

Every owner of a Studebaker, Altman or Blake era *Avanti* worth his fiberglass is aware of the torque boxes, or "hog troughs" his car has. Of sheet metal construction, these units serve a multitude of purposes, including supporting the roll bar on each side, connecting the fiberglass body and the Studebaker designed frame along their length, and adding rigidity to a plastic body which would otherwise act like a half-cured bowl of Jello without them. Necessary parts of the *Avanti's* frame/body structure if the car is to remain as rigid as it was when first built, they are located along the outside of each longitudinal frame rail and extend from the rear of the front wheel well to the front support of the rear leaf spring on each side.

How-To: Classic Enterprises Multi-Piece Hog Trough Installation

By
Chris Altenburg & Marty Burns

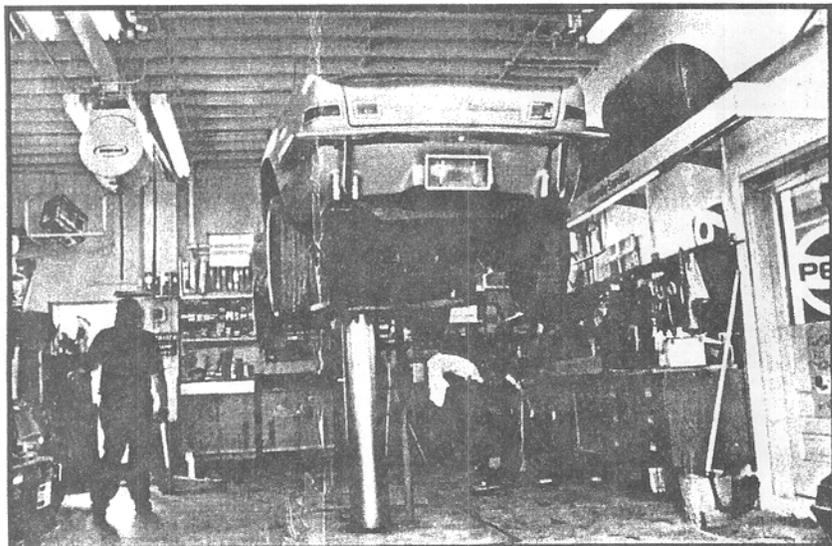
the various replacement hog trough kits available for *Avantis*. *Classic Enterprises (C/E)* manufactures multi-piece plain steel, stainless steel and galvanized steel torque boxes. Our installation made use of the firm's plain steel units which, once installed and undercoated (or painted), should considerably outlast the original boxes,

since C/E's units are formed from thicker gauge steel than were the originals.

The claim to fame for the C/E product is that, because they are multi-piece units, they may be installed without cutting into the *Avanti's* body panels. Our test car's owner desired this feature, as his projected restoration expense was already a budget buster for him, so C/E was selected as the vendor of choice. Single piece torque boxes are available from at least two other vendors, though they cannot be installed without cutting into the car's rocker panels.

We make no attempt here to judge the superiority of single- vs. multi-piece hog troughs as to overall strength, rigidity, safety, etc. The C/E trough can be welded together after all parts are placed in position, and this practice is recommended to improve overall strength. You must decide which brand and design of hog trough to use for your *Avanti*. We set out to prove that the C/E kit can be installed by anyone with reasonable mechanical ability, a complete set of mechanic's tools and avoidance of cutting through the car's fiberglass, and we succeeded.

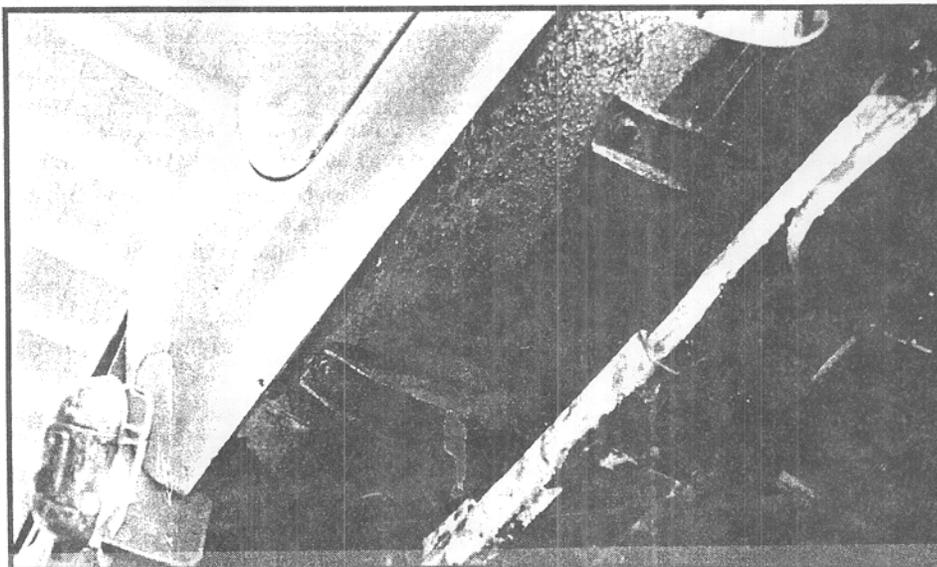
Some considerable portion of Joe's R2 *Avanti's*

