CHASSIS, SUSPENSION & DRIVETRAIN

Source: www.grapeaperacing.com

SUSPENSION & STEERING

The leaf springs had to go; I never cared for leaf spring cars and had no interest in even trying to get it to hook with the factory suspension. If I was going to put in wheel tubs and a roll cage, it didn't make much sense not to tub the entire car and upgrade to coil over shocks.

This is just before I welded the wheel tubes and floors in. The roll cage is partially installed at this point.

For rear suspension I used a Chassis Engineering double adjustable ladder bar set up. This lets me make rather quick changes without removing the bars. Ideally, the lower arm line should pass through the cars center of gravity on the launch to get the best weight transfer. As a general rule you want it aimed a little lower, because toque will make it rise. Until the car was completed, there was no way to figure the center of gravity, so I set the suspension cross-member up so that the center hole would aim the lower bars at the rear center of the crankshaft. The center of gravity on most rear wheel driver cars is about level with the crankshaft and slightly rear ward, so aiming it at the crankshaft would aim the lower bars a little under the estimated center of gravity. When car was finished I weighed it and figure the true center of gravity and there was plenty of adjustment to get it right. From the rear suspension cross-member, I ran 2" by 3" frame rails up to the factory front sub frame to stiffen the chassis.

Here's a look the competed back half. It needs a good cleaning, but I'm happy with they way it turned out.

Another view of the finished back half. No back seat, but you don't need that to go fast.

For rear shocks I used Eagle Alden double adjustable aluminum coil overs with adjustable lower mounts on the rear housing. They are mounted to a cross-member welded in just for the shocks to mount to. I started with 100 lb/inch rear springs, which worked out fine in the end. The lower shock mount can be adjusted in ½" increments and the springs can adjust ride height anywhere in between.

I spaced the rear frame rails apart enough to give 17" of room on each side, which will allow me to run up to a 15" wide tire if I need to. Right now I'm running 10.5" Hoosier Quick Time DOT tires, but the next set will

be a wider drag radial. The front tires are Hoosier street radials. With this set up I, running 2 degrees of negative pinion angle. Ideally you want zero, but hard launches bring it up some and if it goes positive, it can be real damaging on parts.

I did not use the track locator rod that cam with the ladder bar kit, they are not good for street use. I made a panhard bar to locate the rear. Panhard bars have a slight arc as the go through the suspension travel, but are much stronger for street use. Track rods bend very easily on rough roads. This car was built to drive to the track not be trailered.

One thing about me is that I like to do everything myself, front-end alignments are not exceptions.

The front suspension is fairly stock other than adjustable shocks and adjustable tubular upper control arms. The factory alignment sucks for drag racing and the design of the front suspension does not make it easy to get decent positive caster. I got a set of adjustable upper control arms to increase caster to positive 4 degrees. With stock upper control arms, the best I could to was 1 degree positive. Caster is set at zero and toe was set to 1/32" toed in.

The people that know can tell you that there is very little that I don't do myself on a race car. I pride myself in building a car from the ground up, that goes for front-end alignments too. I use a Fastrax gauge for my alignments. It can measure camber +/- 4 degrees, caster from -4 to +12 degrees and with the optional attachment can measure toe. At $150, it will pay for itself in 3 alignments.

I ditched the power steering, there's no need for it, and it also freed up some room for the intercooler piping. I used a Flaming River Vega box and used a 6" pitman arm. For a steering shaft I used two Flaming River Universal joints to and cut a piece of ¾" double D shaft to the right length.

ROLL CAGE

The roll cage is very import, not only are they required by the rules, they make the chassis more ridged and if set up correctly the car will respond to suspension tuning a whole lot better. I had already had an 8 point roll bar, to run 9's I needed a cage. A cage can be done at home with the right tools for relatively cheap. Universal roll cage kits do not fit very well, but are cheap. With an inexpensive tubing bender you can make a universal kit fit good for cheaper than an expensive kit. You pay around $500 for a decent cage kit that fits if one is available for your car. The rear of my car is far from stock, so any decent cage kit for a second generation Camaro wouldn't fit well anyway. You can get a universal 10 point cage kit for under $200. Add a cheap tubing bender for about $100 and you've got about $300 in a cage that you can make fit pretty good in you car. When I say universal kits, these are the cheap kits that you see that *say* they fit in a certain car. In reality what you are getting is a main and upper hoop that are bent to fit that car and a bunch of straight tubes. You're on your own from there.

The top of the door bars needed to be notched to fit the main hoop and well as the seat back brace. A tubing notcher cuts the pipe very nice.

You can get by without a tubing notcher, but they make life a whole lot easier. You want the bars to fit well. Anyone can fill gaps with a MIG welder, but it makes poor inconsistent welds. Remember than the primary function of this thing is to save your ass. You want good strong welds and to get them, the tubes need to fit tighter right. The tubes can be notched with a hand grinder; it just takes time to get them to fit well. If you are only building 1 cage, a tubing notcher may not be

worth the expense, but if you plan on doing more than 1, it'll be worth every penny.

This is how you want the pipes to fit. With no gaps, you can make a nice consistent strong weld all the way around the pipe.

