I've been watching the thread on improving rear brakes with a great deal of interest, though most of the info went over my head. Last year I was able to buy a 1955 MGFT, like the one I owned in 1957. I have always wished I could have kept that car, also the 1952 XK 120 that I traded the MG for.
Since buying the MG I have been working to improve the drive-ability and safety of same. The brakes are a weak point in this car. I had forgotten how hard manual brakes are to actually stop. I have extended the pedals anes when I owned a machine shop some machibout two inches to achieve more leverage. That helps. The car has about 9" drum brakes. There is no way to press the pedal hard enough to lock the front wheels. It comes to a kwik stop, but a panic stop is scary.
I'm not an engineer and don't play one on TV, in fact the only degree I have is from the School Of Hard Knocks. I took some college courses back in the '80s in ACAD, Mech, Hydraulics, and Robotics in preparation for building machinery when I owned a machine shop. Just enough to make me dangerous. I wound up building three plate saws for sawing titanium master plates, the largest was 44 feet long. Still sawing.
What I propose doing is to install a hydraulic cylinder between the master cylinder and the front brakes. The cylinder would not actuate anything, but I would take advantage of the difference in the psi of the piston end of the cylinder versus the rod end of same. difference in area. IS THIS TOO FAR OUTSIDE THE BOX? I think the brake fluid would inter the piston end from the master cyl. could be thinking backwards. The difference in volume would in effect create a leverage and put more pressure on the front brakes.
Crazy?
It seemed a waste to not tap into all this grey mater present on the LIST.
Thanks, don't be too cruel to an old man, Don Baker,
Burleson, Texas

From: "Ken Coit" <ktc...@gmail.com>
Date: Fri, 11 Jan 2008 12:35:36 -0500
Local: Fri, Jan 11 2008 12:35 pm
Subject: Re: [gmclist] IMPROVING GMC REAR BRAKES

By keeping the CG lower than it would be if the rear lifted? How much does that matter in the whole system?

It would seem also to spread the pain more evenly on the center and rear tires.

Ken Coit, ND7N
Raleigh, NC

1978 Royale Rear Bath, 403, 3.07

From: John Wright <power...@chartermi.net>
Date: Fri, 11 Jan 2008 13:18:50 -0500
Local: Fri, Jan 11 2008 1:18 pm
Subject: Re: [gmclist] NON GMC Brakes and Hydraulics
Why don't you put a brake booster and replace the weak stuff you have . There are several street rod kits available that might work.

J.R. Wright

From: Walt Taylor <walttay...@austin.rr.com>
Date: Fri, 11 Jan 2008 13:13:53 -0600
Local: Fri, Jan 11 2008 2:13 pm
Subject: Re: [gmclist] NON GMC Brakes and Hydraulics

Don,

I wouldn't take that approach. Reducing the bore diameter of the master cylinder would do exactly the same thing, without adding another hydraulic system that *had* to work.

I don't remember TF's being that horrid ('course I was a kid with lower expectations). I thought the brakes were "easier" than TC's or TD's. I'd make sure the front's were working properly, then look for softer lining material first.

I'll send more off-line. Everyone might not be interested in my ideas for drum brakes boosted by squirrels running in a treadmill.

Walt Taylor
Elroy, TX
'75 Eleganza, '75 Transmode
From: Rick Denney <r...@rickdenney.com>
Date: Fri, 11 Jan 2008 17:15:07 -0500
Local: Fri, Jan 11 2008 5:15 pm
Subject: Re: [gmclist] IMPROVING GMC REAR BRAKES

Dave Mumert writes...
> I'm still a bit confused about the weight transfer between the
> leading and trailing arms. I can see how Chuck's modification
> removes the weight transfer caused by the brake torque behaving
> differently on the leading and trailing arms but I am still confused
> as to how this completely removes the weight transfer.

It doesn't. It removes the weight jacking in the rear end by lowering the longitudinal roll center to ground level--the same level as the contact patch. You still have weight transfer rear to front because the CG of the vehicle is above the longitudinal roll center. But GMC's are long.

