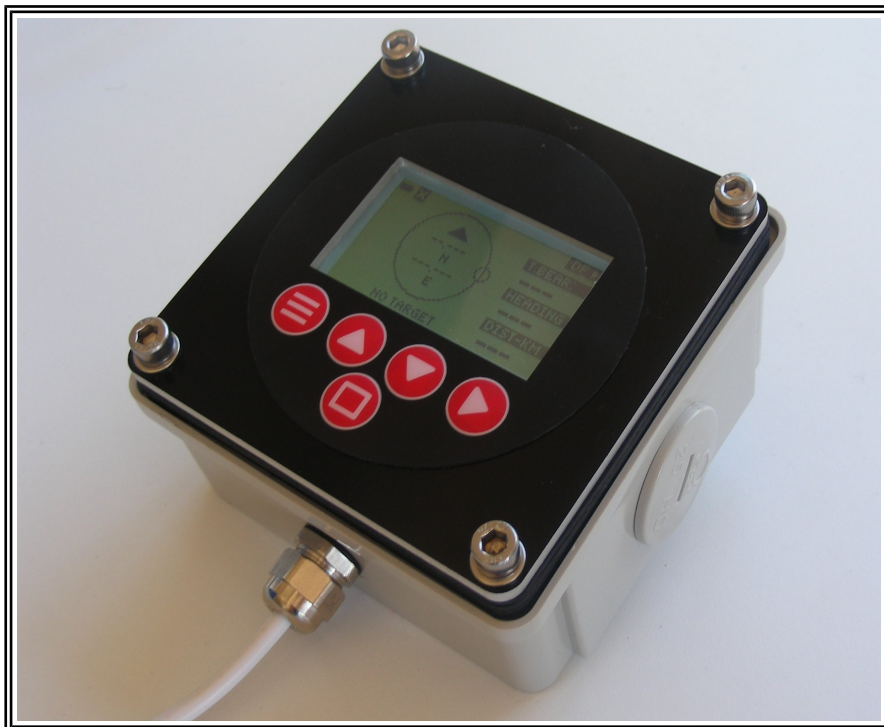


WTE LIMITED

MT-RX Series Receivers



AN004 User Testing Application Note

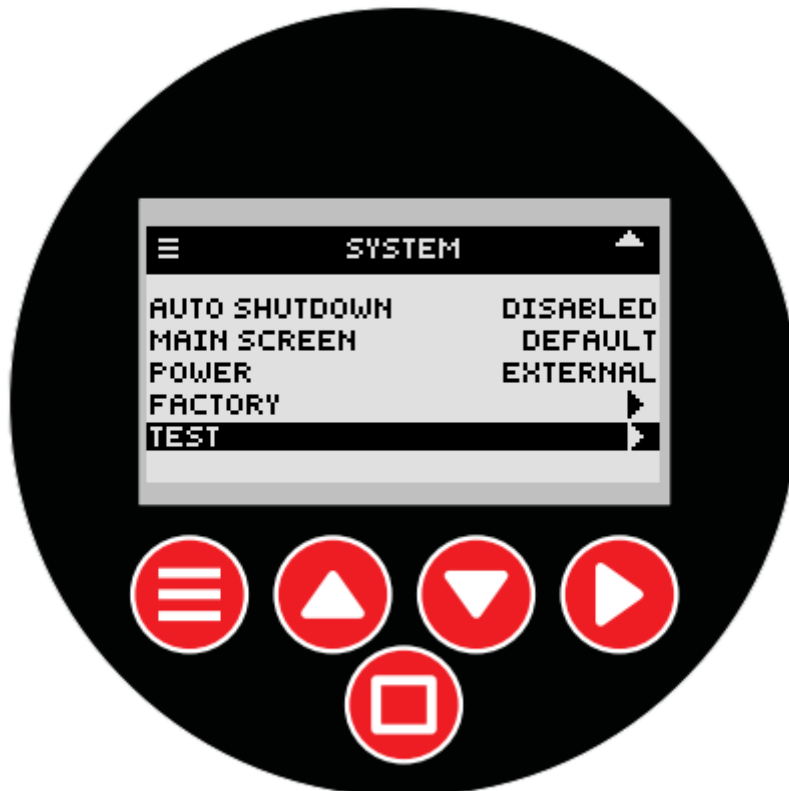
Introduction

This application note describes the test features that have been built into the MT-RX receiver family to allow for testing of receiver sensitivity and also generation of RS232 test output to simplify testing when integrating into other systems.

