Master cylinder sizes

Conference: - Brakes

From: Joe Maher (josephmaher@optusnet.com.au)

Hi People.

I can't remember if I asked this question before but here it is anyway.
For an adjustable Bias pedal box, what are the recommended brake master cylinder sizes used for the front and the rear?
Keeping in mind the front brakes are Volvo 4 pot's on vented disks and the rear are going to be some sort of falcon calipers on disk I think (to be confirmed). I want to buy some cylinders but I'm not sure which are the best to go for.
Also, does anyone know where I can get a good priced Balance bar set up from?

Thanks for your help.

Regards
Joe Maher.

Joe there is no such thing as a good priced balance bar as the only one which is any good is the Tilton and they are around $170 for a 3/8" bar
As far as cylinders go use a .700" for the front a .750" for the rear

Danny

Hi Danny.

Is there much wrong with Coleman or Wilwood branded Balance bars?

Regards
Joe Maher.

From: Yavuz Guven (yavuzguven@hotmail.com)
Date: Thursday, April 04, 2002 09:49 PM

Joe,

Also for the street you may find .7 cylinders for the front to be a little too big, although it will give a real good feel with decent brake lines. I'd tend to go for .625 fronts and .75 rears on a road car. The .7 cylinder that I drove was escort calipers and vented disks.

Cheers,

Yavuz.

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Topic: Master cylinder sizes? (5 of 14), Read 65 times
Conf: Brakes
From: Joe Maher (josephmaher@optusnet.com.au)
Date: Thursday, April 04, 2002 10:59 PM

Hi Yavuz.

Thanks for the info.
Do you think that then I should also go for a 0.7 on the rear?

Does anyone know the calculation used to determine pedal effort to braking power in regards to the disk size braking surface and stuff like that?

Is there much difference in pedal pressure required when comparing a Escort 2 pot caliper to a Volvo 4 pot?

Thanks.

From: Danny Mischok (dmischok@bigpond.com.)
Date: Friday, April 05, 2002 06:21 AM

Joe do not use a .7" on the rear as it will give you too much pressure and staying with a .75" will give you the least as anything smaller in this type of installation results in far too much rear bias as the bigger the master cylinder the greater the volume of fluid moved but the lesser the line pressure so a smaller cyl will give you more pressure but requires more piston travel to do it
So with the standard Escort calipers use a .625" but with the Volvo's use a .700"
The other bars aren't too bad but the Tilton is the easiest to use and the longest wearing of the lot

Danny

From: John Alderson (jsa@powerup.com.au)
Date: Friday, April 05, 2002 06:18 PM

Joe,

Assuming disks all round

First make some assumptions about how many G's you will achieve under Brakes. Determine car mass, CG height and wheelbase. From this determine the Front to rear load distribution that will occur at max stopping G's.

Assume stopping G's = tyre co-efficient of friction. (Fronts will be Slightly less and rears slightly more)

Multiply the G's by the front/rear loads to give the retardation force to be generated at the tyre/road surface. Convert these to torque values based on tyre rolling radius.

Determine the radius of the brake pad effective centerline (close to the middle if the pad is symmetrical). Convert the wheel torques back to pad forces using the pad centerline radius.

Determine brake pad co-efficient of friction. Calculate caliper piston forces by dividing the pad forces by pad COF.

Determine hydraulic pressures from the pad forces and gross cross sectional area of the pistons.

Determine master cylinder forces from hydraulic pressures and master cylinders cross sectional areas.

Add front and rear master cylinder forces. Hopefully they are as good as the same if a tandem master cylinder with a common bore size is being used. If dual cylinders are being used then hopefully the balance bar is set to provide the force distribution calculated.

Determine pedal pivot ratio. Divide the total cylinder forces by the pivot ratio and brake booster ratio, if a brake booster exists, to give the force required from the driver to give maximum breaking.

Escort 2 pot & 4 pot can be compared by simply comparing the piston CSA's as the pads are near as the same width.

2*38*38*pi/4=2268

1*54*54*pi/4=2290

so 2268/2290=0.99 or the 2 pots will 1% more pad pressure for the same pedal pressure.