> In a car the weight transfer between the front and back is a factor of

> (weight X deceleration X CG)/Wheelbase.

If the CG is at 37 inches as you estimated, then the force couple of the weight at a .6G deceleration is 266400 inch-pounds. Over a 160" wheelbase, that force couple applies a force of 1665 pounds.

> Does the rear suspension not act like a very short car with a wheelbase of
> about 40 inches and a CoG of about 14 inches (height of bogie pins). How
> does applying anti-squat to the rear arm and anti-lift to the front arm
> remove the weight transfer?

The roll height of the rear bogies taken together is the intersection of lines from the contact patchs up through the hinge point, as with swing axles in the lateral orientation. I don't know the geometry of the bogies, but I suspect that would put the roll center somewhere between 15 and 20" off the ground. That's the point about which the rear suspension would roll if there were no front wheels to resist the forward dive.

If the roll center is at 16 inches, then the braking force couple is the rear braking force times 16 inches. The weight on the rear will be 6335 pounds after the weight transfer, leading to a force couple of 101360 inch pounds. Divided by 40 inches leaves 2534 pounds transferred from the rear to the middle axle. The middle axle will be 6335/2+2534=5701 pounds. The rear axle will be 6335/2-2534=634 pounds. Guess why the rear axle skids.

With the reaction rod, you have in effect two parallel and horizontal links. The center of rotation for each is where lines through the link hinges cross, effectively at infinity, because the links are parallel. Lines drawn from the contact patch to that distant center of rotation are essentially parallel to the ground, which means they intersect at the ground. Thus, the roll center is reduced to ground level, and can no longer apply a moment to the force applied at the contact patch. The result is that the bogies do not wind up, and the normal force during braking will be 6335/2=3168 pounds on both axles. That includes only the effect of weight transfer back to front, not the roll of the rear bogies around the roll center during braking. You'll end up with a normal force on the front wheels of 5665 and on each of the rear wheels of 3168 pounds.

Of course, all that will change a bit as the vehicle dives, but I don't think it will change enough to cause a design based on it to fail.

(If you had two trailing arms rather than a leading and trailing arm, the lines from the contact patches through their center of rotation would extend upward and forward, but would be parallel. Each would intersection the midpoint between them equal parts above and below the ground, with the same effect of moving the roll center to ground level.)

Rick "thinking much of the brake dive in a GMC is really rear jacking caused by the bogies winding up" Denney

'73 230 Ex-Glacier "Jaws"
Northern Virginia

From: Rick Denney <r...@rickdenney.com>
Date: Fri, 11 Jan 2008 17:23:18 -0500
Local: Fri, Jan 11 2008 5:23 pm
Subject: Re: [gmclist] NON GMC Brakes and Hydraulics

Problemm is that the force will be the same. The product of the pressure times the piston area will be equal. You must add external force to the system to make this work, by adding pressure on the upstream side of your cylinder.

The key to increasing advantage is to increase leverage. You've already done that with the brake pedal arm. To do it with hydraulics, you'll need either a smaller piston in the master cylinder, a larger piston in the wheel cylinders, or both. The hydraulic advantage is simply the ratio of the piston area between the master cylinder and the wheel cylinders.

The downside is that when you increase leverage, you increase travel. If you decrease the master-cylinder piston, you increase the distance the piston must move to effect a given motion in the wheel cylinders. If you have the room, this is a good solution.

If you increase the wheel cylinders, you will move more brake fluid, and the reservoir in the master cylinder must be big enough to hold all the needed fluid.

Rick "thinking a hot-rod booster add-on is probably better in the long run" Denney

'73 230 Ex-Glacier "Jaws"
Northern Virginia
Discussion subject changed to "IMPROVING GMC REAR BRAKES" by Rick Denney

From: Rick Denney <r...@rickdenney.com>
Date: Fri, 11 Jan 2008 18:42:38 -0500
Local: Fri, Jan 11 2008 6:42 pm
Subject: Re: [gmclist] IMPROVING GMC REAR BRAKES

I occurs to me that I'm assuming that the roll center between the front and rear is at ground level with this calculation. That turns out to be the case--both front and rear move straight up and down with extended centers of rotation at infinity. But I forgot to think about it.