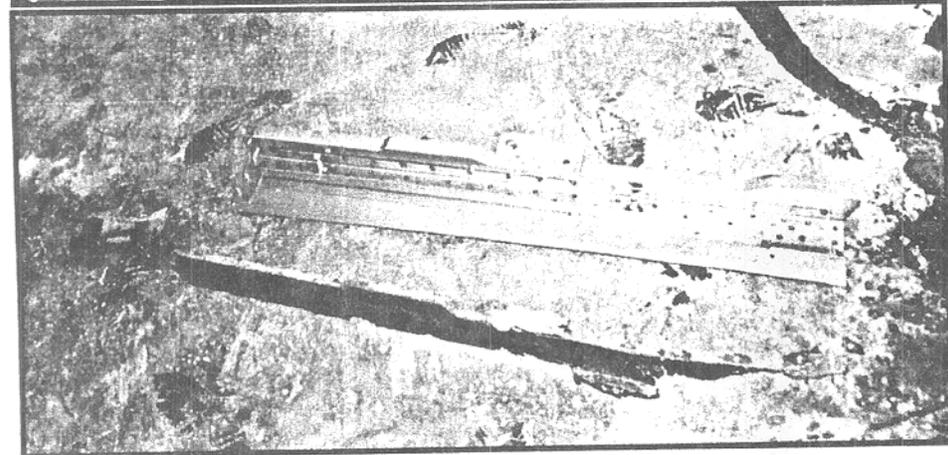
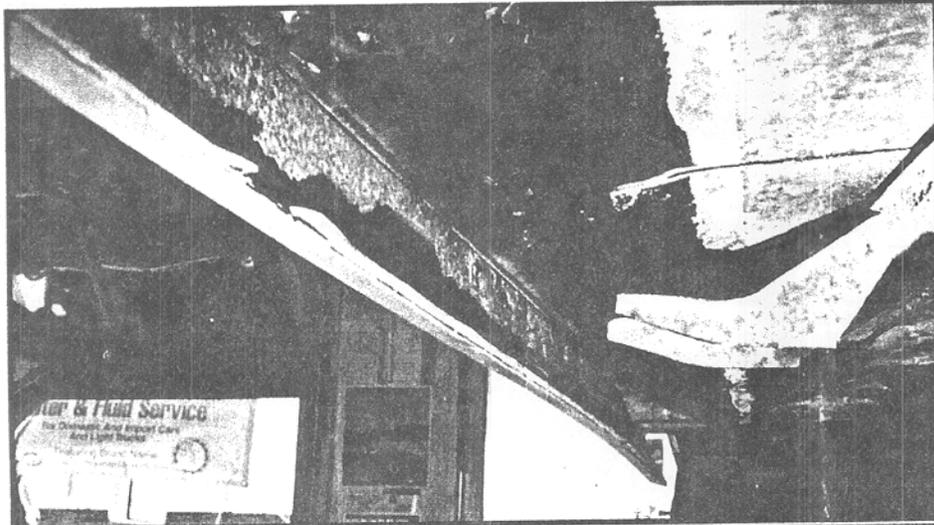


Above: Joe's *Avanti* hoisted for the first look.
Right: A solid left side hog trough (my car).

Avantis driven for any length of time in rainy or winter weather and especially in areas where salt is used to melt road snow, usually suffer from some frame and hog trough rot. Despite undercoating, the stock plain steel torque boxes can rust so completely that all that remains are the frame's supporting ears suspended in space, instead of connecting through the troughs for support of the body.

Frame damage is beyond the purview of this article, but we will take the next several pages to describe how one may install one of





Above, top: Not much remained of Joe's left side trough. The remnants of the main box and side rail are evident. Leave the side rail in-place.
Above: The new main box segment and the original.
Below, right: Despite being in an advanced state of decay, the original hog trough had to be drilled and pried out.

(R-3633) previous life was spent in the northeast, where snow and salt are an integral part of the winter season. Joe contracted with SDC member Marty Burns, in Orlando, to replace the troughs as part of the car's restoration. Marty is a mechanic by profession and has access to a lift, air tools, welder and all of the other tools required to make torque box replacement as painless as possible. I was invited to cover the installation for *Avanti*.

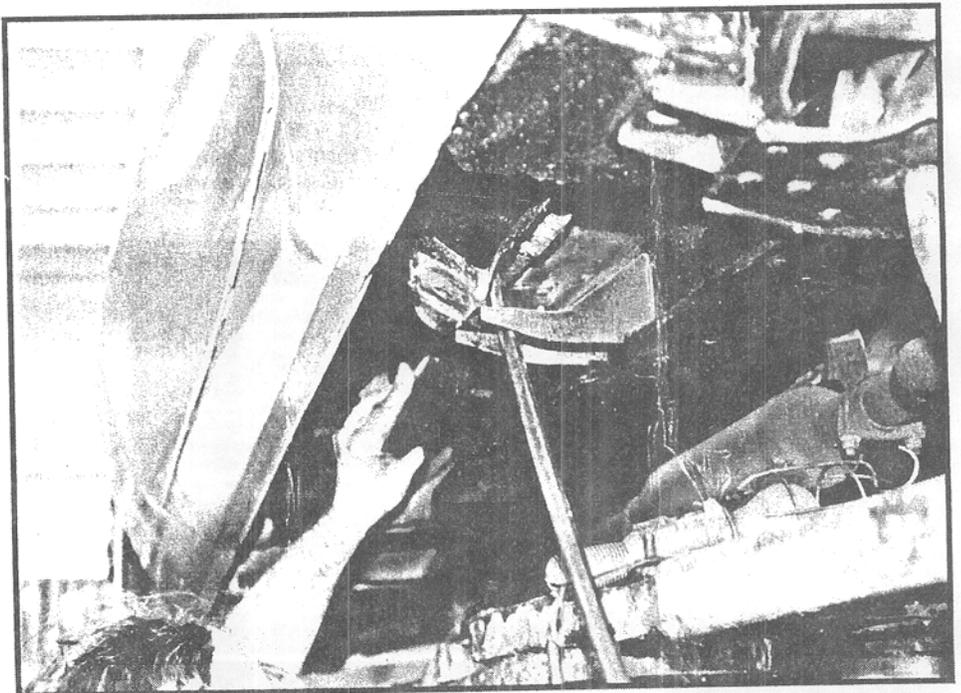
On elevating Joe's car on the lift, we found that while the left side torque box was mostly gone, the right side box was relatively solid, except for some localized rust damage in a single section each in front and back. Marty decided to salvage the right side box, welding patches of steel plate on as needed, and limit trough replacement to the left side alone. The decision proved to be a wise one. Marty spent approximately 12 hours replacing the left side

torque box while I watched, photographed and helped as much as I could. The right hand box would have taken about as long, because the time saved from the experience gained with the first box would have been offset by the effort expended cutting out the generally good right side box. If both boxes had been as badly rotted as the left was, we think the second box would have gone in within 9 - 10 hours. This includes all welding. Not included in this estimate is the time spent kibitzing with passersby about *Avantis*, eating lunch or taking well deserved coffee breaks (and drinking some killer Egyptian coffee, which almost did just that to my stomach).

