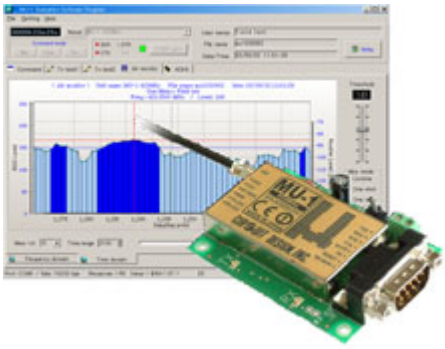
TELELINK COMMUNICATIONS

RANGE TEST OF THE MU-1 FROM CIRCUIT DESIGN JAPAN

PERFORMANCE OF THE MU-1 IN A RURAL ENVIRONMENT



MU-1 Range Test Report By Jack Chomley

CIRCUIT DESIGN HARDWARE SETUP

Hardware used in this test consisted of an MU-1 RIK kit unit, with 3dB ground independent dipole antenna @ 2.5 metres, connected via 3m of RG58 feeder cable. This unit was setup at the shed Tx site for continuous transmission on channel 0 with command @CTON set.
The MU-1 USB kit was setup as the site Rx unit, with a cable fed ANT-01 antenna sitting on the roof of a Toyota Landcruiser, an alloy ground plane was used beneath the antenna.. A Toshiba laptop running the MU-1 evaluation software in 'Air Monitor' mode was used to measure the signal levels at the test Rx sites. A Magellan 315 GPS was used to measure the test path distances.
The MU-1 is a 10mW narrow band, 64 channel radio, operating in the 433-434MHz ISM band.


ANT-01 with alloy ground plane, on Landcruiser roof.


MU-1 USB & Air Monitor s'ware range test setup


MU-1 RIK Tx via half wave dipole @2.5 metres

TEST ENVIRONMENT

The test environment is a rural location, typical of the Rockhampton Queensland local area, with undulating hills and reasonably dense cover of Ironbark trees. There was NO line of site path between any of the test sites. Photos depict site locations where tested.

RUNNING THE TEST

The test was carried out in fine, but cloudy weather on 3/08/05. The shed Tx site was set running and I proceeded to the first test1 Rx site. The path to this site is not line of site, the photo taken is in the direction of the shed Tx site, you can see a small ridge close to the Windmill/Tank that slightly obscured the path, another higher ridge is in the path but cannot be seen from this site. The test1.jpg is the screen grab of the 'Air Monitor" software. Received data in 'command' mode was uninterrupted. The distance was 1.1 kilometres.

The next test was test2.jpg at 1.16 kilometers, this site was slightly higher, you can see the Windmill/Tank site in the background.

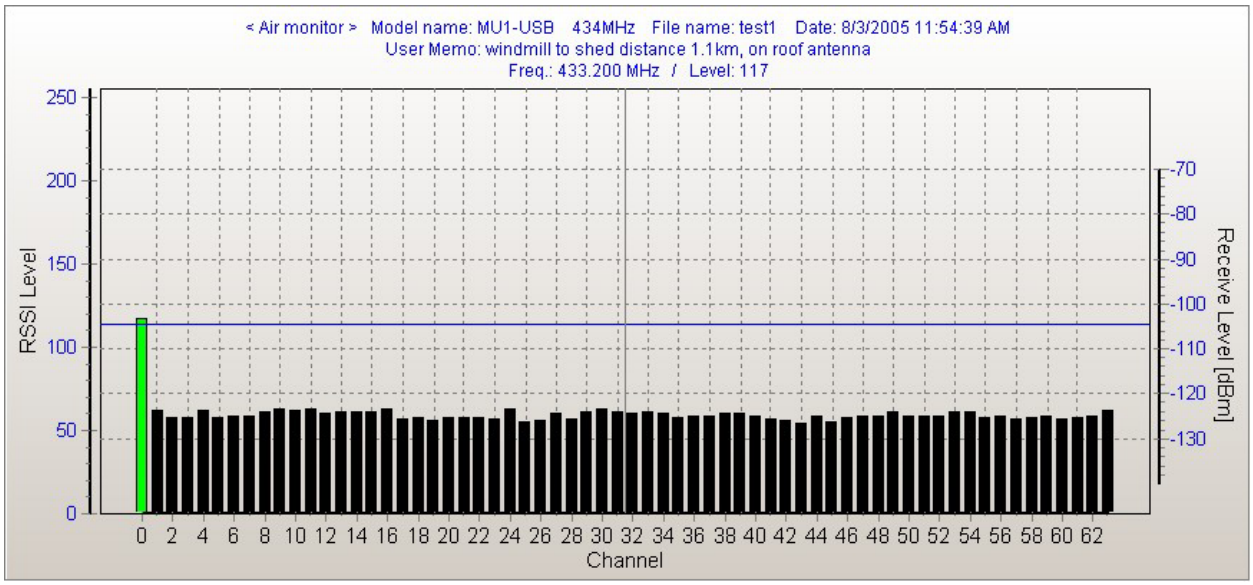
Test site test3.jpg was at 1.37 kilometres and approx 30 metres above the shed Tx site, the hidden ridge from the 2 previous test sites is able to be seen in the photo, looking back towards the shed Tx site, which is hidden by trees etc.

