

## Slow JT9 Modification Kits

These kits have been developed to improve the local oscillator drift of TVTR1 630m Transverters and TVTR2 2200m Transverters. This is necessary when operating the new Slow JT9 digital modes, which have a very tight drift requirement. Rik Strobbe, OR7T, who wrote the software, has estimated the maximum permissible drift for JT9-5, as follows:

- At -5 dB level, a drift up to 0.35 Hz/min seems acceptable.
- At -15 dB level, it is 0.26 Hz/min.
- At -25 dB level, it is 0.24 Hz/min
- At -30 dB level, it is 0.22 Hz/min
- At -34 dB level, (more or less the JT9-5 limit) it is 0.20 Hz/min

Rik's software can be downloaded at [www.472khz.org/SlowJT9/](http://www.472khz.org/SlowJT9/)

The local oscillator used in Monitor Sensors' Transverters is a MEMS oscillator made by SI Time which has a temperature stability specification of +/- 20 ppb/°C. This is very good value, but when operated over a 5 minute transmit period, the internal temperature of the transverter can rise from ambient to over 70°C. This typically results in a drift of 1 or 2Hz, which is outside the limit for JT9-5. This modification does not change the electronic circuit. It simply relocates the local oscillator to a position inside the air intake chamber where cool air is being drawn into the unit. The temperature inside the air intake chamber remains substantially unchanged throughout the transmit cycle, resulting in frequency drifts of typically 0.4 Hz over 5 minutes and 0.7 Hz over 10 minutes. Modified transverters are giving 100% decodes of JT9-5. However it is important to realise that the drift of your transceiver and the drift of the receiving station are equally important. In a recent case, modifying the transverter resulted in more drift. It turned out that, prior to the modification, the transverter had been cancelling the drift of the transceiver. After the modification, the drift in the transceiver was revealed. Before installing the modification kit measure the drift of the transceiver/transverter combination and that of the transceiver alone. Measuring the drift requires a frequency counter and some expertise. Read the document "Measuring Drift" for some hints.

Next proceed to the "Kit instructions" for detailed installation instructions and photos.