RefGen 1V4 Install IC746Pro IC7400

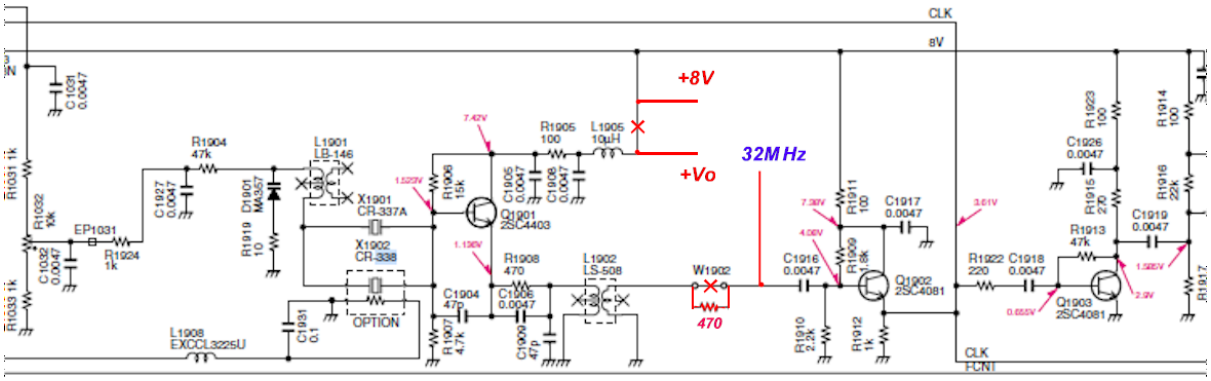
WARNING: The installation of the RefGen module requires excellent skills in modification of radios using extremely small surface mount devices. Where the CR338 high stability module has been fitted, partial disassembly of the refence oscillator section or its shield may be required.

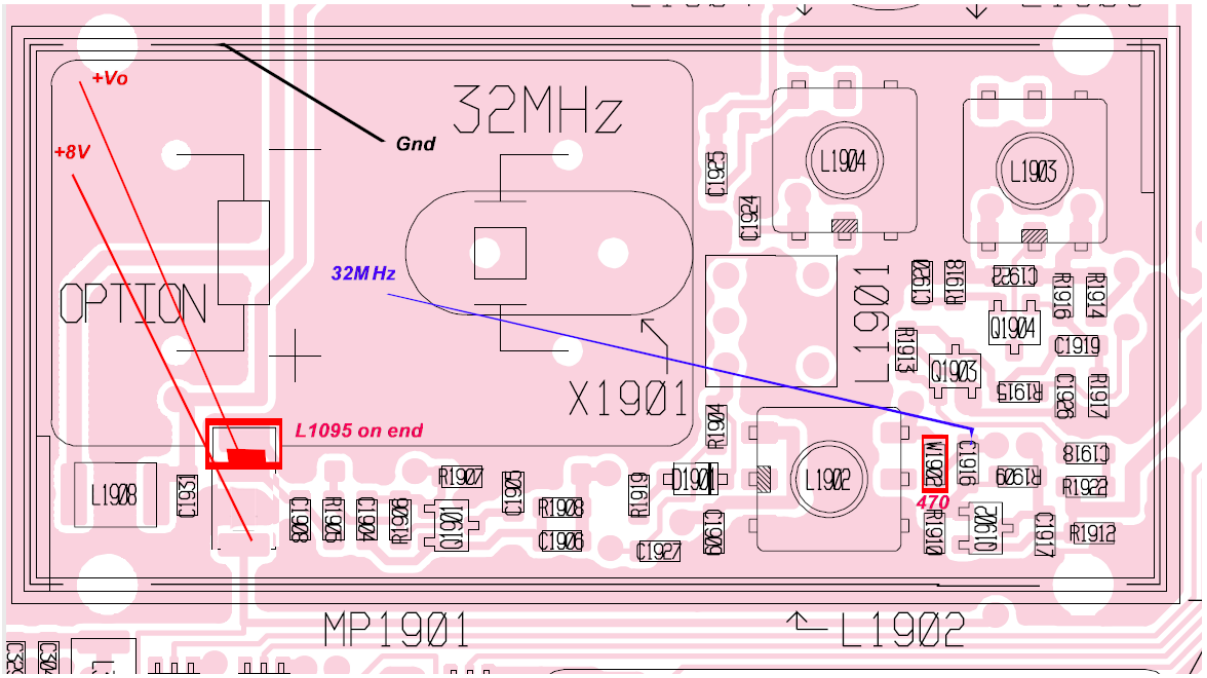
Introduction

The RefGen module, when driven with a 10MHz signal of 0dBm or more, provides 32MHz reference to the IC746Pro / IC7400 PLL circuits. When the 10MHz signal is not available the RefGen is muted and the radio's internal reference CR-338 is powered.

