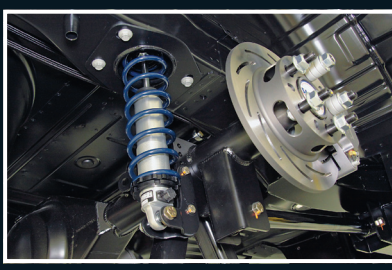
PERFORMANCE
VEHICLES • PARTS • RACING

COPO

BUILD BOOK



An illustrated insider's guide to factory COPO Camaro build processes, parts, and specifications for Bowtie enthusiasts and potential COPO builders

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INTRODUCTION

COPO. There's an awful lot of automotive magic packed into that unassuming four-letter acronym. Historically, it stood for Central Office Production Order, a rather bureaucratic sounding, fleet-oriented, special-order process that surely would have muddled on in utter obscurity had not a hard-core group of Chevrolet dealers, enthusiasts, and racers found a way to use that otherwise innocent COPO program as a back-door path to having Chevy factory-assemble some of the most powerful and iconic performance cars of the late Sixties – cars that simply wouldn't otherwise have ever seen the light of day. And thereby turning that humble four-letter acronym into the stuff of automotive legend.

For racers and collectors alike, the most infamous of those historic Bowtie-built missiles was the 1969 COPO 9560 ZL1 Camaro, of which only sixty-nine were assembled, aimed squarely at NHRA Stock and Super Stock classes, and for going head to head with Chevy's cross-town Detroit rivals. Now, over four decades later, history has repeated itself and that Big Three dragstrip rivalry will be revisited, thanks to the building of sixty-nine 2012 COPO Camaros by Chevrolet Performance. Announced in the fall of 2011, it took little time for all these new-century COPOs to be spoken for by quarter-mile combatants across the continent. Using factory production bodies-in-white as a starting point, and powered by a choice of three different LS-based engines – one naturally aspirated 427 and two 327's with differing twin-screw superchargers – the 2012 COPO Camaro was developed in close cooperation with the NHRA for legality in Stock Eliminator and/or Super Stock competition. Available from Chevrolet Performance as the ultimate "performance part", P/N 20129562, this new generation COPO Camaro proudly carries on the winning tradition of COPOs from the '60's. And, as announced in the fall of 2012, the legacy continues with Cheverolet Performance building sixty-nine COPO Camaros for 2013.

With history thus being re-made, we figured that another four decades hence, future automotive enthusiasts might well look back upon this current new crop of 21st century COPOs with the same reverence that we have for the original Sixties versions, and might like to know how they were manufactured. Our intent in putting together this COPO Camaro Build Book is twofold: first, to provide documentation for present and future enthusiasts of the engineering, processes, and parts that went into crafting these new race-ready Camaros at the COPO Build Center during the summer and fall of 2012. Secondly, this book serves as an illustrated reference for those who might consider building up a COPO-style quarter-mile Camaro of their own from the ready supply of parts and component kits available for that very purpose through Chevrolet Performance and its project partners in the aftermarket.

Thanks to our unrivaled access to the COPO Build Center, this reference is chock-full of insider info, tips, and photos of production-line processes that went into the construction of this historic batch of 2012 COPO Camaros, and will be a great resource to Bowtie enthusiasts and would-be COPO builders alike. We've also included an Appendix containing COPO component specifications, NHRA Vehicle Technical Specifications, a 2012 COPO User's Manual; a flowchart of the COPO Build Center assembly process, a COPO rear suspension diagram, plus a complete source list for the various COPO-specific parts mentioned in our text and captions. We hope you enjoy perusing this in-depth build book as much as we've enjoyed putting it together!

PERFORMANCE
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[CHAPTER 1]

PREPARING THE CHASSIS/UNIBODY

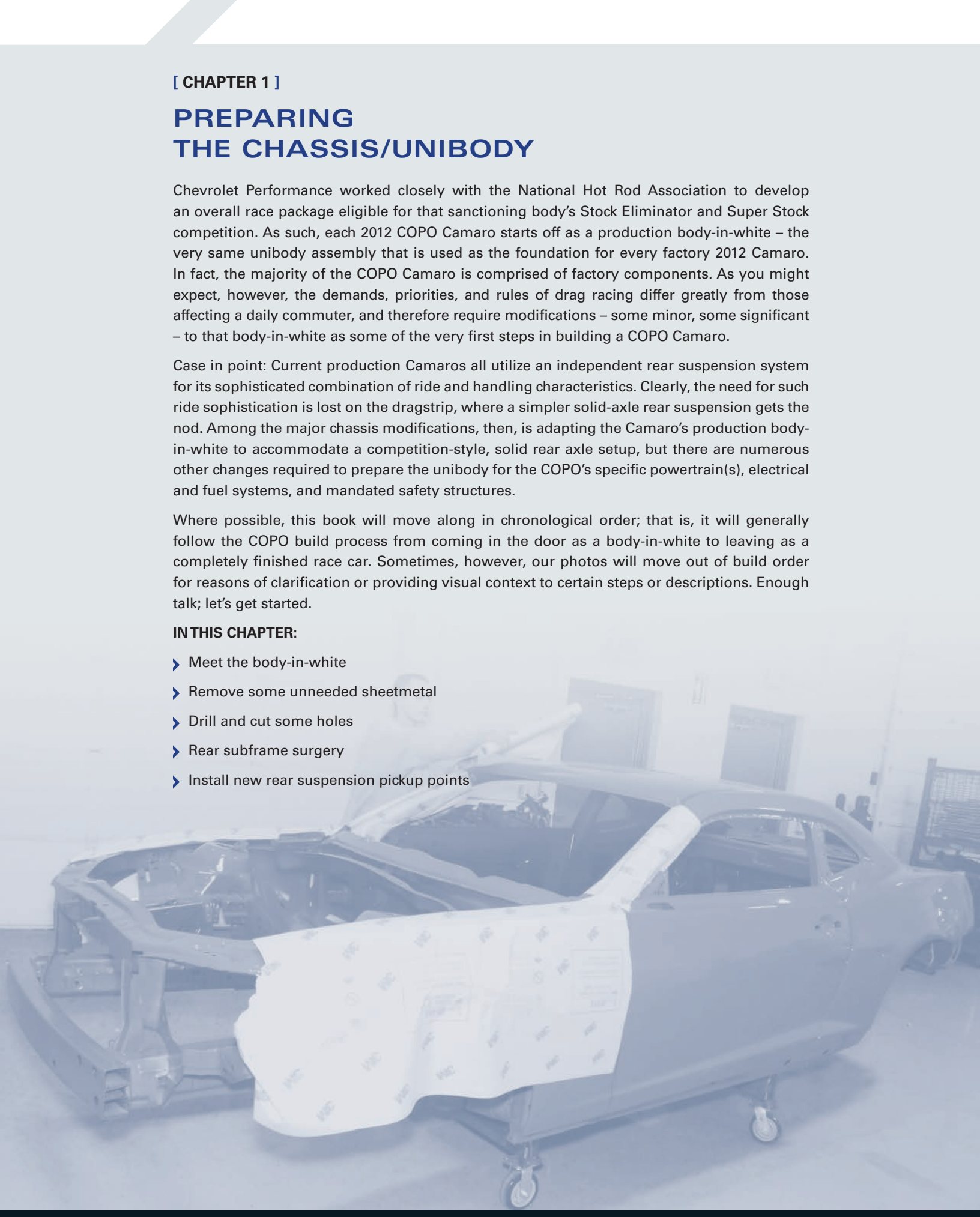
Chevrolet Performance worked closely with the National Hot Rod Association to develop an overall race package eligible for that sanctioning body's Stock Eliminator and Super Stock competition. As such, each 2012 COPO Camaro starts off as a production body-in-white – the very same unibody assembly that is used as the foundation for every factory 2012 Camaro. In fact, the majority of the COPO Camaro is comprised of factory components. As you might expect, however, the demands, priorities, and rules of drag racing differ greatly from those affecting a daily commuter, and therefore require modifications – some minor, some significant – to that body-in-white as some of the very first steps in building a COPO Camaro.

Case in point: Current production Camaros all utilize an independent rear suspension system for its sophisticated combination of ride and handling characteristics. Clearly, the need for such ride sophistication is lost on the dragstrip, where a simpler solid-axle rear suspension gets the nod. Among the major chassis modifications, then, is adapting the Camaro's production body-in-white to accommodate a competition-style, solid rear axle setup, but there are numerous other changes required to prepare the unibody for the COPO's specific powertrain(s), electrical and fuel systems, and mandated safety structures.

Where possible, this book will move along in chronological order; that is, it will generally follow the COPO build process from coming in the door as a body-in-white to leaving as a completely finished race car. Sometimes, however, our photos will move out of build order for reasons of clarification or providing visual context to certain steps or descriptions. Enough talk; let's get started.

IN THIS CHAPTER:

- Meet the body-in-white
- Remove some unneeded sheetmetal
- Drill and cut some holes
- Rear subframe surgery
- Install new rear suspension pickup points



IN THE BEGINNING...

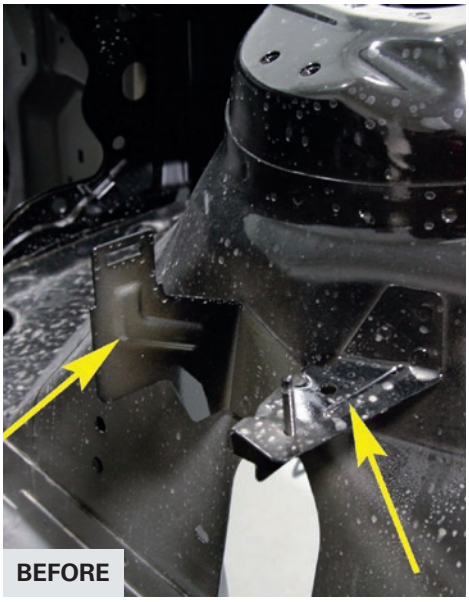
Like every stock, production Camaro, the 2012 COPO starts off as what's known as a body-in-white (available as Chevrolet Performance P/N 19243374). In fact, the body is built by the Oshawa assembly plant that builds every Camaro. Oshawa also provides most of the hardware and trim for the COPO Camaro. The body-in-white has no vehicle identification number, **so is legal for race purposes only and may never be licensed.** Upon arrival at the COPO Build Facility, in Michigan, and after being sequenced for build, these painted unibodies have their front fenders and hoods removed and stored, and their top surfaces covered to protect the finish during the construction process. The fenders come off simply to provide working access; the hoods will not be re-used. The term "body-in-white" in no way denotes color – the 2012 COPO is available in Black, Summit White, Victory Red, Ashen Gray Metallic, and Silver Ice Metallic factory hues.

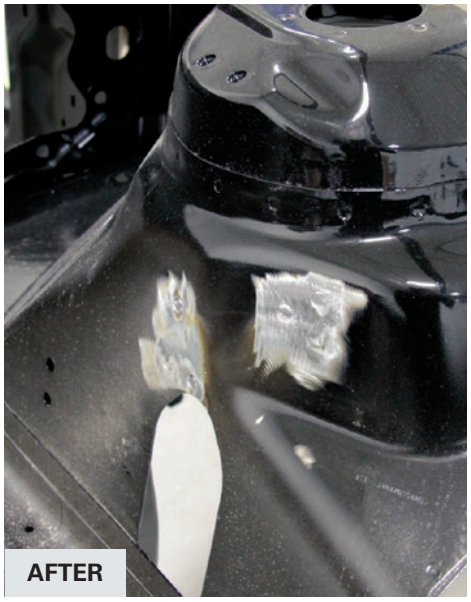
At the COPO Build Center, the cars follow a small-scale assembly line process, moving from station to station on wheeled dollies as various aspects of the build are completed – some while on the dollies, some on hoists. The section of the Build Center building visible here is where the initial structural modifications to the unibodies take place – the cutting, the drilling, the fabrication. Even though it could take as many as 15 days to build a COPO Camaro, start to finish, there were typically about ten to fifteen cars under construction throughout the overall facility's various stations at any given time. All customer cars were crafted during the summer and fall months of 2012. (COPO serial #1, the proof-of-concept, was built for SEMA 2011.)

As each vehicle enters production, it is assigned a build number with a folder containing pertinent information such as quality control checklists for each station, and indications of selected engine and stripe options. This folder stays with the car throughout its build.

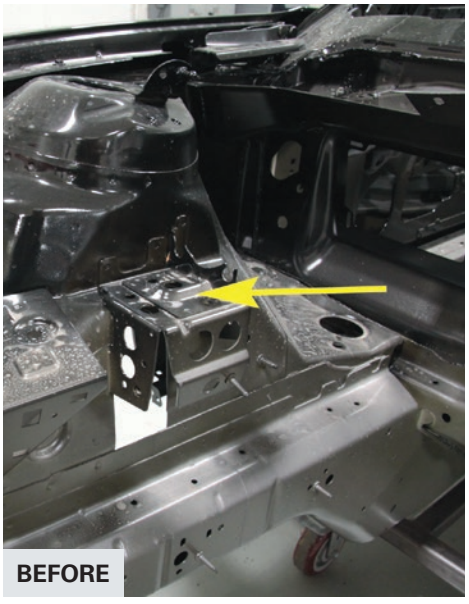
DE-CONSTRUCTION, ANYONE?

Oddly enough, construction of a COPO actually begins with the removal of various spot-welded sheetmetal components from the body-in-white's underhood area, interior, trunk well, and underbody. While these components have their uses on a production Camaro, they are either unneeded or simply would have been in the way of some of the new hardware going on the COPO racer. The removal process is simple, if somewhat tedious and time consuming: drill out the spot welds, pry off the unnecessary sheetmetal, and then grind the weld remnants smooth. For serious students of COPO construction, this chapter's photos and captions should be considered essential reading.

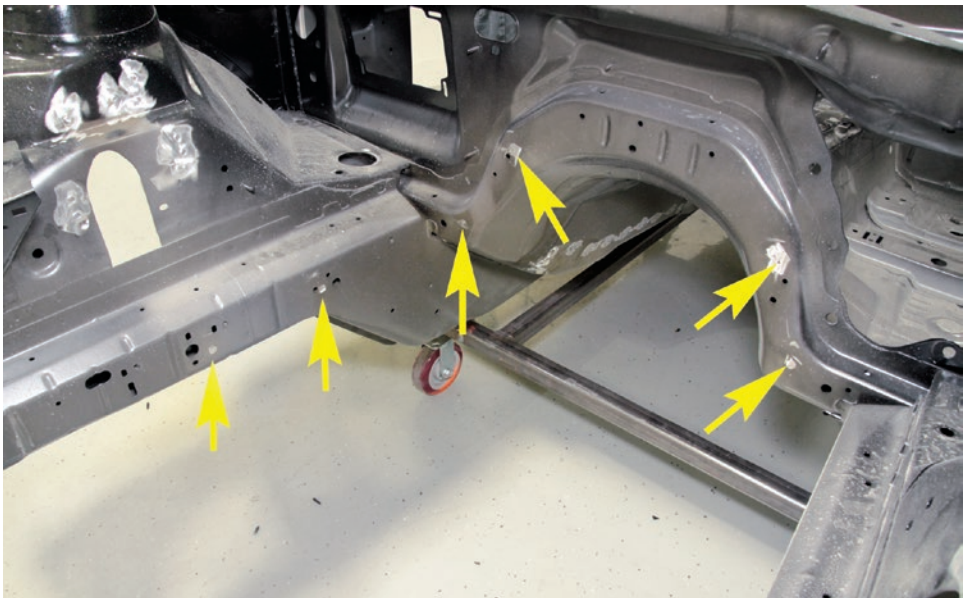




On the left is the stock driver's-side strut tower, with arrows pointing out the sheetmetal to be removed. The right photo shows the tower after surgery.

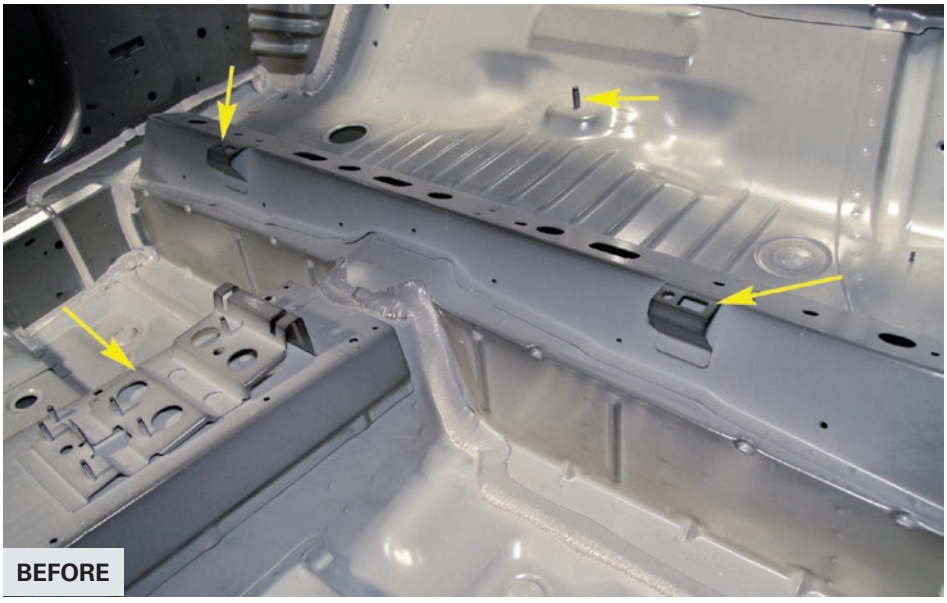


This pair of shots shows the affected parts, before and after removal, on the passenger-side strut tower. Note that the large bracket/tray on the front of the tower remains. As on a stock Camaro, it will eventually be populated with the ECM and electrical power distribution box.

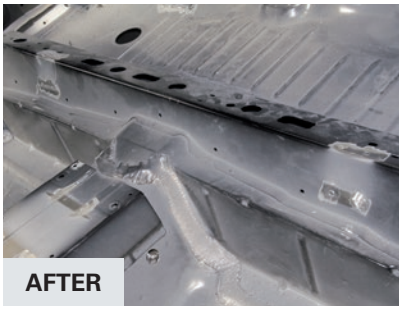


Around the lower perimeter of the engine bay, six protruding studs are ground off, as indicated by the arrows.

In the trunk well, the bracketry that normally secures the battery comes off, and all studs sticking up around the well's perimeter are ground off. A fuel cell will soon occupy this real estate.



In the cabin, the bracket that would normally support the console armrest, as well as the two rear seat attachment brackets and a stud come off as shown.



BEFORE

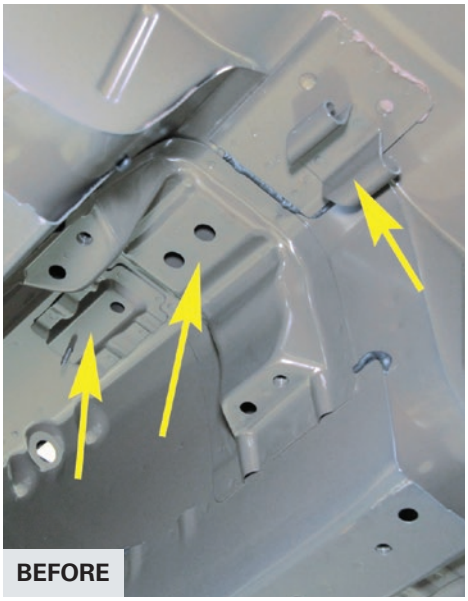
AFTER

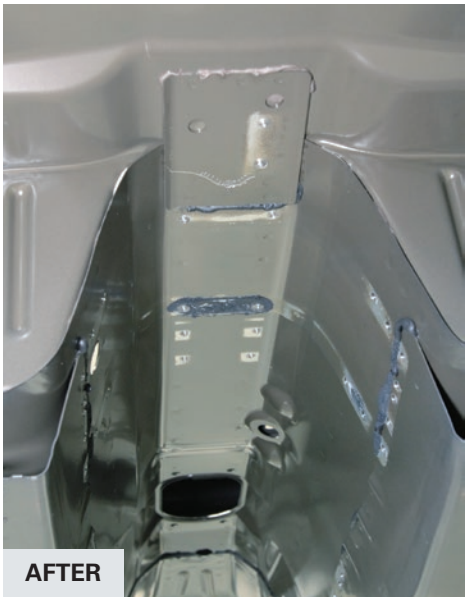
On the underbody of the body-in-white, various stamped steel pieces must be removed from the area of the transmission tunnel and the rear suspension. Just forward of the trunk well, this stamped assembly comes off to make room for the new solid axle and other supporting hardware. The arrow on the right-hand photo points out a tab that is also about to be cut off.

BEFORE

Where the rear subframe kicks up into the rear wheelwell area there are spot-welded pads that, in stock form, are the forward mounting points for the independent rear suspension's cradle. These are removed, as shown on the "after" photo. Keep these kick-up areas in mind as, further along in the build, they will be subject to some serious metal reshaping to make room for the COPO's new lower rear control arms.

AFTER





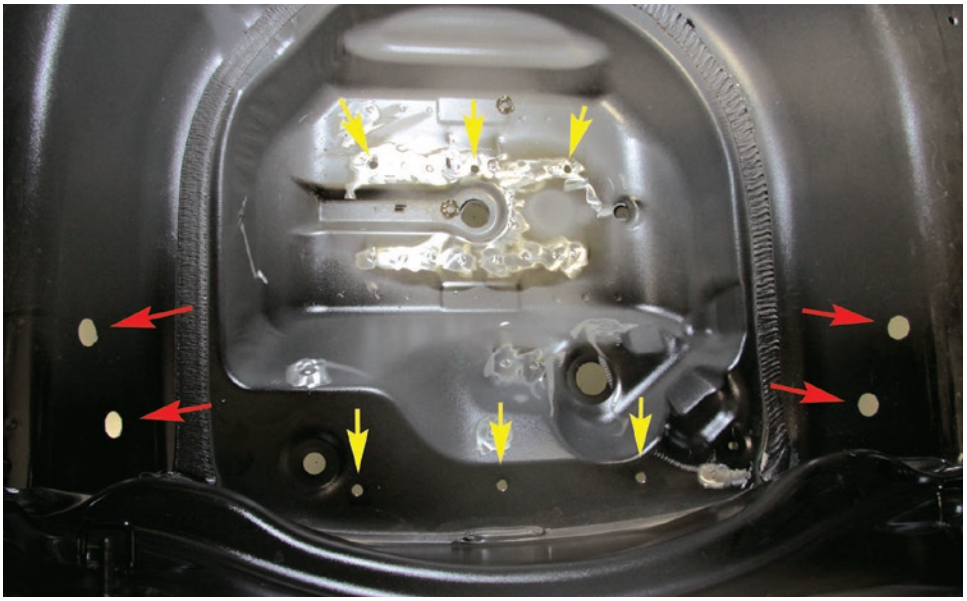
As arrowed at left, three more parts come off at the rear of the tranny tunnel, and head for the recycling bin. The post-operative result is on the right.

To assure header clearance – and because they simply serve no purpose on the COPO – two lengthy stampings come off the front of the transmission tunnel, one on each side.

