Equipment for ADAS Testing: A Comparison

One OEM finds out if VBOX is as accurate as claimed for NHTSA tests

Active safety systems are now common in new cars, as manufacturers seek to differentiate themselves from the competition and satisfy consumer demand for safer motoring. Sophisticated ADAS (Advanced Driver Assistance Systems) such as collision avoidance and lane departure warning need to be extremely accurate to conform to regulations – so engineers must be able to rely on the accuracy of the systems used to test their performance.

Engineers rely on high accuracy testing systems for forward collision mitigation system development

After purchasing a VBOX ADAS testing system, one of the worlds' largest car manufactures recently decided to prove to themselves that it satisfies the NHTSA accuracy requirements before rolling it out in their new vehicle development.

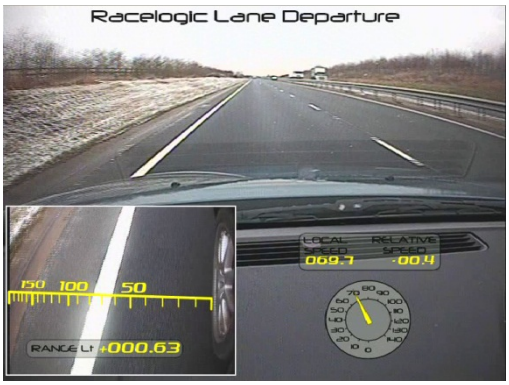
The VBOX system is quick and simple to install

The manufacturer requested that NHTSA's approved testing centre, the TRC (Transport Research Centre) in Ohio conduct full FCWS (Forward Collision Warning System) and LDWS (Lane Departure Warning System) confirmation tests with their existing equipment. The Racelogic equipment was fitted at the same time for comparison. So what happened? Let's start with the installation.

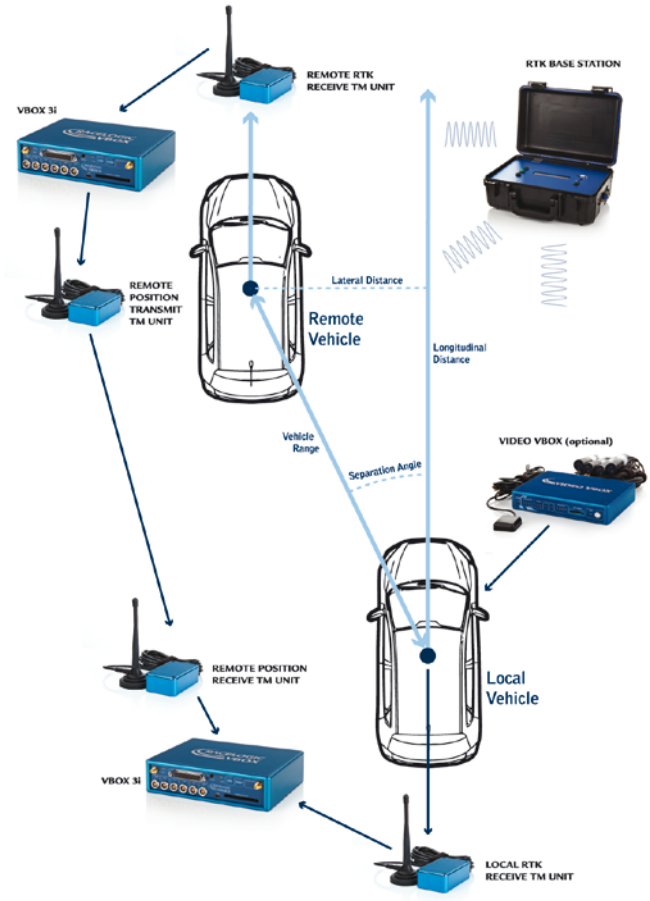
TRC's test equipment consisted of an RTK GPS and inertial unit for measurement, which fed into a separate logging computer system. The 'collision point' for the car was then mapped together with the front left and right corners using a 'FARO' laser line probe. The installation took two full days. A video system (as required by NHTSA for the Lane Departure Warning tests) was also fitted. However it was not synchronised with the other data and video pixels had to be counted with reference to a ruler to establish the visual lane departure warning performance.

In contrast, the VBOX ADAS system took a few hours to install. With the GPS and GLONASS measurement and data logging combined in one device, the equipment included a VBOX 3i data logger, InertialMeasurement Unit (IMU), BaseStation, radio modules, and a Video VBOX.

All data was synchronised, including the video which featured application specific graphical overlays to provide an accurate visual reference of LDW.