For information on connecting to the MT-RX read the MT-RX user manual and if appropriate the MT-RX application notes.

Test Feature Operation

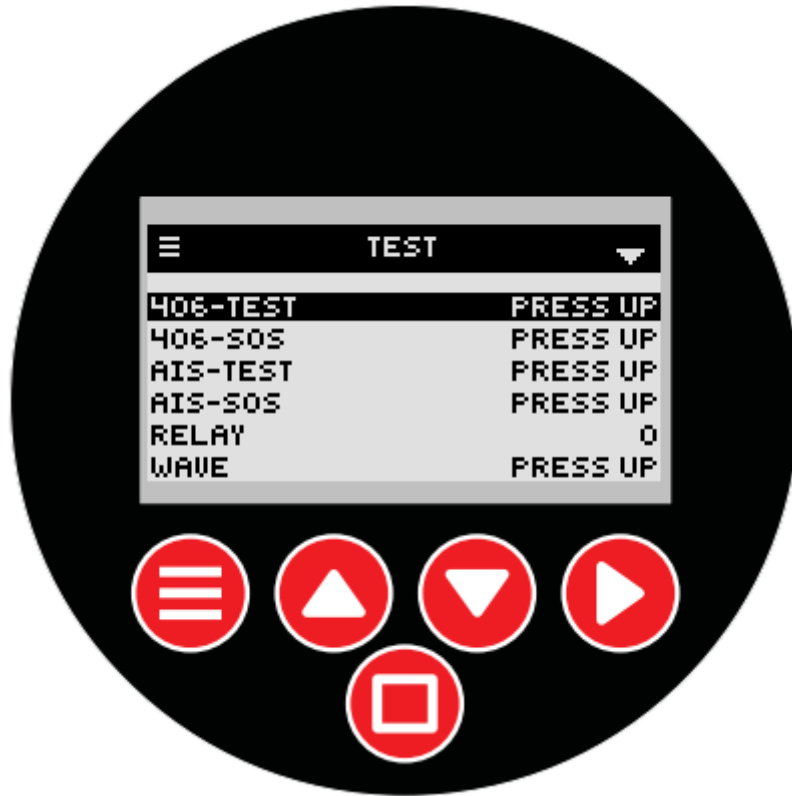
The MT-RX allows for the internal generation of many alerts. This test feature allows for the serial output of a connected system to be tested without the need to wait for actual emergency messages to be decoded that may be infrequent. This particular test feature is only available through the menu system.



This feature can generate both 406 and AIS test, or full alert messages. These messages will be logged to SD card as if decoded by the receiver, and will produce RS232 output as described in the

MT-RX manual.

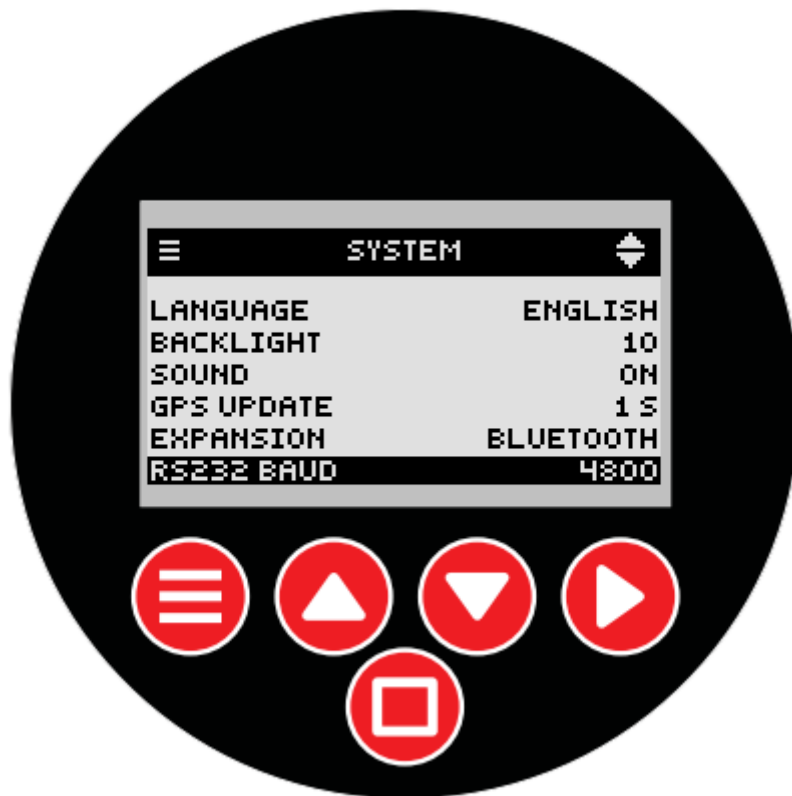
Additionally the relay may be tested and if a speaker has been fitted, playing of wave files from the SD card can be checked.