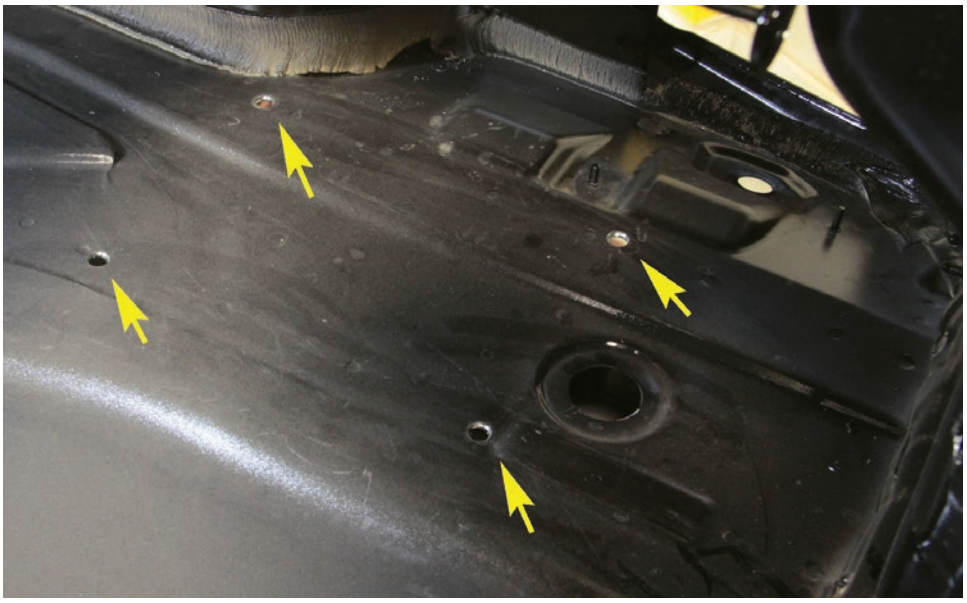
Looking rearward down the tunnel, we see that all weld remnants are being ground off, and that about wraps up our possibly boring, but hopefully helpful, description of stripping the extraneous metal from the underside of the body. Our arrows here are just to make clear that the indicated stampings at the rear of the tunnel DO NOT come off.

MAKING THE CUT(S)

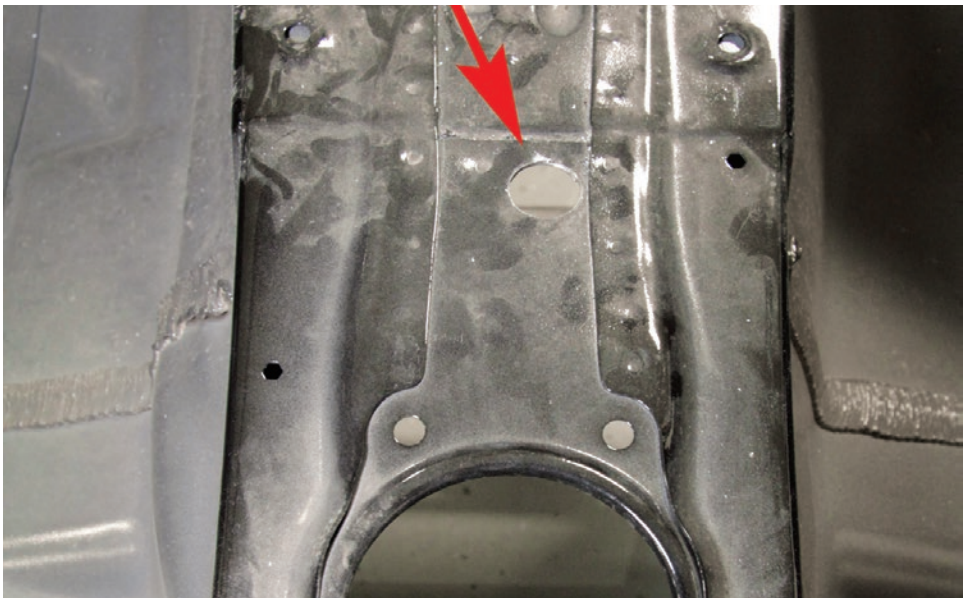
After this initial bout of spot-weld drilling and grinding, the strategy shifts to some larger drill bits and cutting tools in order to create some new holes and openings in the body structure. Bear in mind that, when it comes to the various mounting holes that need to be drilled to accommodate some of the COPO's soon-to-be-installed race hardware, the Build Center developed production-style templates or fixtures that are used to make locating these drill points or cutouts a quick and consistent task for the assembly line technicians. Creating these holes/openings early in the build process – before the body-in-white heads to the paint facility to have the underbody, trunk area and bulkhead-forward section finished in low-gloss black – also makes for a neater finished product. For those readers considering building their own COPO-style racers, we will provide some basic measurements to help locate the more critical of these holes/openings. Knowledge is power.



Looking down into the trunk's spare tire well, the arrows point to holes drilled to accommodate the COPO's new fuel system. The yellow arrows point out the six mounting holes for a 6-gallon Aeromotive fuel cell assembly, while the red ones point out the ¾-inch holes necessary for its fuel feed and return lines (passenger side of well) and its pair of vent lines (driver's side.) More details on the fuel system will follow.

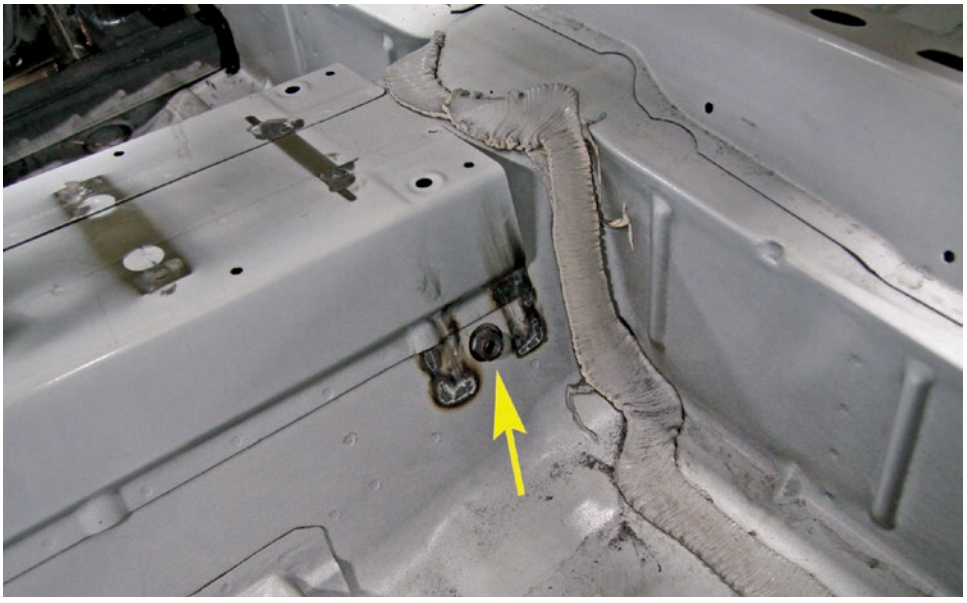


Like its factory counterpart, the COPO Camaro uses a trunk-mounted battery – though in a different location – and the arrows here point out the mounting holes (to the right of the trunk well) freshly drilled for the new battery tray. Again, at the COPO Build Center, these holes are positioned via a template for car-to-car consistency on all the factory 2012 COPOs. If you decide to duplicate this tray setup (the COPO battery tray will be made available through Chevrolet Performance), this shot gives pretty clear representation of the hole positioning – which will obviously vary with different battery tray manufacturers.



In the cabin, a 1-inch hole is drilled through the tranny tunnel in front of the factory shifter opening. This is where the cable from the COPO's Hurst Quarter Stick shifter will pass through to the 2-speed ATI Racing Products Pro Glide transmission. Again, should you choose to use the same setup, this shot clearly shows the hole's offset positioning.

Towards the back of the tunnel, driver's side, a 1-inch hole is drilled for a seatbelt harness anchoring tab. Exact location will depend on your own harness configuration, but in the COPO's case, the center of the hole is about 4.5 inches ahead of the rear wall of the floorpan and its vertical positioning should be obvious from the photo.

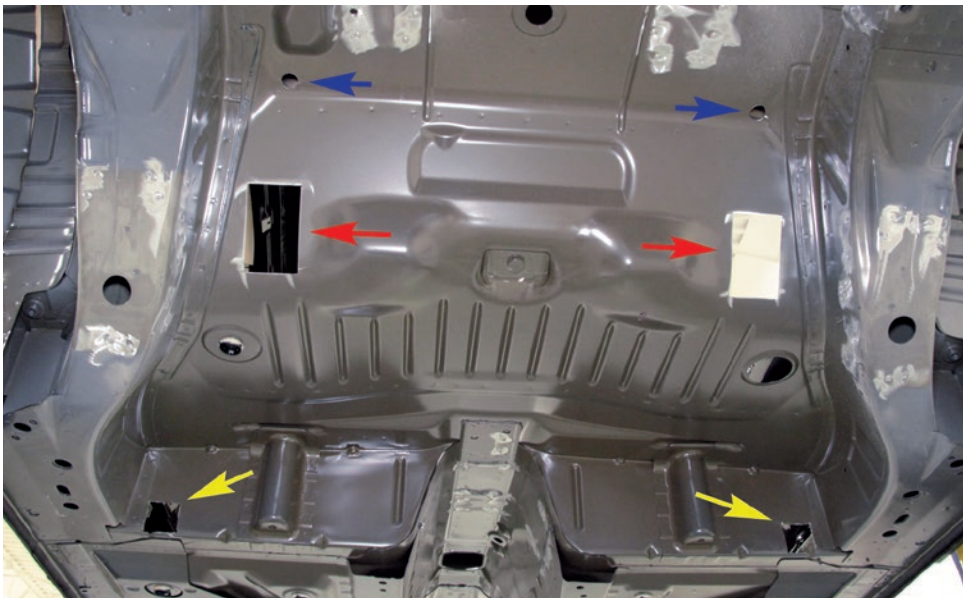


Later in the build, a threaded nut plate will be welded up beneath, as shown, thus giving the RJS 5-point safety harness an inboard anchor point.

Yet more holes. We're looking rearward here from the cabin into the trunk area, and the yellow arrows are aimed at a pair of 7/8-inch holes that are drilled to accept a pair of threaded lugs used to mount a rear anti-roll bar (which forms part of the COPO's rear suspension package from Strange Engineering). Once again, a template was used to position these holes at the COPO Build Center but, for quick reference, the center-to-center distance from the indicated factory hole is 3.25 inches.

Same with the specific positioning of the holes for the COPO's electrical master switch pushrod. The outer hole shown here is 0.625-inches in diameter; the inner hole that passes into the trunk is 0.875 inches. In terms of location, the center of the outer panel hole is 1.75 inches from the small factory hole seen just to the left of the arrow.

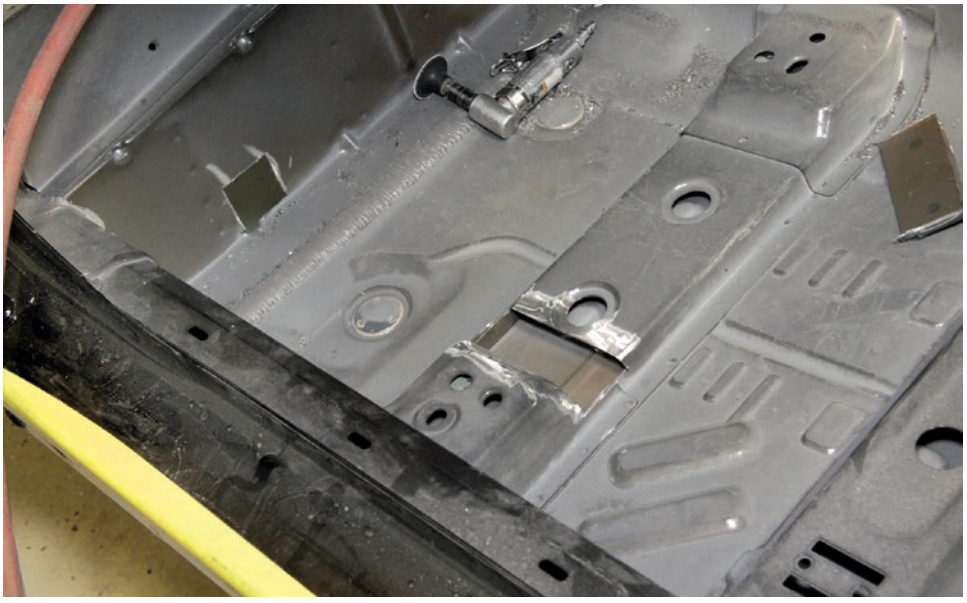
Inside the trunk, a tab will be welded on further along in the build process, to mount the master switch itself (you can see the previously mentioned inner hole for the master switch pushrod behind the tab).



Next, some sheetmetal is cut away in anticipation of fitting the new rear suspension's chassis pickup points. (The blue arrows up top simply show a underbody view of the anti-roll bar mounting holes previously drilled). The red arrows indicate two 4.875 x 3-inch cutouts where the upper control arm brackets will locate (actually, these brackets will pass through from the interior.) But let's begin with the 2-inch-square cutouts indicated by the yellow arrows. Through these, 2x2-inch subframe connector bars will pass through from the interior to eventually be welded to lower control-arm brackets (a process that we'll illustrate in upcoming photos).

Shown here scribed before surgery with a cut-off wheel, the top left corner of the cutout is 1.25 inches in from the side wall, and the bottom line is around 0.25 inches up from the underside of the floorpan. Positioning is symmetrical on both sides of the vehicle.

The opening is massaged as necessary so that the 2x2 subframe connector will pass through with little clearance.

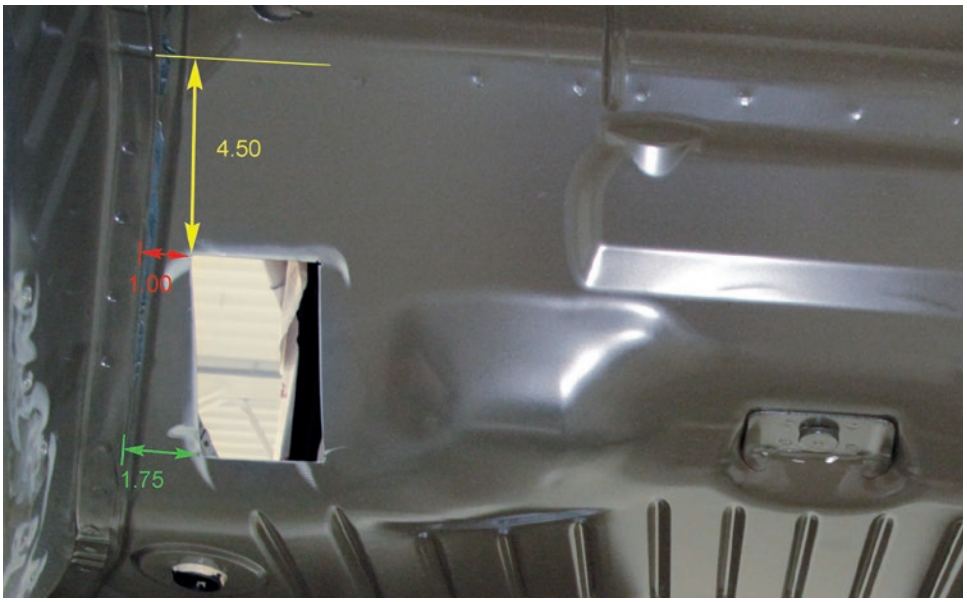


Inside the car, the rearmost bucket seat support structure has to be trimmed so the 2x2 subframe connector will pass through and sit down on the floor pan, as shown in the following photo.

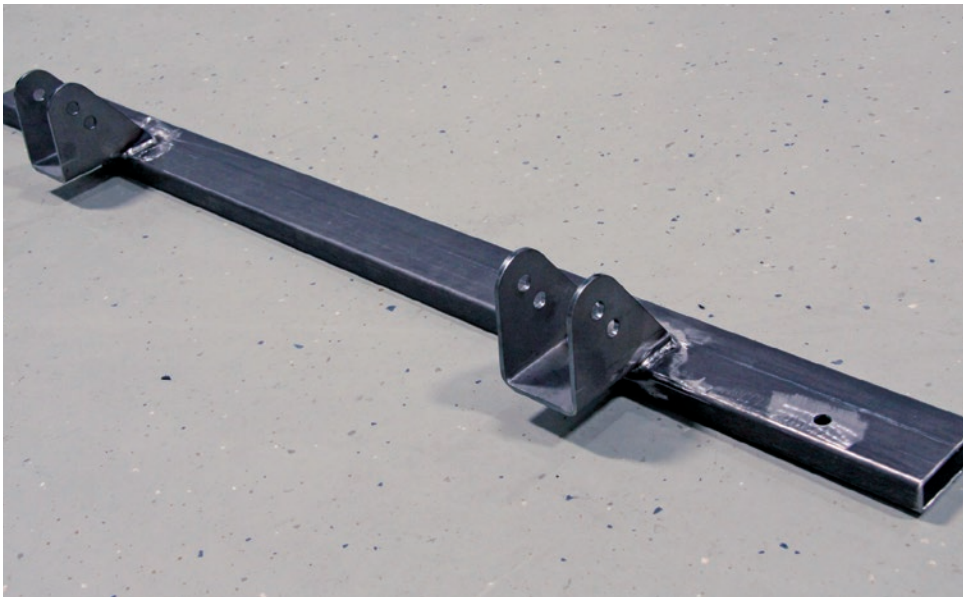
This shot shows how the bar will eventually be positioned, welded at its forward end to the forward front seat support structure, and around the perimeter of the cut just made.

Getting even further ahead of ourselves, the rear of the subframe connectors will eventually be welded to the lower control-arm brackets.

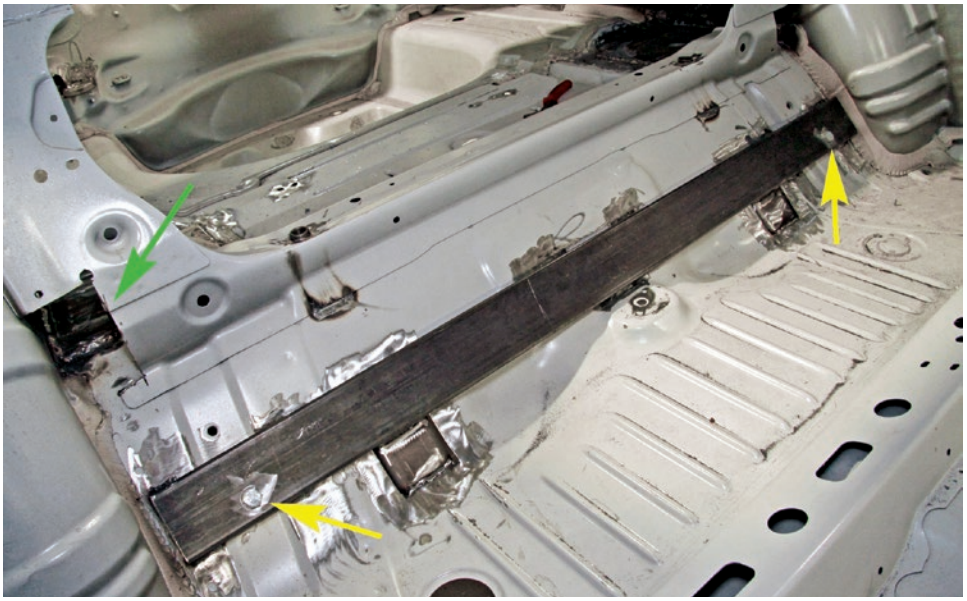
Now let's look at these cutouts for the upper control-arm brackets. Those control-arm brackets themselves come pre-welded to 1x3 rectangular stock as shown in a following photo. The exact positioning of both the upper and lower control-arm chassis pickup points is a critical component of COPO Camaro legality for NHRA's Stock/Super Stock classes.



The COPO Build Center uses templates to create these cutouts, but we'll try and get by with some basic dimensions. The yellow arrow shows that the top of the cutout is 4.50 inches down from the lower of two "bumps" in the wheel arch pinch weld. The red and green arrows measure the top and bottom corners of the cutout at 1.00 and 1.75 inches inboard from the edge of the pinch welded seam. As previously stated, the cutouts themselves are 4.875 inches high by 3.00 inches wide, and all these dimensions are the same on driver and passenger sides of the unibody.



As noted, the upper control-arm brackets are pre-welded to a stout chunk of 1x3 rectangular stock. This welded and drilled component is available as part of a comprehensive COPO rear suspension installation kit (P/N 22950680) from Chevrolet Performance (see content photo below).



Further along in construction, this upper bracket and bar assembly will mount inside the car, as shown, with the control-arm brackets protruding down through the previously described cutouts. The yellow arrows point out the fact that this bar is designed to bolt to existing factory holes in the floor structure (to assure proper lateral alignment) before being securely welded in place. The green arrow? It's pointing to an enlarged cutout where the new main battery cable and additional wiring will pass from the passenger compartment into the trunk.

P/N 22950680: COPO Rear Suspension Installation Kit

COPO REAR SUSPENSION INSTALLATION KIT

Chevrolet Performance offers a COPO Rear Suspension Installation Kit (under P/N 22950680) that includes the previously noted bar-mounted upper control-arm brackets, a pair of lower control-arm brackets, a Panhard bar chassis bracket, anti-roll bar mounting lugs, and precision-cut heavy-gauge metal necessary for modifying the rear subframe structure to clear the solid axle's lower control arms. The kit will also include some templates not shown here. This is an essential kit for a COPO build.

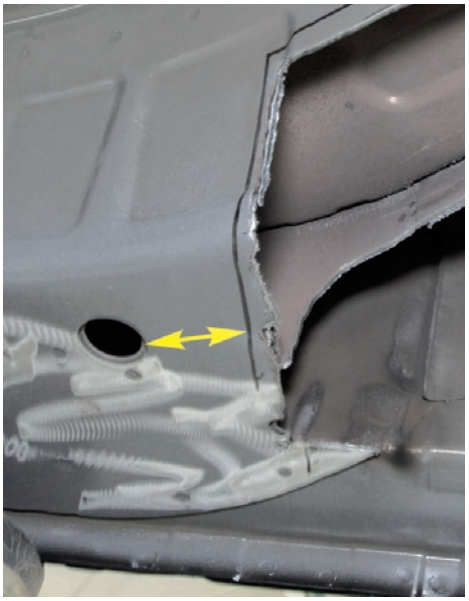
SUBFRAME SURGERY

The next step in unibody prep is a major one: cutting and altering the rear subframe members to, first of all, provide working room for the soon-to-be-installed rear axle's lower control arms and, second, to provide a chassis mounting point for the lower control-arm brackets. Accurate positioning of those brackets is essential both for proper rear axle function, and the COPO's NHRA class legality. Please refer to the suspension line drawing in the Appendix.

We're looking here into the front section of the passenger-side rear wheelwell, where the rear subframe begins to kick up into the wheel opening. The line drawn on the frame member indicates the delineation of a section of that frame member (and its driver's-side counterpart) that must be cut away. (Though not shown in the content photo, Chevrolet Performance will include a set of templates to accurately locate and outline this cutout in kit P/N 22950680.) The spot-welded vertical plate visible to the right of the subframe will also be completely cut out. Let's be real: Unless you are a very competent metal fabricator, we strongly suggest such steel surgery be left to a professional chassis shop.

