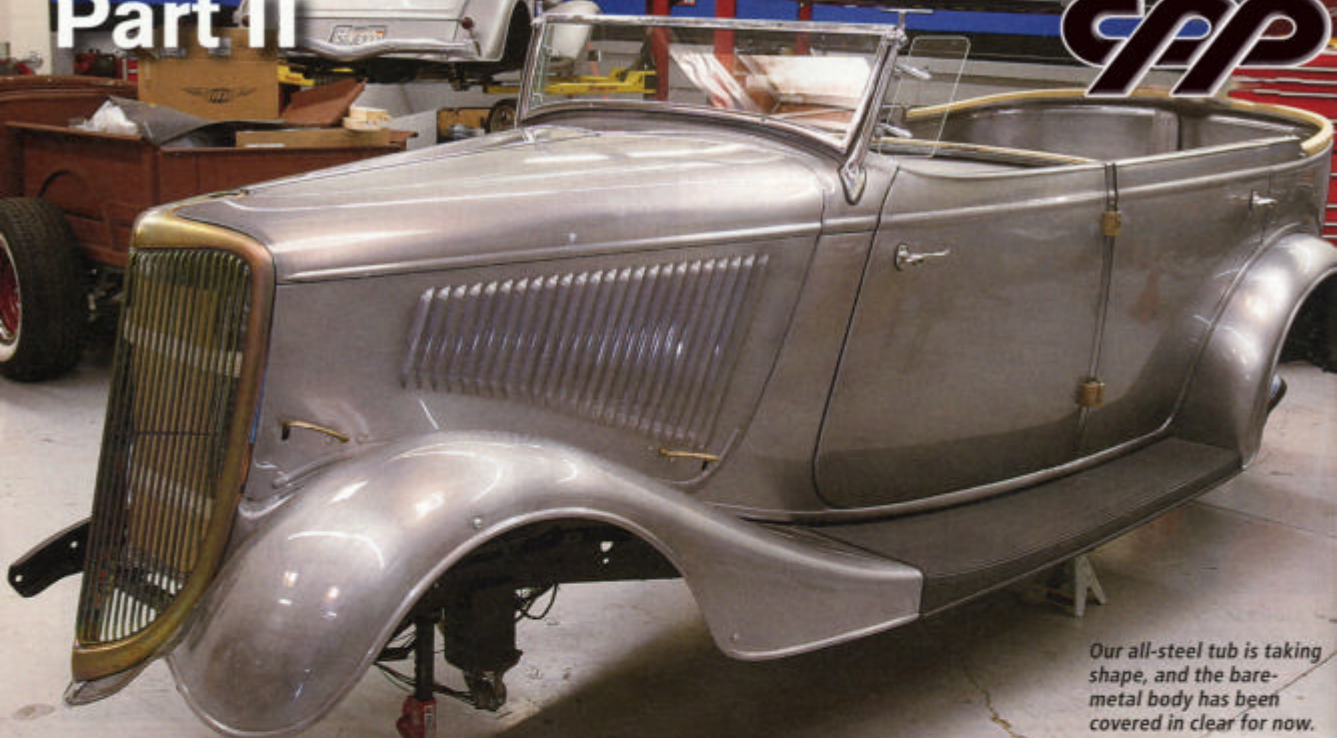


Ultimate Underpinnings: Part II

CAP



Our all-steel tub is taking shape, and the bare-metal body has been covered in clear for now.

Building a contemporary version of a traditional chassis

Last month, we introduced the '34 phaeton from Kelvin Waddington's Australian Ute Company that we're building to drive to various summertime events and to tag along with Jerry Dixey on a few of the Road Tour legs.

There were several specific goals when the project began. First and foremost, we wanted a car that was a no-hassle driver, something that road and handled well, was simple and reliable, and that could be easily duplicated by anyone building a street rod at home. For those reasons, under that new all-steel tub body is a traditional solid axle chassis from Pete & Jake's. In our first installment, we documented the assembly of the front suspension, and this time we installed the rear suspension and plumbed the chassis.

