



A good exhaust system begins with a tubular header that can pass between the frame rails and avoid the motor mounts. This Sanderson shorty header came in bare steel, but it was covered with a high performance coating to prevent discoloration and rust.

EXHAUST

How to Build Exhaust Systems That Breathe and Last

By Rich Boyd


Car guys agree, the sound a cool hot rod makes is almost as important as its stance. Those of you who have been through the experience of installing a modern drive train upgrade know that building a custom exhaust system is one of the most important steps for maximum engine performance.

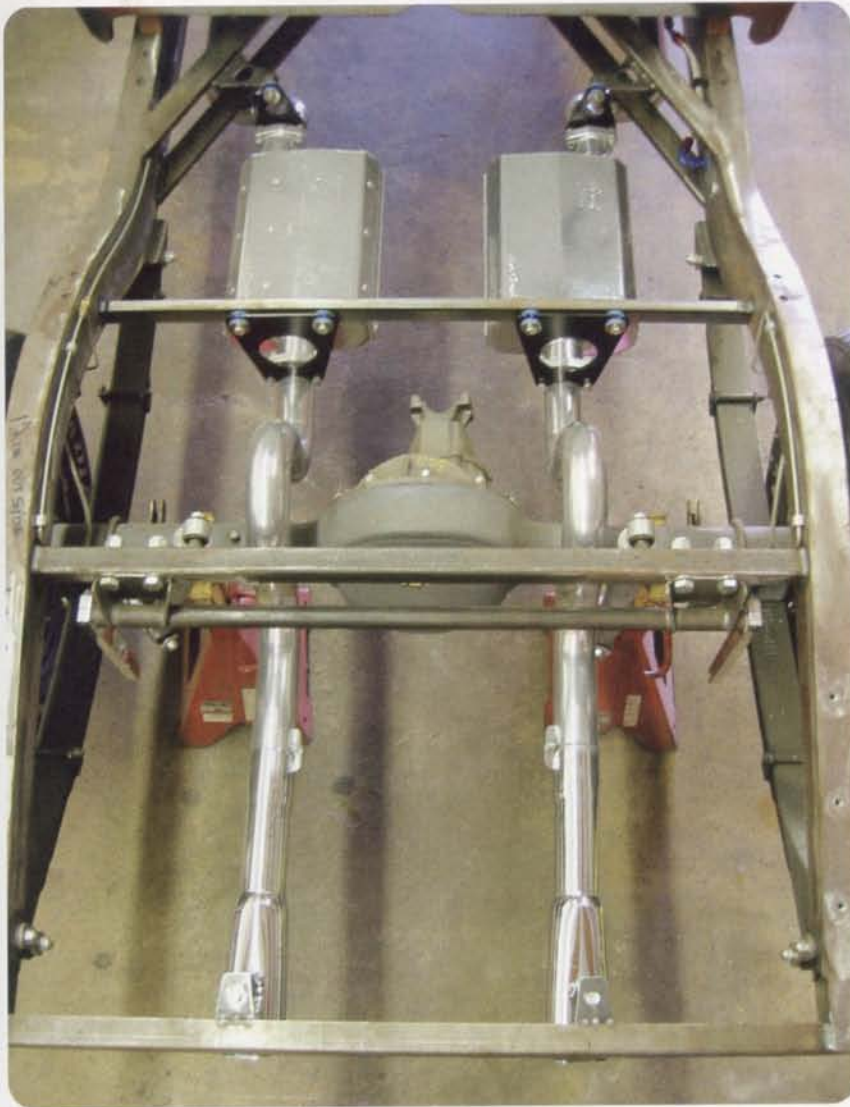
The results of our stainless steel exhaust system for my '33 Ford roadster gave us confidence to head in a similar direction with my '40 Ford pickup. The pickup is equipped with a

Ford 351W engine and AOD transmission. Naturally the place to start is with tubular headers, and Sanderson Street Rod Headers has a full line of tubular headers for the vintage car market. Creating good flow is primarily common sense. Equal length headers are the basis for this philosophy as well as improved aesthetics.

Another important quality of an effective exhaust system is good heat dissipation, plus, the avoidance of heat transfer from the exhaust tube to the chassis, especially to the rubber insula-

tion grommets in the hanger brackets. The shape of these brackets, with a round opening, will allow air to pass through and cool them better than if they were solid.

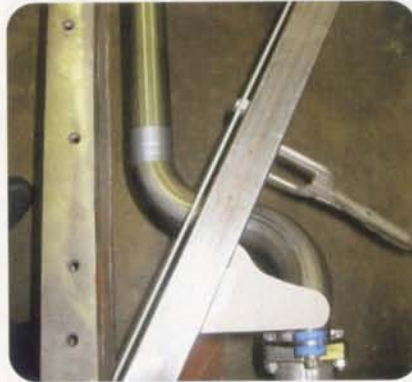
Obviously you'll need a good band saw and access to either TIG or MIG welding equipment. A large diameter grinder is also a must to face the tubing. We hope you find a few tips to consider before starting your next exhaust system. 



The completed system is HPC coated in a high gloss aluminum coating that will resist discoloring or rust. HPC also offers a Liquid Buff Polish made especially for a coated header that might see slight oxidation. Our thanks to David Hatch (Chandler, AZ) for helping us recover the cost of replacing a lost muffler that went missing when a UPS shipment came apart in route.



We purchased a half dozen U-bends and 15 feet of straight stainless steel pipe from Burns Stainless in Costa Mesa, California. We also purchased 10 stainless steel three-bolt flanges in order to accommodate the system break down if necessary.