RS232 Output

406 and AIS messages are decoded and sent out the serial port at RS232 levels.

By default the serial output is at the rate 9600:N:8:1, but if AIS messages are being decoded the default rate is 38400:N:8:1 (as is the case for MT-RX-3 modules). These rates can be changed through modification of the CONFIG.INI file on the SD Card or through the menu interface.



When decoding ALL AIS data for mapping applications, the output rate should be at least 38400 bps, or data is likely to be lost.

NOTE: firmware revision 1.88 onwards does not require an SD card to store configuration data (except for the storage of 406 beacon data).

Receiver Sensitivity Testing

There a factory test option that allows for the sensitivity of each receiver to be verified if using a calibrated radio signal generator.

After using the factory test options, the power to the MT-RX MUST be cycled to restore the unit to normal operation.



406 Testing:

Sensitivity Testing of the 406 Beacon receiver may be tested with the following settings when connected to a RF test set (such as an HP8920B).

- Set Initial frequency to 406.020MHz.
- Set Frequency FM deviation to 4kHz (the MT-RX decodes PSK signals, but the FM signal is sufficient to test sensitivity).
- Set Test modulation signal from test set to 0.4kHz.
- View the modulated signal on the MT-RX oscilloscope view screen.



When a valid test signal is present, the top line will show a clean noise free signal. The bottom line shows the recovered clock.

The test signal can be reduced to approximately a -118dBm level before noise will overwhelm the signal.

The test frequency can be varied from 406.020 to over 406.040MHz confirming that the receiver will operate with 406 beacons operating over this range.

AIS Testing:

Testing is performed in similar manner except frequencies are 161.975MHz and 162.025MHz.

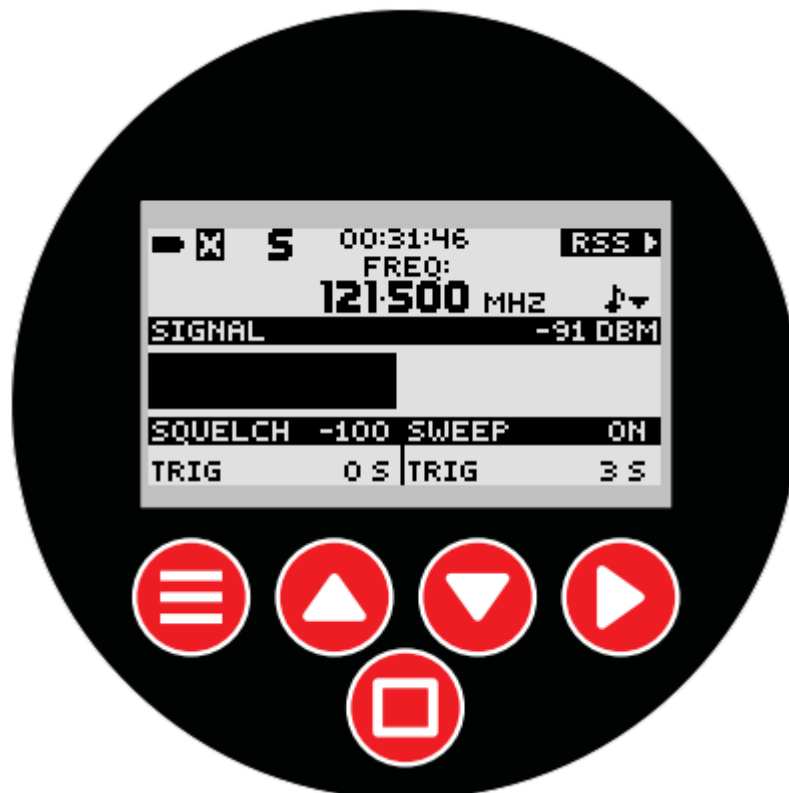
Test signal should be from the test set function generator using a 4.8kHz square wave modulated at 4kHz.