If 260mm discs are used as opposed to 247mm discs

123.5/130=0.95 or bigger discs will produce 5% more brake torque for the same pedal pressure.

(2290*123.5)/(2268*130)=0.96 or 4% for the Volvo with 260mm discs compared to Escort 2pots with std disc Dia.

So say about 2.8% less pedal pressure for the volvo/260mm if the system is rebalanced to achieve ideal bias.

Cheers

John

From: Joe Maher (josephmaher@optusnet.com.au)

Hi John.

I lost you just after you said "I assume disks all round", and regained you towards the end. :-)
So it looks like that agrees with what Danny was saying. By using the 4 pots I'm increasing the torque applied to the disks, which will lessen the pedal pressure required to do the same job. This will enable me to use a slightly larger master cylinder on the 4 pots when compared to the 2 pots.

Have I got that right John?

Thanks.

Regards
Joe Maher.

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Conf: Brakes
From: John Alderson (jsa@powerup.com.au)
Date: Saturday, April 06, 2002 08:31 AM

Joe,

The 2 pots apply 1% more force than the 4 pots, to the rotors for a given master size. So slightly more pedal effort on 4 pots to get the same pad force.

__If__ you fit rotors that are 5mm bigger in diameter you have the ability to gain about 5% more torque __if__ the pad is positioned as far out on the rotor as possible. Repositioning the std 2pot caliper further out on 260mm discs will still out do Volvo 4pots by that 1% leaving 4%.

Assuming a 70/30 bias split, Volvo 4 pots and 260mm discs, a 2.8% (4*0.7)pedal effort reduction will be realized with 260mm discs over std Dia. discs.

Say you have a 0.75" front master,

0.75*0.75*pi/4=0.4418"sq

0.4418*1.04=0.4595"sq

sqrt (0.4595*4/pi)=0.765" front master Dia. for same pedal effort and bigger discs.

On the other hand choosing a pad that has a COF of 0.5 instead of 0.35 gives a 42.8% increase in brake torque for the same pedal effort.

> From: "Joe Maher"
>
> Hi John.
>
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> So it looks like that agrees with what Danny was saying. By using the 4 pots I'm increasing the torque applied to the disks, which will lessen the pedal pressure required to do the same job. This will enable me to use a slightly larger master cylinder on the 4 pots when compared to the 2 pots.
>

Only if you fit bigger discs.

Cheers

John

From: Bud DaDude (webmaster@hot-escort.net)
Date: Saturday, April 06, 2002 09:47 AM

What about the increase in pad surface area?
How does that affect things?

Bud
http://www.hot-escort.net

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From: Albert Del Medico (zakspeed@telstra.com)
Date: Saturday, April 06, 2002 11:43 AM

don't forget the pressure loss in the std flexi brake lines (if you have them) and the effect of different brake pad materials.

Regards

Albert

From: John Alderson (jsa@powerup.com.au)
Date: Saturday, April 06, 2002 09:15 PM

Bud,

Assume CO of 0.5, pad A area 200mm sq., pad b area 400mm sq and caliper piston force of 300kg.

PAD A

force/mm sq = 300/200 = 1.5kg/mm sq of pad area

stopping force on disk/mm sq = 1.5*0.5 = 0.75kg/mm sq of disk area contacted by the pad

stopping force on disc = 200*0.75 = 150kg

PAD B

force/mm sq = 300/400 = 0.75kg/mm sq of pad area

stopping force on disk/mm sq = 0.75*0.5 = 0.375kg/mm sq of disk area contacted by the pad

stopping force on disc = 400*0.375 = 150kg.

Net result is different wear rates, but the same brake torque.

Cheers

John

From: Bud DaDude (webmaster@hot-escort.net)
Date: Saturday, April 06, 2002 11:36 PM

Tah John.

Bud
http://www.hot-escort.net

From: Joe Maher (josephmaher@optusnet.com.au)
Date: Friday, April 05, 2002 08:18 AM

Hi Danny.

Thanks very much for the info.
It is much appreciated.

Regards
Joe Maher.