We unpacked and inventoried the C/E units on Saturday morning, January 28, the day of installation. The torque boxes are made up of five pieces per side, with a sixth piece supplied that may or may not be required, depending on your car. There is an outer rail, for installation along the car's rocker panel; the main box section; a front box section; a roll-bar bulkhead fabricated of 3/16" thick steel, an end cap to seal off the rear of the main box, and an interestingly shaped small piece (the sixth) that is supplied to limit water entry along one side of the new box. C/E also includes new body mount bolts, hardware for roll bar bulkhead attachment, as well as for bolting down the seat belt and seat, and enough 3/16" pop rivets and washers for both sides. Four pages of concise

instructions round out the package.

The owner must supply his own silicon sealant (one 10.3 oz. tube per side, of any color, is suggested) and structural



adhesive, such as that sold at home improvement centers, if an exact duplication of the original factory installation is desired.

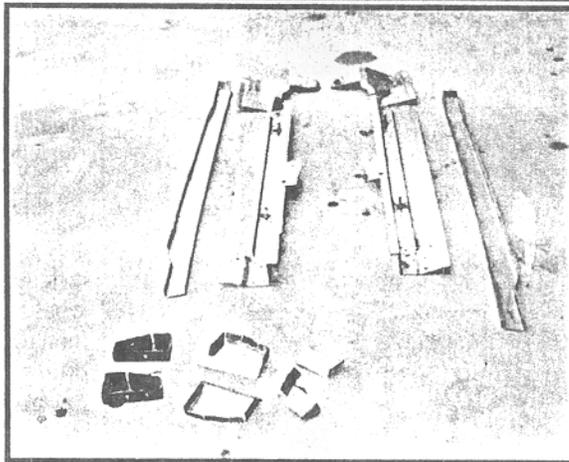
Tools:

Ideally, installation would be done in a fully equipped auto repair shop, complete with lift, professional mechanic's tools, air powered cutting and nibbling tools, a number of "BF" tools for the occasional "gentle persuasion" required to get the various pieces to fit, and a good mechanic to wield them all. "BF" stands for **BIG FREAKING**, as in BF hammer, BF screwdriver, etc. Any hammer with a 2 lb. head or greater qualifies as a BF hammer. A BF screwdriver is one with a 36" shank, suitable for serious prying. You get the idea.

A MIG welder is also advisable, although the entire kit can be installed without making a single weld, and the car later driven to a welding shop for this step. I strongly advise welding the pieces of the kit together after installation but before final undercoating so as to achieve the greatest possible rigidity. Marty used a Daytona "Pocket MIG" welder to do the job, and bought a bottle of Argon/CO2 gas mix for use with it.

Several sharp drill bits and at least a 3/8" drill are also needed. If the drill has an angle fitting for accessing tight spots, so much the better. A few 3/16" bits for drilling out old pop rivets and for making additional pop rivet holes will prove handy, as will a 25/64" bit for drilling out the roll bar holes in preparation for tapping threads in them. A 7/16" x 20 tap is needed to complete this aspect of the job. Have a box of about 25 #10 hex head sheet metal screws and washers available also.

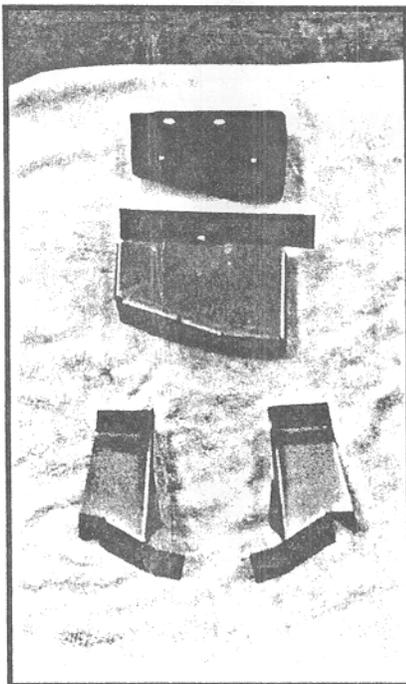
Scrounge up some 2" x 4" wood blocks, some pry bars



Above: All parts of the kit. Side pieces are on the outside, main boxes inside, front pieces at top. Roll bar bulkheads and end caps are beneath.

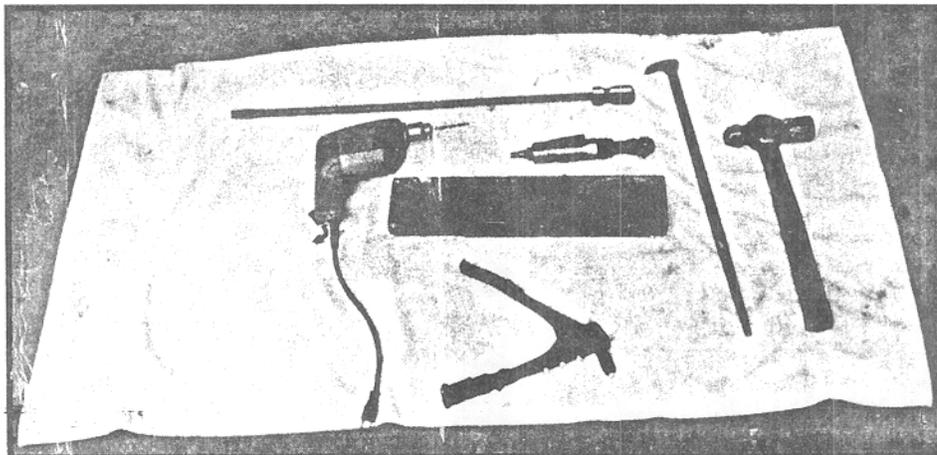
(large screwdrivers, crow's feet, drift pins, etc.) and enough chain to wrap around the car's frame and the hoist supporting it, or the frame and your floor jack. The chain will prove useful for separating the car body from the frame far enough to slip the main box section into place.

For personal safety, come prepared to work with thick gloves and goggles, and a long sleeve shirt if you will be welding. The old boxes are rusted and have razor sharp edges and welding generates many sparks. You have been forewarned.



Above: Roll bar bulkhead, end cap and both dog-eared shaped pieces shown in greater detail. When this photo was taken, we could not tell where the dog-eared sections fit, but Marty was able to make use of them as C/E intended.

Below: Some of the tools you had better have on-hand for the job. The hammer and wood block proved especially valuable.