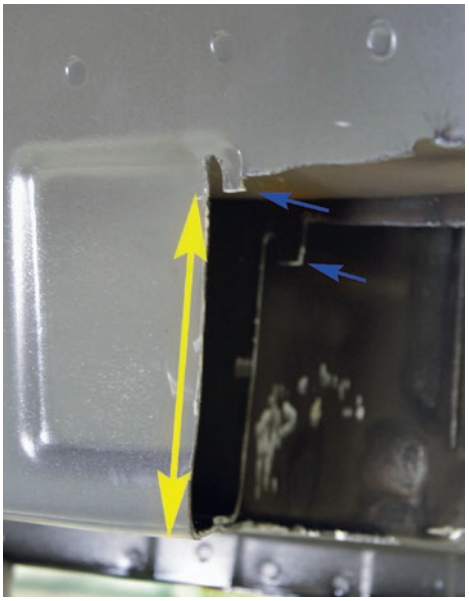
A plasma cutter is used to make a rough cut inside the reference line, and to remove the spot-welded vertical sheetmetal visible in the previous shot.

Here's a view after that initial cut (which will be repeated on the driver's side of the car). Notice that the previously mentioned vertical side plate has also been cut away.



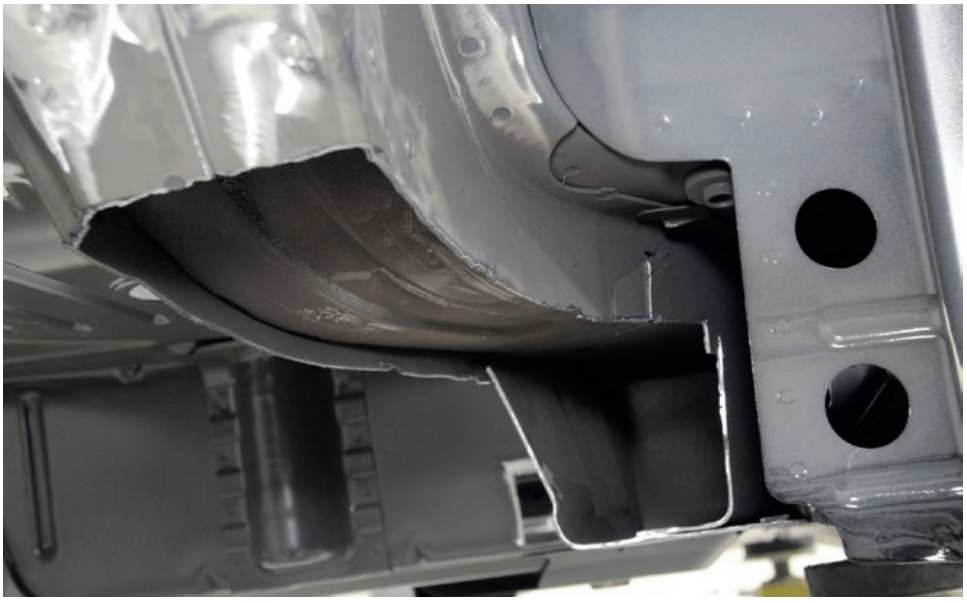
Again, the dimensions of this cutout are really only practically determined via the template, but to give some idea of location, the finished forward edge (as indicated by the Sharpie line) measures at 1.6875 inches rearward from the edge of the indicated factory hole on the bottom of the subframe.

A cutoff wheel is used to accurately work the opening out to the forward drawn line (on both the inboard and outboard walls of the subframe). This forward edge must be accurately established to longitudinally locate the lower control-arm brackets (especially critical due to the fixed length of those lower control arms).

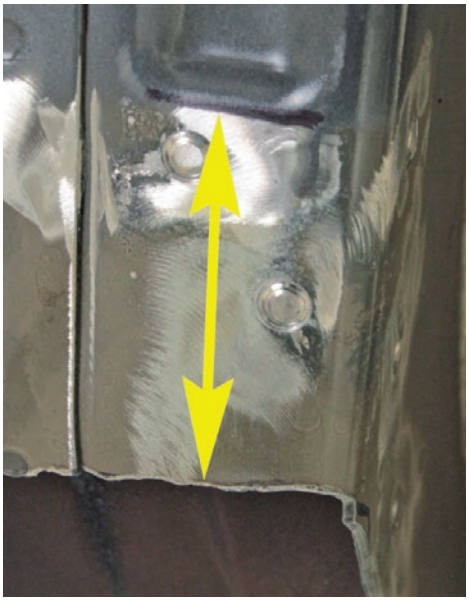


Notice the two little tabs indicated by the blue arrows. The bottom face of these tabs will correctly position the height of a new bottom plate soon to be welded in place (this concept will become clearer in upcoming photos). We measured the height from the bottom of the subframe, as indicated by the yellow arrow, at 3.75 inches, but the available templates will more clearly define this.

A shot of the finished cutout. It will be covered by the new cap plate ...

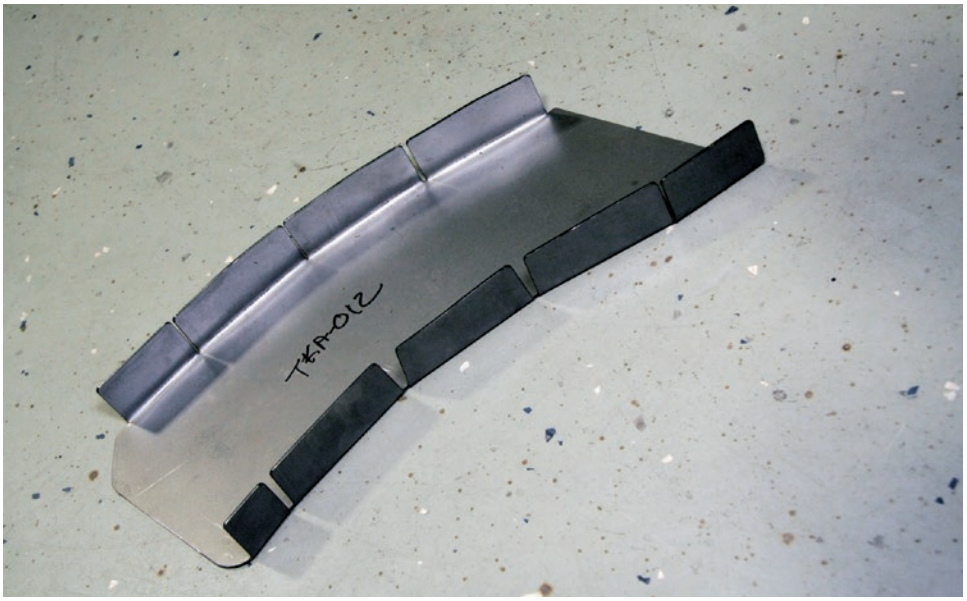


... And one more shot from an outboard view.



The rear limit of the cutout is best determined by the available template but, as a quick reference point, it measured at 3 inches from the bottom of the visible rectangular dimple in the frame rail.

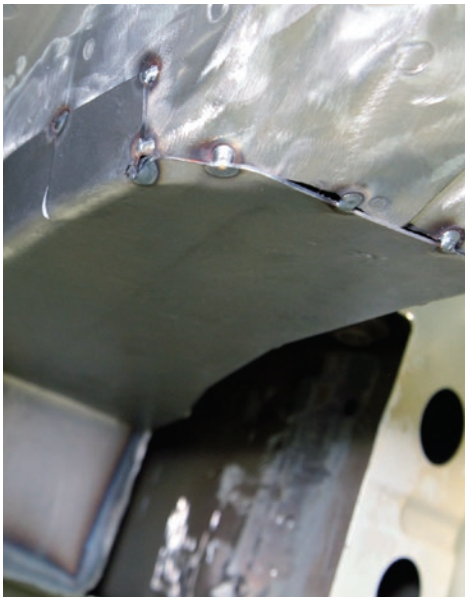
The front of the openings on the left and right subframes are then closed off by welding in a vertical plate (included in the previously shown Chevrolet Performance 'Rear Suspension Installation Kit' P/N 22950680).



Next, one of these horizontal cap plates (also part of kit P/N 22950680) is welded onto each side's subframe cutout.

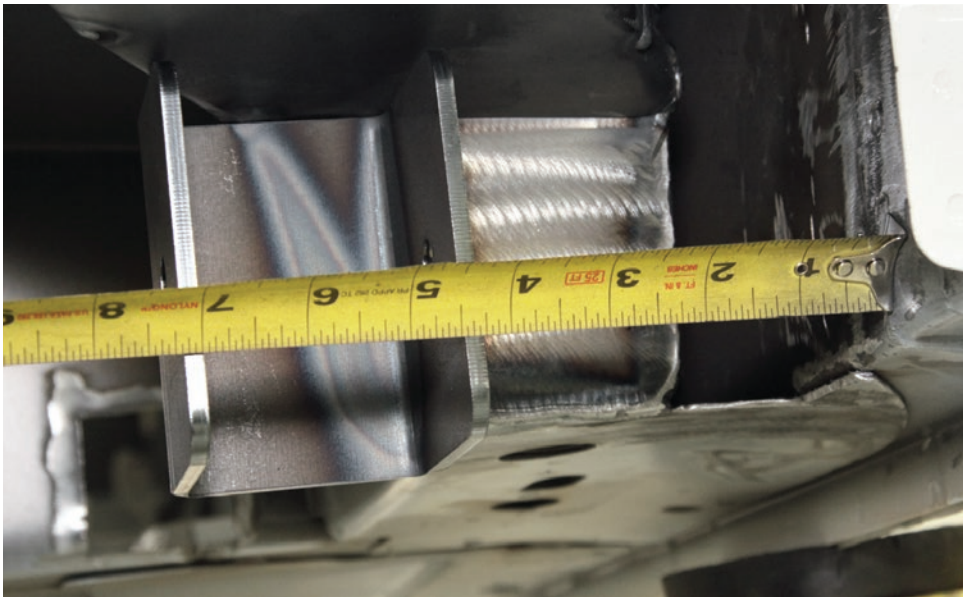
The cap plate is first tack welded at the forward end ...

... and then bent up to follow the curve of the subframe's gradual kick-up and close the gap at the rear ...



... and then tacked up at the rear as shown.

It is then stitch welded around its full perimeter, creating the new subframe floor shape on each side of the car.



Now the lower control-arm brackets (included in part Chevrolet Performance P/N 22950680) are welded on, inset 4.25 inches from the inner rocker structure, as shown.

Here's the bracket seen from the side. It is positively located, top and back side, by the new subframe structure previously installed.

An overall look at the finished revisions to the subframe structure and the (arrows) attached lower control-arm chassis brackets.

The 2x2 subframe connectors are then welded in place on the cabin floor, passing through the holes in the rear floor wall. (These square bars will also tie into the COPO's roll cage structure.)

At their aft ends, the 2x2 subframe connector bars weld to the lower control-arm brackets. For reference, the dimension shown (unibody to rear face of LCA bracket) is 11.125 inches.

An overall view of the progress so far. Note that the suspension installation kit's threaded lugs (arrows) to mount the suspension's new anti-roll bar have been welded into the holes previously created. Next comes the upper control-arm bracket assembly we introduced you to earlier.

The 1x3-inch rectangular bar with its pre-mounted upper control-arm brackets is now bolted and welded securely in place across the trunk bulkhead.

NOTE: *Shortly, this bar will tie into, and be buttressed by, the roll cage structure.*

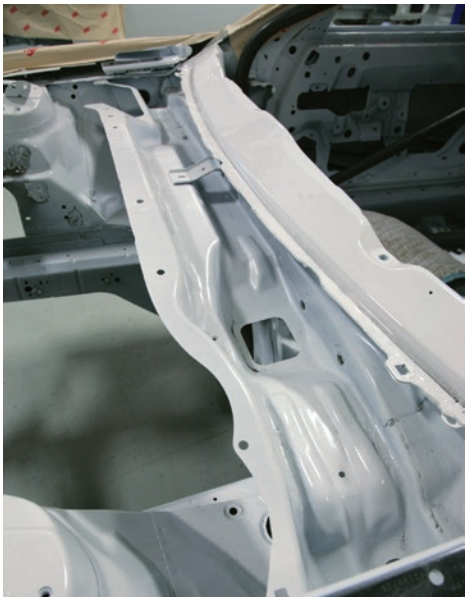
Here are the installed upper and lower control-arm brackets seen from below. The positioning of these chassis pickup points officially comprise part of the COPO's approved new solid-axle rear suspension configuration for NHRA Stock Eliminator competition.

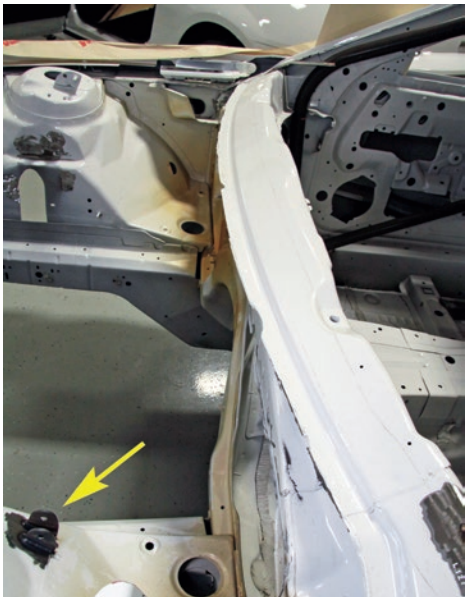
MORE UNIBODY MODS

Before moving on to the next chapter's quick overview of the COPO roll cage, there are a just few more alterations to the body-in-white to cover.

A bracket for the new rear suspension's Panhard bar is welded to the left rear subframe. It goes over a factory dowel that protrudes from the subframe (this dowel's twin is just visible on the far side frame rail in this shot). The bracket is yet another inclusion in the Chevrolet Performance installation kit (P/N 22950680), as is a template to establish that bracket's correct installation angle.

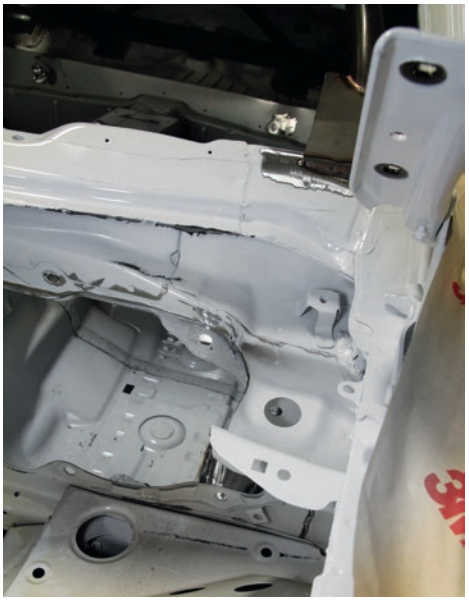
In preparation for the COPO's new Hurst shifter, the factory shifter opening on the transmission tunnel gets a welded-in filler plate. The new shifter will sit atop this plate.





The factory cowl structure, which normally houses the windshield wiper hardware, must be cut out to make room for the upper intake (or the supercharger assembly) atop the COPO engines. Besides, who needs wipers on a drag racer?

After delicate application of a plasma cutter, the abbreviated cowl area looks something like this. Also, the arrow points out a small bracket that gets welded to the rear of the driver's side strut tower. A few steps down the production line, this will locate a brace for the COPO's new brake master cylinder (see photo of this brace in place in Chapter 5).



Some detail shots of what's left of the cowl on the driver and passenger sides.

[CHAPTER 2]

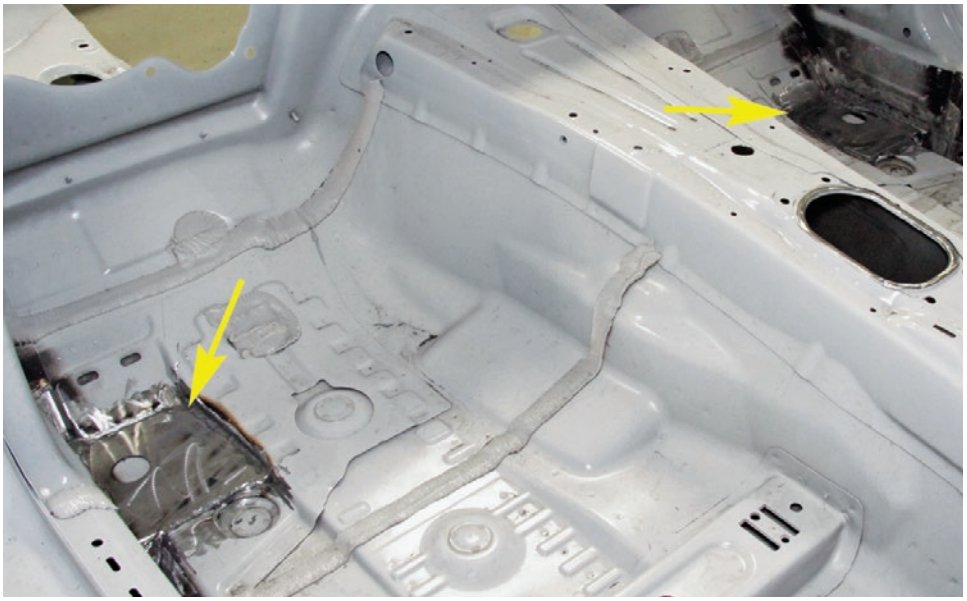
THE CAGE

Once the body-in-white has received its initial prep as outlined in Chapter 1, it moves on to the next station for fabrication of its all-important cage structure. The 2012 COPO Camaro's roll cage is engineered and constructed to meet or exceed NHRA rulebook requirements for quarter-mile elapsed times as quick as 8.50 seconds. While safety was the primary consideration in its custom design, the bar layout and configuration are also intended to maximize driver headroom and outward visibility, and have minimal impact on the stock trim elements of the interior.

Chevrolet Performance will not offer any of the COPO's cage components through the parts catalog, and we include the following photos simply to illustrate one possible approach, should you wish to build your own COPO. The current NHRA rulebook must be consulted regarding the requirements for cage construction.

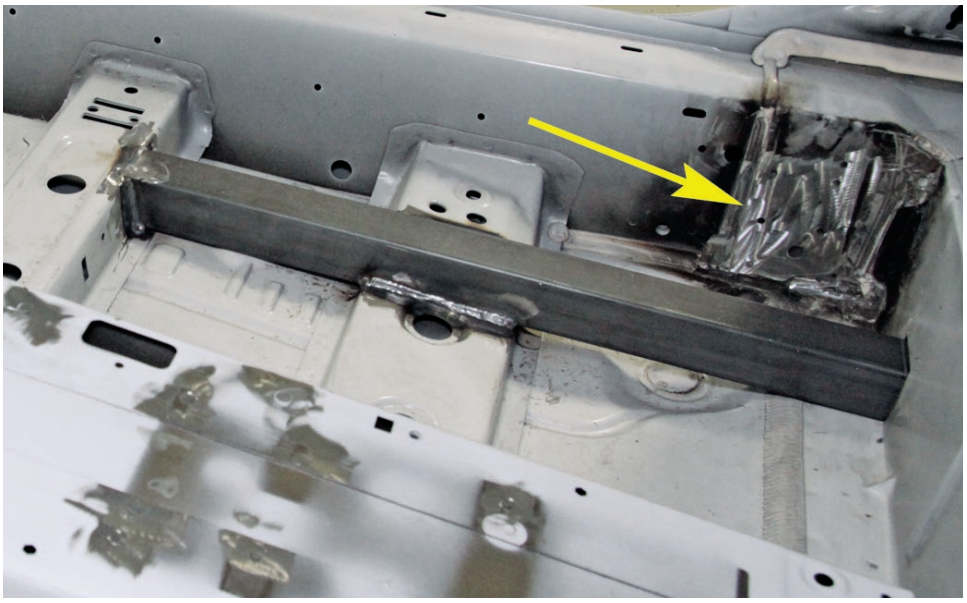
IN THIS CHAPTER:

- Overview of the factory COPO cage
- Begin closing off the trunk bulkhead



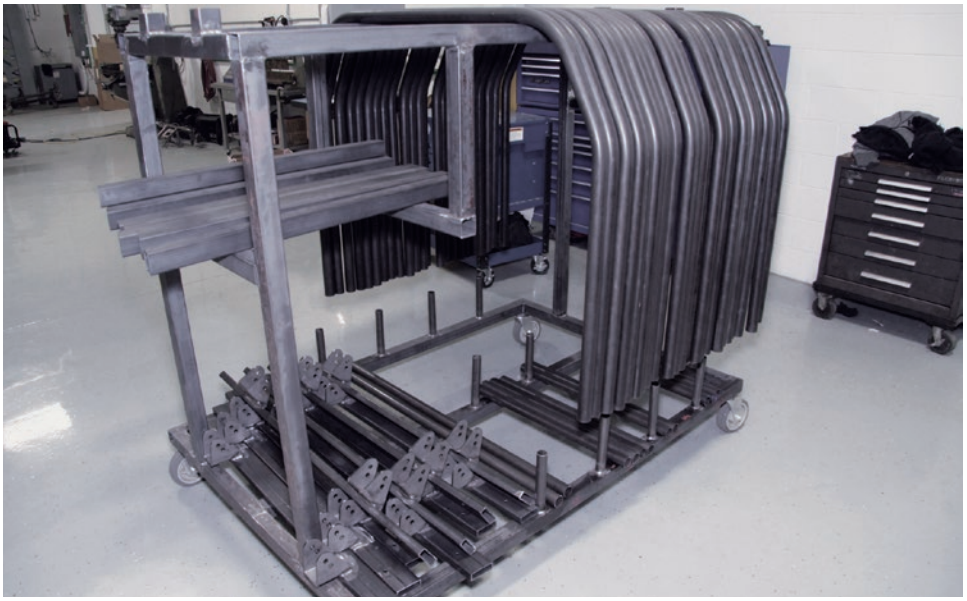
As a first step in cage construction, some reinforcing plates are welded onto the floor structure in the front kick panel areas. As with any areas on the COPO where welding will occur, all paint and any primer coats are first ground away.

Reinforcing steel also goes in the trunk area, where the cage's rear bars will anchor. As on the front reinforcing, you can see the holes in the plate where the bars will locate.



At the rear corners of the floor pan, portions of the sidewall are also ground free of paint, as some cage structure will tie in at these locations.

The cage is constructed of chromoly steel, with tube sections of varying diameters. The latest NHRA rule book should be consulted for specific details of cage requirements.



A supply of cage main hoop sections can be seen here (along with some of the 2x2 subframe connectors and upper control arm bracket assemblies detailed in the previous chapter).

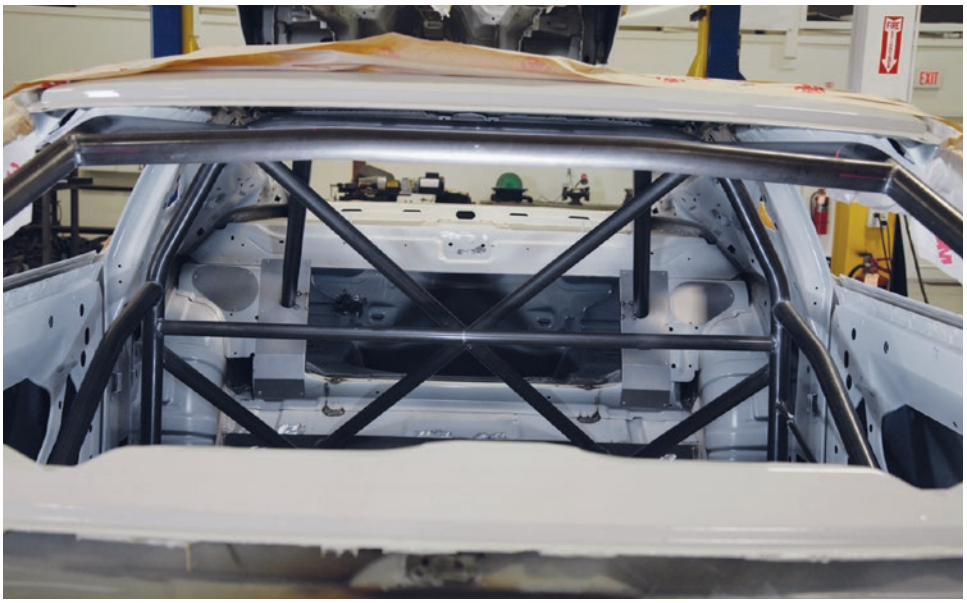
The cage sections are TIG-welded together in a process that could consume up to 16 man hours, start-to-finish.