See the photos with text descriptions of the various sites and path views etc.

These tests were run using the MU-1's as direct links, there were no relay units used to extend path range etc.

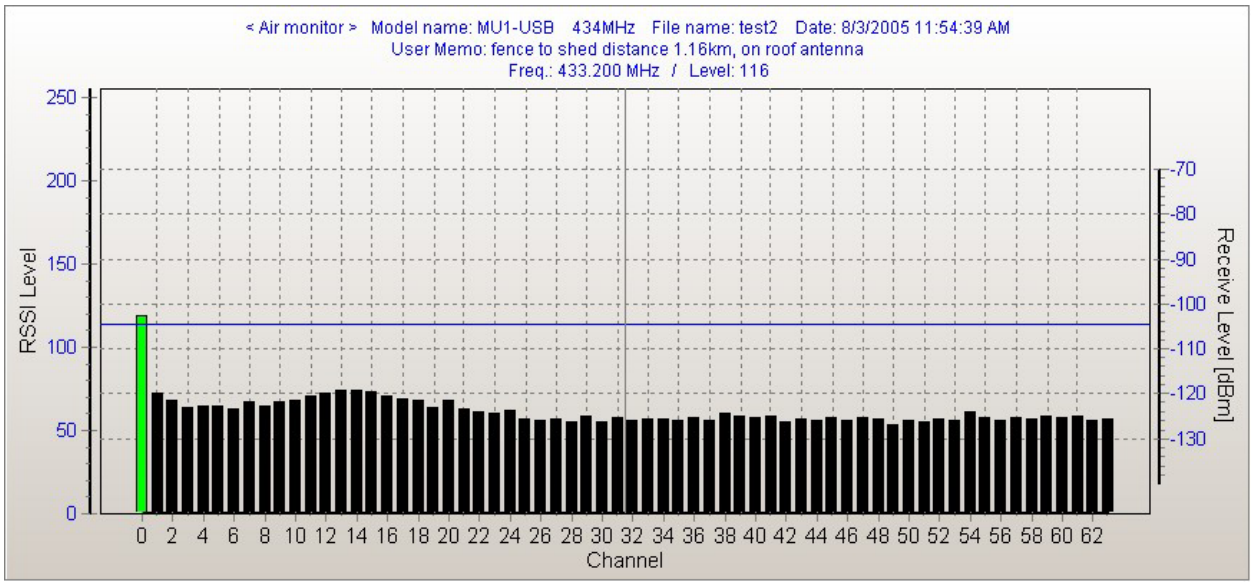
The 'Air Monitor' software was switched back to 'command' mode at each Rx site to verify actual data was being reliably received, via the incoming line count values on screen. The MU-1 was able to receive data right down to signal levels as low as -105dBm on the tests.

