

## REFLECTED LIGHT TESTS 21 NOVEMBER

The objectives of these tests were:

- To see if a QSO could be completed using light reflected from Gum Trees on Mt Knocklofty
- To compare signal levels with previous tests using Empress Towers as the reflector
- To vary alignment to establish the best signal level

### Equipment

1. VK7MO Mike's "Big Box"
  - a. 3 Watt Luxeon
  - b. TX lens 400 x 340 mm
  - c. RX lens 400 x 340 mm
2. VK7TW Mike's "Yellow Box"
  - a. 1 Watt Luxeon
  - b. TX lens 180 x 150 mm
  - c. RX lens 250 x 180 mm

### Weather Data

During the day the Aviation weather reports on 128.45 MHz were not reporting visibility although the day before they were. Just prior to sunset there was a general haze and during the tests Justin noticed a mist rolling down the valley from Mt Wellington which might explain the slightly poorer results at the end of the test compared to the start even after alignment.

### Locations

#### VK7MO

Latitude 42 Deg, 54 min, 28.60 secs South  
Longitude 147 Deg, 18 min, 13.78 secs East

#### VK7TW

Latitude 42 Deg, 53 min, 46.5 secs South  
Longitude 147 deg, 18 min, 6 secs East

#### MT KNOCKLOFTY REFLECTING POINT

Latitude 42 Deg, 53 mins, 24.84 secs South  
Longitude 147 Deg, 18 mins, 12.69 secs East

Distances to Mt Knocklofty Reflecting Point

VK7MO 2.0 km  
VK7TW 0.7 km

Total Path Length between Stations

VK7MO to VK7TW 2.7 km

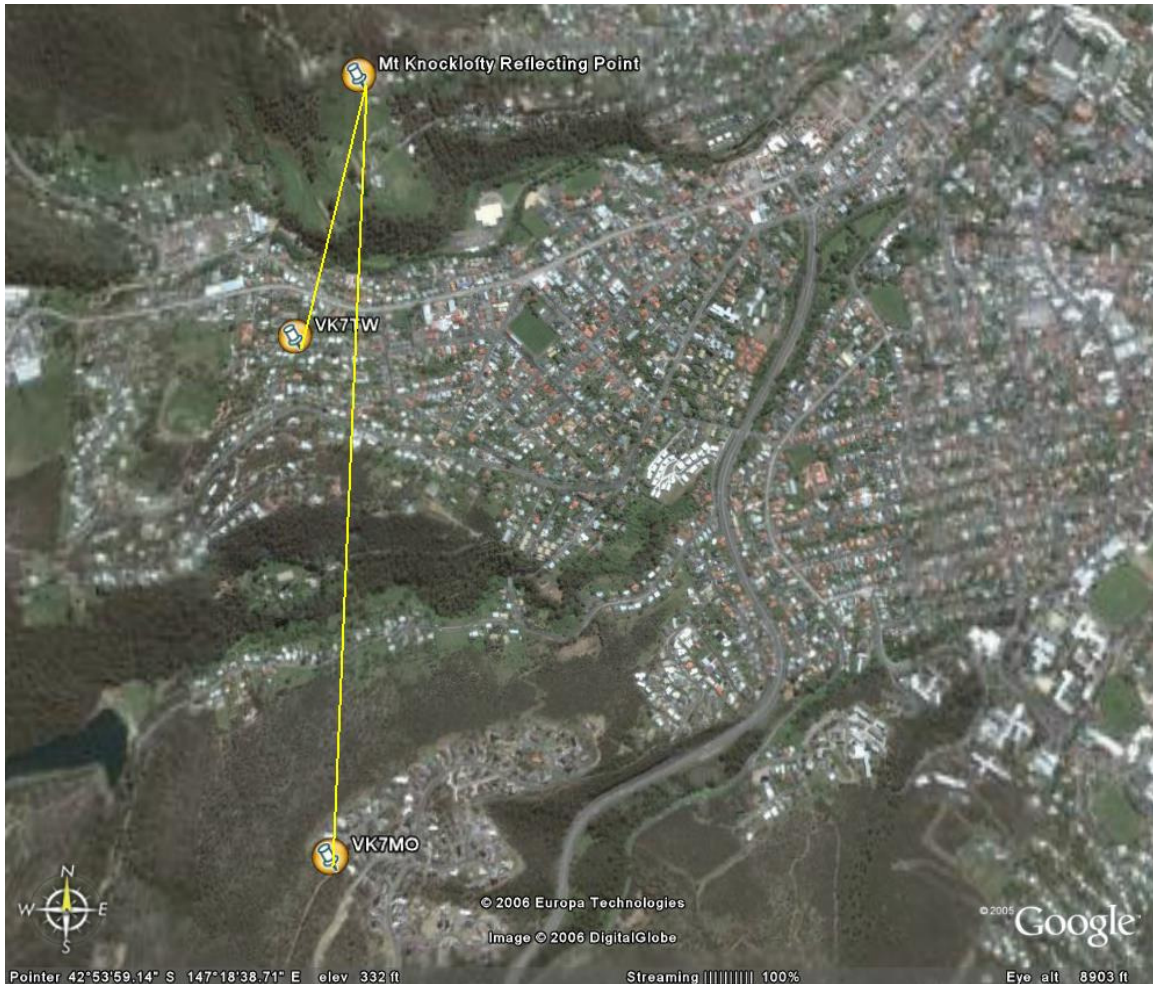
Relative Propagation Losses of Path compared to Empress Towers