An overall view from the driver's door. Note that the main hoop has diagonal bracing that ties into the 1x3 bar stock to which the upper control-arm brackets are mounted.

Looking in from the passenger side, you can get an idea how the main hoop is anchored to a 2x2 square bar joining the subframe connectors to the unibody wall.

A closer look at the main hoop/ floor junction.

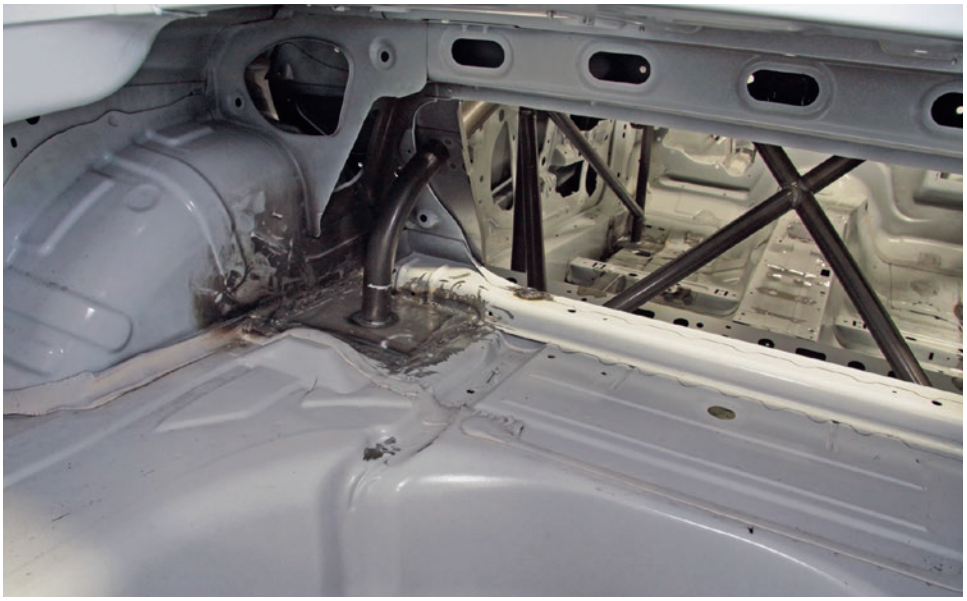
An ever closer look shows a tab welded in place to secure the outboard seatbelt.



A straight-on view through the windshield opening.

NOTE: *The gentle arch to the front cross bar.*

An overview up front shows there is no cross-dash beam on the cage. The COPO's factory dash structure, with its cross-car beam will be retained, as we'll see in upcoming photos.



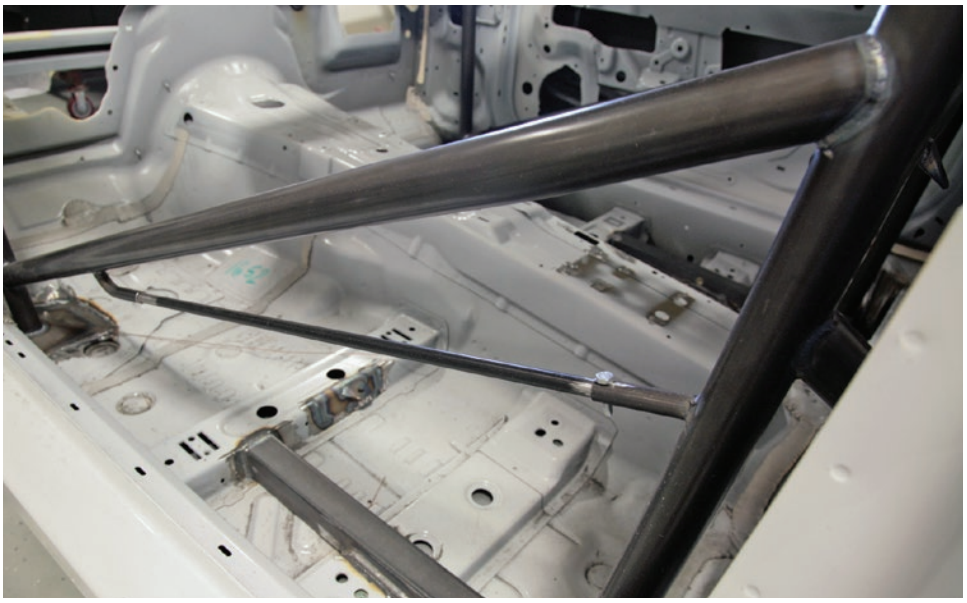
Out back, the main bars pass through into the trunk and curve down to meet the reinforcing plates.

This shows how well the back sides of the upper control-arm brackets are braced by bars tying into the main hoop of the cage structure.

NHRA rules require that the trunk bulkhead be closed off from the cabin. This shot shows the beginning of this process, which involves riveting aluminum block-off panels to any major trunk-to-cabin openings.

As part of this process, the rear parcel shelf's speaker openings are also closed off. The main opening between cabin and trunk will also be closed off with sheetmetal later in the build process.

Up front, the bars are tied to the cowl structure such that the factory dash pad will eventually go in place with minimal modification.



The small, removable bar here will be used as the lower mount for a window safety net.

[CHAPTER 3]

THE BUILD-UP BEGINS

With the cutting, major drilling, welding and fabrication out of the way, the reworked and rigidized body-in-white then proceeds to the COPO Build Center's paint shop for some low-gloss black paint to heal its surgical scars.

Once painted, the satisfying process of gradually adding the mix of production and race-specific hardware that will soon turn this strengthened shell into a Stock or Super Stock competitor can finally begin.

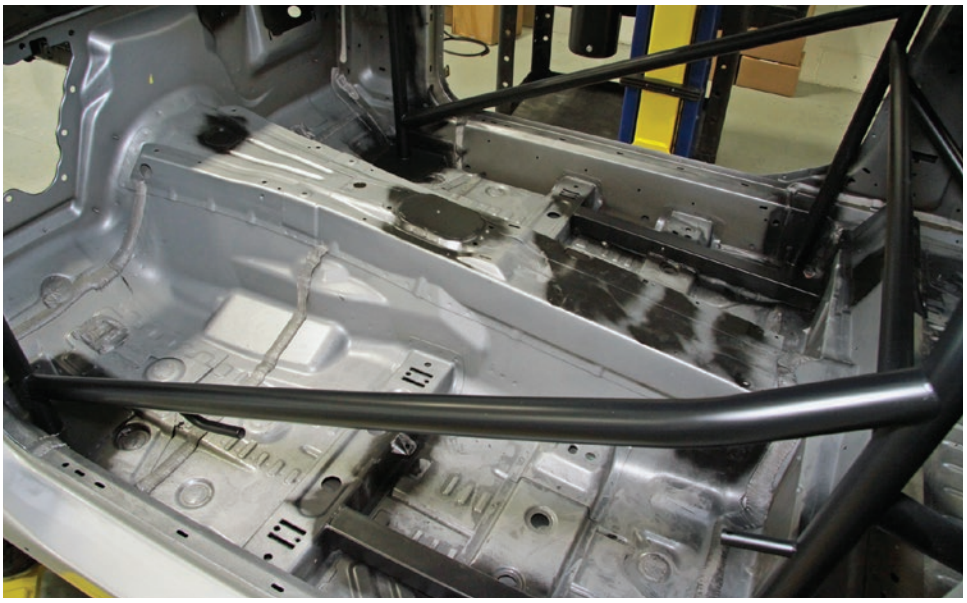
IN THIS CHAPTER:

- Body-in-white gets some black
- Some rear body trim and a trunk release
- Install the hard brake lines and line-lock solenoid
- Start fuel system installation

JUST A TRIM, PLEASE

After fabrication, but before assembly gets under way, the unibody's front-bulkhead-forward area, as well as its roll cage structure, the inside of the trunk area, and the complete underside of the chassis get shot with low-gloss black. Note also that the doors have now been removed (and won't go back on until the very final stages of assembly).

A close-up of the engine bay, now looking factory fresh – in a racy kind of way.

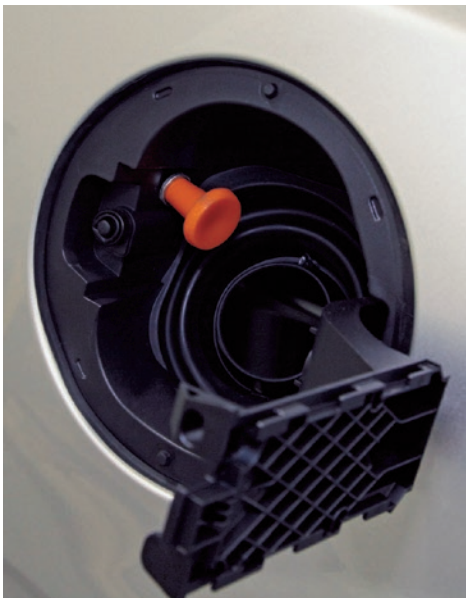


Inside, for corrosion protection, the painter also aims his gun full of low-gloss black at any other unfinished metal, or areas that had been ground bare during fabrication. Ultimately, the cabin will be dressed out with carpet and full factory trim – as required to run in Stock or Super Stock classes.

Here's a shot of COPO #38 (one of just two finished in Silver Ice Metallic in the 2012 production run) just before the start of assembly. The assembly process begins at the rear with some factory rear trim pieces.

Among the first items to go on is the trunk release mechanism. Note that the dangling emergency inside-trunk release lanyard will be cut off later in the build process, and its steel cable will instead be joined to a release handle about to be installed in the fuel filler area. This will serve as a fall-back manual trunk release, should the COPO's electric release be disabled by a dead battery, or when the electrical master switch is shut off.

Before its installation, a hole is drilled through the factory plastic fuel filler receptacle, through which the new trunk release cable is inserted and routed to the trunk.



When connected to the trunk release mechanism, a yank on the orange knob will pop the trunk regardless of the car's electrical state. By the way, because of the COPO's new fuel cell, this factory fuel filler location will no longer be used.

Numerous rubber body sealing plugs now go in place, and these factory-production screened vents are popped into the outboard corners of the trunk. (In addition to providing ventilation, these reduce decklid and door closing effort when the windows are up.)

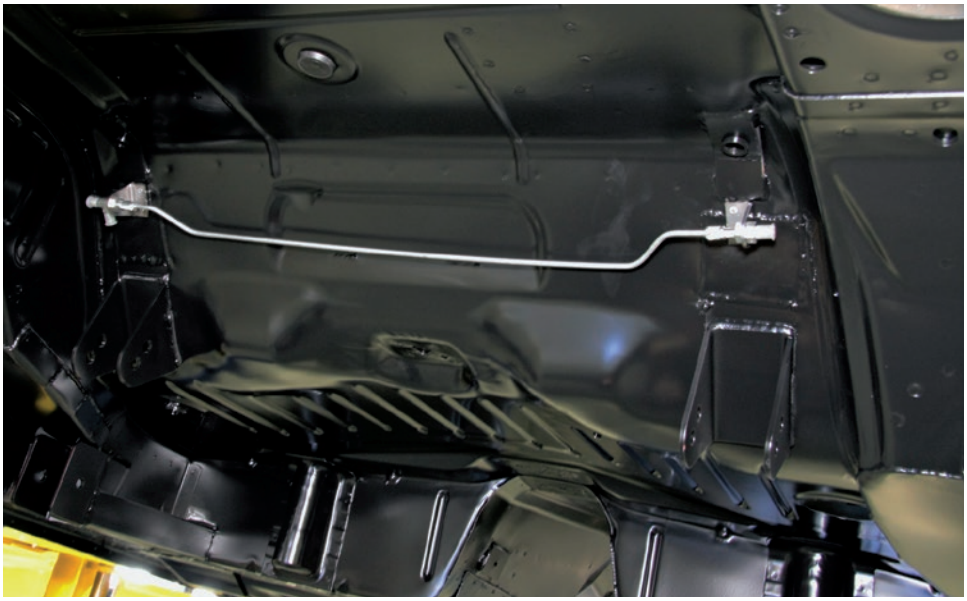
The factory hardware that will soon be used to mount the rear fascia assembly gets riveted in place beneath the trunk opening. Note that the factory rubber molding has also been installed around the trunk opening's perimeter.

More receiver trim for the rear fascia is riveted behind both rear wheel openings.

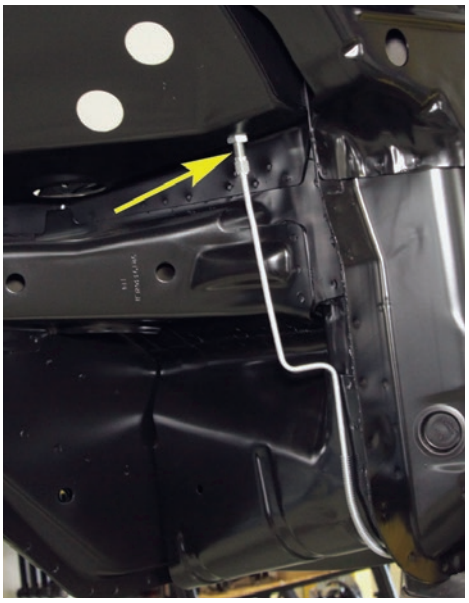
The rear-quarter windows are then bonded in place, and that's about it for the initial round of body trim additions. We now move on to some non-production hardware ...

LINING UP THE BRAKES

Next up, the COPO's pre-bent, hard brake lines are installed, creating a fluid circuit that includes provision for a Hurst roll control (line-lock) system. This brake hard-line kit will be available through Chevrolet Performance.



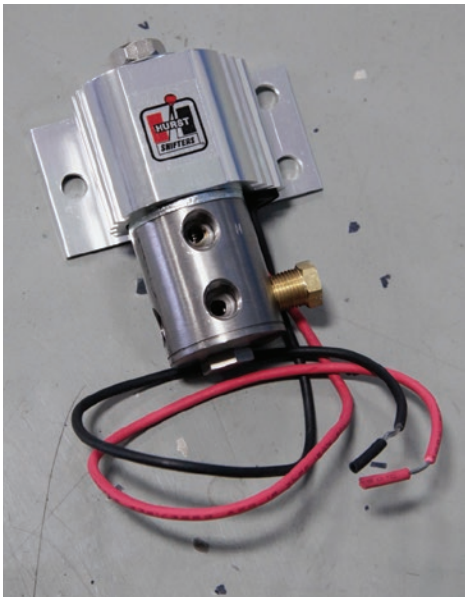
First of the hard lines to be secured is the cross-trunk line to feed the rear brake flex lines. You can see that its end brackets are mounted directly beneath the welded-in anti-roll bar mounting lugs. A T-fitting goes on the driver's side.



Next, the long rear supply line is routed from that T-fitting up along the driver's side floor to the left front wheelwell. You can see here how it runs outboard of the upper and lower rear control-arm bracket assemblies.

Up front, this long line connects to a junction fitting passing through the wheelwell structure. (On the under-hood side of this junction, a short hard line will connect it to the rear circuit of the COPO's new brake master cylinder.)

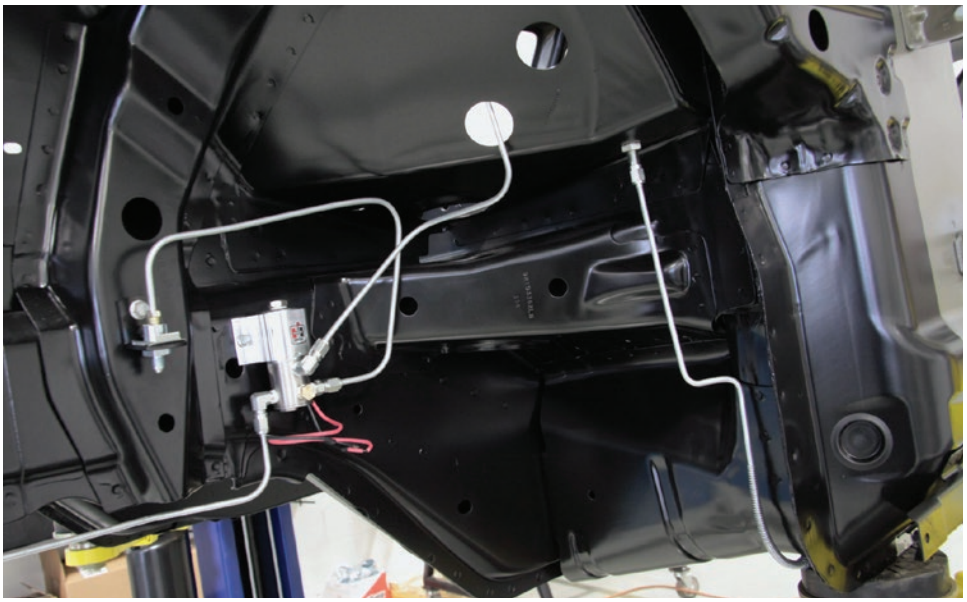
Once connected, the rear feed line is then clipped up to the bottom of the rocker structure.



The COPO Camaro uses a Hurst line-lock (roll control) solenoid.

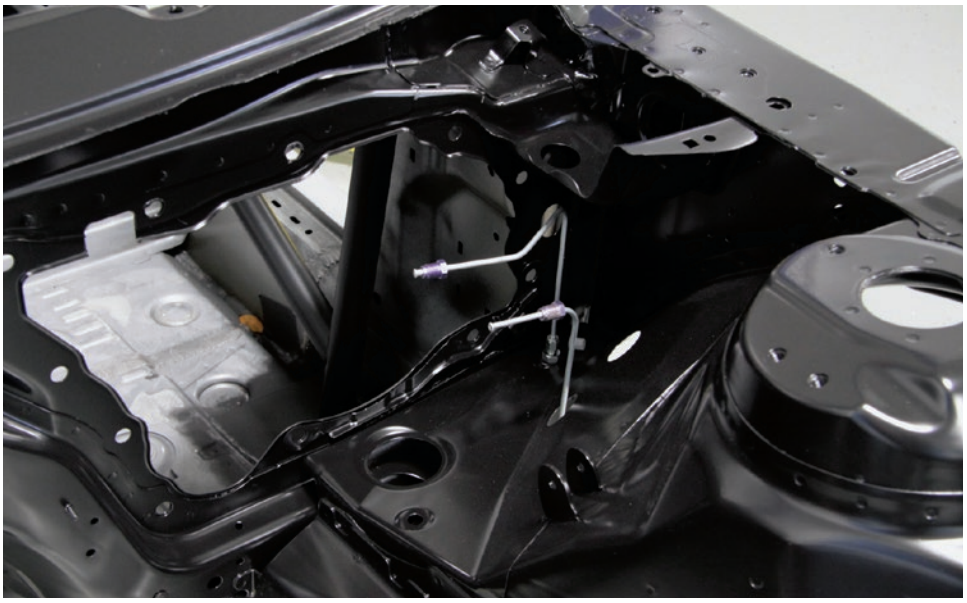
The line-lock solenoid is mounted as shown, on the wheelwell structure.

L-brackets are then bolted in place in both front wheelwells to mount junction fittings where the front brake flex lines will meet the hard lines.



Hard lines are then plumbed from the lower outlet ports on the line-lock solenoid to the junctions installed in the previous step in each wheelwell. Note also that the solenoid's feed line has been installed here and routes up through an existing hole on the wheel arch to eventually connect to the master cylinder's front circuit.

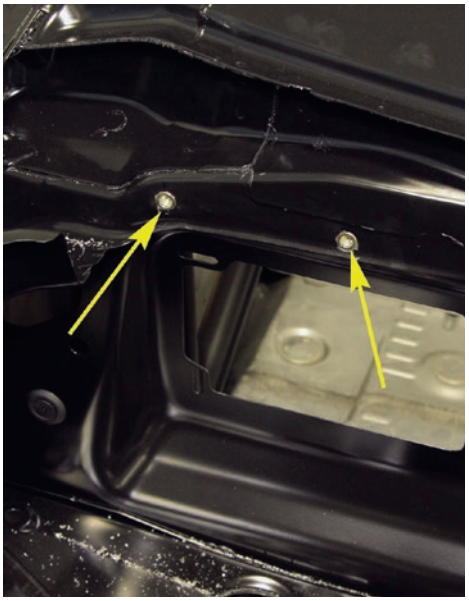
The hard line for the front passenger side is routed and secured around the forward perimeter of the engine bay (NHRA rules require that fluid lines be routed away from, or around, any spinning driveline or engine systems.)



Looking down into the engine bay, this shot shows the front and rear feed lines awaiting the new master cylinder that will come onboard a few steps down the production line. And that about wraps up our discussion of brakes for now.

Before moving on to the fuel system, preparations are made to mount some upcoming engine bay hardware. A bracket for the upcoming coolant overflow bottle is being bolted in place here ...

... Moving forward many steps, here's what that overflow bottle will look like.

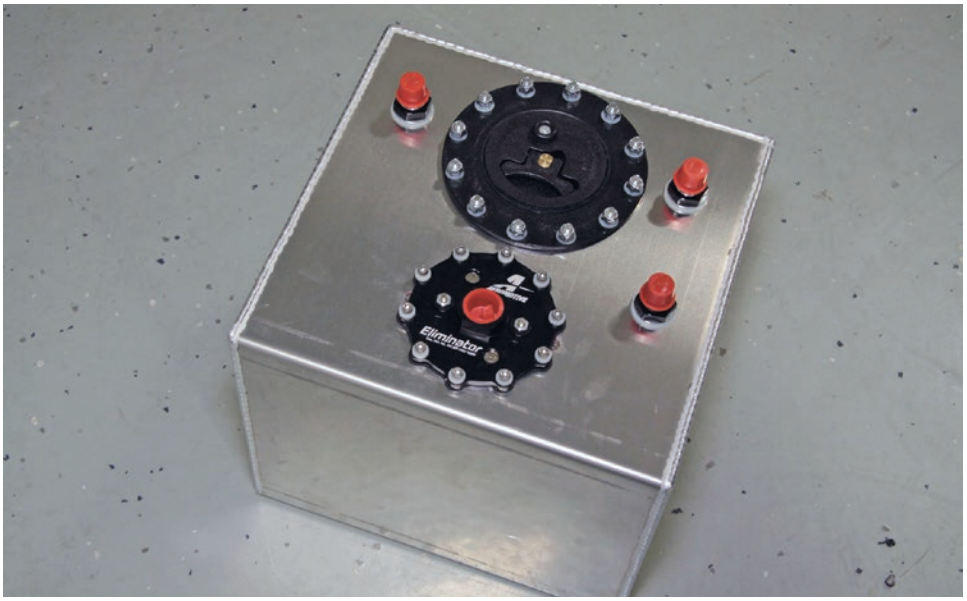


On the passenger side of the cowl area (above what would normally be the heater core opening), holes are drilled and some threaded inserts (Rivnuts) riveted in for an upcoming positive crankcase ventilation (PCV) canister.

Here's how that PCV canister will eventually mount. We'll have more photos and detail when we get to the engine installation stage.