Marty installed the left trough on Joe's car at his place of employment, with a lift and every available tool close at hand. But, one could also do this work at home in the driveway or garage. If taking the latter approach, in addition to the above listed tools you will need a decent floor jack, jack stands, wheel chocks and LOTS of patience. Patience is a prerequisite for installing this kit regardless of where it is done. After working in your driveway, on your back, I doubt you will ever offer to help another install his new torque boxes, at least not without some form of substantial monetary persuasion. Plan on taking some of the money saved by doing it yourself at home to pay your favorite chiropractor.

INSTALLATION:

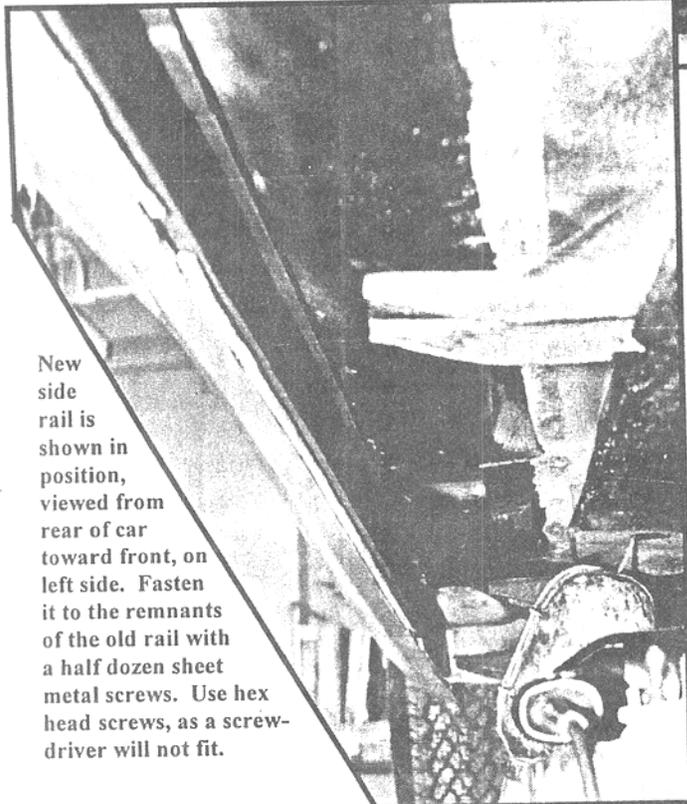
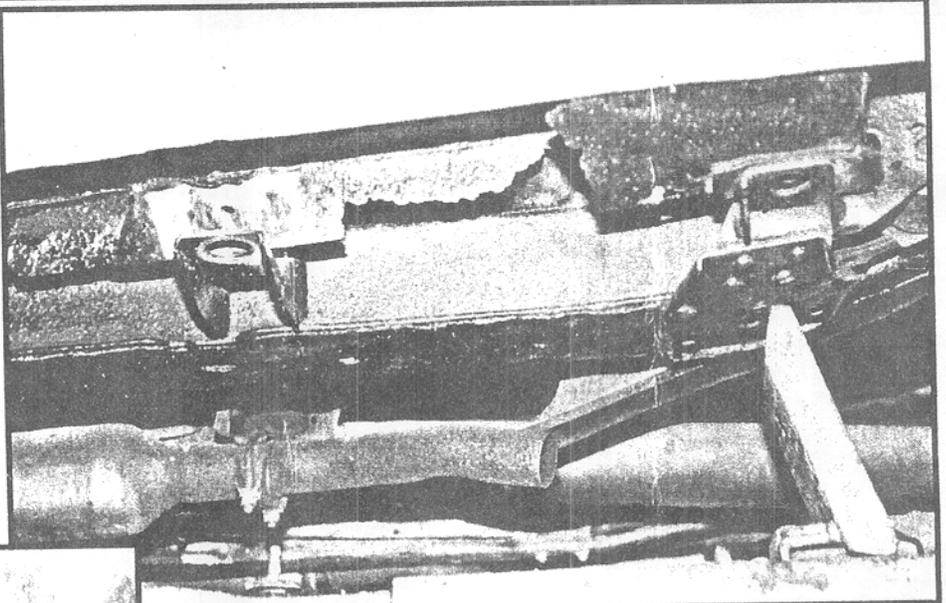
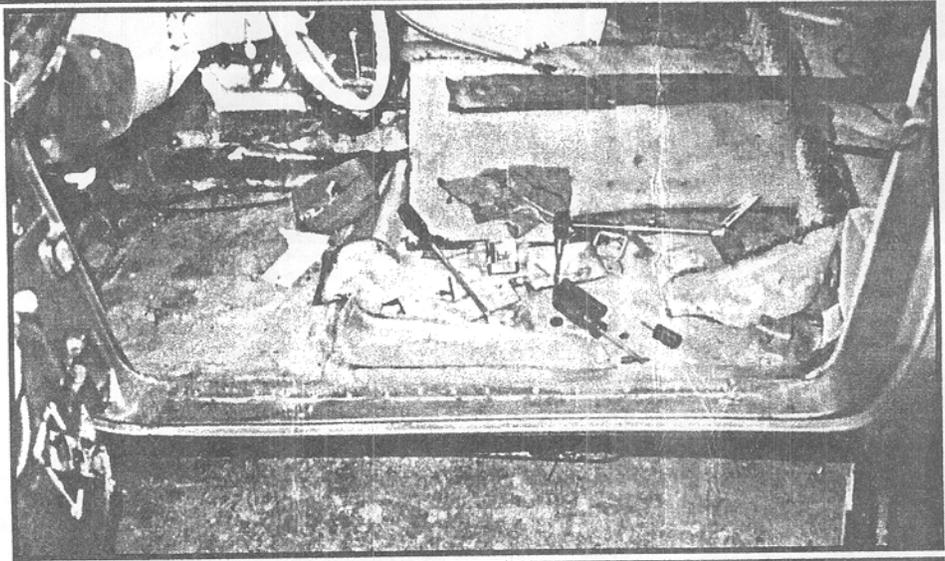
Unpack the box and make sure all pieces and hardware are there. A parts list was not supplied with our kit, but we had little difficulty determining which parts we had and where they went. The side rails are not hard to match to the car, as their upper surface is shaped to follow the floor's contour along the rocker panel, just inside of the old hog trough's side rail. The main box is likewise easy to match as to location.

C/E's instruction sheet is complete and concise. For best results, follow the instructions without

second guessing what's written there. I will supplement C/E instructions with our experience as Marty and I did the job on Joe's car.