When building a roll cage, have a rule book close by. You want to get it right the first time. You can see in the picture above that I have 2 seat back braces. The lower 1 in the original that was legal with the stock seats. The racing seats sit about 2" higher which put the harness mounting point lower than 4" under my shoulders and also made the door bars too low. The door bars are quick and easy to move, but the original seat brace is where the ladder bar front mounts tie in to the main hoop, so it was easier to leave all that alone and just add another seat back brace high enough.

The side bars would not clear the seats if they were straight, this is where the tubing bender cam in. I slight outward bend near the bottom put the bars closer to the doors and cleared the seats. The front struts also did not fit very well. If left alone, they would have ended up about 5" off the A pillars. I bent them at the top to put them about 1" from the A pillars making a much nicer fit. To mount the front struts to the floor I used 6" by 6" 0.125" thick plates welded to the floor. The frame rails are too narrow at that point. All other tubes are welded to the frame.

I put the top hoop as close to roof as I could and still leave room to install the headliner when finished.

I had to bend the side bars to get them closer to the A-pillars so they didn't obstruct my view for street driving.

I have to bend the rear of the top hoop end inward to weld it to the main hoop high enough for my liking. If I didn't, I would have had to weld it on the bend of the main hoop making it about 2" lower. This way the top hoop fits up in the roof where it belongs.

The rear struts go into the trunk and are welded to the frame rails at the shock mounting cross-member to strengthen it. There are also two struts going from the ladder bar front mounting to the main hoop at the seat back brace. Welding the roll cage point at the suspension and shock mounts puts the strength where it is needed. This will make any car more responsive to suspension tuning by eliminating flex at these important areas.

FORD 9" REAR

The stock 8.5" 10 bolt is a weak link and had to go. The 12 bolt Chevy is a very good rear, but not nearly as popular as the 9" Ford. In stock trim, the 12 bolt is a stronger rear, but the aftermarket supports the 9" more.

The pumpkin is the only stock part left in my rear. The 3" axle tubes were cut out in favor of thicker 3 ½" tubes. The center section is a Moser unit with 3.50:1 Richmond street/strip gears. This may not sound like much gear, but a 3.28:1 first gear ratio is steep, on my best run I ran 143 mph and went through the traps at 6500 rpm in 4th gear. The rear is 6" narrower than the stock 10 bolt and I run 33 spline Moser Pro-Street axles.

Here is the rear installed. With the 10.5" wide tires, there is still plenty of room to go bigger.

This time around I went with an Auburn posi unit rather than the locker that I used to run. The locker worked fine, but the clicking around corners gets old after a while and the locker would lock if you accelerated out of or decelerated into turns too fast. This made it a little tricky to drive sometimes. The Auburn unit is much more street friendly and quiet.

I used Moser housing ends to keep the factory brakes on the rear. I was going to make a fixture to narrow the rear myself, but I had a friend who owned a speed shop that narrowed rears and he did it for me. The fixture is nothing fancy; it's just a 2" bar that slides through plates the same diameter as the bearings. With the center section installed, the bar slides through to locate the housing ends for welding. All I had to do to hook up the factory parking brakes was to weld tabs on the frame to mount the rear cables.

TRANSMISSION

I love standards, and for a fun car, there is no other way to go for me. If I raced in a bracket class, I'd have an automatic, but I don't care about consistency, I care about having fun. A 4 speed isn't good enough to have ¼ mile gears and drive on the highway, so I was looking for at least a 5 speed. I know many people who drag raced Doug Nash 5-speeds and they lasted forever. I found out that Richmond Gear bought out Doug Nash and was building the transmissions now, so I looked them up. They took the Doug Nash 5-sped a little further and added an overdrive to it. The Richmond ROD had great gears for running ¼ mile in 1st through 4th and that left 5th and 6th for the highway, so I bought one. It has taken a lot of abuse and is still going strong. I am looking into other options now because I am pushing the limits of the transmission, but it's been a very good transmission to me. I have nothing bad to say about Richmond transmissions.

FLYWHEEL & CLUTCH

The first clutch I had was a Center Force dual friction, which had claimed would hold 800 ft. lbs. of torque. It didn't last an hour. I couldn't even hold the engine, forget about nitrous. I called Center Force and they told me my car wasn't properly geared, they told me I should have 4.11 to 4.56:1 rear gears. Bullshit!!! I matched the rear gears to the transmission gears to give shift points and rpm drops to match my rpm range, the clutch just couldn't hold the power.

I gave up on them and called Ram, who told me they could set me up with a clutch to hold the power, but it would have a heavy pedal and I'd get some chatter on take off. Ram hooked me up with a 3200 psi Borg & Beck style pressure plate and 6 pad 6000 series sintered bronze 11" clutch disc. I did get a little chatter if the rpm is too low on take off and it is a heavy pedal, but it holds the power no problem and it grabs just as hard if not harder when it gets hot. It took a little getting used to, but it's still a blast to drive.

I'm using a Ram aluminum flywheel with a steel friction insert to keep rotating weight down. I had a lot of people tell me not to run an aluminum flywheel on the street because it will be hard to take off and you'll get a rougher idle. I have no such problems, I can't tell one bit of difference.