The IC746Pro/IC7400 version of the RefGen module is mounted on the 32MHz reference shield of the radio. Four connections see below are required to the radio. 10MHz is fed to the RefGen from a rear panel mounted SMA connector.

In normal operation, the changeover from the radio's internal reference to the RefGen should be transparent. If the 10MHz signal is removed, a short burst of noise may be heard before the radio continues to operate from its internal reference oscillator.

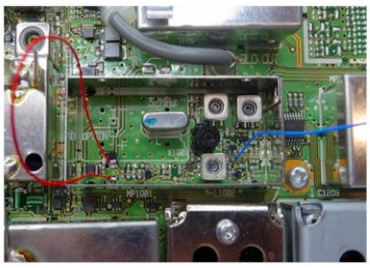
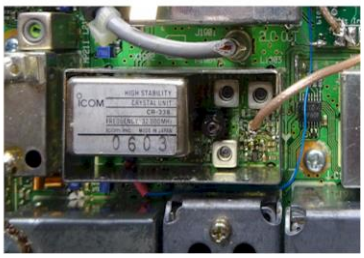




Power for the RefGen is drawn from the +8V supply to the reference oscillator. The controlled +8V for the oscillator is fed to the radio reference oscillator. A feed-point for the 32MHz reference from the RefGen module is the junction of W1902 and C1916. To increase the impedance at this feed point, W1902 (0R 0603 resistor) is replaced with a 470R 0603 resistor. Ground for the RefGen is provided by pigtails soldered to the shield of the 32MHz reference oscillator.

Installation

Access to the 32MHz reference oscillator is achieved by removing the bottom case of the radio and then removing the partial cover carrying the “tuner” connector (left Photo). The centre photo shows the standard crystal reference oscillator. The right photo shows the high stability refence oscillator option.

The partial schematic and the PCB layout on page 1 shows the connection points for the RefGen.

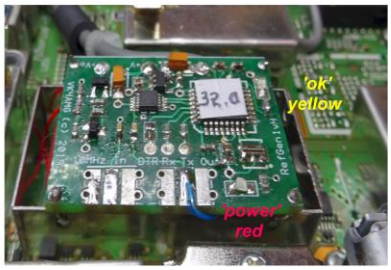
Remove L1908. A fine pointed heat gun and tweezers are recommended. While Icom SMD components are place with a small amount of adhesive, the amount of heat and airflow must be carefully controlled to avoid displacing other components. Where the high stability oscillator is fitted it may be necessary to remove the RF Unit board from the radio and remove either the high stability oscillator or the reference oscillator shield.

Where the high stability oscillator has not been fitted, the L1908 may be refitted on its end to the track to the junction of C1908 and R1905. Otherwise, it is recommended to remove L1908.

A red wire (+V) should be connected to the mounting pad of L1908 nearest the shield. Another red wire (+Vo), the controlled voltage from the RefGen module should be connected to the L1908 on its end or if L1908 is to be omitted to the other pad (junction of C1908/R1905).

W1902 (0R) adjacent to L1902 should be removed and replaced with a 470R 0603 resistor. A blue wire should be connected to the junction of W1902/C1916 or the adjacent test point (refer left hand photo below). Refit the shield and or high stability oscillator module.

Resistor pigtails or similar should be soldered to the reference oscillator shield at the locations of the four holes. These will provide mounting points and ground for the RefGen module (centre and right photos).



The red wire from closest to the shield should be connected to the RefGen pad marked +V (second from the left) and other red wire, to +Vo (see centre photo above).

The module should then be mounted through the corners of the RefGen PCB on the four pigtails from the shield.

The blue wire should be soldered to the centre conductor of the right-most SMA pads, marked 'out'.

The coax from the rear mounted SMA connector should then be connected to the left-most SMA pads, marked '10MHz'.

Testing

Before the covers are reinstalled, the functions of the RefGen module are tested.

When the radio is turned on the 'power' LED ('red') near the 'out' SMA connector should light, and the radio operation should be normal. Supply to the refence oscillator can be checked at the +Vo pad (+8V, withing 0.1V of the voltage at the +V pad).

When the 10MHz reference is applied to the radio, the 'ok' LED near the uP should light.

The internal refence oscillator may be calibrated by comparing the audio tone from a test signal against that when the 10MHz reference is applied. Adjust rear panel Calibrate pot if necessary.

Completion

Reconnect the Tune wiring and refit the internal partial cover.

Replace the bottom (and top cover if removed).

Check normal radio operation.