Based on inverse square law both too and from the reflecting point and assuming no significant absorption and similar reflecting properties and the following distances:

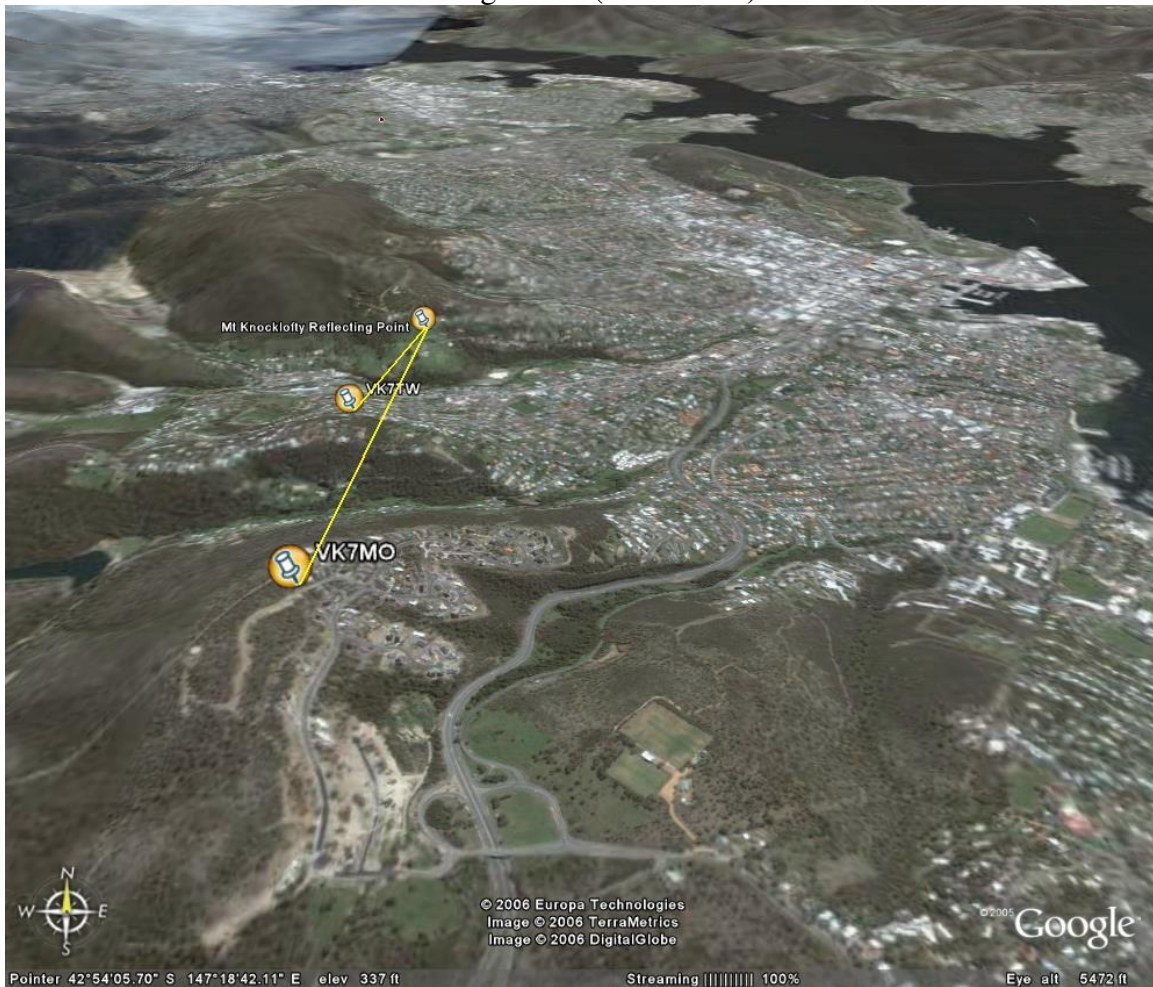
Empress Towers 3.4 + 3.0 km  
Mt Knocklofty 2.0 + 0.7 km

