



FEATURE



GIVING A PROTOTYPE CAR A HIDING IN THE HEAT HAZE OF THE AUSSIE OUTBACK IS ALL IN A DAY'S WORK FOR FPV'S ENGINEERING TEAM. WE DESERTED THE OFFICE FOR A WEEK IN THE DESERT TO PROVIDE A BEHIND-THE-SCENES EXCLUSIVE IN THE DEVELOPMENT OF THE NEW BF RANGE.



HEAT STROKE

The mercury has just burst through 40 degrees centigrade, and the little hand on the clock on the wall has only just ticked past 10 in the morning. It's so hot even the blowflies are sweating!

"This is the sort of weather we've been chasing...this is perfect," says Adam Smith, Prodrive Asia-Pacific's Calibration Manager, as he whisks another football team of flies off his back.

We're in a big tin shed on the outskirts of Alice Springs at the end of January. Around us in the weltering heat is enough spare parts to rebuild a couple of vehicles, a fleet of prototype development "mules" and a bunch of wide-eyed engineers diligently studying information on their laptops.

These top-secret machines aren't the prettiest performance cars on the block. They've got wires hanging out all over the place that makes the interior look like someone dropped their spaghetti and couldn't be bothered cleaning it up, and the exterior is disguised with matt black car bras and race tape.

But these cars are not here to look good. The wires are linking a plethora of sensors to the external computer systems that allow the engineers to read their measurements in real time, while the disguise is to protect the design of the prototype bumpers almost eight months before the real thing is unveiled at the Sydney Motor Show in October.

At this time of year, the red centre peaks at above 40 degrees day in and day out. The chance of rain is as remote as the pub running dry.

But not only does Alice Springs have the weather, it also has the Sturt Highway – the only unrestricted stretch of blacktop in the country. The combination of the two makes this the ideal location to test the absolute performance of new vehicles under the most extreme conditions.

Prodrive is not alone out here either. During the summer months – or dry season – there is a multitude of vehicle manufacturers from all across the globe with top-secret prototypes darting in and

out of the desert and to and from non-descript workshops across town.

The team is in the middle of the country at the hottest time of the year to take part in one of the largest hot weather tests ever conducted by Prodrive Asia-Pacific. This two-week test is to ensure the new FPV BF range meets the strictest emission tests ever placed on locally-built petrol-powered vehicles with the introduction of Euro III emission regulations on all petrol-powered passenger vehicles from January 1, 2006.

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The strict new regulations enforce a significant reduction in the production of harmful Hydrocarbon (HC) emissions from 0.6 grams per kilometre to 0.2 grams per kilometre, reducing Carbon Monoxide (CO) from 4.0g/Km to 2.3g/Km, as well as reducing oxides of nitrogen (NOx) from 0.15g/Km. Under the previous Euro II regulations NOx levels were

recorded within the Hydrocarbon output.

The stricter emission regulations not only reduce the amount of harmful emissions produced by vehicles, but also introduce a number of significant new test procedures to ensure they run as clean as possible for as long as possible.

These tests include measuring the emission output from the moment the engine fires into life, an evaporative heat soak test, ensuring that the



Hot weather testing is rigorous work, consisting of long days under extreme conditions







Prodrive uses the Woomera air force base for high-speed testing



catalytic converters still operate correctly with a legal emission output beyond 80,000km of use and a sub-zero emission test.

The start-up test replaces the previous test that only recorded emissions 40 seconds after the engine had started, while the other three are all new.

The revised start-up test has created numerous challenges for the engineering and calibration team. The previous test allowed the engine to run rich for a short period of time and “light up” the catalytic converters to an operating temperature before the test commenced. With the measurements now recorded from the moment of ignition, the “cats” have to operate effectively and instantly.

The heat soak test is designed to measure the emission output of the fuel as it evaporates from the fuel system while stationary and under high ambient temperatures.

This is not only torturous for the vehicle, but for the calibrator in charge of the exercise.

It involves towing a trailer dyne – effectively an electric generator housed in a trailer that provides loads on the car to simulate heavy towing conditions and even extreme gradients – for almost 50 kilometres at relatively low speeds before parking it in a soak tent on the side of the road. The tortuous driving test is to ensure the engine and, in particular the fuel injection system, is at peak operating temperature before it’s parked. The soak tent is designed to generate an extreme and consistent ambient temperature by holding the

heat in at close quarters and minimise the effect of wind. At its peak, we saw temperatures of almost 60 degrees centigrade inside the tent when the ambient temperature was hovering just above 40.

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The calibrators are then required to check the measurements at regular intervals to record any vaporization of the fuel. In between, they have to keep themselves mildly amused – which is not too easy standing around in the middle of the desert. You

can get RSI from constantly flicking the flies off your face, or a stiff neck watching the eagles soar on the hot winds. Or, as any true-blue Aussie would do, kick a footy around in the sand.