FITTING THE FUEL SYSTEM

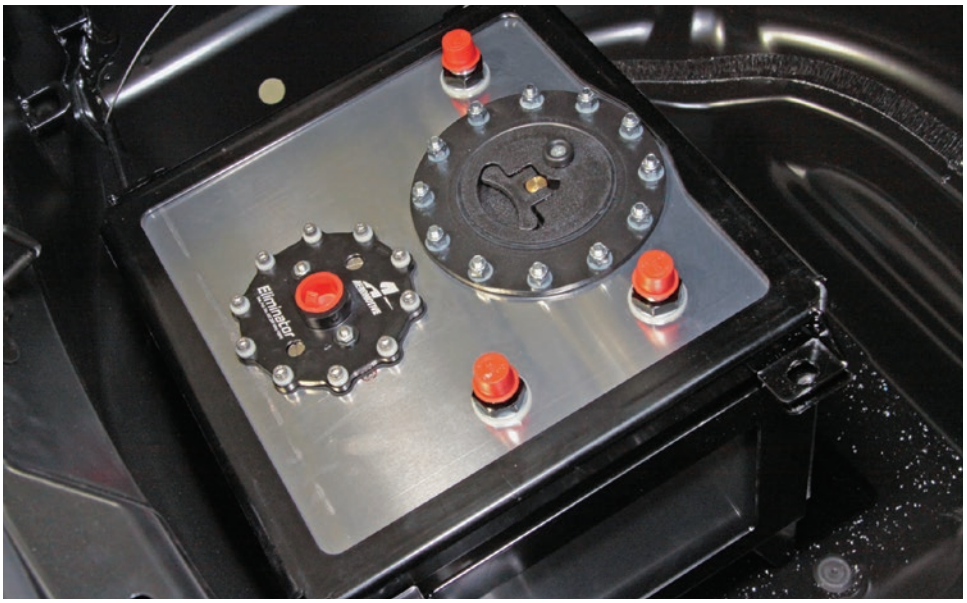
The bulk of the COPO's fuel system (including the fuel cell itself, lines, filter, and pressure regulator) is manufactured by the experts at Aeromotive. In this section, we have a look at the chassis portion of the fuel system installation. Later on, we'll see how the lines are plumbed to the engine(s).



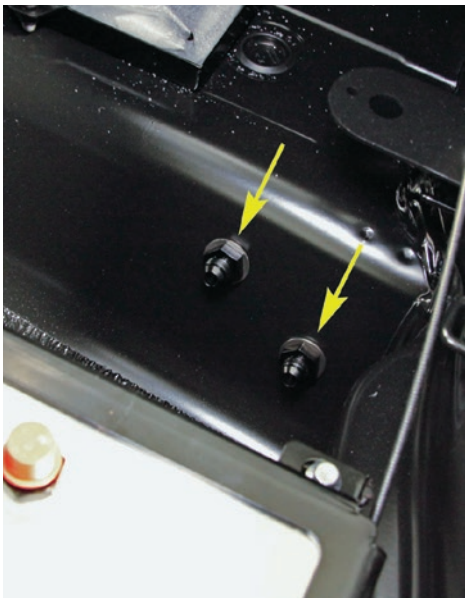
This is the COPO's Aeromotive 6-gallon Eliminator Stealth fuel cell. Internally baffled, and with a flow rating of 800 pounds per hour, this cell easily feeds any of the COPO's three available engine choices.

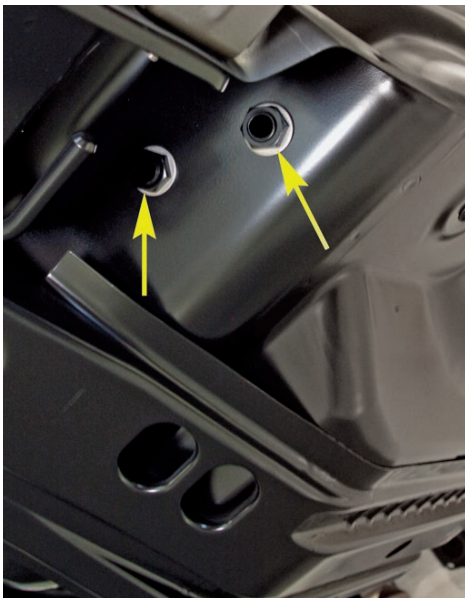
It mounts in this fuel cell bracket with its nifty Bowtie symbol cutout. (This bracket will be available through MPR.)

The rest of the Aeromotive fuel hardware. All fuel lines are black nylon braided -8 AN, and the AN fittings are black anodized aluminum. The four lines and fittings on the left of the photo will be installed in the trunk. The three longer lines and filter in the middle route along the underside of the unibody, while the six lines and the pressure regulator at right will go underhood, but only once the engine is installed.



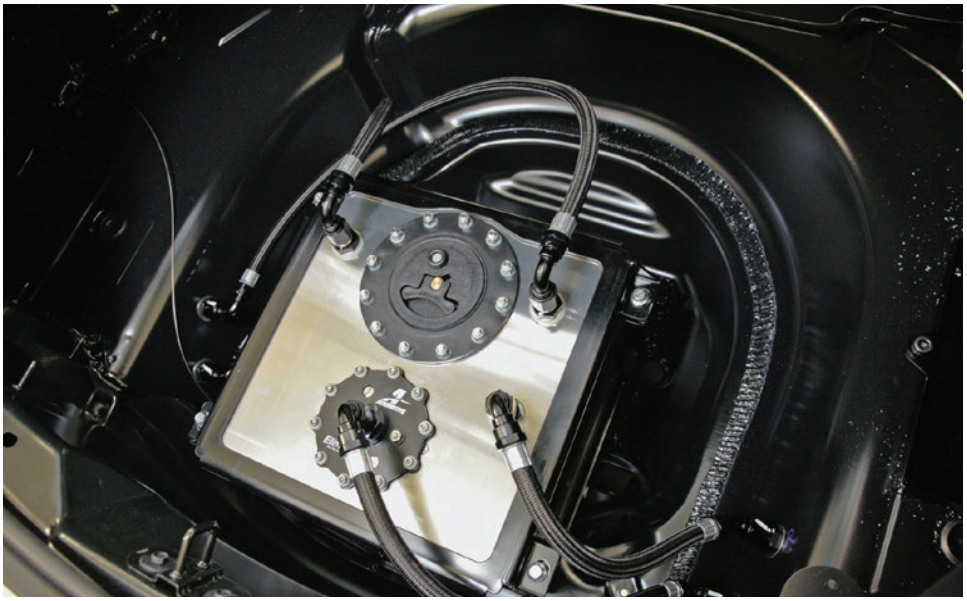
Remember those six small holes drilled in the bottom of trunk well way back in Chapter 1? They've been put to use here securing the fuel cell/bracket assembly.



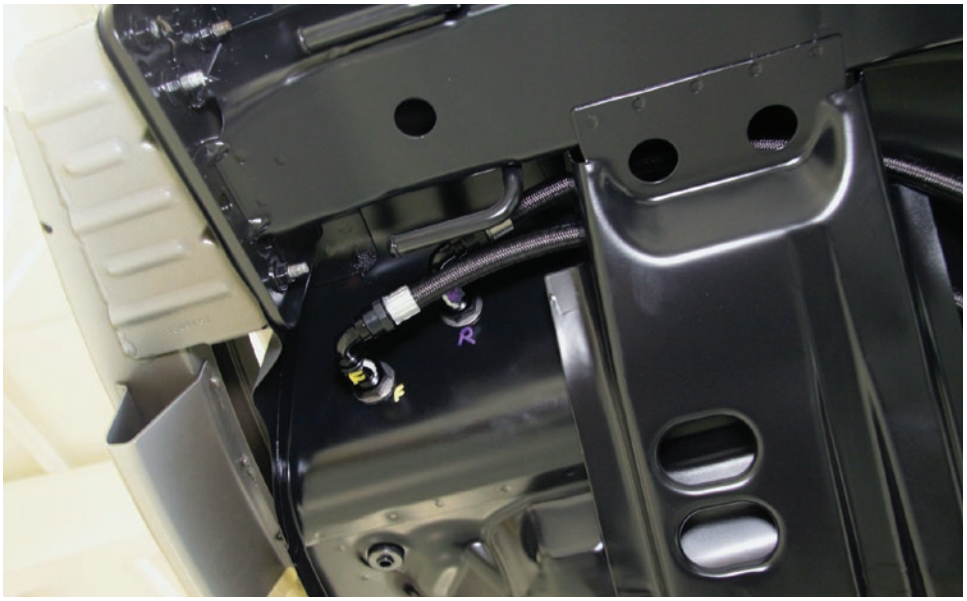


The four larger holes that were drilled on either side of the trunk well now get put to use as well. Into the pair on the right side of the well, visible here, go connectors – one each for the fuel feed and return lines.

The pair on the left side of the trunk, seen here from below looking up, are simply there to anchor the fuel cell's two vent lines.



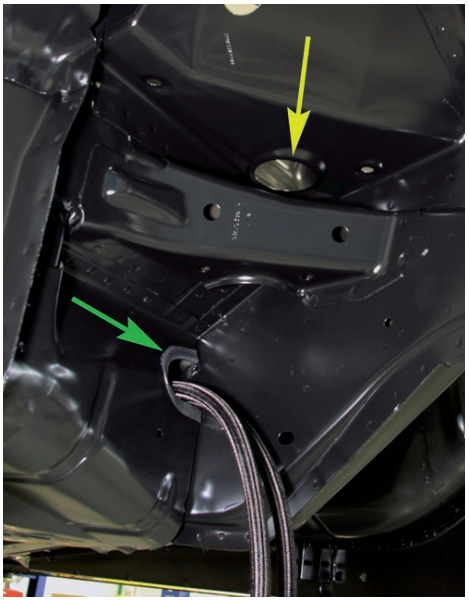
Here, the two lines from the forward side of the cell have been plumbed to the fittings on the left side, to vent to atmosphere, while the fuel feed line (from the center of the pump cap) and the return line connect to the passenger- side fittings.



From these fittings, the feed and return lines route down the passenger side of the chassis to another pair of junction fittings mounted in the right front wheelwell (the feed line will pass through a filter on the way). Note the fittings are marked “F” for feed, and “R” for return. You may also notice a white marker line on the fittings themselves. This is simply a production line process to indicate that the fittings have been properly tightened. Throughout the build process this marking of correctly tightened fittings and fasteners is standard procedure.

Continuing forward, the -8 AN feed and return lines are clamped up out of harm’s way along the inside of the rear subframe rails and then over to the outboard side of the subframe connectors/ rear lower control arm bracket …

... and from there along the bottom of the unibody, where a 10-micron filter is mounted in-line with the feed, while the return line simply continues along to the front wheelwell.



Looking back here from the wheelwell, the return line, and the feed line from the downstream end of the filter, then pass through a factory opening that has been lined with a piece of soft molding (green arrow) to eliminate any chance of chafing on the metal edge of the opening. The yellow arrow points to a large factory hole where a junction block between the body fuel lines and those soon to go in the engine bay will now be mounted.

And, finally, the lines get connected to the fittings on that junction block, thus wrapping up the fuel system installation – at least for now.

[CHAPTER 4]

FRONT/REAR SUSPENSION & STEERING

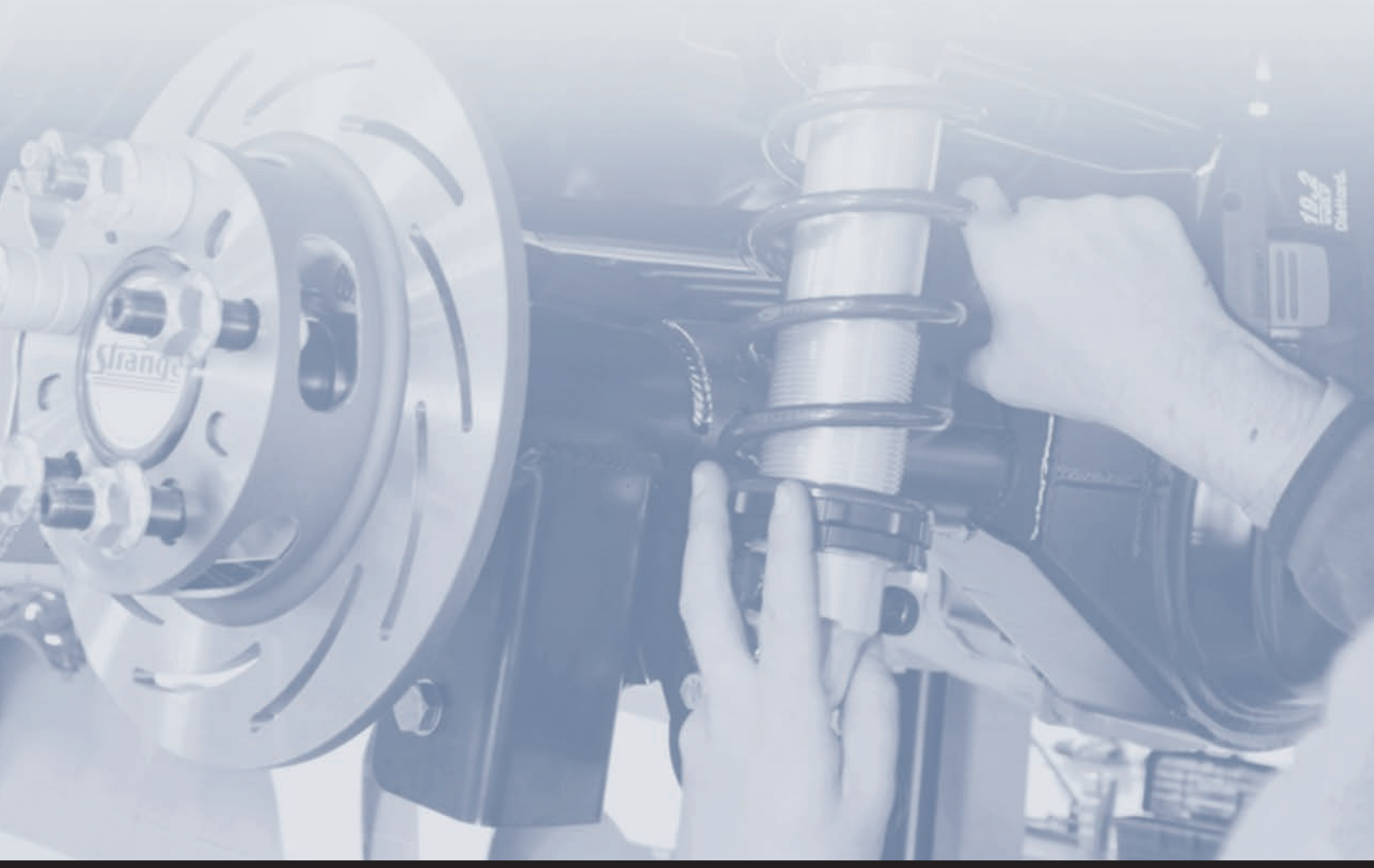
In the COPO build process, only the rear suspension gets fully installed at this point, but we thought it logical to look at some of the front suspension and steering hardware at the same time. We'll also examine the racing brake components that get affixed to those front and rear suspensions.

In truth, while the COPO's rear suspension is entirely different from that of a production Camaro, the majority of its front suspension is factory stock. And the COPO's steering is simply a non-power adaptation of the factory rack and pinion setup.

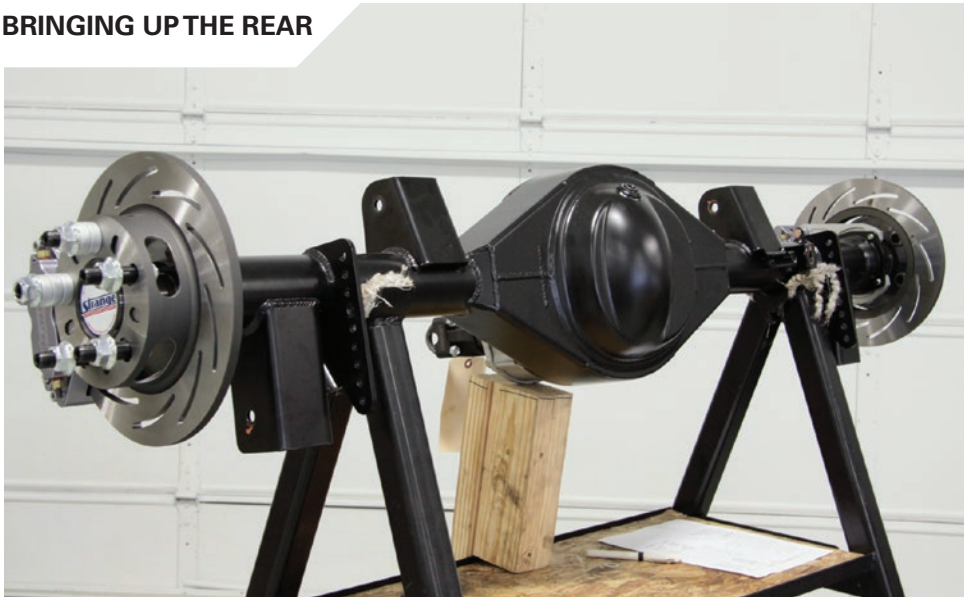
But let's start with that all-important rear suspension, the design and specifics of which had to be approved by the NHRA before the 2012 COPO Camaro could be legalized for Stock Eliminator competition (see diagram on page 130). For such Stock Eliminator eligibility, the entire rear suspension must be deemed a "factory" part, and so it has a GM P/N 22950665, and is available through Chevrolet Performance.

IN THIS CHAPTER:

- Install the COPO-specific rear suspension
- Front suspension and steering hardware



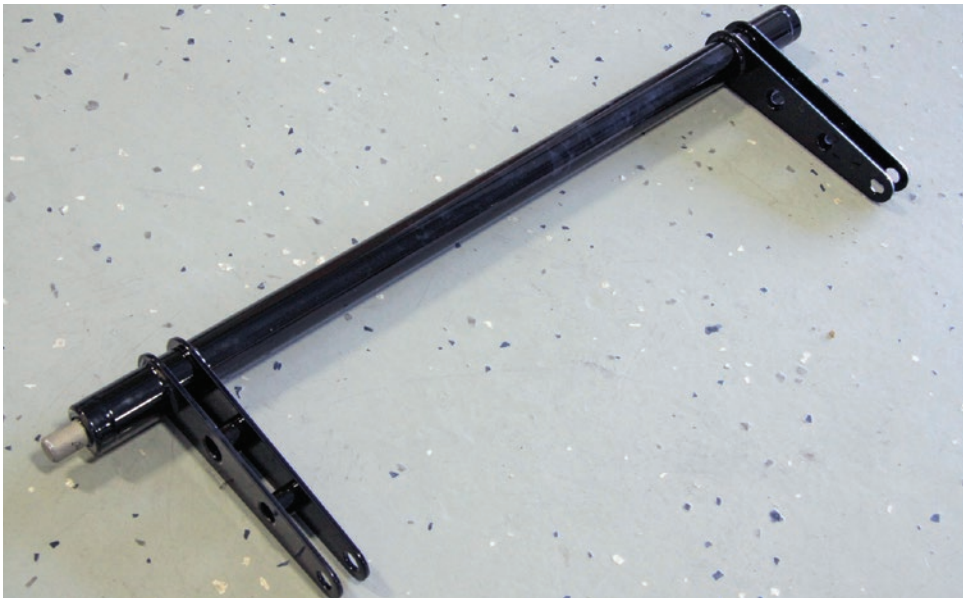
BRINGING UP THE REAR



Shown here mounted on a rolling stand used for installation, this is the COPO Camaro's NHRA-approved 9-inch rear axle assembly, manufactured by Strange Engineering. As we saw in Chapter 1, it will be located by four control arms and a Panhard bar, and will ride on double-adjustable Strange coil-over shocks. An adjustable anti-roll bar is also part of the setup. On the ends of the housing are Strange Pro Race brakes with 4-piston calipers and slotted one-piece rotors.

The axle's aluminum center section is loaded with a lightweight steel spool and either a 4.29:1 or 4.10:1 ring and pinion set, depending on the COPO's particular engine. Strange Engineering also manufactures the assembly's chromoly yoke and the 35-spline axles.

The suspension's fixed length (20-inch, center-to-center) lower control arms have mandated rubber bushings, while the upper control arms (12.5 inches, nominal center-to-center length) use Heim joints and are adjustable for optimizing pinion angle.



This is the COPO's anti-roll bar which attaches to the unibody (via Heim joints) at each end, and to the axle housing by way of adjustable links to any of the three holes in the bar's lever arms.

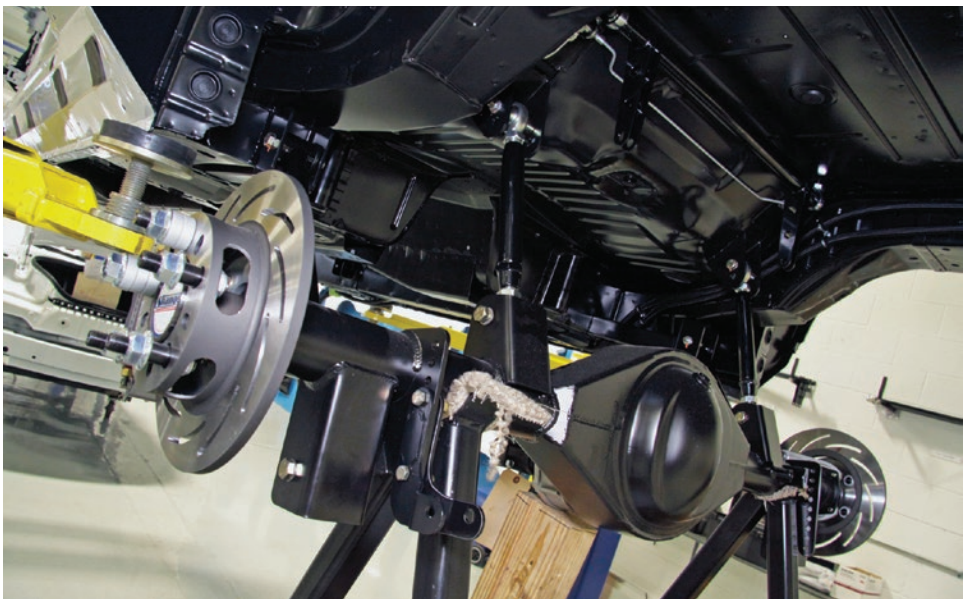
The anti-roll bar is among the first of the rear suspension components to go on. Because they can be clogged with paint, a preparatory step at the COPO Build Center is to use a tap to chase the threads on the chassis' welded-in mounting lugs, where the bar's Heim joints will be inserted.

The bar's pair of Heim joints – or rod-end bearings, if you prefer – are then threaded into the lugs ...

... and the anti-roll bar is captured between them. You can also see in this shot that the upper control-arms have already been loosely bolted into the uppermost pair of holes in their brackets.