Thoroughly clean all pieces of the oil or silicon coating C/E uses to prevent corrosion. If the parts will be welded together it probably does not make sense to do any coating of the inside pieces to prevent future corrosion until all welding is completed, as welding heat will destroy the coating at every spot welded. The outside edge of the outer rail may be coated at this time, though, as you'll never get close to it again (it'll be hidden by the car's rocker area). Most of the rest of the exterior can be treated with your favorite rust preventative formulation after all welding is accomplished.

The entire inside of the new torque boxes can be accessed after installation through holes you can drill through the car's floor, permitting spraying of any oils, greases, paints, etc. you fancy to minimize future inside rust. I had a thought that the expanding foam products available at home improvement centers could also be used to fill all trough interior space, giving water no place to collect. If Shake were the patient, my approach would be to treat each box's interior to a complete spray of motorcycle chain lube (it's sticky and will not run off after the solvent carrier evaporates),



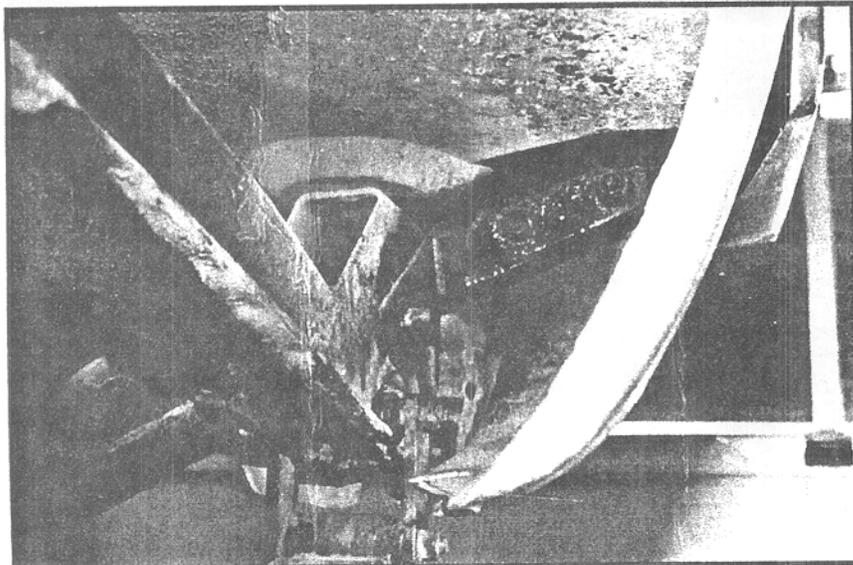
New side rail is shown in position, viewed from rear of car toward front, on left side. Fasten it to the remnants of the old rail with a half dozen sheet metal screws. Use hex head screws, as a screwdriver will not fit.

Top: Remove all of the interior on the side of the car you are working on, including the sill plate, except for the front kick panel, back section of the rear seat and the rear seat armrest. Note the fresh row of pop rivets beneath where the door sill will cover. These fasten the new outer rail hog trough piece to the body.
Center: Leave the old outer rail section in place for properly locating the new outer rail.

after which all crevices would be filled with foam, the access holes then sealed with fiberglass patch. I'll bet the boxes would then outlast the car and me. I would still leave drain holes in place in the new boxes, just in case.

OLD BOX REMOVAL

Air powered nibbling and cutting tools will make fast work of removing the remnants of the old box, after the car is raised off the ground far enough to permit access. Inside the car, the front seat on that side must be removed, as must the base half of the rear seat. Take off the door sill and peel the carpet back enough to reveal the two rows of pop rivets the factory installed



Left: Preparatory to separating the body from the frame for slipping the main box into place, remove either the pair of bolts fastening the outer bumper bracket to the frame, or the pair connecting the bracket pieces together. Remove also the single bolts fastening the bumper vertical to the very end of the frame rail, and the trunk floor to frame bolts. Do for both sides, even if only one trough is being replaced.

to secure the original trough. You'll need to have access to the area under the driver's (or passenger's) feet also. The kick panel can be left in place. Remove both rear wheels.

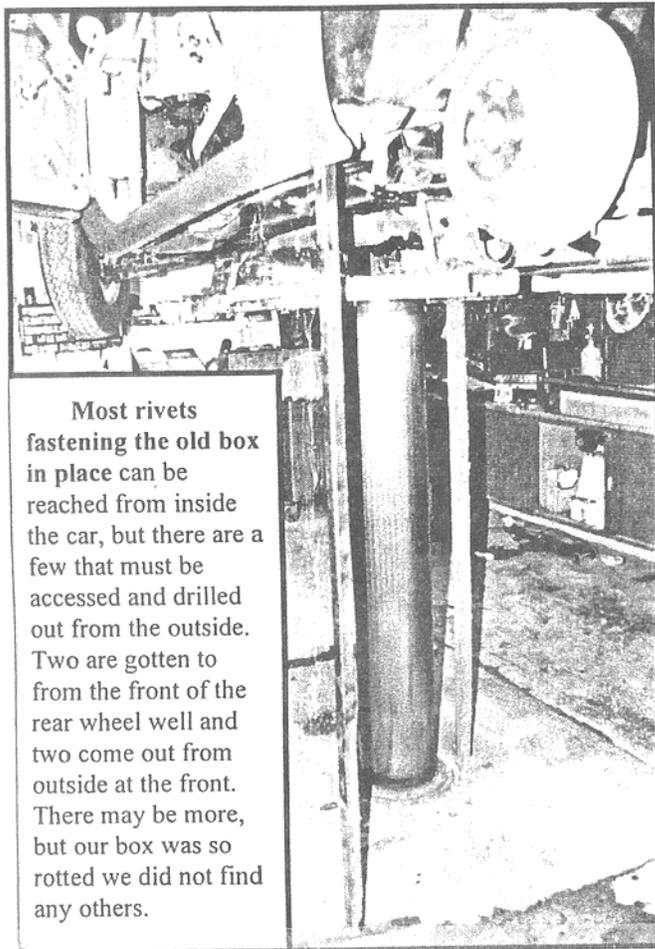
Leave as much of the old box's outer rail intact (by the rocker panel) as possible. There may be little left, as in our case, but what is there will serve to position the new box's outer rail. You'll anchor to it before final pop riveting of the outer rail to the floor.

