RACELOGIC

Application Note

Distance between vehicles

Abstract
This Application Note describes a test to measure the accuracy you can expect when using two VBOXs to measure the distance between two cars. Two VBOXs were used and the test was carried out both with and without a local DGPS base station providing corrections to each VBOX.

For the purposes of this test, both VBOXs were fitted to the same vehicle, and the antennas were separated by exactly 3m.

The results show that without the Base Station providing corrections to the VBOXs, the calculated distance between the antennas varied by up to 2.3m. With the Base Station, the distance stayed accurate to within 20cm.

Introduction
Accurately measuring the dynamic separation between two moving vehicles is required during the development of Active Cruise Control systems. This measurement is quite difficult to achieve using conventional distance measuring equipment, as the line of sight between the two vehicles is hard to maintain in all conditions. Using GPS means that the line of sight does not have to be maintained in order to measure this separation.

Without any external corrections, a VBOX should be able to measure it's absolute position to within 3m. With an external reference (Base Station) this improves to within 40cm.

Equipment
2 x VBOXII DGPS
2 x GPS Magnetic Aerial, RLVBACS050
1 x VBOX DGPS Base Station. (including RF antenna GPS antenna + tripod)

Test Setup - Base Station
The Base Station was switched on, and the option 'Set to Average' was chosen. This took 5 minutes during which time an on-screen counter indicated the time left to complete the averaging. When the count was over "Set to Average" was selected, and the position was stored using the "Store Location" option, which meant that on another day the Base Station could be returned to exactly the same spot, and the original location can be loaded.

The Base Station was now ready and transmitting positional correction information via Radio.

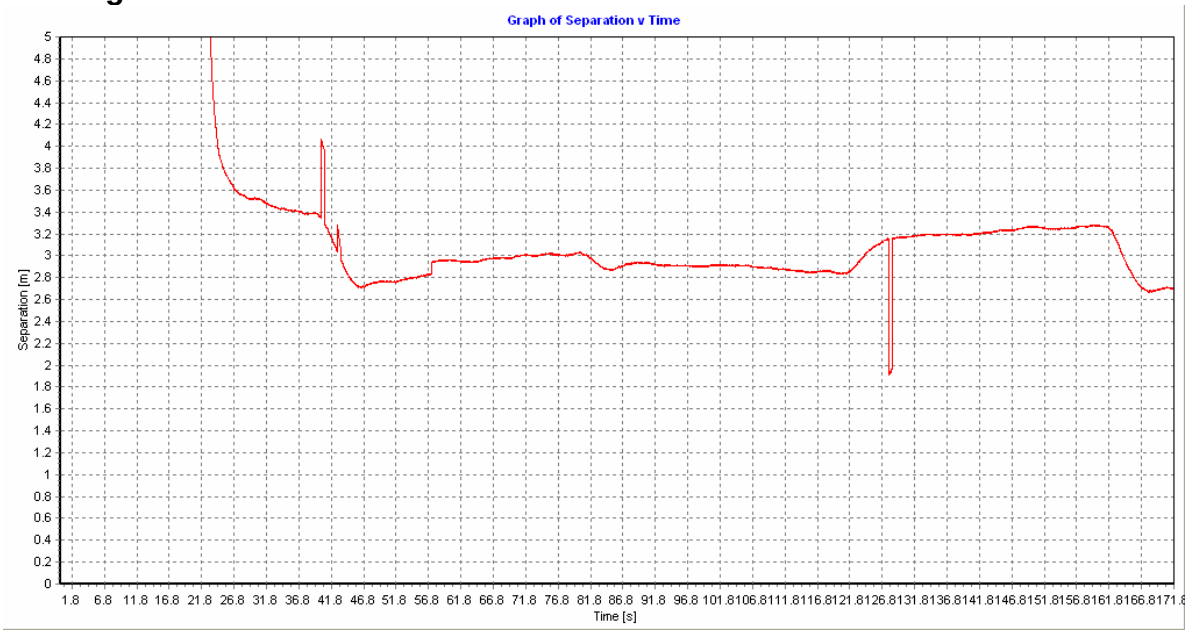
Test Setup - VBOX
Two VBOXs were placed in the vehicle, and the antennas were mounted exactly 3m apart. Each VBOX was connected to a telemetry radio which was receiving DGPS corrections from the Base Station.

Test Procedure

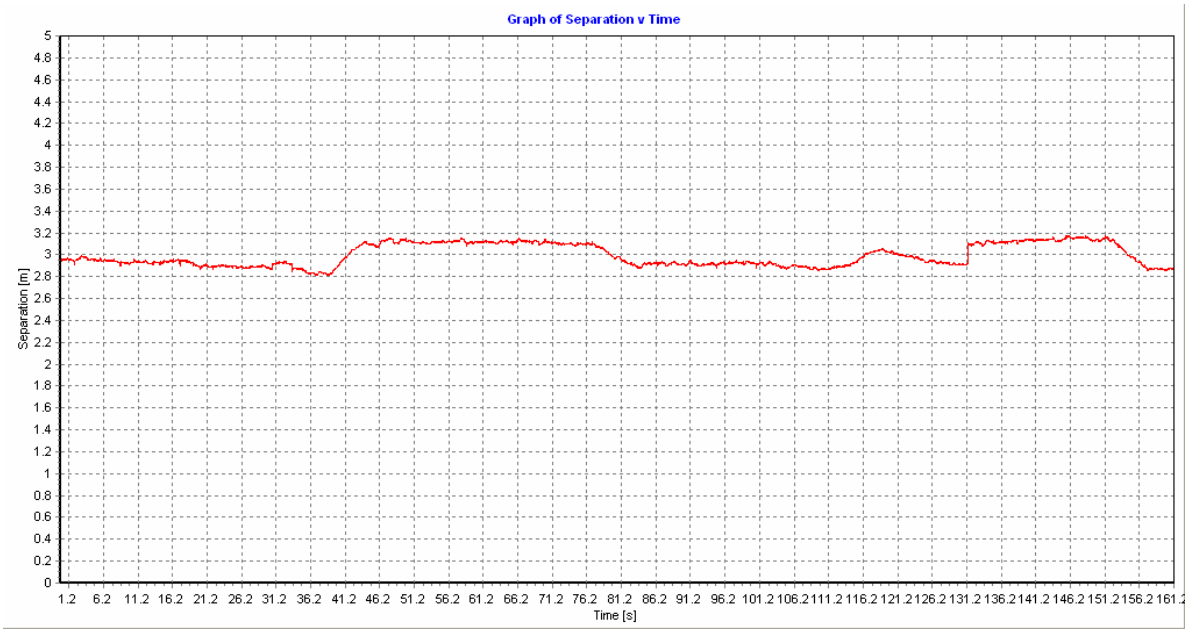
The vehicle was then driven around a test site whilst logging the output of both VBOXs onto two separate compact flash cards.

The Data from these two VBOXs was then taken and analysed using some custom software to compare the output of the calculations to the actual (3m) separation. This test was also repeated without the Base Station providing corrections.

Viewing the Data / Results



Separation results without using DGPS corrections



Separation results using DGPS corrections from a local Base Station

Conclusion

The use of a Local DGPS Base Station improved the separation accuracy to within 20cm, which gave enough accuracy for use in testing of Active Cruise Control systems.

Using GPS can be more robust than conventional radar based measurements, and it also provides other many useful parameters such as continuous position and speed information.