Racelogic's Video VBOX synchronises with the GPS data to provide a visual reference with graphic overlay for LDWS testing



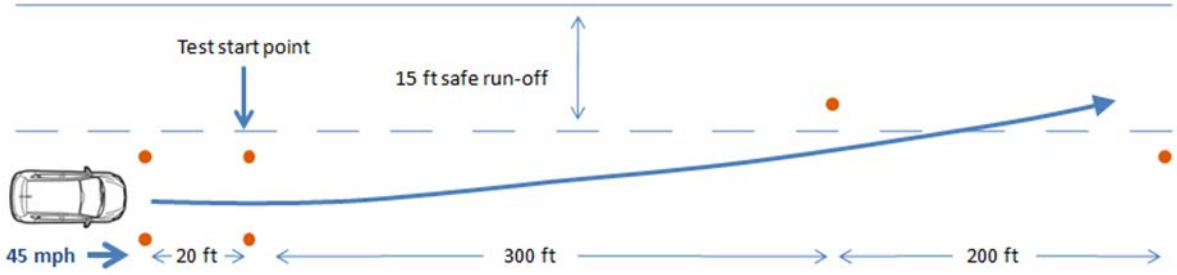
The VBOX FCWS test setup, including VBOX3i, BaseStation, inertial measurement units, and radio modules

Both sets of equipment were connected to the vehicle CAN bus to pick up the forward collision warning signal and lane departure warning signal.

NHTSA requires that to test FCWS, you must measure the system accuracy in three scenarios. Firstly, where the subject vehicle (SV) encounters a stopped principal other vehicle (POV), secondly when the SV encounters a decelerating POV, and thirdly when the SV encounters a slower POV. The forward collisions warning system must occur when the time to collision is at least 2.1 seconds.

The LDWS test involves driving the SV in both directions (i.e. to test the lane departure warning system on both sides of the vehicle) against three different types of lane edge marking.

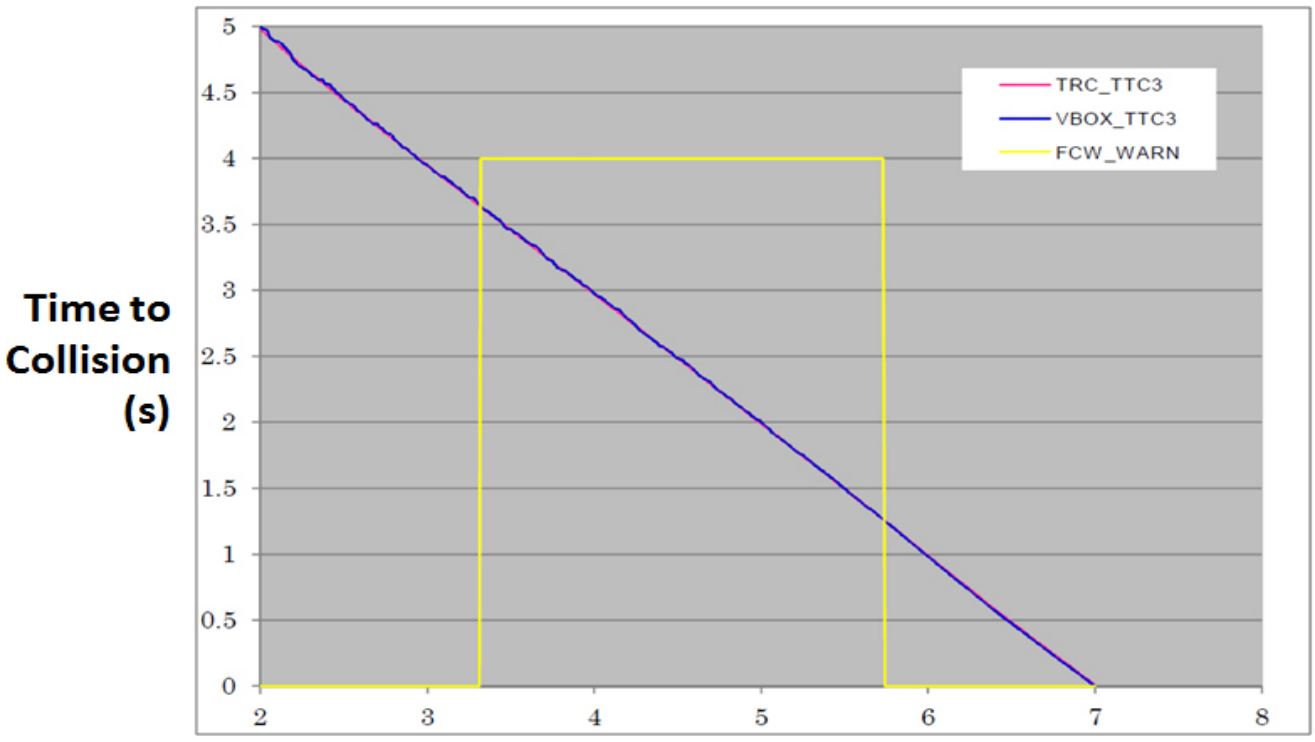
Below: The test layout for Lane Departure Warning System evaluation



So how did the VBOX ADAS system perform?