There was also a small fiberglass plate in back riveted to the body to close off the hole between the car's side panel and the trough outside wall. We removed it at this time and reinstalled it after the new box was completely in position and welded.

Remember to salvage what remains of the body shims used between the old box and support ears. They can be reused, though there is no guarantee they may be placed in the same relative positions from which they were removed. If your car's boxes have

been badly rotted for a while there is no telling how far the body has shifted and sagged relative to the frame mounts. You may end up using more or less thickness for each shim; base your judgement on how well the door on that side opens and closes, the shape of the door opening and presence of cracks in the body, etc. This is definitely your judgment call.

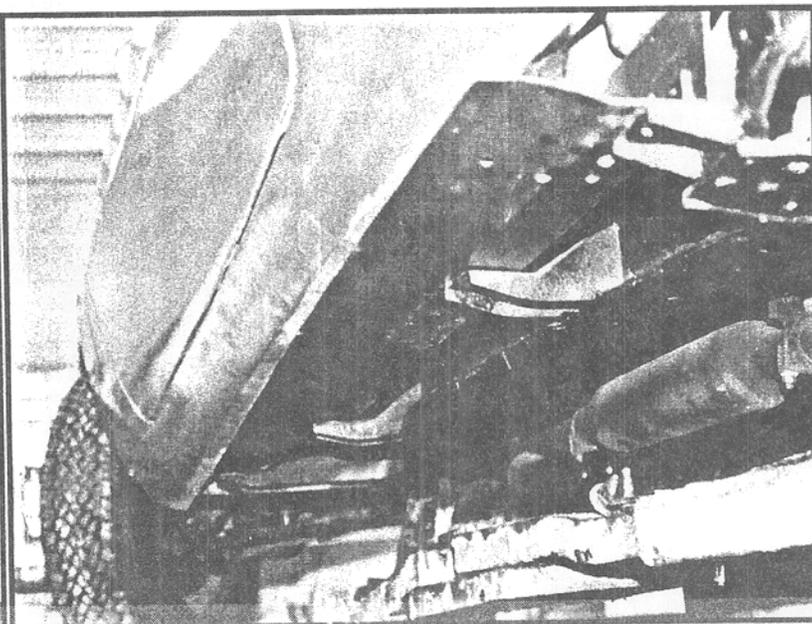
By the time you're through with this phase, all of the old box will be removed, excepting the side rail, and the body support ears jutting from the frame rail will hang in space, supporting nothing at all. Though it looks like there is not enough space to fit the new pieces in, have faith. They will fit.



Most rivets fastening the old box in place can be reached from inside the car, but there are a few that must be accessed and drilled out from the outside. Two are gotten to from the front of the rear wheel well and two come out from outside at the front. There may be more, but our box was so rotted we did not find any others.

Left: We chained the *Avanti's* frame to the hoist arm, then lowered the car onto a steel bar pressing against the roll bar base in order to separate the frame and body.

Below: The new main box fully slid into position. We hammered on blocks of wood laid against the main box's outer lip to force it into place. No new damage to the car's fiberglass rocker resulted from our exertions.



OUTER ROCKER RAIL

Test fit the new side rail against the old rail, noting where several sheet metal screws may be installed to fasten them together. Drill the screw holes, then remove the new rail and liberally coat the rail's top surface with silicon or adhesive. Reinstall the rail, fastening it to the old rail with about six screws. Go up top and fasten the floor to the rail's top lip with pop rivets.

(HINT - use screws every second or third hole to pull the floor and lip together, then rivet through the neighboring holes. Replace the screws with rivets as you go along. You may want to use additional rivets beyond what the factory originally installed, but stagger them so there isn't a straight line that could act like the perforations of a loose leaf sheet if stress is placed there in an accident.

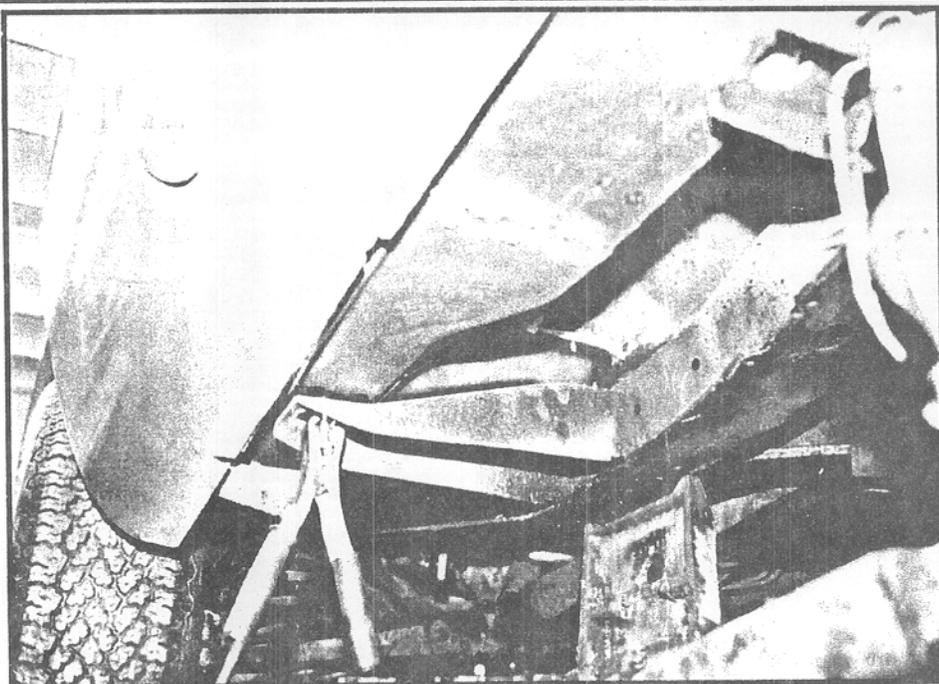
Our new side rail did not butt up against the floor at all points, but we filled all existing gaps with more silicon after screwing it to the old side rail and before final riveting. Its final fit was very good. We used 17 rivets from the top, and two from the outside (from the back of the front wheel well). Now, remove what remains of the stock bolts used to secure the roll bar base to the old box and tap both holes to 7/16" x 20.

By this time we were both tired and hungry, so we retired to the diner across the street for lunch. You may want to do the same. I recommend the BLT sandwich and a tall glass of milk.

