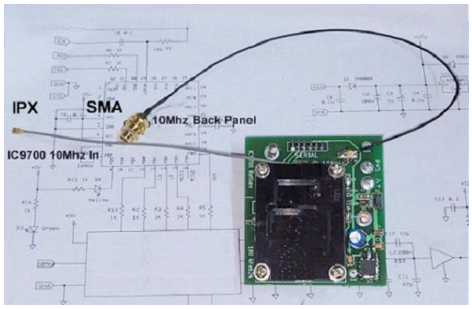
Introduction

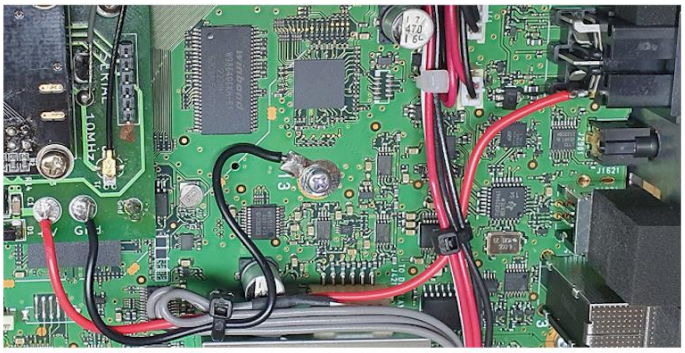
The RefGen-9700 module provides injection lock of a IC9700 to an external 10MHz reference generator such as the GPS Disciplined Reference GPSD-2 (see CLUB SHOP – City Of Brisbane Radio Society inc.)

The RefGen-9700 generates a stable 49.152MHz signal and couples this injection lock signal into the IC9700 reference oscillator TCXO. The module mounts internally, mountings on existing screw locations. The injection coupler is mounted on the back of the module and is precisely located within the TCXO shield. The 10MHz external reference connects to the RefGen-9700 via the existing rear panel SMA connector location.



To allow the IC9700 “Auto Sync” function to remain operational and to support the RefGen-9700 injection synchronizing, a new cable with IPX connector connects the external 10Mhz reference via the RefGen-9700 to the IC9700 EXT-IN (JB8801 IPX jack).

The RefGen-9700 operates from the radio’s supply of 13.8V dc. The current drain at start-up is less than 150mA. V+ (red) wire is soldered to the auxiliary 8pin DIN connector pin 7 and Gnd (black) if soldered to a eyelet lug under screw 13 (see below).



Prep for Installation

While this step is not critical, it does allow the OCXO “Ref Adjust” values to be determined and noted. If it is not intended to run the external 10MHz Reference continually, setting these values ensures the RefGen-9700 will injection lock without auto sync “Sync to REF IN”.

Connect the external 10MHz Reference to the IC9700. Power on the radio in its normal operating position and allow time (say, 20mins) for the radio to stabilize in temperature.

Set the auto sync as per the Set Up procedure (page 3). Note the Coarse and Fine % values.

Installation

Remove the screws on the bottom cover of the IC9700 and remove the cover.

Remove the external 10MHz reference in connector from the Reference-In on the PCB and undo nut securing the rear panel 10MHz (SMA) connector. Remove the existing external 10MHz cable.

Remove the two screws (#10 & #12) from near the temperature compensated crystal oscillator (TCXO). These locations will be used to secure the RefGen-9700 module.

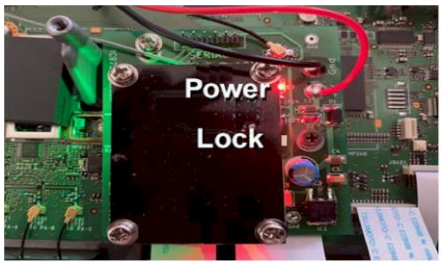
Remove the four screws securing the top PCB from the RefGen-9700 module (round head screws). Remove the top PCB by pulling straight up. Place top board on a static safe surface (metal or conductive).

While carefully inserting the coupler device into the TCXO shielded enclosure, position the RefGen-9700 module over the screw locations #10 & #12 and secure the module with two longer screws provided. Locate the top PCB over the lower and carefully insert the interconnecting pins in the headers. Secure the top PCB with the four round head screws.

Insert the SMA connector in the radio's rear panel, apply the washer, and tighten the nut. Fit the IPX connector to the radio's reference-in jack. The IPX plug is placed over the jack and press down firmly until it clicks into place. **Do not force**.

