reference and the added cooling fan is needed in some cases**. Some 9700's will drift out of range of the synchronizing circuit in the 9700. It appears the frequency drifts off faster

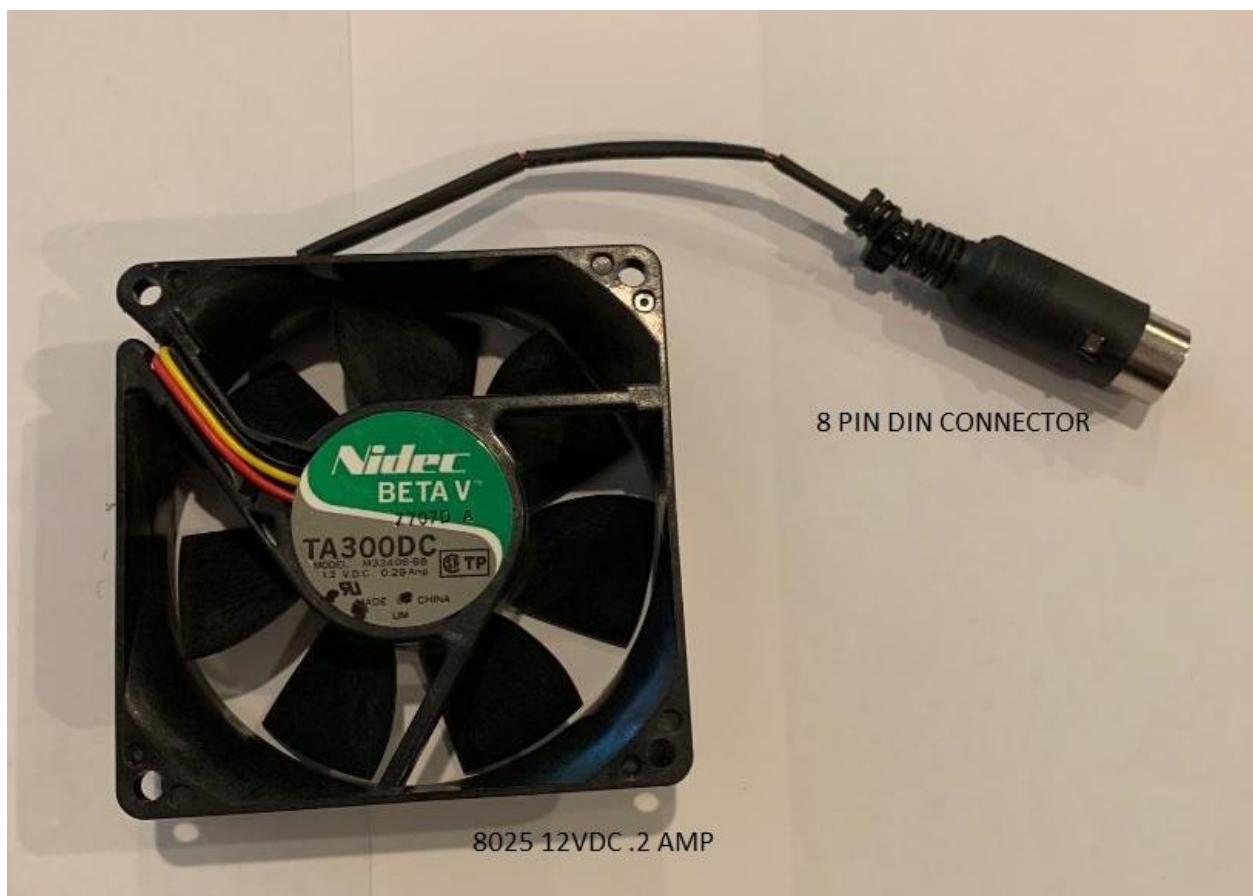
than the radio's sync circuit can keep up. When the fan plus the external reference is added, there was no problem. My radio was one of the later production models and it did not require the fan to stay in sync with the external reference. A factory mod may have been done later in manufacturing. **All radios need to be on the latest version 1.23 for the external sync to work.**

