



Pipe Dreams

Playing with intake pipe lengths can give staggering variations in power!

When we were approached by Mark Marchesan of Adelaide's Exhaust Technology to do some testing of his Daihatsu Charade we weren't wildly excited. This is 'cos Mark didn't have in mind the dyno'ing of a blower or turbo package or even a new exhaust; no, he wanted us to test different lengths of pipe between the aircleaner and the throttle. Like, what was there gonna be in doing that? - a 1 per cent variation in power? Or even a change so small that it couldn't be measured at all? Well, that's what we thought, but since Mark was happy to make up various lengths of pipe and give us free reign to test his car we thought we'd better humour him...

We approached Leon Vincenzi of Awesome Automotive who happily agreed to provide the dyno time. Leon's one of the very few dyno owner/operators who's always happy to test out engine mods - no matter what they might be. All part of learning what works and what doesn't, you see...

Testing



The G200 FE2 Charade uses a 1.5 litre four cylinder SOHC engine. In standard form it has a power output of 66kW (88hp) at 6200 rpm at the flywheel. Being owned by Exhaust Technology, as you'd expect the car does not have a standard exhaust - instead a Sebring rear muffler and larger resonator have been fitted. When it was provided to us the car was fitted with an oiled foam Finer Filter mounted on a spun alloy funnel-shaped intake. This was bolted straight to the throttle body, giving a constant diameter intake duct that was only a few centimetres long.



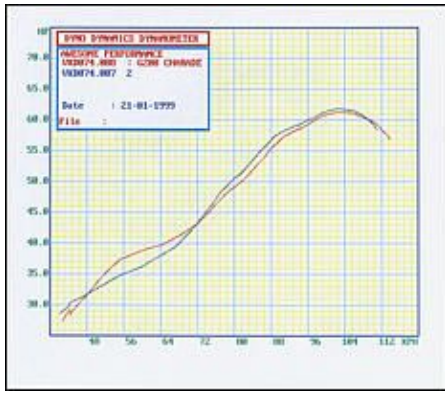
Testing was initially carried out with this ram pod assembly in place. The ram pod was then replaced with a 90 degree bent piece of pipe, 50mm diameter and 36cm long from throttle body to the end of the pipe. A K&N filter was placed on the end of this new duct. The new duct was then extended so that intake lengths of 60, 80, 90, 100, and 110cm could be tested. Testing was carried out in third gear on the Dyno Dynamics chassis dynamometer. Intake temperature correction was used, with the temp probe located close to the filter in each of its revised locations. All dyno runs were averaged ramp-up, ramp-down pulls. The Charade was tested in third gear, a ratio that provides 20 km/h per 1000 rpm. This means that the dyno runs were made between about 2000 and 5800rpm.

The Results

We decided that splashing numerous dyno graphs all over the screen (or numerous lines on the one graph!) could get a bit hard on the eyes so we've picked out just three graphs. These give a good overview to the results that were found.



We'll give you the straightest comparo first. That's the power output with the K&N filter being used in both tests, with one power run using a 36cm long intake duct and the other a 110cm long duct. Same filter, same shaped intake into the throttle body - same everything except the length of the pipe between the filter and the throttle. As you can see, there's certainly a difference in the power curves! The red line shows the power with the 110cm long duct in place and the blue line the results with the 36cm long duct. At low revs in third gear the short duct is up a little in power but from there on there's a clear-cut advantage in using the longer pipe. In the mid-range, the power improvement of the long pipe is nearly 7 per cent, and peak power is up by about 2.5 per cent.



OK, but Mark had provided the car to us with the ram-pod fitted. How did the shortish 36cm long duct with the K&N compare with the **very** short ram-pod with the Finer Filter? This graph shows the result. Note that at the top end there is very little difference in power, and that as with the graph above, the power lines cross over. From this you can see that the flow of the two filters isn't having much bearing on the results - again it's the different pipe lengths that's causing the changes in tuning. The blue line shows the power curve with the 36cm long duct and the red line the results with the ram-pod fitted. This time the result's a bit closer - the short funnel is better at the bottom end but the 36cm duct gives a little advantage over the rest of the rev range.



Okay, but what about all of the other pipe lengths tested? Which gave the very best gain over the short ram-pod? Glad you asked. We found that 60cm long duct was the pick of the bunch. As you've probably guessed by now, that's the one you see right here. The pink line is with the ram-pod fitted, while the green line is with the 60cm duct. And this shows some bloody major changes! Except below 64km/h in third gear (that's 3200 rpm), the power curve shows a healthy increase. The maximum gain in the upper mid-range is 8 per cent, with peak power up by 3 per cent. While the top end increase is nothing unbelievable, the gain over most of the engine's power range is pretty good - 'specially for about 10 bucks' worth of pipe..... Remember also that in a charge up through the gears the engine revs would always be in the "power gain" area.

Conclusion

It would have been good to have dyno'd the Charade in dead standard trim with its factory aircleaner and intake duct in place. But even without that, we sure showed one thing - changing the length of the intake system can make a helluva difference to the way the engine develops power. On this car the best results came from ducts that were longer rather than shorter - with a 60cm duct the best overall.

To get the very best results we'd suggest that you put the car on the dyno and do some testing with a variety of intake duct lengths. You could also experiment with different diameter ducts - all of our testing was with 2½ inch diameter pipe. Even paying for the dyno time, it's cheap power when you can make gains (or avoid losses) like the ones shown here.

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