Turbo Size, A/R and Trim

A/R Explanation

A/R is the rated volumetric efficiency of a turbo's 2 sections, so to speak. Imagine if you have a garden hose spraying water out at a pinwheel with the hose open ended, the pinwheel spins okay. Put a nozzle on it and the pinwheel will spin like mad. There are issues with the nozzle on the end, you lose volume but gain pressure. With the nozzle off you gain volume, but lose pressure and you can't turn the pinwheel as much.

Simply put, on small displacement engines a smaller A/R is better, on large displacement engine a larger A/R is better due to exhaust volume.

A larger A/R will spool later and provide a higher power band, if your engine is capable of reaching the RPMs it should be used in.

You can't cross compare different types of housings and wheels, but if you have a typical T3/TO4E 57 trim with a stage 3 exhaust wheel and a .48 A/R housing, it might have a powerband of 3000-7000, with the .63 it might be 4000-8000, and with a .82 A/R housing it might be 5000-9000. If you have headwork and cams that stop pulling at 8000 RPM's, it's smart to run the .63 A/R housing. If you have a fully ported head and huge cams that will make power till 9000, the .82 A/R housing would be a better choice. <Source>
This link I provided tells you how to calculate the trim of a compressor wheel. Just a little FYI when calculating trims, you can calculate it in inches or mm it doesn’t matter. Trim is just the ratio of inducer/exducer. The trim will come out the same whether you calculate inches or mm. The link also tells you how a higher or lower trim number determines where the compressor is the most efficient. Also check out the previously provided Garrett link to look at the products menu and the tech menu. You can use the products->turbochargers menu to calculate the trim of the compressor wheels. Use the formula in the rx7 club site or Garrett site to calculate the trim.
and 7000 rpms however it sounds like the smaller trim wont do as much. Is there a perfect turbo for a low revving motor with alot of displacement exhaust?

http://www.shaunhamptondesign.com/Sigs/FS01a.jpg

That's for you to decide. The write up shows you how to figure out the proper A/R and trim necessary to get a good, fast spooling turbo to help the low end torque grunt.

The part about the high revving was because it was written about Honda's. You can disregard that, unless you wanna build a 4.6 with an 8k redline and turbo it. lol

Originally Posted by 2000Si

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Measuring A/R Ratio

A divided by R gives you the A/R Ratio.

A (Area) + Area of Exhaust Inlet

Trim_{Turbine} = \frac{Exducer Diameter}{Inducer Diameter}^2 \times 100

<Picture Source>
bump I wanted to bring this back up it has been most helpful

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hannes_slanec

Look Ma! My First Post!

Join Date: Mar 2008
Posts: 1

@2000SI

Thanks Sir!

Very nice and interesting.

My knowlegde about turbos is limited and altough your explanation is very exact I still have problems to determine what size of turbo I should take.

I build a 68 Impala with 540cid BBC with Dart 320 alu-heads and want to go with a twin turbo setup.

I have enough torque through the huge displacement but I would like to have additional power in the mid to high rpm - range.

From your explanation the 48 A/R housing would be the right one since my engine got redline at 7000rpm but I will rev it only up to 6500-6800maximum rpm. I have around 9,6:1 compression and therefore I will not go higher than 6 - maximum 9psi. I have bought 2-1/4" upsweep dragster headers and will convert them to nice turbo headers.

What is your recommedation for a turbo, is a pair of T4's to small for 6-9psi?

Also I would like to keep down with the weight since the BBC got enough weight already and I have been told that a bigger turbo got around 50pounds, is that really true.

Thanks Hannes.

banned

Regular

Join Date: May 2007
Posts: 428

Good info, but your a/r suggestions are well off... I'm not even an expert, but I can tell you that a 76mm w/.96 will make boost around 3200

Considering selling my car to fund my race car: take a look and tell me what you think.
http://www.moddedmustangs.com/forums...ml#post1041280

SpeedSicks

Newbie

"79 2.3 Turbo Stang Coupe
Working on it..."

Join Date: Feb 2008
Location: Riverton
Posts: 19

Originally Posted by banned

Good info, but your a/r suggestions are well off... I'm not even an expert, but I can tell you that a 76mm w/.96 will make boost around 3200

That depends on the motor that the turbo is linked to, mind you...

Addicted to tuning 2.3 turbo cars 😊 no doubt 😊

06 mazdaspeed6 2.3T direct injected DOHC 6spd AWD
79 stang coupe 2.3T old school injected SOHC 4spd RWD
63 F250 highboy 4x4 convert, 428, all original body, restored to custom. for sale
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