Mt Knocklofty path should be 17.2 dB better than Empress Towers

Paths between Stations and Reflecting Points (Plan)



## Paths between Stations and Reflecting Points ( Slant view)



## QSO

Tones were used to establish that a path was open and readily received by Justin. This compares with earlier tests of this path when Rex was using the smaller “Green Box” and nothing was received.

Note: Prior to the test Rex undertook some tone tests on a short path within his house and found no signal spreading down to 1 mHz bandwidth and gained at least another 20 dB in system performance. It will be interesting to do similar narrowband tone tests on Empress Towers to establish bandwidth limits on longer paths.

## Comparison of signal levels

The best median signal levels off Empress Towers once aligned compared the signal levels off the Mt Knocklofty trees are compared below:

Empress Towers  
dB

Mt Knocklofty  
dB

RXed by VK7TW	17	13
RXed by VK7MO	14	26

It is noted that At Justin's end there was a 4 dB improvement still well short of the expected 17 dB is the reflecting properties of both of Empress Towers and the Mt Knocklofty trees were similar. At Rex's end the situation was even worse with a 12 dB drop compared to an expected 17 dB gain.

This is a turn around from VK7TW receiving 4 dB worse to 12 dB better. We think the most plausible explanation for this turn around is that when beaming towards Empress Towers Justin is suffering heavy interference from lights which prevent him receiving down to the noise level, where-as when beaming towards Mt Knocklofty Justin has a dark background and can see noise across the passband.

The reasons why Rex is receiving some 12 db worse towards Mt Knocklofty are probably due to the fact that Rex is using a higher power luxeon and Justin is using a larger receiving lens than for transmitting – even so 12 dB is a big difference and it will be very interesting to see what happens when Justin goes to a big lens and higher power Luxeon.

On the basis that Justin's results are affected by light interference and Rex's are not to any substantial extent we can use Rex's results to compare the paths. These show a drop in signal level of 12 db on the Mt Knocklofty path even though it is much shorter and the inverse square law path losses would suggest an improvement of around 17 dB. Unless there are other factors involved this would imply the reflective properties of the of the Gum trees is some 29 dB worse than Empress Towers which means they are surprisingly poor reflectors of Red Light reflecting little more than 1000<sup>th</sup> of the energy of Empress Towers. Such a figure is a bit hard to believe and it is possible that there were other contributing factors such as partial blocking by trees or interference from Rex's TX due to the light reflected from partial blocking – a useful test that we should with hindsight have undertake would have been to check the received level when Rex's TX light was turned off.

### **Alignment Tests**

The graph below compares signal levels while Justin attempted to peak the signal in both the horizontal and vertical dimension. It was found that the original position on the Power Pole was close to optimum in the horizontal plane with a small improvement in the vertical plane by dropping elevation slightly. The data also shows a sharper drop-off in signal level at Rex's end when off beam, consistent with earlier results on Empress Towers.

### Variation of Signal level with alignment