Rick "whose brain just exploded" Denney

'73 230 Ex-Glacier "Jaws"

Northern Virginia

From: Don Baker <baker-...@sbcglobal.net>
Date: Fri, 11 Jan 2008 16:06:49 -0800 (PST)
Local: Fri, Jan 11 2008 7:06 pm
Subject: Re: [gmclist] NON GMC Brakes and Hydraulics
Rick, let me esplain my thinking, flawed as it might
be. Just for simplicity say the master cylinder has a
1" area, the wheel cylinder also has a 1" area. You
press the master cylinder in 1", the wheel cylinder
will move the same 1".
Now we add a hydraulic cylinder in the line between
the master cylinder and the wheel cylinder. The piston
end of the hydraulic cylinder has 1"
area, the rod end of the hydraulic cylinder has .75"
due to the rod taking up part of the area. Now when
you press the master cylinder in 1", it moves the
hydraulic piston 1", But only displaces .75 as much
fluid on the output end, in turn only moving the wheel
cylinder .75". Thereby you receive the advantage of
leverage because now you have to move the master
cylinder further than the wheel cylinder moves.
Does that make any sense ? or is my brain fried?
thanks, Don Baker, Burleson, Texas '77 Kingsley

What you are doing is exactly the same as using a smaller master cylinder. You are just lengthening the pushrod hydraulically. But it will have the same effect as using a .75" master cylinder.

The problem is that you'll only have the travel available on that original master cylinder, and to move the wheel cylinders the same distance, the master cylinder will need 1.78 times the travel (the fluid displaced by a 1" movement of a 1" piston is 1.78 times the fluid displaced by a .75" piston moved an inch). I doubt your master cylinder will accommodate that, even if the pedal travel does.

Rick "now understanding the design" Denney

'73 230 Ex-Glacier "Jaws"
Northern Virginia

From: Don Baker <baker-...@sbcglobal.net>
Date: Fri, 11 Jan 2008 17:21:42 -0800 (PST)
Local: Fri, Jan 11 2008 8:21 pm
Subject: Re: [gmclist] NON GMC Brakes and Hydraulics
Thanks Rick, This was mostly a theory. I probably will
never get around to trying. I can live with the way
the brakes work on the MG. It is as much fun to drive
as I remember. The PO from Michagan had bastardized
the car with an 1965 1800 MGB drivetrain, So it will
never be a collector car, Just fun to drive. Much

faster than the original 1500 motor. And I have really
enjoyed working on it. thanks again, Don Baker

But it

From: "Jim Kanomata" <jimkanom...@gmail.com>
Date: Fri, 11 Jan 2008 19:44:32 -0800
Local: Fri, Jan 11 2008 10:44 pm
Subject: Re: [gmclist] IMPROVING GMC REAR BRAKES
Chuck feels that the rear does not rise during braking . Only
thecenter arm creats the lift. When you see the vidio, you will become
a belever.
Jim Kanomata
Applied/GMC
j...@appliedairfilters.com
http://www.appliedgmc.com
1-800-752-7502

Don Check out Victoria British as they have an add on servo that may or may not work -- HTH..... Glenn 76 Glensbroke

From: Glenn Gregory <ggreg...@tbaytel.net>
Date: Sat, 12 Jan 2008 08:16:52 -0600
Local: Sat, Jan 12 2008 9:16 am
Subject: Re: [gmclist] IMPROVING GMC REAR BRAKES

Don
Check out Victoria British as they have an add on servo that may or may not work
--
HTH.....
Glenn
76 Glensbroke

From: "Dave Mumert" <dmum...@telusplanet.net>
Date: Sat, 12 Jan 2008 11:43:20 -0700
Local: Sat, Jan 12 2008 1:43 pm
Subject: Re: [gmclist] IMPROVING GMC REAR BRAKES
Hi All

I'm going to make a statement here and you all can disagree or comment.