We've always believed the simple approach is often best when building a street rod, so we chose Pete & Jake's ladder bar rear suspension for our '34. The suspension works without binding when the rear wheels encounter bumps individually or when the car is driven across an uneven surface, as the frame ends of the bars are mounted close together, unlike split wishbones attached to the framersails.

Other advantages to using ladder bars include the facts that they don't interfere with the car's floor, there are no severe pinion-angle changes throughout the range of suspension travel, only two easily replaceable bushings are used, and



A street rod's suspension doesn't have to be complicated to work well. Our Pete and Jake's chassis uses ladder bars and a Panhard rod to locate the rearend, while suspension is via Viper adjustable damping coilovers.

they easily handle the forces of acceleration and braking applied to them. Last but not least, they are simple for the homebuilder to assemble.

We also elected to use Pete & Jake's Viper coilovers to absorb the bumps during the Road Tour. The beauty of coilovers is they allow the ride height to be quickly altered, thanks to multiple mounting holes in the brackets, and ride quality can be tuned by changing springs, altering the preload on the springs or adjusting the damping on the shocks.

One of the biggest advancements in street rod components has been in the area of brake kits. While there are many options, the most popular combination continues to be discs up front and drums in the rear, and that's what we opted for. Super Bell Super Stoppers with four-piston calipers and Pete & Jake's cool finned aluminum backing plates, vented rotors, and aluminum hubs are used fore; all-new drum assemblies from John's Industries are used aft.

A critical consideration when selecting brake components is the size of the master cylinder; common bore sizes range



Special rivets were used to secure the cover. They are expanded and locked in place by driving in the center pins with a hammer and punch.



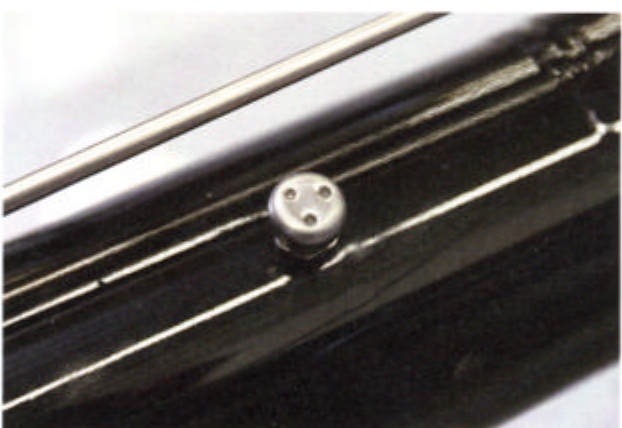
We installed a Pete & Jake's aluminum cover to give the new 9-inch housing from John's Industries a different look. After grinding away any rough spots, silicone was applied to the lip of the cover and it was pressed in place.



The finished installation gives the Ford housing a new and different look. The cover carries the Pete & Jake's logo.

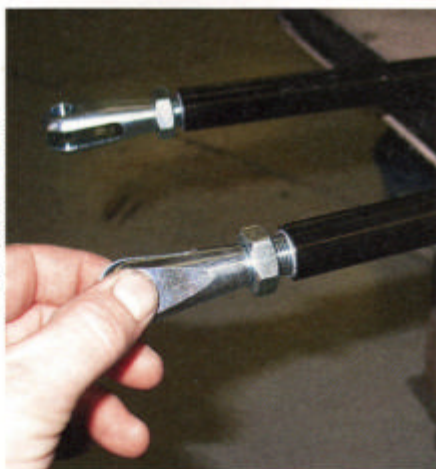


Duct tape was used to secure the cover while the silicone set. Then, using the holes in the cover as a guide, the housing was drilled for the special fasteners.



This rearend vent is necessary to prevent pressure from building up inside the housing, which can cause gear oil to be forced past the seals and onto the brake linings. OEM-style vents often serve to secure brake line fittings to the housing, and short vents are available at most parts houses.

Our Pete and Jake's ladder bars attach to the rear end housing with simple clevises that provide adjustment for pinion angle.

