

# TT1254 Upgrade Operation Manual

The operation of the upgrade kit firmware has been kept close to that of the original unit shipped from Ten-Tec. For general operation of the radio see the original manual shipped with the radio. This documentation details the differences in usage between the two.

## Tuning Steps

The new firmware does not choose frequency tuning steps, either 2500 Hz or 5000 Hz, based on receiver mode, SSB or AM. It is instead fixed by a menu setting. To enter the step setting menu press the **SPEED** key when in VFO mode. The current frequency step will be displayed. Rotating the tuning knob will increase or decrease through the available tuning steps from a low of 10 Hz to a high of 100000 Hz. Turn to find the step desired. Press the **SPEED** key again to retain this new step setting. If the step is 100 KHz the **FAST** LED will be lit on exit from the menu.

Exact frequency tuning is obtained over the full receive frequency range from 100 KHz to 30 MHz for all tuning steps down to 1250 Hz. Exact 1000 Hz tuning steps are available from 100 KHz to 20.535 MHz. PLL tuning solutions to frequencies with finer tuning steps not in the above range are calculated using a special algorithm. In 98% of all cases a solution is available for the requested exact frequency. If a solution is not available the frequency is not tuned.

## Memory Mode

The new firmware supports 128 memories instead of just 16. It is accessed for saving and restoring in the same manor as the original firmware. VFO mode allows tuning via frequencies. Memory Mode displays memory channel numbers, then after a delay the memory channel frequency. Switching between modes is by using the **V/M** key. A new feature is an alternate exit from the memory channel mode. Instead of pushing the **V/M** key to exit memory mode and return to the last used VFO frequency if the **MW** key is pressed (Memory Write) the mode will return to VFO tuning mode, but with the frequency that was recalled from the last memory channel accessed.

## Memory Write

Pressing the **MW** key in VFO mode brings up a display of the current memory channel pointer. Rotate the tuning knob to select any of the 128 available channels. Press **MW** again to write the current frequency and receiver mode to that channel. The write can be aborted by pressing any other key than **MW**.

Memory writes are disabled for the specific selected frequencies that are not able to be tuned.

Note that the backup power 9 Volt battery is not to be used with the upgrade in place.

## Programmer's Reference Guide

The new firmware supports external computer control. The firmware implements a subset version of Ten-Tec's Orion interface protocol. The link to Orion documentation is:

<http://www.tentec.com/files/565prg%20Rev%201.2.pdf>

This Orion electrical interface and software protocol was chosen because it is straight forward to write host application software to, and there is already available third party software that can communicate with this serial protocol.

The electrical interface is on a DB-9 female connector and is RS-232 using no hardware or software handshaking. The wiring, RX, TX, and ground, are one to one for a connections to a PC or a RS-232 to USB converter. The Orion protocol baud rate is specified as 57,600. This is the default baud rate set in the radio.

The Orion of course has many features not applicable to the 1254 as the 1254 has only a single receiver and no transmitter. The 1254 firmware supports a subset of the Orion command set.

In general for all commands and queries:

Sending a command to either the Main or Sub receiver have the same effect.

Queries from the Main or Sub receiver return the same information.

Many commands are valid but have no effect, and return preset responses. This has been done to allow third party control programs expecting valid responses from an Orion radio to operate. Where possible the fixed responses have been set to values that correspond to the real settings of the 1254 receiver.

## **Support for the Commands and Queries from the Orion Command Set**

### **Restart and Notify**

This command is implemented. It commands via software a hard processor reset. The fixed response on each processor restart is “ RADIO START”.

### **Receiver Modes**

The 1254 supports AM and SSB (both Upper and Lower at once) only. Requesting selection of USB, LSB, UCW, and LCW modes have the same effect: to select SSB. Trying to select FM or FSK returns an invalid command error. Queries return the current receiver mode.

### **Audio Level Controls**

All audio level commands are valid, but have no effect. Queries return a fixed response of 128, half volume.

A future revision of the firmware will use this command to support changing the line output level.

### **Binaural Receive Control**

All binaural commands are valid, but have no effect. Queries return a fixed response of “O”, Binaural receive mode off.

### **Speaker & Headphone Settings**

All speaker and headphone setting commands are valid, but have no effect. Queries return a fixed response of “BBB”, both, both, both.

### **Receive Filter**

All filter commands are valid, but have no effect. Queries return a fixed response of “4000”, for radio's fixed filter of 4 KHz bandwidth.

### **Antenna Selections**

All antenna selection commands are valid, but have no effect. Queries return a fixed response of “MMN”, main receiver, main receiver, not assigned.

## **Frequency Tuning**

All frequency tuning commands are valid and implemented. The one exception is the 4-byte binary frequency mode command. Though this command is coded in the firmware it should not be used due to the possibility of a hex 0x0D in the binary portion of the command being taken for a command string terminator. This is a general error in the protocol specification mixing binary and ASCII together. Ten-Tec in the Orion protocol introduced the acceptance of full ASCII only commands for setting frequency. This encoding method should be used.