Having a road level roll center front to back on the GMC does not eliminate
weight transfer during braking as Rick stated.
> If the CG is at 37 inches as you estimated, then the force couple of
> the weight at a .6G deceleration is 266400 inch-pounds. Over a 160"
> wheelbase, that force couple applies a force of 1665 pounds.

The only way to eliminate similar weight transfer between the rear and
intermediate wheel is to eliminate the coupling between them. So dual
trailing arms or quad-bag systems with isolated air springs will eliminate

weight transfer BUT standard GMC suspension or quad-bag systems with coupled bags will still have weight transfer. One should be able to calculate the amount of transfer using the same formula as we use for the entire vehicle. Wheel base = distance between rear wheels, CoG = bogie pin height, weight = current weight on bogie mount (this will change during braking as weight is transferred to front wheels).

The extreme transfer caused by the brake torque from the rear wheel pushing down on the bogie and the brake torque from the center wheel pushing up has been very well dealt with with Chuck's modification.

One does not need to see a video to appreciate how badly out of balance the brakes are. If the rear wheels are providing equal braking of 1000 pounds at the road surface there will be 1000 X 14 (wheel radius) inch pounds of torque on the bogie arms. The force at the bogie pins will be 1000 X 14/arm length. The leading arm will be pushing up and the trailing arm pushing down. The forces will be 1000X14/20=700 pounds, so the leading wheels will have 700 pounds more pressure on them while the trailing wheels will have 700 pounds less. If my figures are right that amounts to 1400 pounds of weight transfer all of which Chuck's mods will eliminate.

Dave

From: "Gordon & the \"Tin Gerbil\"" <wizw...@telus.net>
Date: Sat, 12 Jan 2008 11:12:55 -0800
Local: Sat, Jan 12 2008 2:12 pm
Subject: Re: [gmclist] IMPROVING GMC REAR BRAKES
Dave;
I will now show my ignorance. How can you state the force is from the center wheel is pushing up and by how much, when you don't know the relationship between the height of the front spindle and the bogie pin. For an extreme example, what is the effect on brake lift if all the air is out of the bag and the spindle is much higher than the bogie pin? Doesn't this angle make a large difference it the lift component? When I try to analyze things I have on idea on how they work, I always use the extreme case to give me some insite. i.e. What if the bogie arm was straight down to the wheel? What it the bogie pin was welded solid? I ask myself these type of questions in order to have an understanding as to what is going on.
Have you ever watched dual trailing arms with air bags on a heavy truck during start and stop? Weird stuff goes on. An empty tractor (truck) squats 8-10 inches on start and lifts on stop. These are trailing arms as you suggest and seem to behave the opposite to what you are suggesting? Does quad bag, with an anchor in the middle of the bags reduce the lift (50% ??) and greatly improve the braking?
Gordon

From: "Dave Mumert" <dmum...@telusplanet.net>
Date: Sat, 12 Jan 2008 13:16:09 -0700
Local: Sat, Jan 12 2008 3:16 pm
Subject: Re: [gmclist] IMPROVING GMC REAR BRAKES
Hi

Sorry Gordon I should have been more clear in my assumptions. I was assuming a normal ride height, at that point the spindle and bogie pins are the same or nearly the same height. This is obviously not accurate during heavy braking as the rear end will rise and the angles change.

It is my understanding that Chuck's modifications neutralize the torque effect 100%.

According to my calculations the vertical component of the brake torque in the example I gave only changes by about 32 pounds when the rear end is 5 inches lower or higher than normal, again Chuck's mod removes this.

Picture the passenger side of the GMC. When going forward the wheels are rotating clockwise. When you apply the brakes the bogie arms want to rotate the same direction as the wheels, the only thing to stop the rotation is the mounts. So the leading arm wants to rotate clockwise so it pushes up on the bogie pin, the trailing are also wants to rotate clockwise so it pushes down on the pin. Newton says there must be an equal and opposite reaction to these forces, the only place for the opposite force is at the wheels. So the leading wheel gets more downward pressure while the trailing wheel gets less.