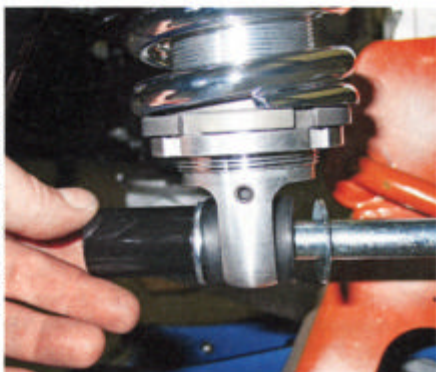


The ladder bars use urethane bushings at the frame attachment points. The bushings were installed first, and then the center sleeve was put in place.



Here's something often learned the hard way. Install the upper coilover bolts from the front of the crossmember; otherwise, the bolts/coil can't be removed once the gas tank is in place without removing the tank.

The lower mounting bolt required a spacer between the bracket on the rear end and the coilover. It's important that bushings are not cocked, or in a bind, when the shocks are installed.

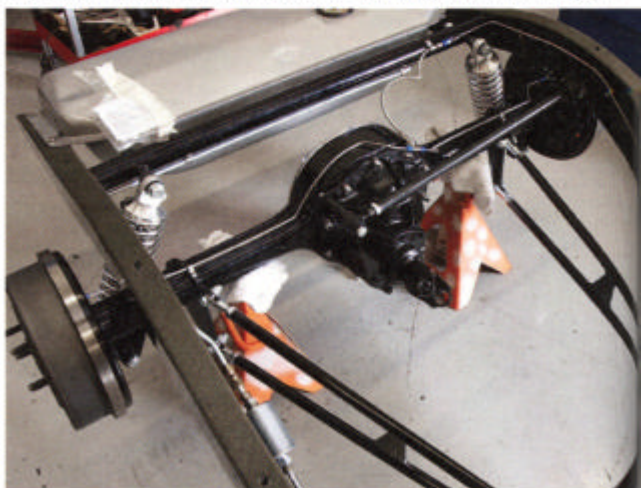


from $\frac{7}{8}$ to $1\frac{1}{4}$ inches. Smaller bore sizes will result in more pressure in the system but may not supply the necessary volume. The master cylinder must be able to supply fluid to all the components with less than two-thirds travel of the available stroke. Of course, the master cylinder required will also depend on the type of brakes used. Typically, a drum brake master cylinder will have a smaller bore than a disc master, and the fluid reservoir chambers will be equal in size. A disc/drum master

A pair of brackets mount the Panhard bar to the center section, and copper washers were used under all the third member nuts to prevent seepage of gear oil.

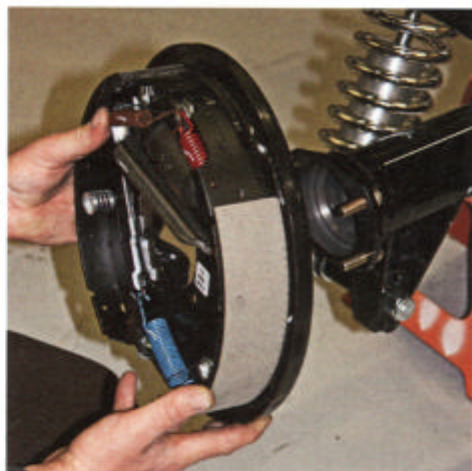


Like the ladder bars, urethane bushed ends were used on the Panhard bar. Antiseize was used on the threads, and the final bar adjustment should be made with the chassis loaded at ride height.