RSS Testing:

The oscilloscope screen shows modulated AM signals.

Set the test set to the configured RSS frequency (typically 121.5MHz). Set AM Modulation level to approaching 100%. Set a test signal of approximately 1kHz (shows between 500Hz and 1.6kHz).

As a more useful test, the front RSS screen can be used to display the signal strength.



406 Beacon Test Commands:

Raw 406 beacon data can be sent into the MT-RX via RS232 as if it had been received as part of a transmission from a 406 beacon. This method allows virtually any test signal with embedded beacon details and position to be used by the developer to confirm the operation of the MT-RX. Examples are below, but for details of constructing these packets the user should consult with the 406 beacon specification. No support will be provided for additional example packets.

The full packet decode for each message decoded under normal operation is stored to the SD card. These may be copied out and using this test command, the operation of the MT-RX can be confirmed again as if the receiver had decoded the message itself.

Packets that begin with FFFED0 are full alert 406 distress transmissions – changing this to FFFE2F will change the transmission to a “Test” transmission – all other parts of the packet including error correcting information remain the same.

Command

***T12**FF FED0A0062C94EE7FDFF975503783E0F66C909D868D000000<CR>

Where *T12 indicates that raw 406 beacon data follows.

Typical response:

MT1001000TL400C5929DCFFBFF23-----N-----E8443

NOTE:

Test messages using the *T12 command will result in 406 beacon messages being logged to the SD card.

example 406 beacon raw transmissions (note that not all 406 beacon transmissions are the same length):

```
FFFE2FA0062C93A9AB959E55EE7788C71B79
FFFE060058CFC3ACA068FABCF90
FFFE2F6004EB28140AA68B369B50
FFFE2FA0027A12B0AB959E46E73788C71B79
FFFE0600720019600000AD29210
FFFE2F600720019600000AD29210
FFFE0A0062C84B37FDFF985D23783E0F66C
```


Live Testing using Actual Radio Signals

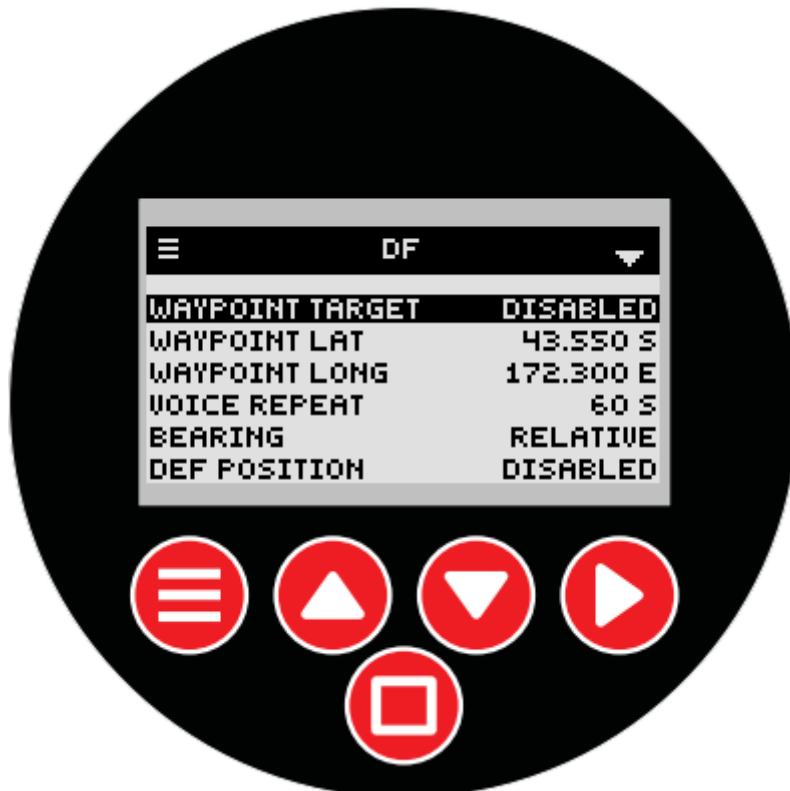
Testing using an actual 406 beacon is possible.