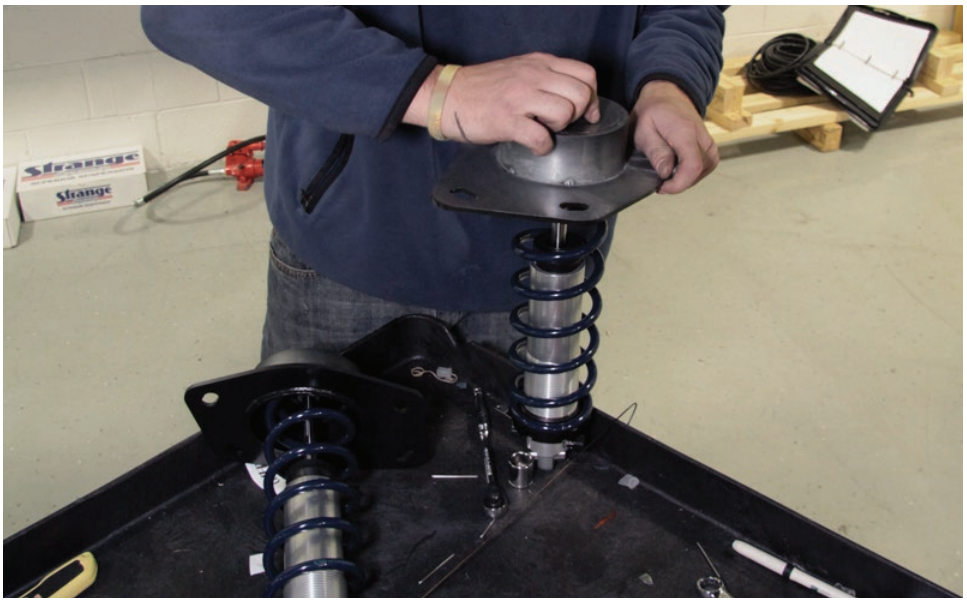
In this shot, both upper and lower control-arms are loosely hanging from their respective brackets, and the next step will be to attach their axle ends.

At the COPO Build Center, that job is made effortless by the combination of the rolling stand to position the axle, and the hoist to lower the unibody down to meet it.

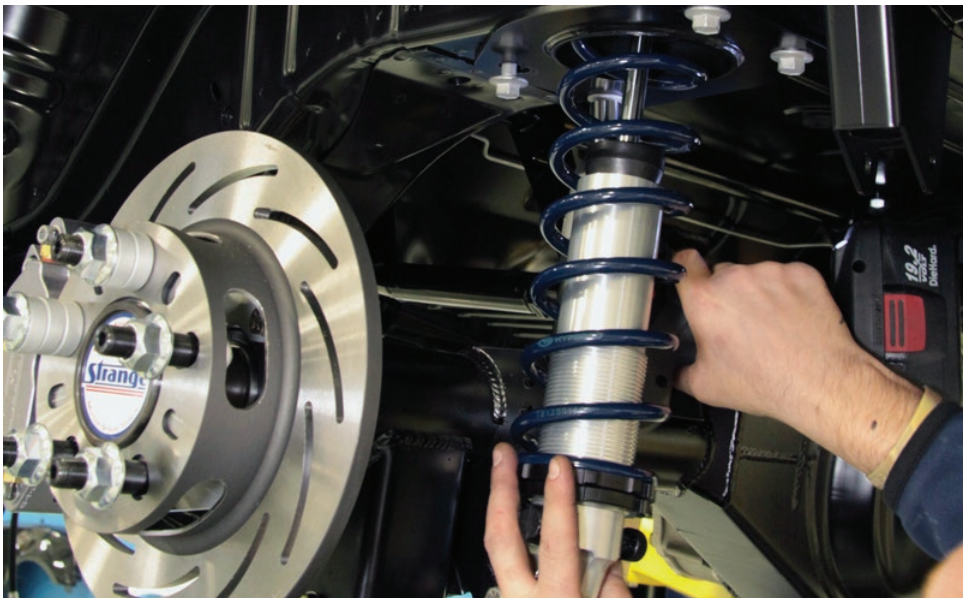


Here, the upper and lower control-arms have been loosely bolted to the axle housing brackets. Again, we stress that this is the only NHRA-approved axle assembly for the COPO in Stock Eliminator competition.

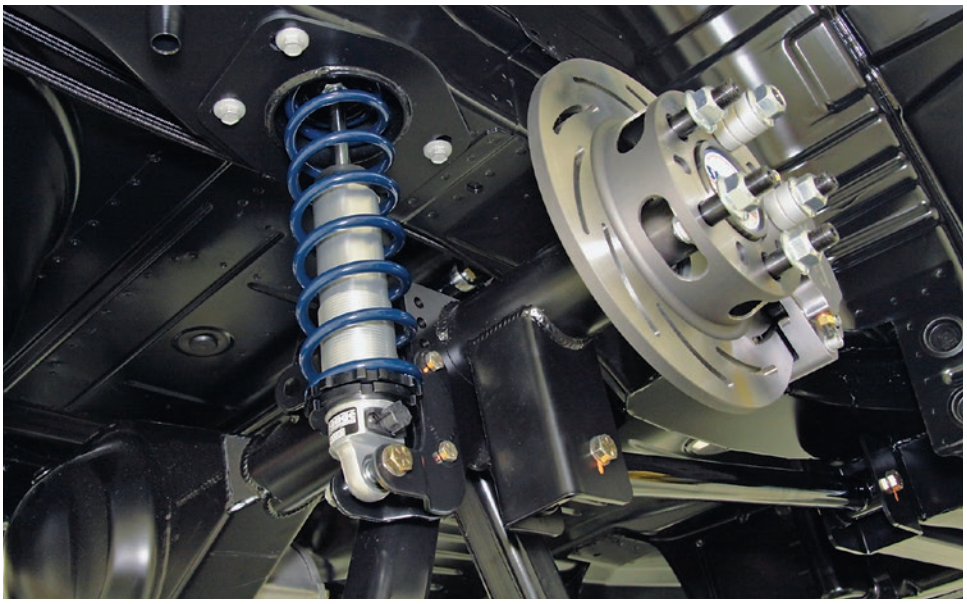
Next, the adjustable anti-roll bar links are bolted to the bar itself and to the brackets on the axle housing. On the bar end, the COPO is delivered to the customer with the links attached to the hole furthest outboard (the least stiff bar setting).



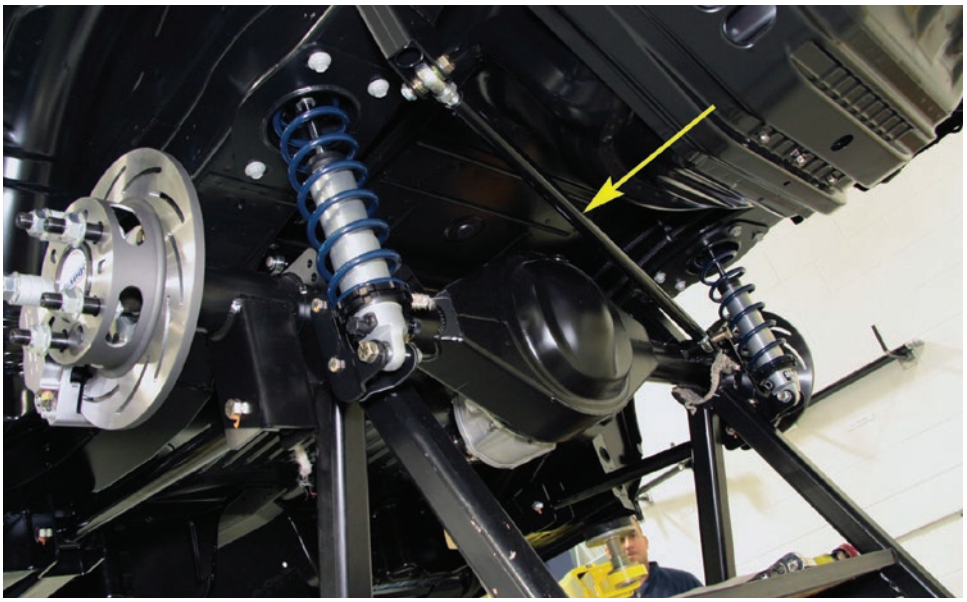
In preparation for installation, the rear coilovers are secured to the beefy mounting plates that will bolt to the unibody. The COPO's rear shocks are adjustable in both damping and rebound.



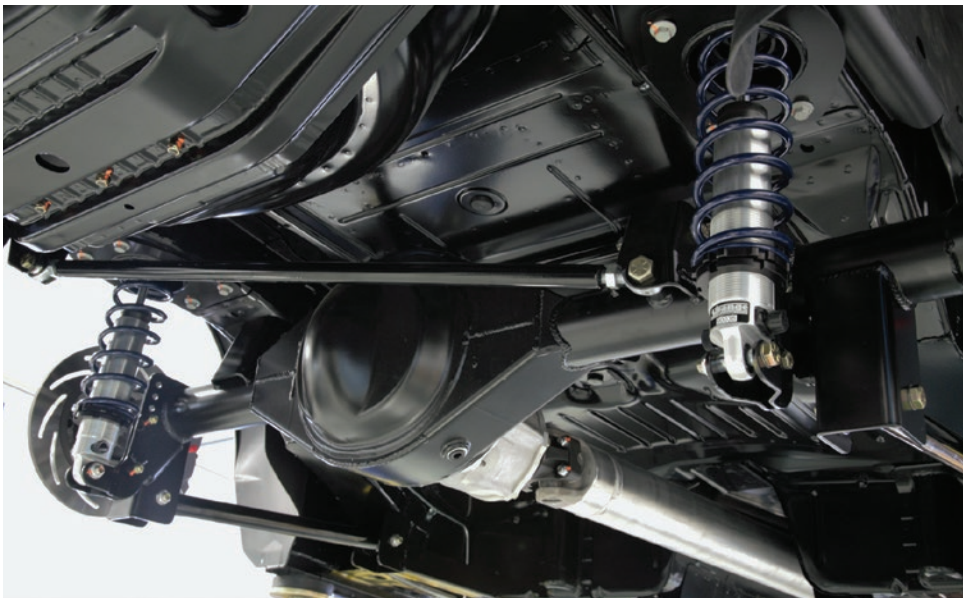
The coilover mounting plates bolt to existing holes in the subframe – the same mounting points used by the factory spring/damper combo.



At their lower ends, the coilovers mount to L-shaped brackets that, in turn, mount to multi-holed flanges on the axle housing. On the factory COPOs, these L-brackets are mounted so that three holes are visible above them on the flanges.



Last of the rear suspension components to go on is the Panhard bar, which spans between the axle housing and the chassis bracket welded on back in Chapter 1. The jam nuts on its Heim joints are left loose for now. Later, in the setup stage of the COPO build, the Panhard bar will be adjusted so as to laterally center the axle housing under the car.



One last look at the rear suspension. Of note here is the adjusted height of the spring perches on the coilover units. This perch position – with roughly ten threads visible beneath on the damper body – sets a good starting point for the COPO's as-delivered ride height. That ride height will be more precisely set in the "underbody audit" stage of the build.

FRONT SUSPENSION

We'll look at some of the COPO's front suspension hardware now, but will cover its installation a bit further along in the build process. The COPO's front suspension is essentially unchanged from a production Camaro's with the exception of substituting drag-specific coil-over strut assemblies, and eliminating the front anti-roll bar. Also, the COPO's Strange-manufactured front brakes required minor modification of the factory spindles and hubs.

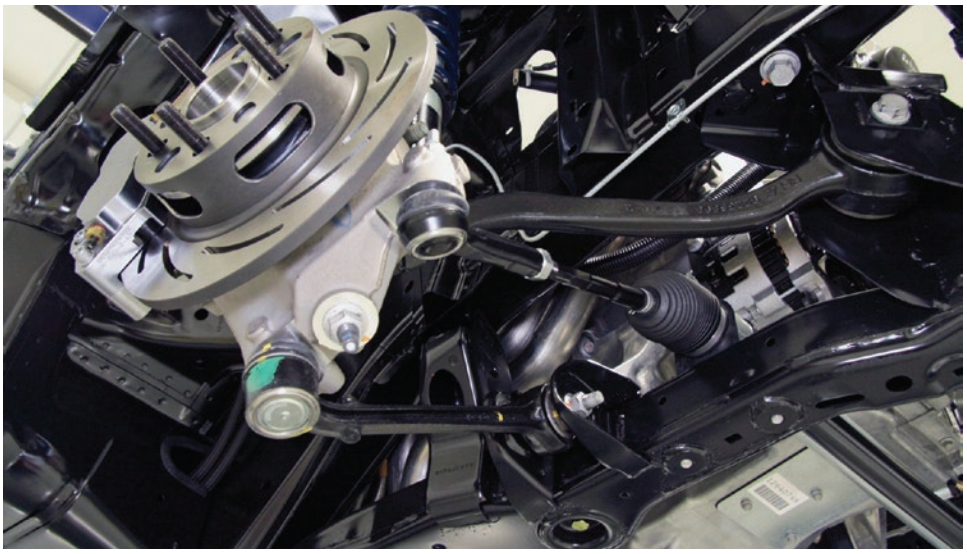
On the COPO, the production Camaro's spring/strut package is replaced with drag-specific coil-over struts from Strange Engineering. The dampers are externally adjustable in both compression and rebound, while the spring rates vary slightly depending on the engine chosen.

While the damper/spring assembly is from Strange, the upper mounting nut, washer and donut are factory Camaro bits.

Rebound adjustment is accomplished at the top of the strut, while the compression adjuster is on the bottom – both easily accessible.

Here's the COPO's front brake hardware – the same Strange Engineering Pro Race specification as the rear brakes – mounted on its modified factory hub and spindle. The hub is modified to the 5 x 4.75 bolt pattern of the Strange rotor hat (from the factory's 5 x 120mm pattern).

The factory spindles, or uprights, are machined slightly to accept the brake kit's 4-piston calipers.

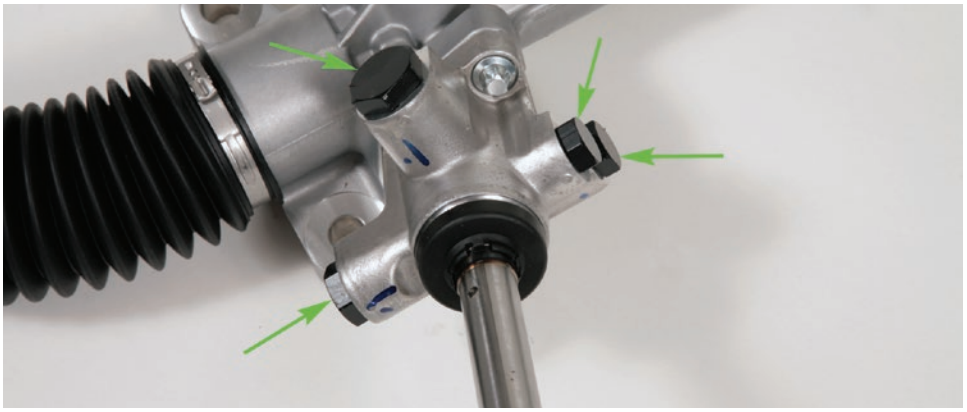


That's it for non-production front suspension parts. The COPO's front control arms are factory stock, as seen here – and notice that, in typical drag fashion, there is no front anti-roll bar. We'll have a quick look at the assembly process later on.

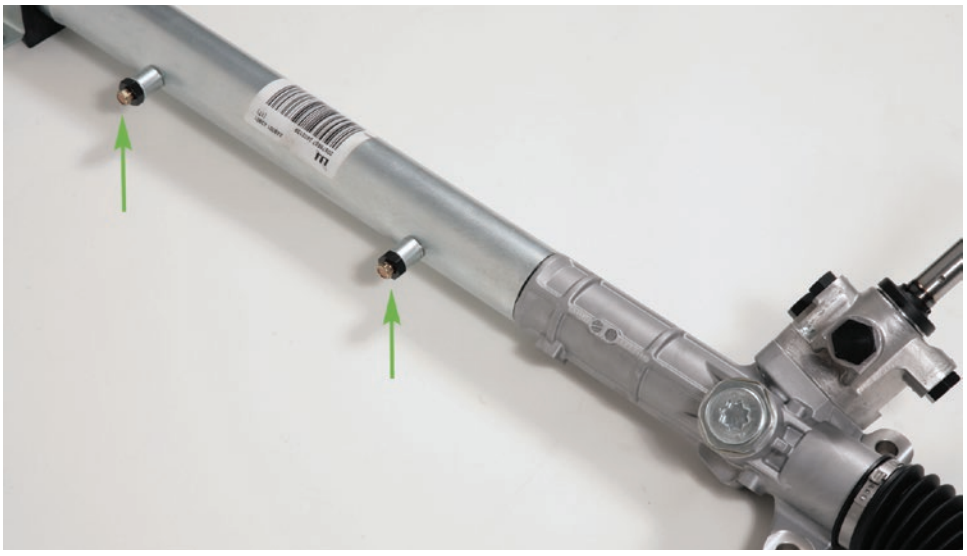
STEERING

As mentioned, the COPO's steering is by manual rack and pinion – simply a production Camaro rack without hydraulic boost. Likewise, all steering linkage, and even the steering wheel, is identical to a production Camaro's.

The COPO's steering rack – with its 16.1:1 ratio – is like any current production Camaro's, except all hydraulic ports have been closed off.



At the base of the steering shaft, all four ports have been capped off with threaded plugs ...



... and on the rack's center section, two vented plugs are threaded in. And that's it for COPO steering modifications.

With this look at suspension and steering components wrapped up, let's get back to the chronological process of assembling a 2012 COPO ...

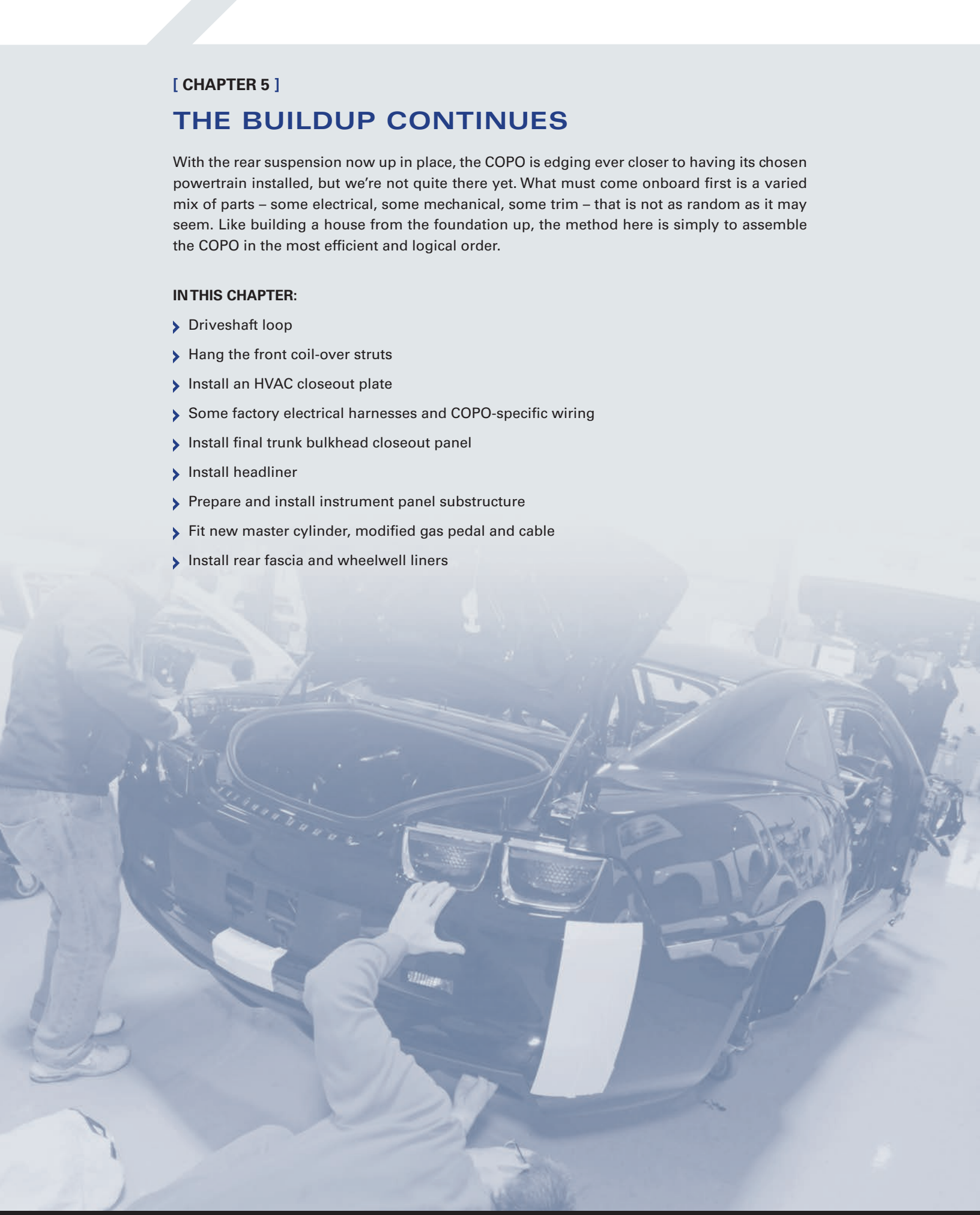
[CHAPTER 5]

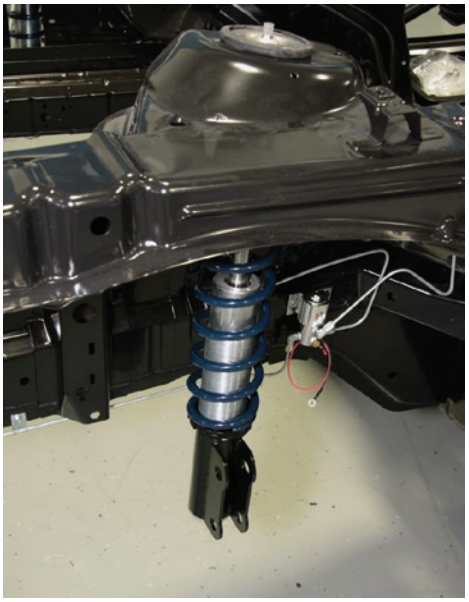
THE BUILDUP CONTINUES

With the rear suspension now up in place, the COPO is edging ever closer to having its chosen powertrain installed, but we're not quite there yet. What must come onboard first is a varied mix of parts – some electrical, some mechanical, some trim – that is not as random as it may seem. Like building a house from the foundation up, the method here is simply to assemble the COPO in the most efficient and logical order.

IN THIS CHAPTER:

- Driveshaft loop
- Hang the front coil-over struts
- Install an HVAC closeout plate
- Some factory electrical harnesses and COPO-specific wiring
- Install final trunk bulkhead closeout panel
- Install headliner
- Prepare and install instrument panel substructure
- Fit new master cylinder, modified gas pedal and cable
- Install rear fascia and wheelwell liners

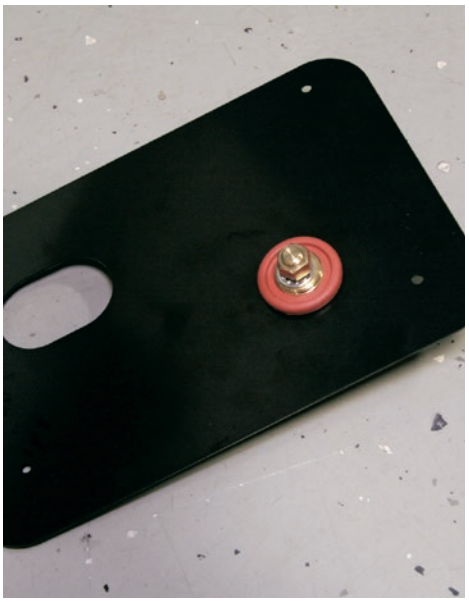




Up front, the COPO's coil-over struts are fastened to the strut towers. The rest of the front suspension has to await installation of the engine cradle.