Fortunately we only have to deal with brake torque on the GMC, trucks must deal with brake torque as well as drive torque.

I am not sure I understand what happens with all this when the shocks bottom out, I suspect things change.

I can think of only two ways to deal with the weight transfer caused by brake torque. One is Chuck's system, the other is different suspension (dual trailing arms or dual leading arms)

I think an ideal system would be a quad-bag system with isolated air springs and Chuck's mods on the brakes.

Dave

Sent: Saturday, January 12, 2008 12:12 PM
Subject: Re: [gmclist] IMPROVING GMC REAR BRAKES

From: Eli Dragisich <elid...@comcast.net>
Date: Sat, 12 Jan 2008 14:34:28 -0600
Local: Sat, Jan 12 2008 3:34 pm
Subject: Re: [gmclist] IMPROVING GMC REAR BRAKES

I have followed the complete discussion pertaining to Chuck's modification. I appreciate the vast amount of knowledge, formulas, and mathematical computations that have been exchanged among GMCnet members who are significantly more mechanically knowledgeable than I am . Many years ago as an undergraduate and later as a graduate student, analytical skills and theoretical models were essential components of my life. Today that is no longer true. Instead, I look for much more simple answers, especially when I am trying to improve my GMC.

I purchased my coach 2 years ago primarily to spend quality time with my family, and most specifically my young grandchildren. Like all of you, I'm always concerned about the safety of my family; therefore, the purchase of a thirty-

year-old motorhome weighed heavily on my mind. After months of research, I finally purchased a coach that had been completely refurbished by Jim Bounds.

Before I purchased it, I expressed to Jim my deep concern about about thirty-year-old technology, and my primary concern was directed toward the braking ability of a thirty-year-old coach. My concern escalated on the trip from Florida to mountainous West Virginia, which was not uneventful. Upon my arrival back home, I read every discussion on the GMC forum about brakes. Ultimately, I decided to convert my original drum brakes to disc brakes. Moreover, I am always looking for new updates that will further improve the performance, the safety, and especially the braking ability of my GMC. Up to this point, I have spent many additional dollars to achieve my goal, and I will continue to do so, but I want something positive for my money.

Regardless of all of the formulas, hyotheses, and the bantering back and forth, some of us with minimal mechanical abilities (like me) simply want to know whether or not the modication improves the braking ability of the coach. Simply put, if it works better than the original, I'll buy it!
--
Eli Dragisich
Weirton, WV
'76 Norris Edition

Hi Dave; Thank you for the time to answer some of my questions. When you have time, would you please comment on the rest of them? Have you ever watched dual trailing arms with air bags on a heavy truck during start and stop? Weird stuff goes on. An empty tractor (truck) squats 8-10 inches on start and lifts on stop. These are trailing arms as you suggest and seem to behave the opposite to what you are suggesting? Does quad bag, with an anchor in the middle of the bags reduce the lift (50% ??) and greatly improve the braking? And some more; Are the 2 bags on one side not pressure isolated from each other? Do you have to manually isolate them after one fails? If that is the case, I won't even consider the quad bag system. A sudden loss of pressure in one bag should seal the other bag. Is a shuttle valve too complicated for all the minds that hang out here? Gordon Dave Mumert wrote: > Hi > Sorry Gordon I should have been more clear in my assumptions. I was > assuming a normal ride height, at that point the spindle and bogie > pins are the same or nearly the

From: "Gordon & the \"Tin Gerbil\"" <wizw...@telus.net>
Date: Sat, 12 Jan 2008 12:49:13 -0800
Local: Sat, Jan 12 2008 3:49 pm
Subject: Re: [gmclist] IMPROVING GMC REAR BRAKES

And some more;
Are the 2 bags on one side not pressure isolated from each other? Do
you have to manually isolate them after one fails? If that is the case,
I won't even consider the quad bag system. A sudden loss of pressure in
one bag should seal the other bag. Is a shuttle valve too complicated
for all the minds that hang out here?
Gordon