Solder the red to the rear 8pin DIN jack (auxiliary) as in photo on Page1. Fit the solder lug on the black wire under the screw #13.

While the bottom cover is removed, apply power to radio and switch on. Power Led on module should be lit.



Connect external 10MHz reference to the radio and note the Lock LED lights.
Refit radio bottom panel and secure.

Power on the radio in its normal operating position and allow time (say, 20mins) for the radio to stabilize in temperature.

Setup

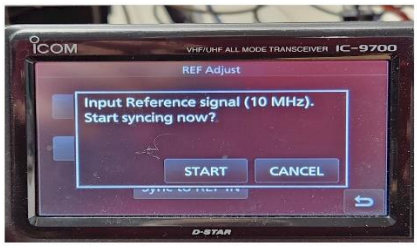
Power on radio with 10MHz reference applied. To check the radio TCXO is set to frequency:

- Press <Menu>; then <Set>.

- Press <Function>; and navigate up / down to display the “Ref Adjust” screen.

- Touch the selected “Ref Adjust” bar to display the coarse and fine adjustment screen.

- Press “Sync to REF IN”



- Then press “Start” in response to the “Start syncing now” prompt.

- After a short delay the “REF Adjust (synchronizing to REF IN)” will display. Displayed values are expected to be around 50.0% Fine 50%. +- a few %.

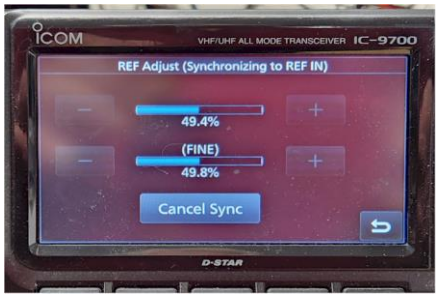
- Press “Menu” to return to the main screen.

The injection lock will then be operational.

It is recommended that the external 10MHz reference is continuously operating. This ensures the 10MHz reference is warmed up and stable when the IC9700 is turned on. If not, the IC9700 will detect the 10MHz is off frequency and advise “SYNC to Ref failed” and require the above procedure to be repeated when the 10MHz reference is stable.

The alternative if the external 10MHz reference is not on continuously, the “Synchronizing to REF IN” should be cancelled and remain off. The previously noted coarse and fine % may be set to those values and the auto sync may remain off. If the auto sync is turned off and the ambient temperature changes greatly, auto sync should be checked from time to time.

If the external 10MHz Reference remains on continuously, the auto sync may be turned on. No further adjust will be necessary. The IC9700 Auto Sync will keep the radio TCXO in the range of the injection synchronization.



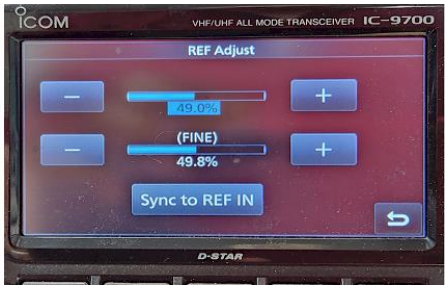
Compensation by the auto sync may be check at any time on the “REF Adjust (Synchronizing to REF IN) screen, as in the above photo.

Operation check

If you are interested, the correct operation of the injection locking may be checked by cancelling the auto sync as below.

Tune to a stable signal e.g. GPS lock beacon on any band in USB so the audio is centred in the bandwidth, say, 1000Hz.

Proceed via the <Menu>, <Set>, <Function>, to the Ref Adjust screen. If the auto sync is turned on, press <Cancel Sync>. Note the coarse and fine values.



Press the coarse <+> in steps until the tone of the beacon starts to wobble. Note the displayed value.

Press the coarse <-> in steps until the tone of the beacon starts to wobble. Note the displayed value.

The average of the coarse % in these steps should be approximately the value noted when the auto sync was cancelled e.g. between + of 55% and 45%, the REF Adjust should be set to the average, e.g. 50%.

Return the coarse value to that noted in auto sync or the average noted above. Auto sync may then be restored by pressing <Sync to REF IN> and responding “yes”.

Conclusion

Happy hunting! 😊

Any comments or questions to VK4AMG@wia.org.au or vk4wiecbrs@gmail.com

Please recommend the products [CLUB SHOP – City Of Brisbane Radio Society inc.] to your associates.

73
George

VK4AMG

Revisions

9 Mar 2024 First Draft	
17 Mar 2024	Revise photos Add “Preparation for Setup”
08 May 2024	Revise installation and photos