Testing each vehicle can take up six hours, which means it is equally as important to not only take something to relieve the boredom but also plenty of water and sunscreen.

A legal requirement as part of the new Euro III emission regulations is the addition of a sophisticated on-board diagnostics (OBD) system that constantly checks the condition of the components to ensure the vehicle complies with the regulations.

The OBD is linked to the engine management system and monitors the condition and performance of specific components related to controlling the emission output.

The OBD system measures the emission output through the addition of an extra oxygen sensor that monitors the operation of the catalytic converters and provides more accurate control of the air-fuel ratio. There is also a crankshaft sensor that detects misfires - therefore helping to eliminate unburnt fuel from damaging the catalytic converters.



WOOMERA

Even though the Sturt Highway has an unrestricted speed limit outside of the city limits, Prodrive Asia Pacific has placed a self-imposed speed limit of 160km/h on its engineers when using public roads.

So to test the absolute extreme performance of the vehicles, the second half of the hot weather test is conducted at Woomera – the air force base in South Australia that was used for top-secret rocket testing in the 1950s and 1960s.

Woomera was created in the late 1940's as a joint-venture operation between the British and Australian defence forces to test and develop long-range ballistic rockets during the cold war:

In the 1960s, NASA operated a deep space tracking station south of Woomera. In 1962, West Germany, France, Belgium and the Netherlands created a partnership with the British and Australian defence forces to form the European Launcher Development Organisation (ELDO). This collaborative developed and launched the Europa Rocket – which stood 32 metres high and weighed 105 tonnes – to become the largest vehicle launched at Woomera.



The Woomera Prohibited Area is the world's largest land-locked prohibited area and covers more than 127,000 square kms, stretching almost to the Western Australian border, and previously included the nuclear testing sites at Maralinga and Emu Plains.

The village was constructed to house more than 4000 personnel at any point in time with the appropriate amenities, such as sporting fields, a cinema, shops and even a bowling alley. As it is located in the middle of one of the harshest deserts in the world, water supply was an issue. To counter this problem, a pipeline was built directly into the Murray River system to feed the village.

Despite having a permanent population of less than 100, the entire infrastructure still exists today – just in case there is any need to use its facilities by the armed forces.

But even without the armed forces, Woomera is used by all sorts of corporations – including vehicle manufacturers – for top-secret testing.

With super-long runways that were designed to allow access for the world's biggest airplanes – including the mighty B52 bombers – the Woomera base is suitable for high-speed vehicle testing in a controlled and safe environment.



If either of these sensors record an event that results in emissions exceeding that prescribed under the Euro III regulations, the OBD system logs the event within the ECU. If a similar event occurs within the same driving period, or if the system detects the issue when the engine is re-started, the driver is made aware of a potential issue via the engine warning light on the instrumental panel.

As part of the hot-weather test, the OBD system was given a major workout in the desert to ensure it operated effectively under the most extreme conditions.

This involved having a "switchboard" attached to the system that was carried in the cockpit of the vehicle. The calibration engineers conducting this test could manually

create an issue in the logging system by removing the electronic signal from individual components.

The testing of the OBD system required every possible scenario to be simulated more than once to ensure it operated correctly.


Because of the modifications made to the calibration of the engine management system in the turbo-charged F6 Typhoon and F6 Tornado, as well as new-profile camshafts introduced as part of the upgraded BF lineup, another significant exercise that was part of the hot-weather test was to ensure consistent and efficient boost control of the turbo charger under extreme conditions.

Armed with a laptop on the passenger seat that displayed more information than a fighter

plane's instrument panel, the calibrator measured the turbo performance under a wide variety of driving conditions. These included its response to the throttle inputs at high speeds and low speeds and in various gears.

At the end of each test, and then at the end of each day, the team would download their data for complete analysis and discussion. This was more akin to what FPR's race drivers, Jason Bright and Greg Ritter, do with their respective race engineers.

The team spent more almost three weeks in Alice Springs and Woomera, ensuring that the new BF range from FPV met the new emission standards.

This was followed up with the same tests under extreme cold conditions in the Victorian Alps. 

SERVICE TRUCK

The aim of any test is to find the absolute limit. Sometimes that means you burst through the limit and something breaks.

Broken cars and burning deserts are not the best of partners. So, sitting in the wings waiting is Prodrive's little service truck.

This Falcon XR8 is literally a mobile

workshop on wheels, as its specially-built canopy houses almost everything the technicians require to repair a vehicle on the side of the road - no matter how big the job is.

It has hiding holes everywhere, crammed with the tools of the trade and spare parts, and a generator and air compressor for power.