It's customary to design a tubular exhaust to locate in a reasonable proximity near the frame rails. In some vehicles the exhaust can be designed to pass between the upper and lower cross member, which will allow the vehicle to drop its stance to a ground scraping level.



Here's the very rear bracket of the exhaust system. Notice that it also is designed with a rubber bushing between the system and the cross member. At this point the tailpipe extension has been stripped of its chrome-plating to allow uncontaminated welding. When the system was completely fitted we took it to Vern's Chrome Plating in Gardena, California, for a quality chrome finish.



A pair of Hooker Aeroflow mufflers will provide a throaty exhaust note. Here on the workbench they are fitted with Burns three-bolt flanges on each end of the muffler. The stainless steel flange may need to be opened up to slip over the muffler inlet or outlet pipe. Some muffler sizes vary.



Remember that there is an inlet end and an outlet end to the muffler. The exhaust will not flow properly if the muffler is reversed. Check the direction of flow before deciding which muffler is located on the driver's side and which is on the passenger's side. Also, mark the top and bottom for greater accuracy.



It's a good idea to add a short section of stainless steel tubing to the three-bolt flange at the end of the muffler. Otherwise it will be difficult to install bolts into the flange from the muffler side.



Another good tip for a high performance exhaust system is to keep the heavy-wall tubing as round as possible when changing direction. In extreme cases the builder might find it necessary to oval the tube for clearance. Changes in direction are best accomplished by using the next length of tubing from the cut-line.



Besides avoiding the motor mounts, the exhaust must also avoid contact with the steering linkage and both brake and clutch pedals (on a stick shift). Ed checks the clearance of the brake pedal but will have to engineer the steering linkage around the exhaust at a later date. Ed uses 3/4-inch blocks clamped to the frame rail to position the tubes near the rail but far enough away from the frame rail and cross member to avoid contact when minor vibrating occurs during operation. The blocks also provide continuity in spacing.



Other items normally mounted to the driver's side frame rail are the brake booster and master cylinder. The exhaust can pass near the booster (it's slightly above here) but should not come in contact with it or the master cylinder.



As the exhaust moves to the center section of the chassis Ed changes the direction of the exhaust to move between the center cross member at the muffler. The vehicle will have a cleaner look from the side view and protect the muffler from possible damage as a result.



One more square-tube cross member was added at the rear of the muffler to accept a hanger bracket. These heavy-duty (1/4-inch thick) brackets are designed to look great and last a lifetime. As we mentioned earlier, the shape will dissipate heat by allowing air to flow through the hanger, and the rubber grommet will survive longer.



The rear muffler hanger bracket was designed by builder Ed Balsler and then cut by Mission Plastics on a machine that cuts perfect circles to lighten the bracket. We will powdercoat both for a durable finish that will take the kind of abuse that extended driving will hand out. Chrome-plating is also an option.



A round hole was cut to lighten the bracket and it was easier for the machine to cut.



Ed begins to design the front muffler bracket that will be welded to the rectangular cross member. One of the added benefits of a TCI chassis is the rectangular cross members that allow a bracket to be welded to it much easier than a round tube. Notice the rubber insulators that will keep exhaust system vibrations from passing on to the chassis.



The front bracket was tack-welded to the frame rail and a smaller bracket was cut to bolt to the front flange of the muffler. Notice that this bracket has a round hole to make the part a little lighter and to help dissipate heat.



To allow the muffler and flanges to be removed from the exhaust system, Ed designed the bracket with a thick-wall threaded tube (to be welded on) that allows him to bolt the front hanger bracket to it. Note the hanger bracket is also insulated with a rubber grommet.



These rubber bushings are helpful in preventing the transfer of heat and vibration. They are available at most quality muffler shops.



The passenger's side hanger bracket now has the muffler attached securely and we're in the home stretch. There are small bushings that serve two functions: they prevent heat transfer and avoid interference with the weld around the flange.



As Ed checked the passenger's side of the Sanderson tubular header, he wanted good clearance in front of the starter to avoid heating it up. He welded the header flange to the header to prevent it from moving and to improve gasket life.



The stainless steel tube has good spacing in this location with over an inch of clearance. Some applications may require a heat shield or an asbestos wrap.



The passenger's side of the exhaust is somewhat easier to plumb but still has several items to consider. In addition to the starter we may need to locate a battery box between the frame rails. Other body styles may locate the battery in the trunk.



Here's another look at the rear hanger bracket template. You can modify the design to suit your tastes.



Ed designed the system to be as free of rattles and vibration as possible. Here he creates a hanger bracket for the tailpipe extension; the extension will be chrome-plated and insulated with a rubber grommet as well.



One neat feature is this small flange that Ed welded to the extension, a small bolt and nut to keep the tailpipe extension securely located.



Felt tip markers show how the parts are aligned on the exhaust tubing, and they help Ed identify left from right and front to rear when he assembles all of the individual parts. You might consider a letter punch to identify parts after they're coated or plated.



Notice how the diameter of the tailpipe extension is opened up slightly to slip over a section to the rear portion of the exhaust tubing. This service can be obtained from a muffler shop for a nominal fee.



The passenger's side of the exhaust system is nearly complete. Notice that the tubing goes over the rear axle and passes under the fuel tank with adequate clearance.



Clearance is checked over and over to ensure that no part will touch the frame rail or cross members.



The rubber grommets have a male side and a female side that are neatly connected to make pairing them a cinch.



A high performance coating (HPC) is a great investment in a good-looking exhaust system that will last the life of the vehicle and increase the value of it as well. These coatings are typically sprayed on and then baked in an oven at high temperatures for a tough finish that resists coloring and rust.

SOURCE

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