<Test 1>


< Air monitor > Model name: MU1-USB 434MHz File name: test1 Date: 8/3/2005 11:54:39 AM
User Memo: windmill to shed distance 1.1km, on roof antenna
Freq.: 433.200 MHz / Level: 117
RSSI Level
250
200
150
100
50
0
-70
-80
-90
-100
-110
-120
-130
Receive Level [dBm]
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62
Channel

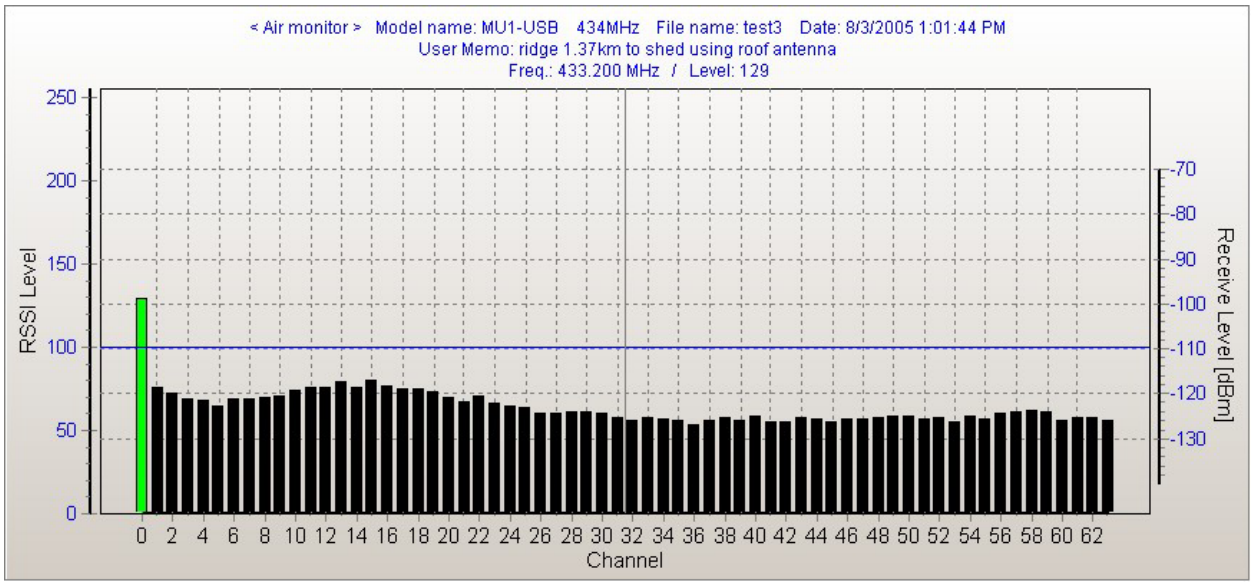

test1 rx site @ 1.1 kilometres with ANT-01

<Test 2>

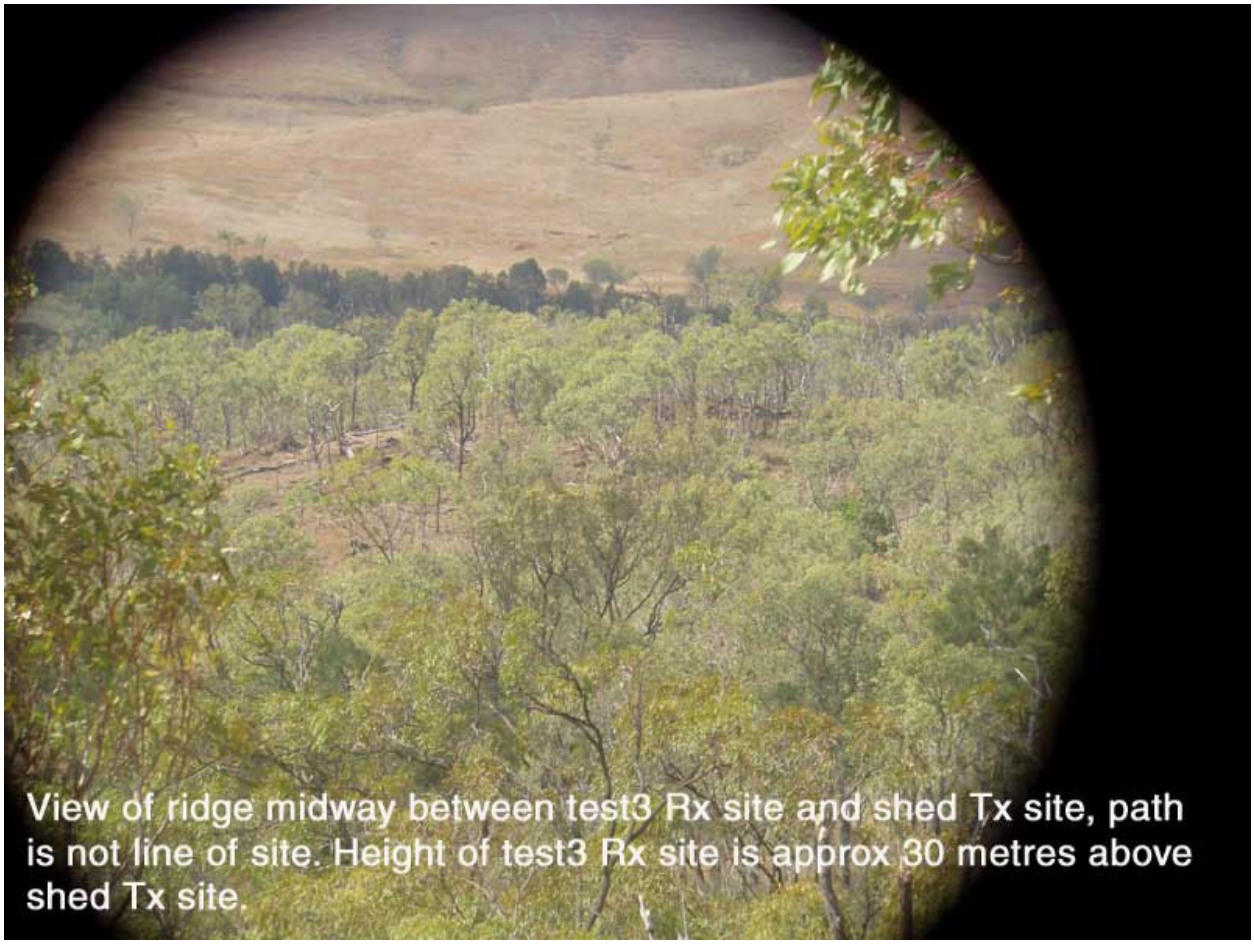

< Air monitor > Model name: MU1-USB 434MHz File name: test2 Date: 8/3/2005 11:54:39 AM
User Memo: fence to shed distance 1.16km, on roof antenna
Freq.: 433.200 MHz / Level: 116
RSSI Level
250
200
150
100
50
0
-70
-80
-90
-100
-110
-120
-130
Receive Level [dBm]
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62
Channel


Test2 Rx site @ 1.16 kilometres

<Test 3>


< Air monitor > Model name: MU1-USB 434MHz File name: test3 Date: 8/3/2005 1:01:44 PM
User Memo: ridge 1.37km to shed using roof antenna
Freq.: 433.200 MHz / Level: 129
RSSI Level
Receive Level [dBm]
Channel


JRC51
test3 Rx site @ 1.37 kilometres (ridge location)



View of ridge midway between test3 Rx site and shed Tx site, path is not line of site. Height of test3 Rx site is approx 30 metres above shed Tx site.

COMMENTS

The Circuit Design MU-1 performed in excess of the manufacturers stated range, in my test environment. The performance for Radio Telemetry/SCADA application designs is an ideal solution, offering many features in addition to good range. The addition of MU-1s, setup as relay/repeater sites would enhance useable range, even further.
The Evaluation Kits allowed me to quickly set up the units for a comprehensive range test assessment, in a very short time. The MU-1 evaluation Software allowed me to save the performance graphs for this report, in an easily understood format.
With the support documentation and Evaluation Kits/Software, integration of the MU-1 for Radio Link applications is made far easier, than for many competitive products.