All Queries are fully supported, including 4-Byte binary frequency response format.

## **Passband Tuning (PBT)**

All PBT commands are valid, but have no effect.  
Queries return a fixed response of “0”, for zero offset.

## **VFO Lock/Unlock**

The VFO lock and unlock feature is fully implemented. Locking locks out the front panel completely. Only the computer control interface is active. The new auxiliary LED lights to denote the panel is locked. Unlocking reactivates the front panel. A power cycle will also reactivate the front panel.  
Queries are fully supported.

## **AGC Mode Control**

All AGC Mode commands are valid, but have no effect.  
Queries return a fixed response of “S”, for slow mode.

## **RF Gain Control**

All RF Gain commands are valid, but have no effect.  
Queries return a fixed response of “1”, for lowest gain.

## **RF Attenuator**

All RF Attenuator commands are valid, but have no effect.  
Queries return a fixed response of “0”, for off.

## **VFO Assignments**

All VFO Assignment commands are valid, but have no effect.  
Queries return a fixed response of “ABN”, for VFOA to the main receiver, VFOB to the sub receiver, and VFO transmitter to none.

## **Squelch (all mode)**

All Squelch commands are valid, but have no effect.  
Queries return a fixed response of “0”, for 0 dbm.

## **Memory Store**

The Memory Store command is fully implemented. The channel range is 1 to 128.  
There is no query response defined for this command.

## **Memory Recall**

The Memory Recall command is fully implemented. The channel range is 1 to 128.  
There is no query response defined for this command.

## **Noise Blanker, Automatic Notch and Noise Reduction**

All Noise commands are valid, but have no effect.  
There is no query response defined for this command.

## **CW & Keyer Settings**

Commands not implemented. Returns invalid command.  
Queries not implemented. Returns invalid command.

## **Keying Command**

Commands not implemented. Returns invalid command.  
Queries not implemented. Returns invalid command.

## **Microphone Gain**

Commands not implemented. Returns invalid command.  
Queries not implemented. Returns invalid command.

## **Transmit Power**

Commands not implemented. Returns invalid command.  
Queries not implemented. Returns invalid command.

## **SSB Transmit Bandwidth**

Commands not implemented. Returns invalid command.  
Queries not implemented. Returns invalid command.

## **Speech Processor**

Commands not implemented. Returns invalid command.  
Queries not implemented. Returns invalid command.

## **VOX Controls**

Commands not implemented. Returns invalid command.  
Queries not implemented. Returns invalid command.

## **Tuner Controls**

Commands not implemented. Returns invalid command.  
Queries not implemented. Returns invalid command.

## **Transverter Control**

Commands not implemented. Returns invalid command.  
Queries not implemented. Returns invalid command.

## **Signal Strength Control**

There are no commands defined.  
Receive signal strength queries are implemented. Queries for transmit signal strength are treated as a receive signal strength query.

## **Preamp Control**

All Preamp Control commands are valid, but have no effect.  
Queries return a fixed response of "0", for off.

## **Receiver Tuning Step**

The Receiver Tuning Step command is fully implemented.  
The allowed steps are 10, 100, 1000, 1250, 2500, 5000, 10000, and 100000.  
Queries return the current tuning step.

## **Query Response Prefix Character Option**

The command to change the query response prefix character is implemented.  
There is no query response defined for this command.

## **RIT/XIT Setting**

All RIT/XIT commands are valid, but have no effect.  
Queries return a fixed response of "0", for 0 Hz offset.

### **302 Remote Keypad/Encode Control**

Commands not implemented. Returns invalid command.  
Queries not implemented. Returns invalid command.

### **CW Character Send**

Commands not implemented. Returns invalid command.  
There is no query response defined for this command.

Future firmware will implement this command for code practice purposes.



The 270 byte query response frames are in the following format:

A four character query response message **@RMC** that is followed by a status data structure.

```
// Radio Status Header (20 bytes)
//
// unsigned long is defined as 4 bytes of data
// unsigned char is defined as 1 byte of data
//
// multi byte data is transmitted in big-endian format, most significant byte first
```

```
typedef struct tagSTATUS
{
    unsigned long ulFreqVCO;           // VCO frequency
    unsigned long ulFreqMem;          // Memory frequency
    unsigned char ucMode;              // VCO mode
    unsigned char ucModeMemory;       // Memory mode
    unsigned char ucMemory;           // Memory channel
    unsigned char ucJog;               // Step size
    unsigned char ucFlags1;           // system flags
    unsigned char ucFlags2;           // system flags
    unsigned char ucVersion;          // firmware version
    unsigned char ucSignal;           // signal strength
} STATUS;
```

The header is followed by 250 bytes of ADPCM compressed audio.