With a driveshaft not too far away in the assembly process, an NHRA-mandatory driveshaft loop now finds its way beneath the COPO, bolting onto some of the chassis real estate freed up way back in Chapter 1 when all that excess sheetmetal was removed.

Looking at one pair of the driveshaft loop's bolts inside the cabin, you can see that the longitudinal position of the loop is about in line with the factory shifter cutout, just forward of the front seat floor structure.



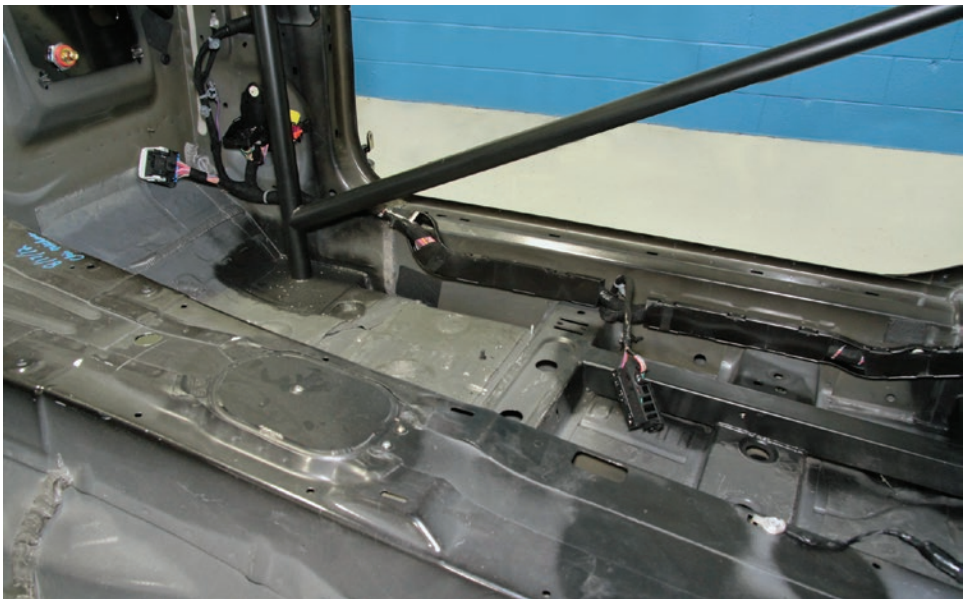
Another bolt-on. In old-school terms, think of this as a heater delete block-off plate, but in this case fitted with an electrical terminal that is insulated from the plate, but passes through it. This plate, as well as the driveshaft loop will soon be available through Chevrolet Performance.

The plate closes off what, in a production Camaro, would be the front bulkhead's HVAC opening. On its cabin side, the electrical terminal will soon connect to the trunk-mounted battery's positive cable (by way of the master switch), so this is the high amperage power feed to the underhood area – namely, to the starter motor.

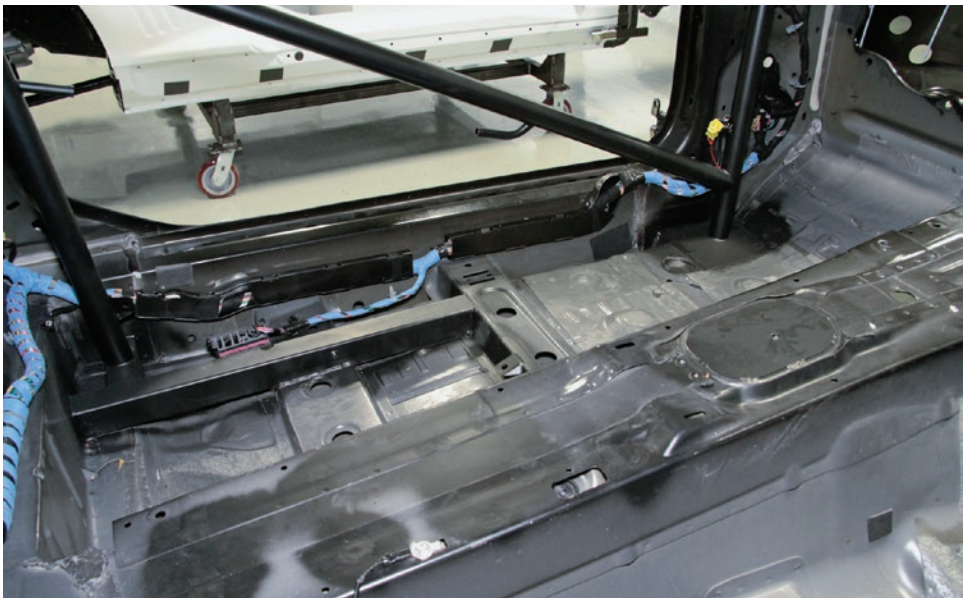
PREPARING FOR ELECTRONS

Modern cars like the Camaro have what might in understatement be described as complicated electrical systems, and the 2012 COPO's is certainly no less so. It uses a combination of a number of factory wiring harnesses (some of which get modified), additional harnesses made up specifically for the COPO build process, and some good old fashioned point-to-point wiring. The bad news is, we can't possibly document it all within the scope of this book. But, while we can't point out every single connection or harness splice, we'll try to provide an overall sense of the wiring scheme used on the 2012 COPO production line, and will get as specific as possible on matters of particular importance.

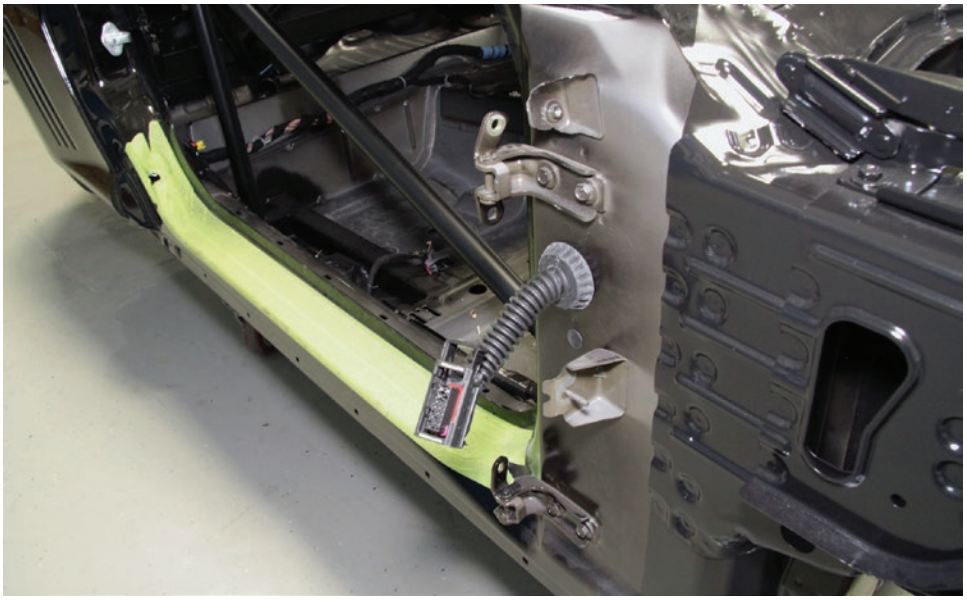
The Camaro's main body harness (GM P/N 22862187) runs around the perimeter of the cabin, feeds the doors on either side, branches off into both sides of the trunk, and basically goes no further forward than the front bulkhead. The good news about modern harnesses is that each connector is different, meaning it will only connect where it is supposed to connect.



As was likely apparent in the previous shot, the main body harness clips to the unibody at various points, and has a number of ground tabs and modules as seen here. One big help when first looking at the main body harness is that it's color coded. The passenger side is wrapped in black ...



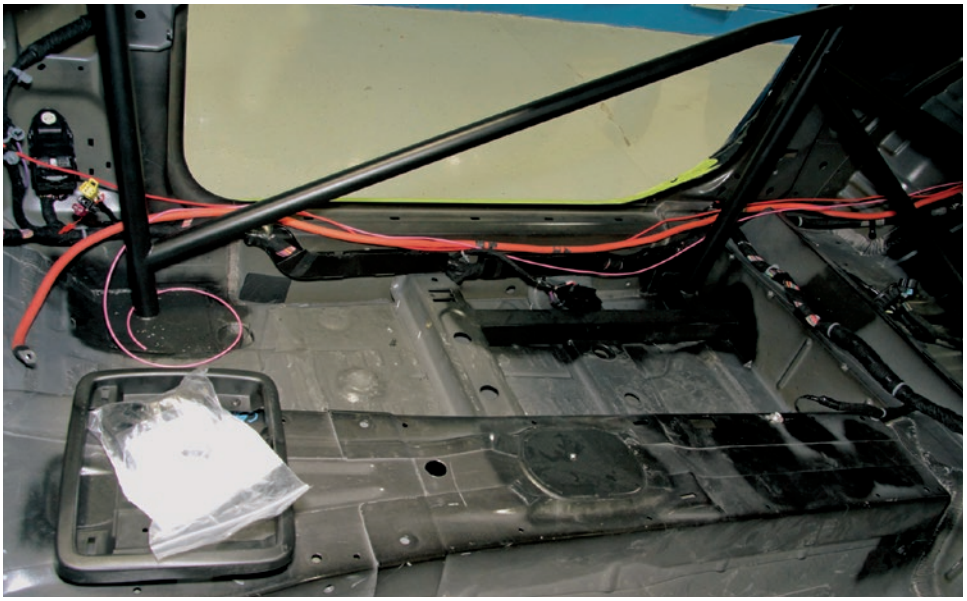
... while the driver's side is wrapped in blue. The crew at the COPO Build Center says that distinction greatly simplifies laying out the interior portion of the harness.



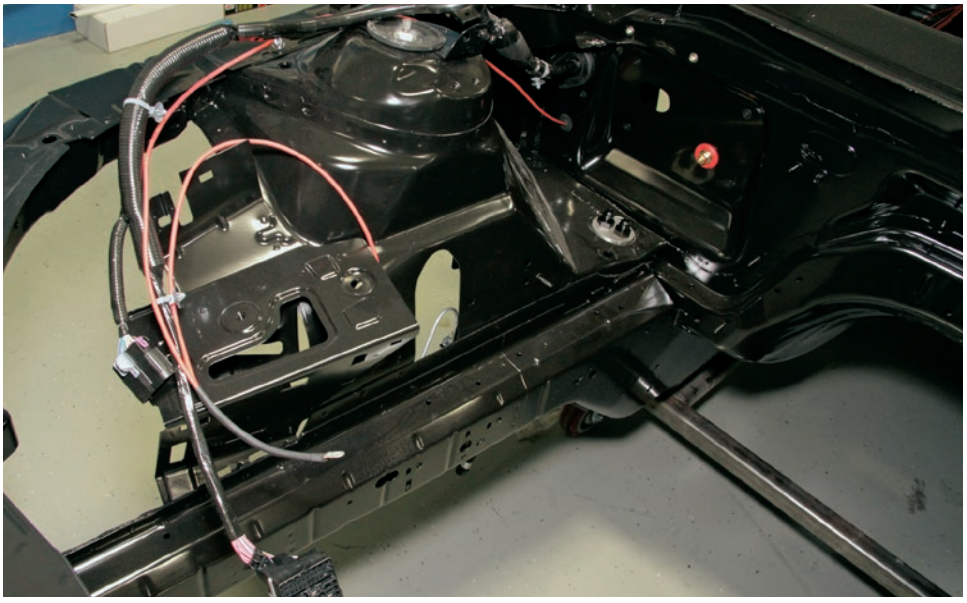
The main harness exits both sides of the unibody to feed the doors. Incidentally, the power windows retain full functionality in the COPO (though the power door locks do not). The green tape? It's there simply to protect the door sill area from any assembly line scuffs or scratches.

Getting to some COPO-specific wiring, a long run of #2-gauge cable is strung along the passenger side of the cabin and fed through into the trunk where it will eventually connect – by way of the electrical master switch – to the battery positive terminal.

The forward end of this #2 cable connects to the terminal installed at the front bulkhead. (On the engine side, a similar heavy-gauge cable will soon run from this terminal to the starter motor.)



At this stage, two more individual wires are routed from the trunk forward. The pink one will feed directly (bypassing the master switch) from the battery to the power window circuit in the harness, so that the windows will have full-time power available. The red one will take juice from the alternator to the battery via the master switch, and to the under-hood power distribution box.



Here we can see that same red wire running through a grommet in the front bulkhead and ending at an eyelet terminal that will eventually connect to the alternator (the shorter wire off that eyelet will eventually feed the power distribution box). Also visible in this shot is another of the factory Camaro wiring harnesses (called a body extension harness, GM P/N 20951243) In over-simplified terms, it will feed the main body harness from the power distribution box. We'll see more of this wiring later, once the power distribution box actually gets installed.

One more factory harness (called the forward loop, GM P/N 22870085) is now loosely set in place around the perimeter of the engine bay. This will feed numerous accessories around this area, but will also have some of its leads that are not used on the COPO (like the ABS, windshield wiper, magnetic ride control connectors, etc.) cut off. That's about it for wiring – for the moment.

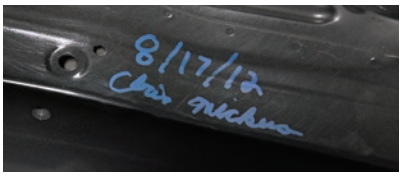
BUT WAIT, THERE'S MORE

You may have noticed in an earlier shot that the last of the major trunk openings has now been sealed off with an aluminum panel. This is all part of meeting NHRA requirements for a barrier between trunk and interior. A trunk closeout panel kit will be available from COPO Parts Direct.

This is the production Camaro rigid-backed headliner used in the COPO.

But, before it can go in, each of the factory COPOs gets a certificate of authenticity decal – imprinted with the purchaser's and selling dealership's information, its COPO serial number, etc. – stuck to the roof. A similar certificate will go in the trunk well, as we'll see later.

As unofficial "authenticity", some of the COPO Build Center technicians sign the unibody in discreet locations as it moves through the various build stations (this one's on top of the transmission tunnel where it will be hidden by carpet and console).



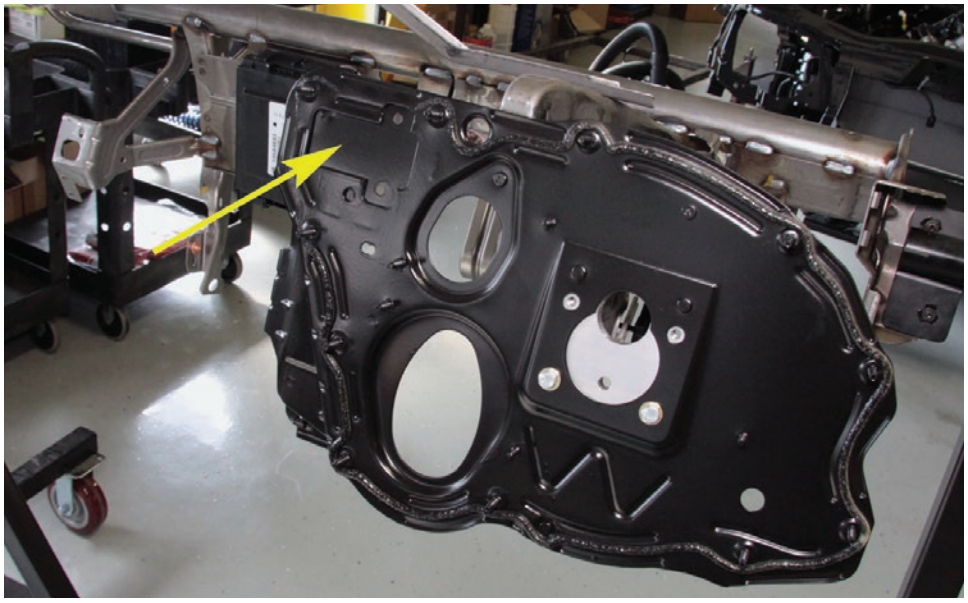
Squeezing the formed headliner through the scant space between the front bar of the roll cage structure and the top of the windshield opening is a delicate two-man task.

But the finished result is worth the effort. As the Stock Eliminator rules require, this will be a nicely finished race car, not a tin can on wheels.

GETTING READY TO DASH

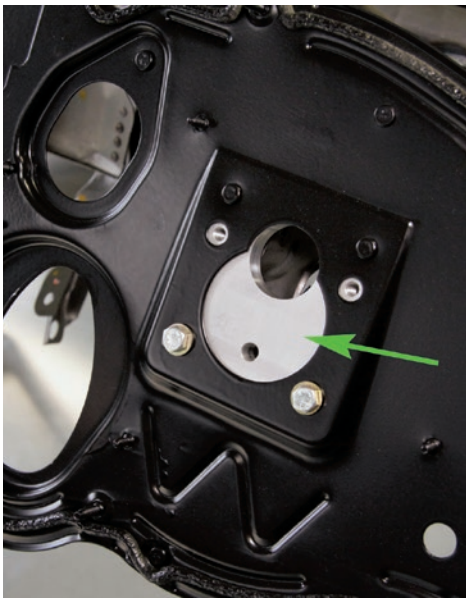
Next to come onboard is the metal crossbeam substructure that will ultimately support the instrument panel/dashboard, and also mount the brake pedal and master cylinder assembly. A production Camaro substructure is the starting point, but must be modified to accommodate the COPO's non-boosted braking system, and cable-actuated throttle.

It's a component of every production Camaro, and is known by many names, but let's just refer to this as the instrument panel (IP) substructure. Why is it bolted to this work-stand? So it could receive modifications and be reassembled before going into the COPO.



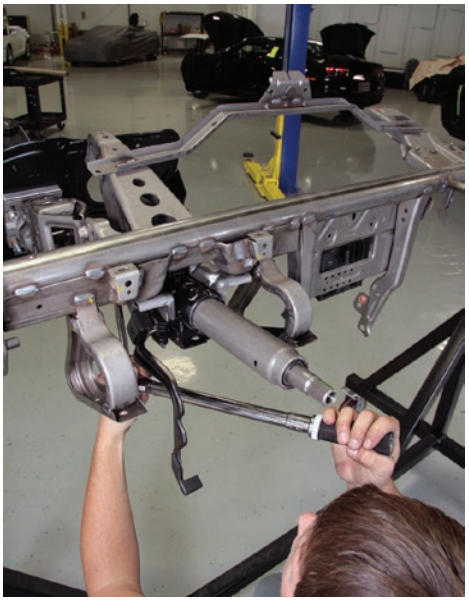
On the forward side of the IP substructure, this black closeout panel is where the COPO's master cylinder (and other components) will soon mount. The arrow indicates an area where it has already been modified as detailed in the following photo.

Lying face down in this shot, some of the closeout panel has been cut away, and its paint ground off to have the sheetmetal plate seen here welded in place. The COPO's throttle cable will pass through one of the two holes in this new plate (more on this later). Production Camaros have fly-by-wire throttles, so they don't use a cable.



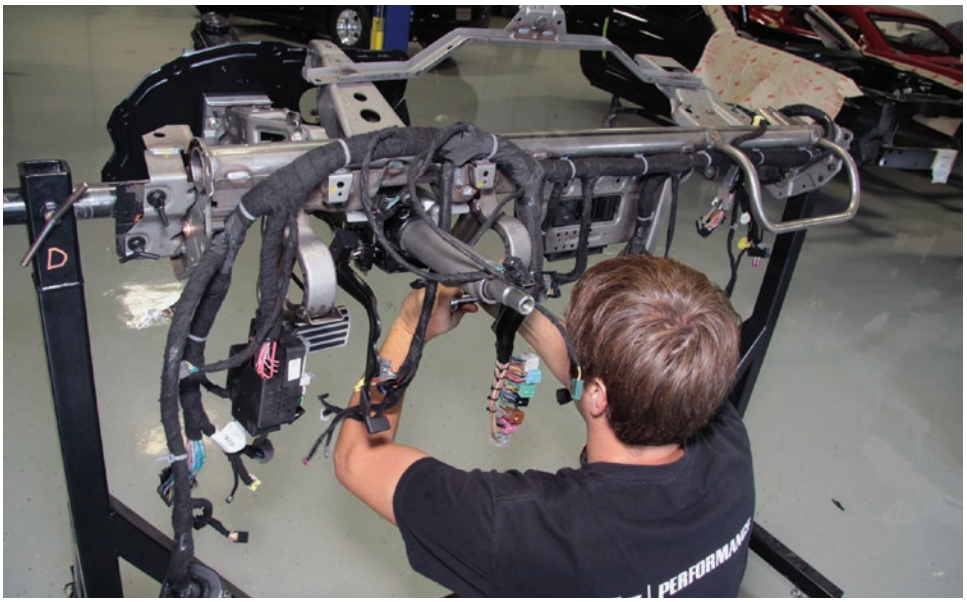
An addition to the closeout panel is this thick aluminum master cylinder mounting plate, seen here bolted in place. It, and the master cylinder itself are included in a COPO Front Brake Kit is available through MPR.

The COPO's dual-circuit master cylinder now bolts to the plate. The hole visible below the master will shortly accept one end of a brake brace rod (another part of the brake kit) that we'll show in upcoming photos.

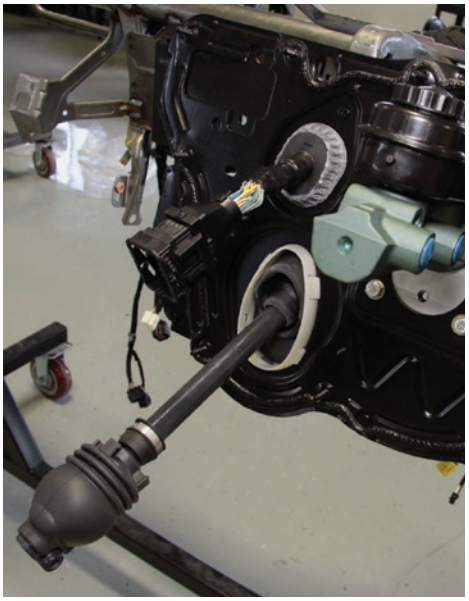


The master cylinder is actuated via an adjustable link (arrow) that connects to the brake pedal assembly.

With the master cylinder and brake pedal now mated, the steering shaft assembly is bolted in place.



The instrument panel wiring harness is now draped and secured across the substructure. You can see that the COPO's fuse box (hanging near the technician's left elbow) is part of this harness. Also note that the multi-colored square connectors visible beneath his right forearm will plug into the body control module.



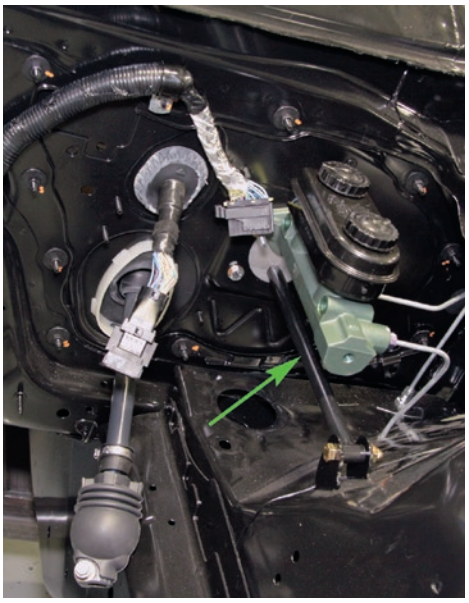
Part of the harness routes out through the closeout plate to connect under-hood. Shown here in its collapsed configuration, the steering shaft will eventually telescope out to mate with the steering rack in the chassis.