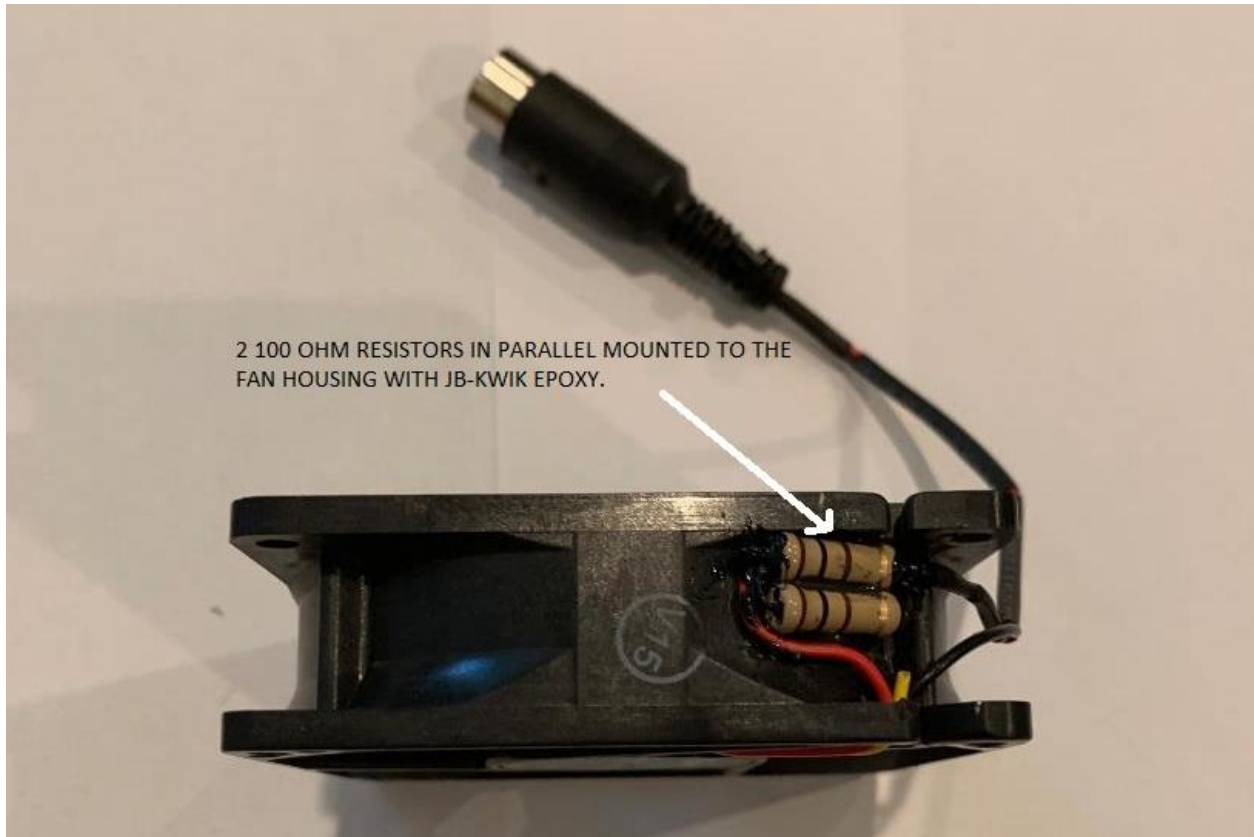
Here are the test results of an IC-9700 that had the drift problem requiring the fan to stay synced with the external reference. Notice that the frequency stability is much better even without the external reference.

Test Results

- IC-9700 on 2m 144.174 FT8 power 100% for 5 minutes or longer.
- Without the fan and no external reference. 25 Hz drift.
- With the added fan and no external reference 3 Hz drift.
- With the external GPS reference there was no noticeable drift.

See pictures below of the added fan.





2 100 OHM RESISTORS IN PARALLEL MOUNTED TO THE FAN HOUSING WITH JB-KWIK EPOXY.



Fan mounted on the IC-9700 and powered by the ACC connector. Notice the additional fan is mounted on the back of the IC-9700 fan with the M4 55mm screws. The fan will run continuous, low speed while the radio is on.