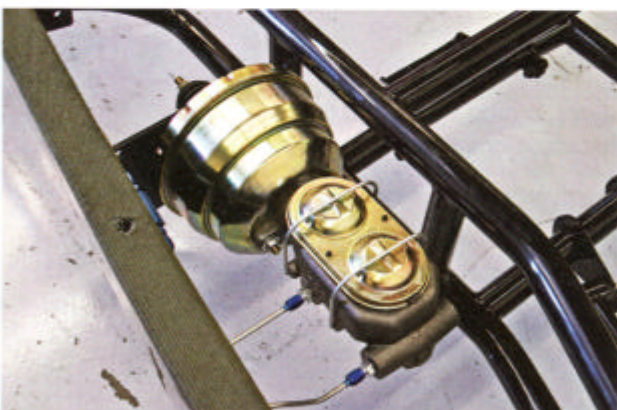
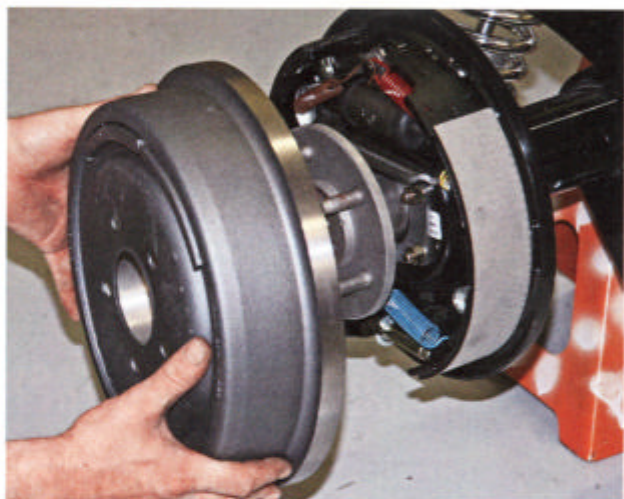


The finished rear suspension is clean and simple, and it has been proven to work well. Because this is a phaeton, and we'll be hauling passengers in the back seat, we used 350-pound springs on the coilovers.

All-new rear brakes were part of the package from John's Industries. The brake shoe with the shorter lining goes toward the front of the car when installing the assembly.



John's offers a variety of kits, but we used a 11x2-1/8-inch drum. Ten-inch drums, Buick-style 11-inch drums, and Ford SVO 11-3/4-inch discs are also available.



Pete & Jake's offers a variety of master cylinders. This is a dual-diaphragm booster and Corvette master cylinder from Classic Performance Products on a Kugel mounting bracket.

Pedal leverage is a major factor in proper brake operation. Pete & Jake's has the correct 6:1 ratio, just like Henry used.



is designed to push more fluid to the front disc brakes, since they require more volume than drum brakes. Generally speaking, a disc/drum master cylinder will have one fluid reservoir larger than the other. This is because the disc brake pads wear faster than the drum shoes, and the fluid reservoir will drop faster.

A four-wheel disc brake master cylinder is designed to supply more fluid pressure and volume to the rear disc brakes than the disc/drum master does. This is achieved through an internal piston redesign. The piston that feeds the rear brakes on a disc/drum master will run out of stroke, limiting the amount of fluid pressure and volume that may be supplied to the rear disc brakes. If you attempt to use a disc/drum master on a four-wheel disc system, you will get poor rear brake function and experience a spongy brake pedal with excessive pedal travel.

One of the misconceptions about using disc brakes is that a booster is necessary, but that isn't the case with the proper master cylinder. Pete and Jake's offers a 3/4-inch disc/drum master cylinder that works very well; however, boosters are available on request.

We incorporated a proportioning valve and two residual pressure valves as part of the brake system plumbing. Proportioning valves modulate the pressure to the rear brakes; they minimize rear-wheel lockup found in heavy braking and compensate for differences in braking conditions in front-disc/rear-drum systems. Residual valves maintain a small amount of pressure in drum brake systems to keep the wheel cylinder cups expanded. This prevents air from being drawn into the system and allows the brakes to react quicker. A 10-pound valve is common in drum brake systems. Normally, disc brake systems don't have residual pressure valves; however, when the master cylinder is mounted below the floor, and is lower than the calipers, a 2-pound valve is used to prevent the calipers from draining fluid back to the master cylinder.

When plumbing a brake system, be aware that the size of the brake lines has no effect on system pressure, and only steel or stainless steel hard lines should be used. Braided lines should only be used between the chassis and wheels. Plumbing an entire chassis with braided line will cause a spongy pedal, because it will swell in use. When routing brake lines, keep them away from heat sources and points of abrasion, and avoid large vertical loops, like over the rear axle that can cause the system to trap air and/or be difficult to bleed.

Our chassis is just about completed, and it's a perfect example of how easy and fun it is to assemble readily available street rod components. And, the great thing about it is anyone can do it.



We used through-the-frame fittings to plumb the brake system. They, along with fittings, braided flex hoses, and line clamps, came from Kugel's.