Perform this testing with the 406 beacon FURTHER THAN 2 M from the receiver to prevent damage. NEVER DIRECTLY CONNECT a 406 beacon!! This will result in certain damage to the MT-RX.

Pressing the test button on the beacon will result in the beacon details being displayed on the MT-RX. DO NOT FULLY ACTIVATE the beacon! If full beacon testing is required, either operate the beacon in an RF shielded room or seek permission from local search and rescue services. Misuse of a 406 beacon may result in prosecution!

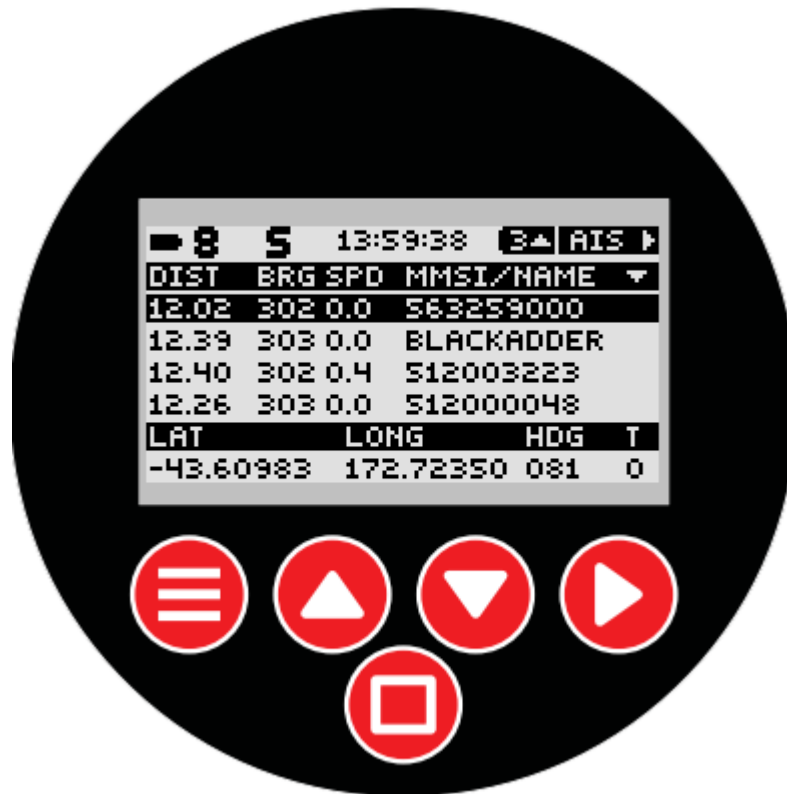
Some beacons will transmit the GPS position on test, some will not. Consult your beacon manual for details. If a beacon transmits position information, it will be displayed on the receiver.

NOTE: in order to determine direction to a beacon, a NMEA signal must be provided to the RS232 port OR using the static position feature, the current location and orientation of the receiver must be set on the DF screen.



AIS Live testing can only be performed with an AIS beacon or alternatively, using an antenna in visual range of any ship greater than 25 tonnes (any active shipping port), view current vessels on

the AIS screen.



Disclaimer

This documentation has been provided in good faith to assist in testing of the MT-RX receiver.

Every attempt has been made to provide accurate information, and examples where provided have been tested. However WST NZ Limited reserves the right to add or remove features without notice.

When supplied, MT-RX modules have been tested but it is the responsibility of the user to ensure that this module is periodically retested, when part of a system, using methods that are deemed appropriate to the system designer.