FCWS Test: Time to Collision Results (s)			
	TRC	VBOX	Difference
	3.63	3.64	-0.01
	3.79	3.8	-0.01
	3.73	3.72	0.01
	3.8	3.8	0
	3.8	3.82	0.02
	3.78	3.78	0

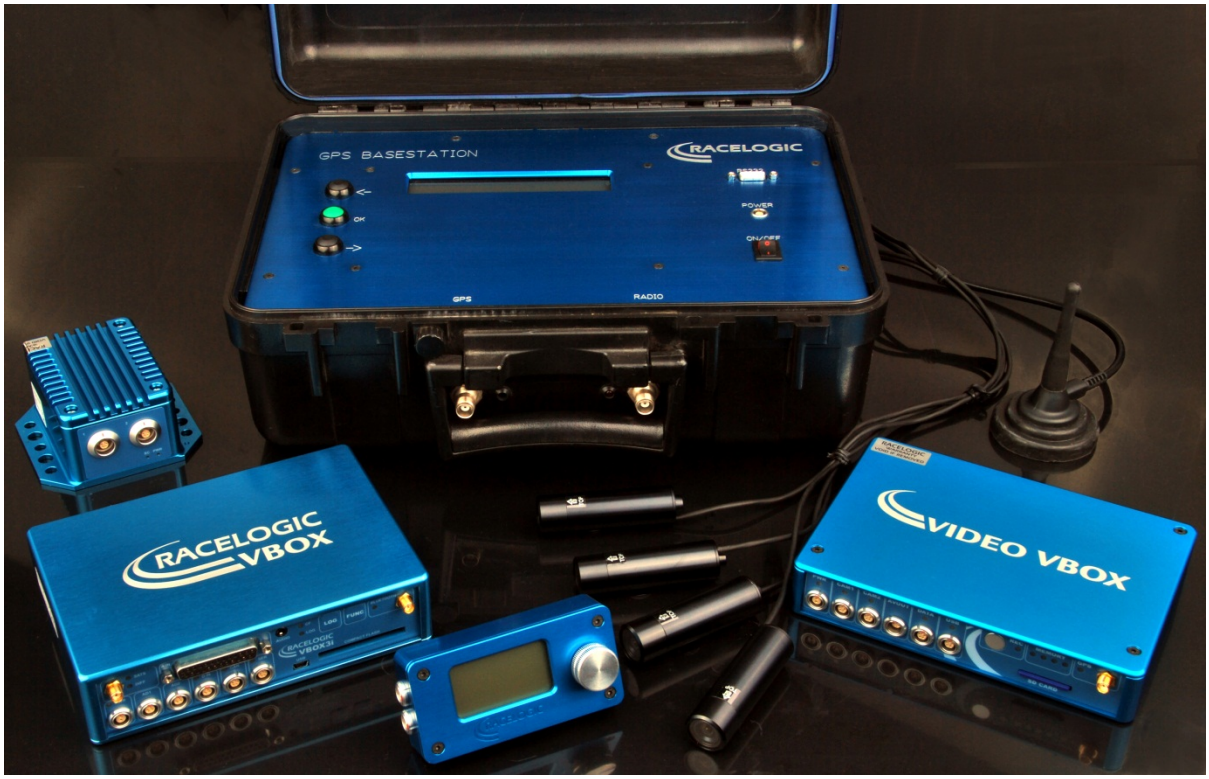
FCWS Test: Distance Results (m)			
	TRC	VBOX	Difference
	38.38	38.392	-0.012
	41.162	41.159	0.003
	40.587	40.587	0
	41.615	41.595	0.02
	39.919	39.909	0.01
	40.221	40.194	0.027



The pink line represents the TRC test data, the blue line the VBOX test data. The yellow line illustrates the moment the vehicle forward collision warning system is activated. The graph shows there was almost no difference in the recorded data between the TRC and the VBOX system

The results showed the VBOX data to be within 0.005s (time to collision) and 1cm (separation) of the data taken by the official test equipment used by the TRC. This led to the vehicle manufacturer approving the VBOX ADAS solution as meeting NHTSA's accuracy requirements for FCWS and LDWS tests.

As the VBOX uses a sophisticated heading algorithm for the calculations, the Time to Collision (or TTC for short) value was actually far more stable than the reference system. The VBOX system is quick to fit, easy to use, less expensive than other solutions, and can produce live results in real time, meaning that no post processing required and testing times are reduced.



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For further information on Racelogic's VBOX ADAS system go to www.velocitybox.co.uk