Front brakes are Super Bell Super Stoppers from Pete & Jake's. Make sure the bleeder screws are at the top when installing the calipers, and don't use standard open-ends to prevent damaging the fittings; invest in a set of line wrenches, as shown on the right.



The left front through-the-frame fitting has been installed here. We used stainless lines with AN fittings, which require 37-degree flares.

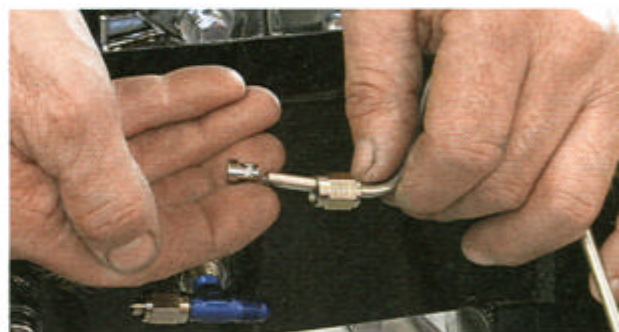
A Wilwood adjustable proportioning valve was installed in the rear brake line. Rotating the knob clockwise until it's all the way in delivers full pressure to the rear brakes. Turning the knob counterclockwise reduces pressure.



It's hard to make smooth, consistent turns in brake lines without a bender. They're inexpensive and will usually pay for themselves when compared to the tubing that's ruined trying to bend it by hand.



After brake line tubing is cut to length, always deburr the tubing before flaring. Even the smallest burr may cause the flare to split.



Anyone who has ever made a set of brake lines has forgotten this at least once. Although it seems obvious, put the nut and ferrule on the line before flaring it.



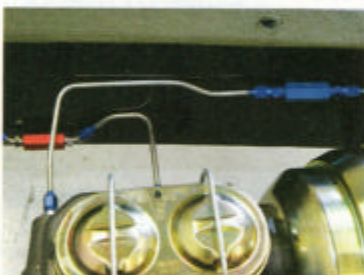
With most tools, the tubing should be flush with the outer edge before it's flared. Stainless line uses a single flare with a ferrule inside the nut to reinforce it.



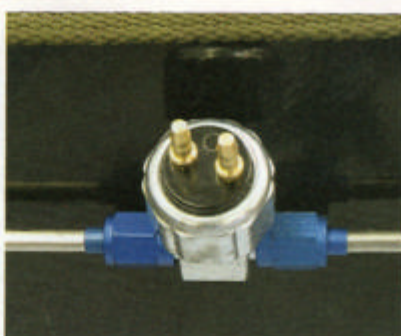
Here is a properly formed 37-degree flare on stainless tubing. Stainless cannot be double-flared like steel, so a ferrule is used for reinforcement.



Here's the completed flare, ferrule, and nut. Don't over-tighten the fittings or use any sealant or Teflon tape during assembly.



Residual pressure valves are normally built in master cylinders used with drum brakes. Our master cylinder was not equipped, so we installed Wilwood inline valves—10-pound in the rear and 2-pound in the front.



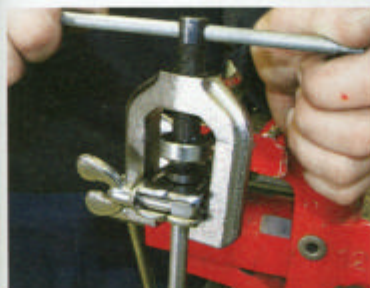
We opted for an inline hydraulic brake-light switch to activate the stoplights; these work fine with conventional bulbs or LEDs. If high-output halogen-type lamps are used, a relay should be considered to protect the contacts in the switch from arcing, which will shorten its life.



Delivering fuel is a billet-aluminum Holley electric fuel pump. It's internally regulated for a maximum of 7 psi and is compatible with alcohol/methanol. Steel lines were used for the fuel system.



For fuel or brake lines, steel tubing is double-flared at 45 degrees which requires a special tool and a two-step process. First, the end of the tubing is "folded" toward the inside.



The next step is forming the 45-degree flare. Fold the end of the tubing into a double layer for strength.



This is a 45-degree double-flare on steel tubing. The thicker flare makes it more resistant to cracking from fatigue, and a ferrule isn't required.

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