

Xref Versatile

Yaesu FT-736R Installation Guide

1. Overview

The XRef Versatile is a replacement Reference Oscillator for a variety of amateur transceivers, intended to be installed internally within the radio.

The board takes a 10 MHz reference signal from a GPS reference or other high-accuracy source and generates a precision reference for the radio. It also provides a backup in the case where a 10 MHz source is not available.

In the case of the Yaesu FT-736R, the Reference Frequency is 20.480 MHz.

The version of the XRef that should be used with the FT-736R is the Xref-VT with onboard TCXO. This completely replaces the radio's own reference oscillator with the TCXO being used when the external 10 MHz reference is not connected.

2. Technical Specifications

Connections for the board are shown in Figure 1 below.



Figure 1 – XRef Connections

Connection	Description	Specifications
VIN	Supply for Xref	5 to 16 V 20 mA for XRef
VOSC	Not Connected	
RF	Reference frequency out to Radio.	Radio dependent
10 MHz	10 MHz Reference Input	0 to +15 dBm (0.5V to 3.6V p-p)

3. Installation

Remove the radio covers.

Locate the "Tx Unit PCB" and, using a CRO or other means, measure the RF level at J01 "Ref Out". It should be about 1V peak to peak.

Unplug 11 PCB connectors, remove 4 holding screws and remove the "Tx Unit PCB" from the radio.

Remove the original 20.480MHz Ref Osc. (see Figure 2) from the "Tx Unit PCB".

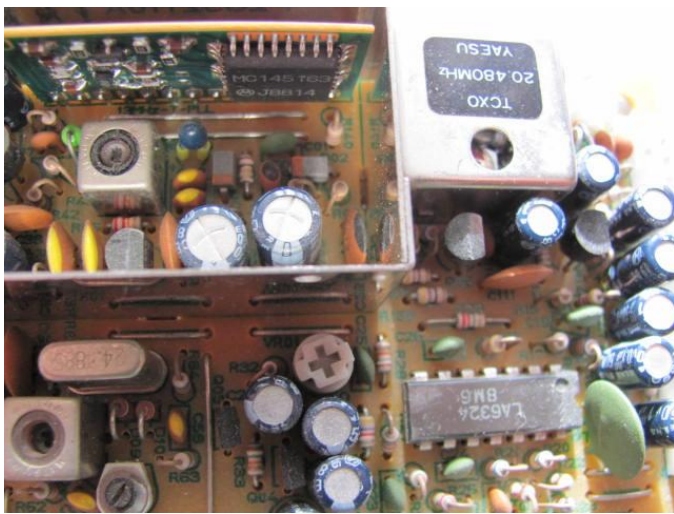


Figure 2 – Before and After View of Ref Osc Removal

The XRef is mounted to wires soldered to the shielding frame that is around the 13MHz PLL (see Figure 3). This places it directly above the spot where the original Ref Osc was and allows short wires to drop down and be soldered into the connection points that the original Ref Osc used. (Obscured in the pictures)

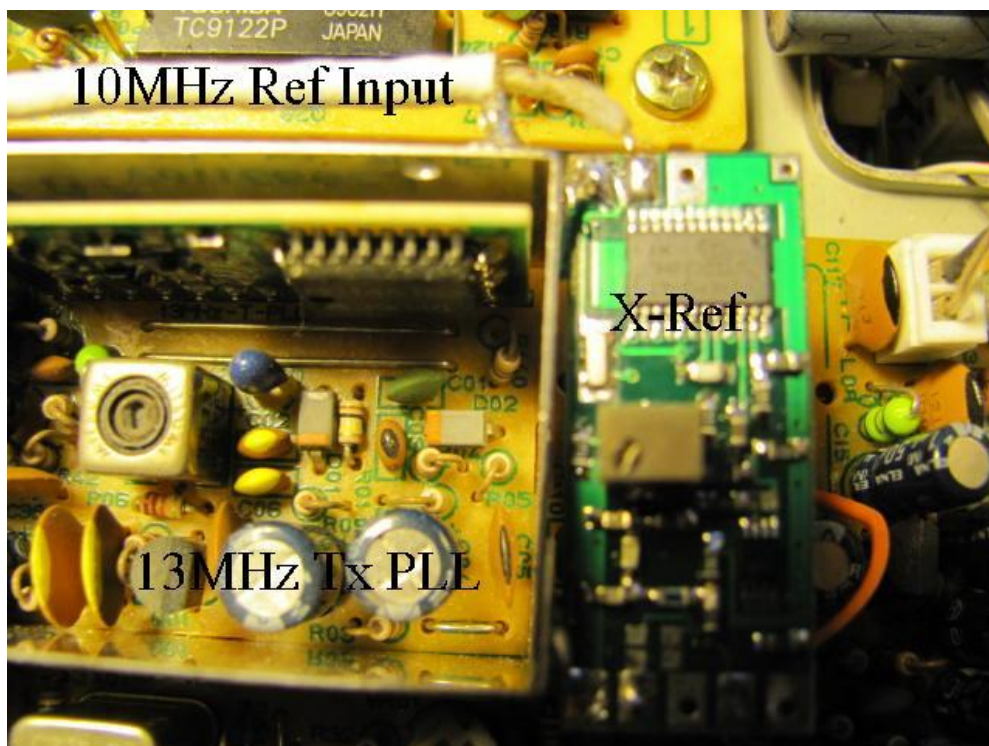


Figure 3 – Xref Installation

After installing the XRef, again check the level at J01 “Ref Out” which should be close to same. If the level is substantially greater, a small value capacitor can be used in series with the XRef output to the connection point. Start with say 47pf and adjust to suit.

Mount a suitable connector for the 10 MHz input to the back panel and run a length of thin coax cable to the XRef.

Before putting everything back together, you might want to do some preliminary testing. Connect a 10 MHz source to the rear panel connector and check that the radio is working correctly. Turn the radio off, disconnect the 10 MHz source, turn the radio on again and check that it is still working.

Finally, re-assemble the radio and enjoy your new level of frequency accuracy and stability!

4. Operation

The board only tests for the presence of the external reference when power is first applied. Therefore, if you plug/unplug the 10 MHz lead during operation, you must cycle power to the radio for it to operate correctly.

The onboard TCXO was set to the correct frequency during testing. However, the TCXO may drift due to aging during early days of operation. The TCXO frequency is set by the multi-turn trimpot on the XRef board.

It is important that a clean source of 10 MHz be used as a reference. The board is, in effect, converting the signal you are supplying to the reference frequency of the rig, including whatever imperfections there may be. The old adage *garbage-in, garbage-out* applies here.

It is also important that the 10 MHz reference is stable in frequency before the radio is powered up. The synthesiser chip used in the XRef does a self-calibration when powered up based on the actual output frequency. If the reference frequency is varying, this calibration can fail. If using a GPSDO or Rubidium reference, wait for it to lock before switching on the radio.

5. Support

If you have any difficulties, you can contact David Smith VK3HZ either:

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- by telephone : (+613)/(03) 9013 1919