MAIN BOX

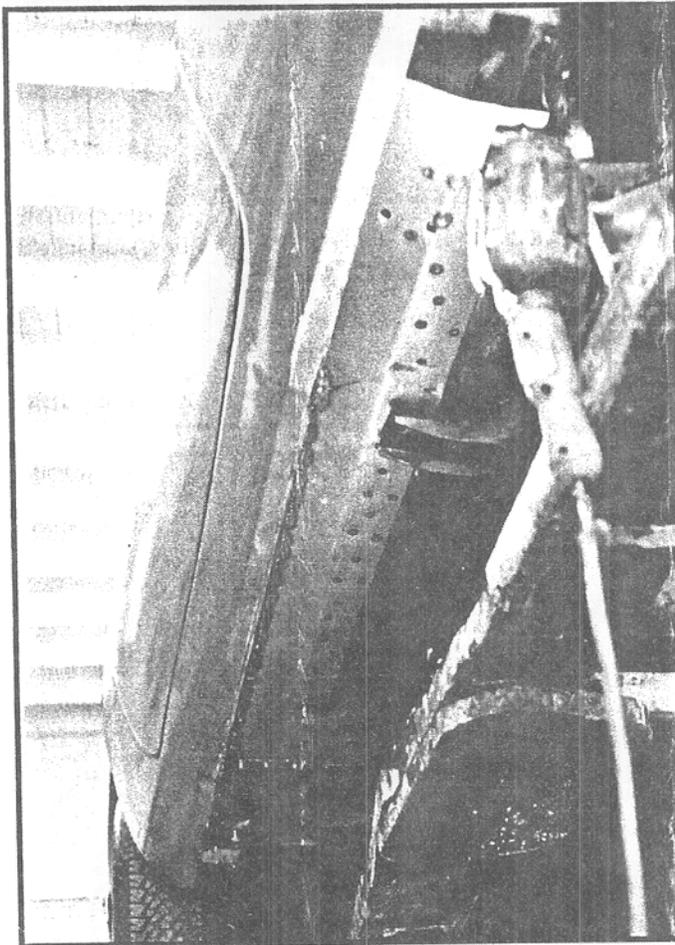
The main box will not slide into place without separating the body from the frame a little. We followed C/E's instructions and removed both trunk floor to frame mounting bolts (located beneath the carpet, near the tail lamps), the rear bumper to body mounting bolts (the pair which fasten the two brackets together within and in the back of the rear wheel well) and the rear bumper vertical bolts that fasten both vertical pieces to the frame. But the body still would not shift enough.

Our next step was to chain the *Avanti's* frame to the hoist support arm at the point where the frame and X-member meet in the back. A long steel pole was then placed between the roll bar base and the floor and the car was lowered so the pole forced



Above: The front box section is first joined to the main section with three screws, then it is welded at this junction.

Left: Three of the six pieces are in place - outer rail, main section and front section. Still to come is the bulkhead, rear cap and dog-eared piece (by the trouble light).

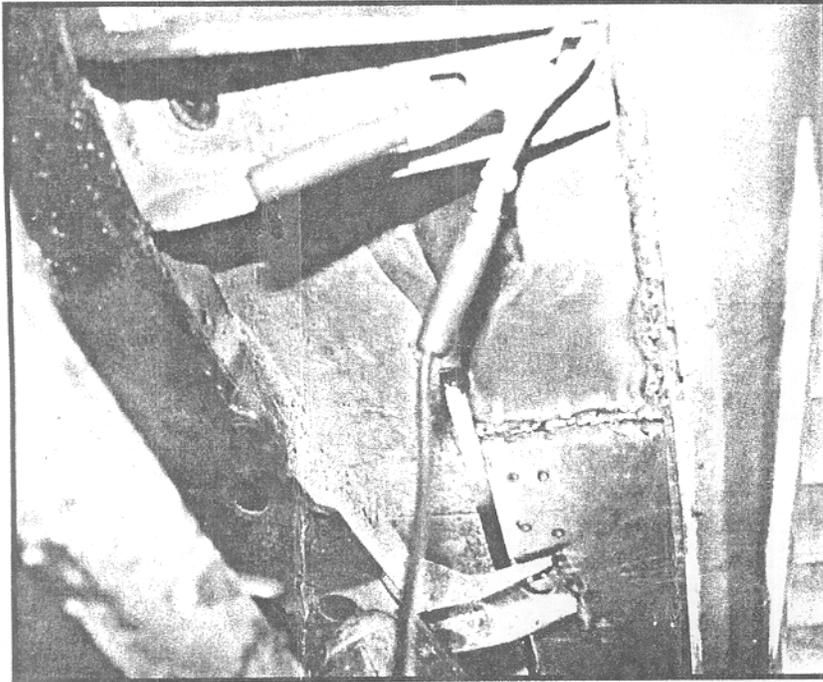


the body upward and away from the frame. Fiberglass is flexible but not terribly strong so we proceeded very carefully, listening for warning creaks and groans and watching everything as the hoist lowered, until the body had moved as far as we dared hope. Wood blocks and other spacing paraphernalia were

then used between frame and body to keep it spread apart, while the main box was cajoled to fit in position.

Our "BF" tools, especially the 3 lb hammer and 36" screwdriver, plus wood blocks, came into their own at this stage. Sliding the main box in sideways, and slightly forward of its final position, we exerted maximum force via wood blocks

and hammer blows on the box's outer lip at the rocker area, until it popped into position. Some prying was also necessary. The suspicion remains with me that had we separated the body and frame more, and followed C/E's instructions more closely, it



Above: Evident here is the first welding done - connecting the front and main sections together, then fastening the main section and side rail. By the time Marty finished, the weld continued along the entire rocker panel. Rivets may also be used to affix the fiberglass of the rocker to the hog trough side rail for even greater rigidity.

might have been easier to lever the box into place. Too late to

worry about that now. We were gratified to find that all frame mount bolt holes matched perfectly, and we also easily removed the several custom contusions we made in the box while installing it.

Massive silicon sealing and pop riveting to the car's floor followed. The front box quickly followed its mate into place. More rivets to the floor were put in and we did our first welding, affixing the front box to the main box.

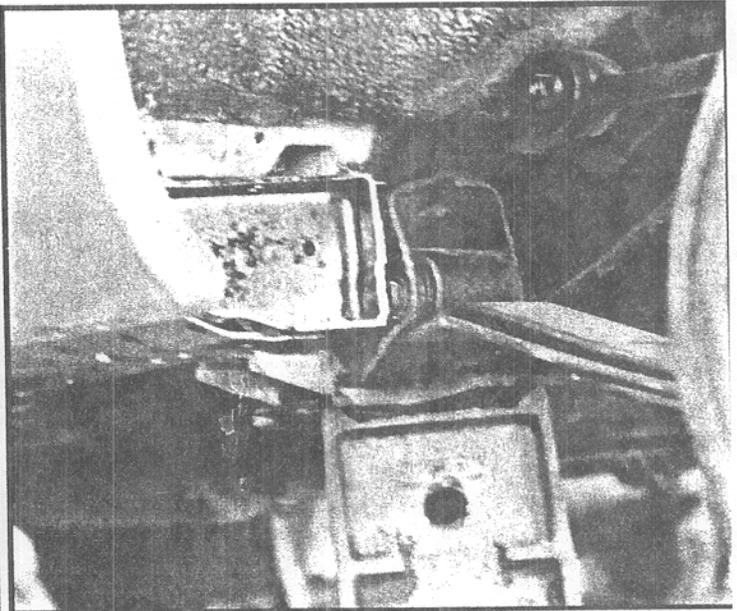
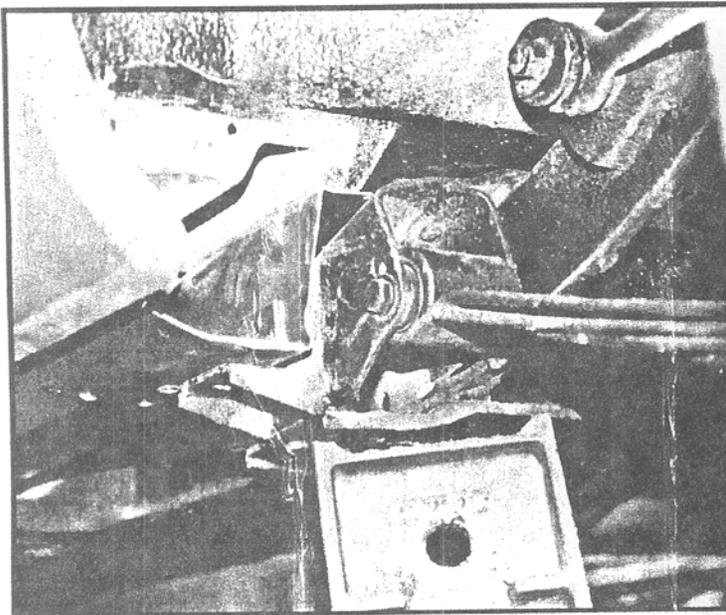
Serious welding then commenced to connect the side rail and main box along the car's rocker section. Marty used his wire fed MIG welder to good effect, fusing the two pieces together without damaging any paint, though his shirt sleeves did not fare as well. Overhead welding carries its own unique risks. C/E instructs also to rivet the car's fiberglass rocker section and torque box side rail together for added strength.

ROLL BAR BULKHEAD

After another break, Marty installed the steel bulkhead in the rear of the box's center section, beneath the roll bar base. Two 7/16" x 20 bolts secure the bulkhead and roll bar together, and the final assembly is welded to everything within reach.

(HINT - Check the bulkhead hole size and spacing against the roll bar base before installing the main box. Enlarge the holes as necessary so everything will match when the bulkhead is pressed into place as, at that point, you are essentially working blind for any further hole matching.)

After the bulkhead is installed, but before closing everything off with the end cap, tack weld a nut in place inside



Above, left: The back of the main box section before the bulkhead is installed. Above, right: The bulkhead as it is first being pressed into place. Ensure the roll bar mount has been tapped for 7/16" x 20 bolts and that the bulkhead bolt holes are spaced properly before inserting the bulkhead piece. Use a small mirror to determine when the bulkhead holes line up with the roll bar base. I have no photos of the end cap being placed into position and welded, but it fits relatively well and prevents moisture from entering the main section from the rear.

the box's main section for the most rearward body mount bolt. Finally, the end cap is forced into position to close off the new hog trough's rear entry and it's welded and siliconed in position.

C/E describes the sixth and last metal piece of the kit for each side as "...strange looking dog-eared pieces." Not all *Avantis* will make use of these but if they fit on yours, install them. They act as a barrier to road spray and trash thrown up against the rear of the box. Splash shields of plastic or metal placed in front of each rear wheel well will go far toward limiting the future spread of corrosion. The same goes for fender flaps for the front tires.

Complete all welding you plan on doing, caulk everything in sight with silicon, measure and mount all body shims, and paint/undercoat to suit. The car's interior needs to be reassembled at this point and the rear tires must be reinstalled. Without them, Classic cautions, your car will be at a loss for adequate traction.

We end this How-To article with the following conclusions, reached after 12+ hours installing Joe's driver's side hog trough:

1. C/E's multi-piece hog troughs do install as advertised.
2. It's a dirty job and lengthy, but any competent shade tree mechanic can accomplish it. The result is a very presentable torque box which appears to be strong as well.
3. Read the instructions several times before starting, then re-read them as you proceed. And follow them. This ain't your kid's bicycle.
4. You will need proper tools to do the job right. Without them,

you'll probably expire of a frustration attack before coming anywhere close to finishing the job.

5. Once undercoated and/or painted, they look extremely close to stock to all but the most experienced observer.
6. I'm glad my *Avanti* doesn't need its boxes replaced. See #'s 2 and 4, above.
7. Duck when walking under an elevated *Avanti*. I have two knots on my head proving the hypothesis that steel is tougher than bone.
8. Finally, do not drink too many cups of Egyptian coffee, unless you want to stay awake for several days afterward with a serious caffeine buzz, the better to contemplate the knots on your head.

Should you have additional questions about the procedures we used to install the C/E hog trough on Joe's car, or if you live near enough to Orlando, Florida that you may want to contract with Marty for him to install torque boxes on your *Avanti*, call him during the week, between 10 AM and 6 PM (EST), at (407) 843-1028.

As for me, I'm staying far away from this kind of work. Both ends of me were in pain for days; my feet because I was on them for twelve hours helping and photographing, and my head from bouncing it off the lift and sundry pieces of the car's undercarriage.

— *Avanti*



Below: The drawing Classic Enterprises supplies with its instruction sheet.