The body control module (BCM) is a production Camaro component mounted near the center of the IP substructure. To grossly oversimplify its function, the BCM acts as a relay for powering lighting and power window operation, so that only light-gauge trigger wires feed from their respective control switches.

The sub-assembled instrument panel substructure is finally ready to go in the car. Note that a gas pedal is not yet part of this assembly; modified for cable actuation, it will be mounted later, once the IP substructure is in the car.

Getting the bulky IP substructure – with all its protruding hardware and dangling harnesses – into the COPO is a three-man operation. Notice that the driver's door roll cage bar has been covered with a cardboard tube to protect against dings or scratches.

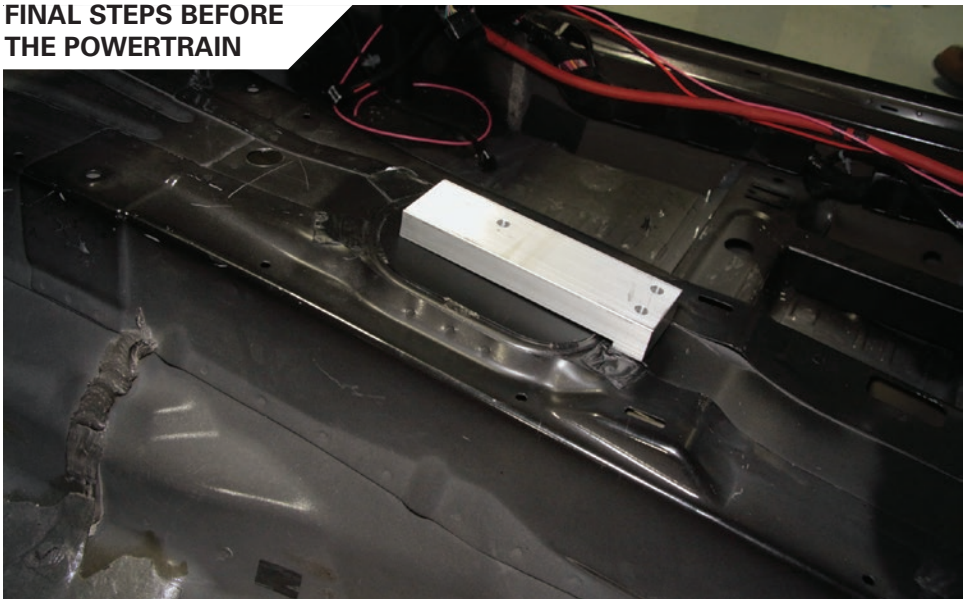
Ten bolts secure the IP substructure to the unibody – three at each outboard corner, two down through the cowl, and two at the base of the center stack to the transmission tunnel …



… plus the twelve nuts that spin onto the closeout plate's studs protruding through the front bulkhead. Here, the technician has tightened those fasteners and is in the process of indicating with a marker that all have been properly torqued.

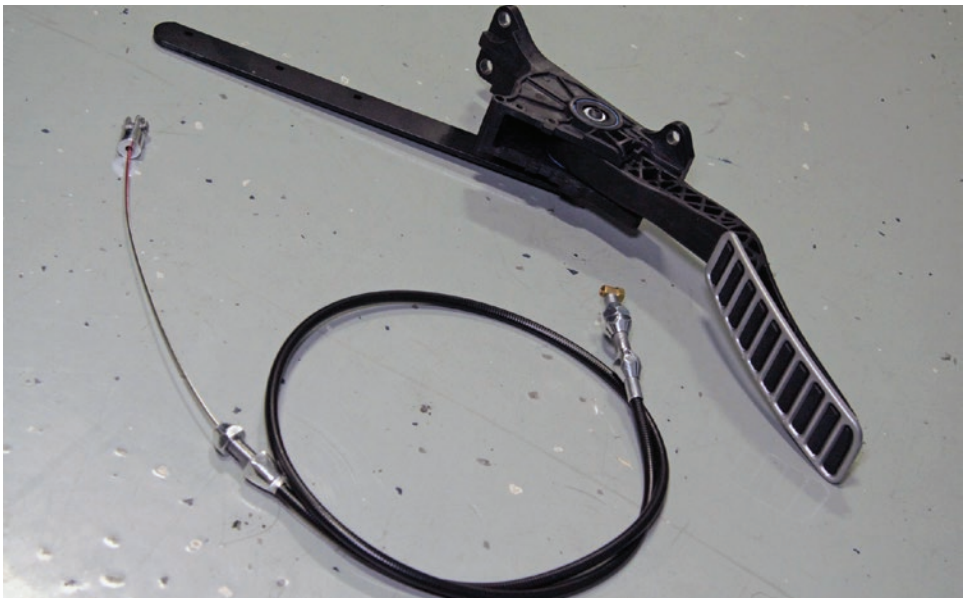
A brake brace rod (arrow) is now bolted in between the master cylinder mounting plate and a bracket previously welded onto the strut tower. And the two brake lines are now fastened to the master cylinder.

FINAL STEPS BEFORE THE POWERTRAIN



Inside, an aluminum mounting spacer – used to properly set height of the COPO's Hurst Quarter Stick shifter – goes in place on the transmission tunnel. Here's some 2012 COPO trivia: Early build factory COPOs used a thinner spacer because their carpet did not have production-style jute backing. Later cars like this one have thick jute sound-deadening backing on their carpet, and thus need the thicker spacer plate.

The Quarter Stick is now bolted through the spacer plate to the tunnel, and its shifter cable fed down through the previously drilled hole (where it will just hang around for awhile, awaiting the impending arrival of the powertrain).



This is the COPO's gas pedal assembly, modified with the addition of a bracket to attach the real, honest-to-goodness throttle cable lying beside it. (A factory Camaro uses fly-by-wire throttle.)

The throttle cable is fed through the previously described modified plate in the closeout panel. Exactly where the cable passes through the panel is important. As arrowed here, the cable is properly oriented for use with one of the COPO's two supercharged 327 engines ...

... that is to say it feeds through the lower of the two holes in the plate. The same cable is used on naturally aspirated 427 applications, but would instead be fed through the upper hole (arrow).

The gas pedal assembly can now be bolted to the back of the closeout panel, as shown.

NOTE: *The throttle cable clevis is connected to the middle of the three holes on the pedal bracket for use with the supercharged engines. For a 427, the cable clevis would connect to the top hole. (Refer to the pedal diagram in the Appendix.)*

The rear fascia assembly, complete with taillights and backup lights is now slid into the previously installed factory receiver hardware, and secured with an array of fasteners.

And, just before moving on to the powertrain installation station, the production rear wheelwell liners are snapped and fastened in place. And with that, it's time to talk power ...

[CHAPTER 6]

COPO POWERTRAINS

The decision to develop and build the new COPO Camaro for NHRA Stock and Super Stock competition was certainly not made lightly. Chevrolet entered the high-visibility skirmish populated by cross-town rivals with the Bowtie's new quarter-mile combatant competitive right out of the gate. Chevrolet Performance put together the right engine packages for the job.

NHRA Stock/Super Stock classes are broken down by power-to-weight ratios that divide factory shipping weight by NHRA-factored horsepower. Given the competitors' varied engine offerings, it made sense to develop COPO packages for more than one class. After considering multiple factors, including power, durability, and, yes, historical significance, it was decided to submit three unique engine combinations to NHRA for approval. As approved, two are eligible to run in either Stock or Super Stock: first, a naturally aspirated, all-aluminum 427 cubic inch (7.0L) combo factory rated at 425 hp, and second, a 327 cubic inch (5.3L) iron-block package topped with a 2.9-liter Whipple positive-displacement supercharger, rated at 500 hp. The third combination – a 327 blown by a 4.0-liter Whipple – is factory rated at 550 hp, and eligible for Super Stock only. These are currently the only NHRA-legal COPO engine combinations for Stock/Super Stock competition, but some new options are coming for 2013.

In this chapter we'll look at the specs of these three Bowtie bruisers, check out some of what went into their development and construction, and follow along with the process of installing and plumbing both a naturally aspirated and supercharged variant.

Speaking of combinations, all sixty-seven factory 2012 COPO Camaro coupes utilize a 2-speed Powerglide-based automatic transmission race-prepped by ATI Racing Products. However, Chevrolet also submitted 3-speed automatic and manual transmissions in their NHRA Technical Information Forms (COPO #68 is built with a 5-speed Liberty manual, while #69 has a TurboHydramatic – both are convertibles.)

IN THIS CHAPTER:

- Specs of the three 2012 COPO engines
- How they were developed, built, and tested
- Powertrain components and installation
- Engine and transmission cooling
- Front suspension assembly
- More electrical and fuel hardware
- Differences on supercharged engines

COPO 427

17802825 | 425 HP

The COPO 427 uses the large-bore cylinder block and high-flow cylinder heads of the LS7 engine and complements them with a high-compression rotating assembly to deliver big power from its large displacement. Its lightweight aluminum block and heads revive the spirit of the original ZL1 all-aluminum 427 big-block that helped forge the COPO legacy in 1969.

SPECS

Displacement:	427 cu in (7.0L)
Compression Ratio:	13.5:1
Cylinder Block:	LS7 cast aluminum
Bore x Stroke (in):	4.125 x 4.100
Crankshaft:	forged steel
Connecting Rods:	forged steel
Pistons:	forged dome
Cylinder Heads:	LS7 aluminum
Induction:	natural
Intake Manifold:	Holley
Camshaft Type:	hydraulic roller
Valve Lift (int./exh.):	.630/.630-inch

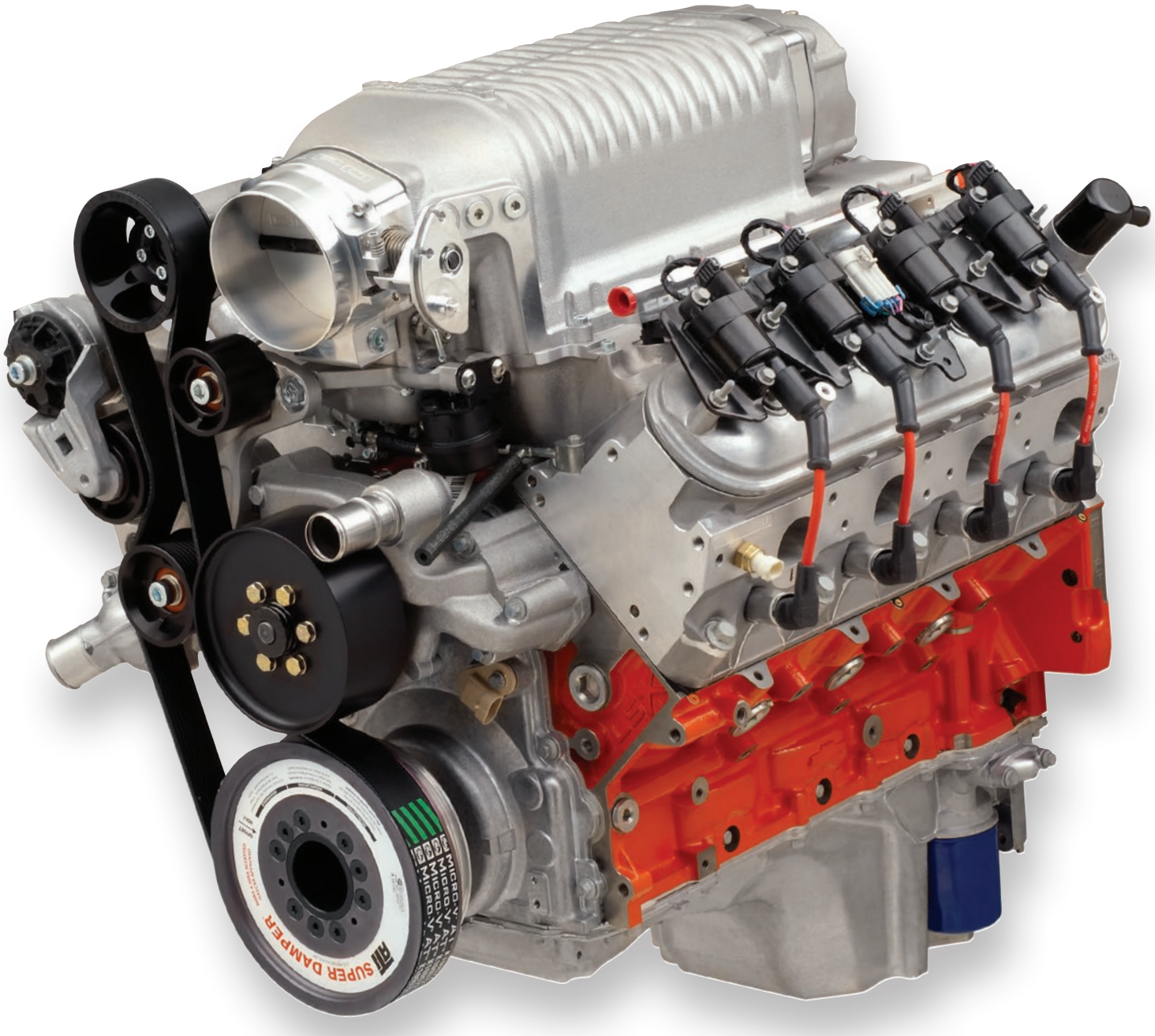
COPO 327– 2.9L S/C

17802826 | 500 HP

This smaller-displacement racing engine packs a big supercharged punch. The engine breathes via a force-fed air charge through high-flow LS7 cylinder heads. The supercharger is a twin-screw design from Whipple.

SPECS

Displacement:	327 cu in (5.3L)
Compression Ratio:	10.2:1
Cylinder Block:	LSX cast iron
Bore x Stroke (in):	4.065 x 3.150
Crankshaft:	forged steel
Connecting Rods:	forged steel
Pistons:	forged dome
Cylinder Heads:	LS7 aluminum
Induction:	boosted
Supercharger:	2.9L Whipple
Camshaft Type:	hydraulic roller
Valve Lift (int./exh.):	.630/.630-inch
Duration (int./exh.):	244/255 deg. @.050-inch



› COPO 327– 4.0L S/C

17802827 | 550 HP

The most powerful supercharged COPO crate engine uses a large, 4.0L compressor to generate tremendous horsepower. Its foundation is the sturdy LSX cylinder block, with a tough, all-forged rotating assembly and the big-displacement Whipple blower. Like the other COPO crate engines, this one uses the high-flow LS7 heads to move as much air as possible.

SPECS	
Displacement:	327 cu in (5.3L)
Compression Ratio:	10.2:1
Cylinder Block:	LSX cast iron
Bore x Stroke (in):	4.065 x 3.150
Crankshaft:	forged steel
Connecting Rods:	forged steel
Pistons:	forged dome
Cylinder Heads:	LS7 aluminum
Induction:	boosted
Supercharger:	4.0L Whipple
Camshaft Type:	hydraulic roller
Valve Lift (int./exh.):	.630/.630-inch
Duration (int./exh.):	244/255 deg. @.050-inch

THE MAKING OF LS-BASED LEGENDS

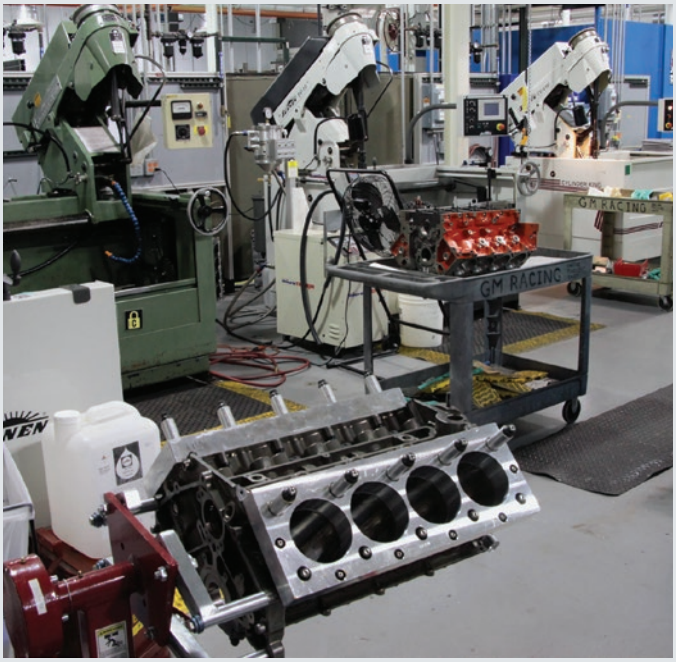
The 2012 COPO's targeted trio of engines was conceptualized, machined, scrutinized and assembled at the GM Powertrain facility in Wixom, Michigan – in the same corporate race shop responsible for such other notable programs as Chevy's NASCAR and C6R Corvette efforts. This, then, is the A-Team of Bowtie horsepower development – more formally known as the "Racing Powertrain and Advanced Projects" team. Within this gaggle of gearheads, Robin Wright is the COPO Powertrain Engineer and Program Manager, and this dedicated aficionado of NHRA Stock Eliminator competition took his role very, very seriously.

We sat down with Robin and asked him how the engine programs evolved: "Step one in the process is the development," Robin said, "and the first phase of that is to create the analytics. What that means is to do the math to understand what kind of power and torque is required in order to make a vehicle of a given weight go a certain ET and mile-an-hour on a dragstrip. That's my function; that's what I do. From there, we then decipher what bits are going to be required in the engine in terms of hardware, and configurations of the hardware, solidify that, then we procure the hardware to do the engine builds."

"In the prototype phase, we would do a couple of those. We put the engines together, we run them on the dynamometer, we get power verification, and if power verification is suitable, we then put the engines on a durability test that's based on vehicle data loaded on a dynamometer that can replicate vehicle cycles. We run that for a couple hundred vehicle cycles on the dynamometer, then do a tear-down analysis to understand whether the engine is going to survive or not. If it's deemed suitable and it's going to survive, then we go into production – procure all of the parts required to do the build for production in whatever volume we selected."

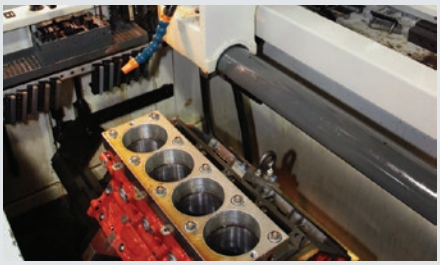
"There are a couple of phases that occur in production. Subassembly component measurement is done here in the racing lab. What that means is we measure crankshafts; we measure connecting rods; we measure parts like that, make sure that everything's going to fit well in each individual engine. Once those parts are measured, they're put together in kit form, they're rolled over to the performance build center [next door to the racing lab.]The performance build center completes the assembly process of the long-block – which is everything minus the induction system and some ancillary bits that go on the outside of the engine. The production build center completes their process, the engine returns to the racing lab, and then receives the final dress of the induction system, wiring harnesses, etc. The engines are then shipped over to the car build site."

For further details on engine specs and materials, check out the "COPO Specifications" sheet at the back of this book. After our conversation with Robin Wright, he took us on a tour of the race lab, where a few photo opportunities presented themselves …



This is a small portion of the GM powertrain race lab's machining area. The block back in the midst of the honing stations is the mighty, cast-iron LSX – the foundation for the COPO's pair of supercharged 327's – showing off its familiar orange powdercoated finish. Oh, and the torque-plated block in the foreground? It's a NASCAR-spec R07 block – not bad company to keep.

This must have been LSX day at the race lab, as palettes of them sat awaiting machining. In the race lab, for COPO use, these blocks are decked, their cam- and main-bores are machined, and their cylinder bores are machined and honed.



A 327's LSX block sits in a Sunnen honing station, with a torque plated secured to replicate the effect of a head bolted on. By contrast, the 427's aluminum LS7 block comes to the race lab almost completely machined.

"Regular" LS7 heads are already ported, but those destined for COPO engines receive even more attention from the CNC machines at the race lab, including decking, valve seat work, and porting of the intake and exhaust passages.

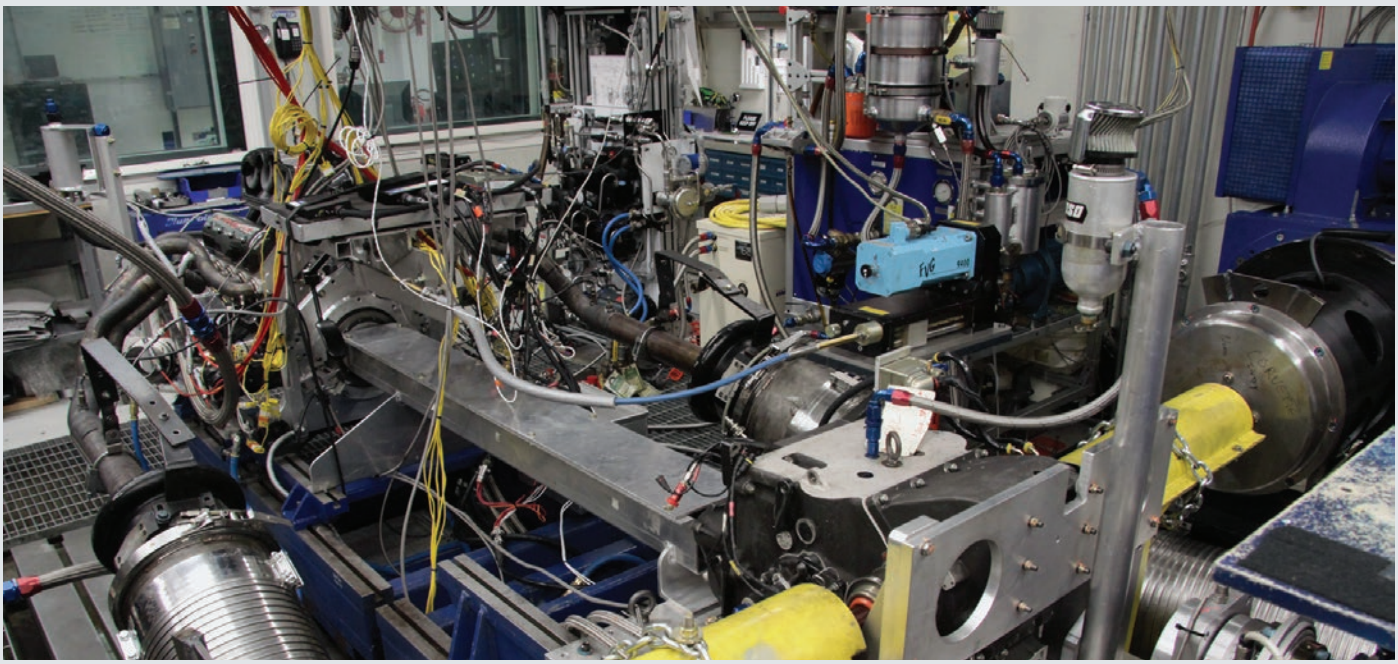
This is a digitizer, which basically enables that CNC machining repeatability by precisely mapping an original pattern head that has been hand ported, and found to perform well in flow testing. The digitizer turns those measurements into numerical data that the CNC cutters can subsequently use to faithfully duplicate the hand work done on that original head.

The various engine components are inspected and gathered into kits before heading next door to the performance build center where they are assembled into long blocks. Up top here are the oil pans shared by both the 327 and 427 engines. These are production pans from 6.0L truck engines.

This is the COPO 427's rod and piston assembly. Though these assemblies certainly differ between 327 and 427 applications, in both cases the rods are manufactured by Callies and the pistons by Mahle.

NOTE: *The H-beam rod wears a Chevrolet P/N 17802817.*

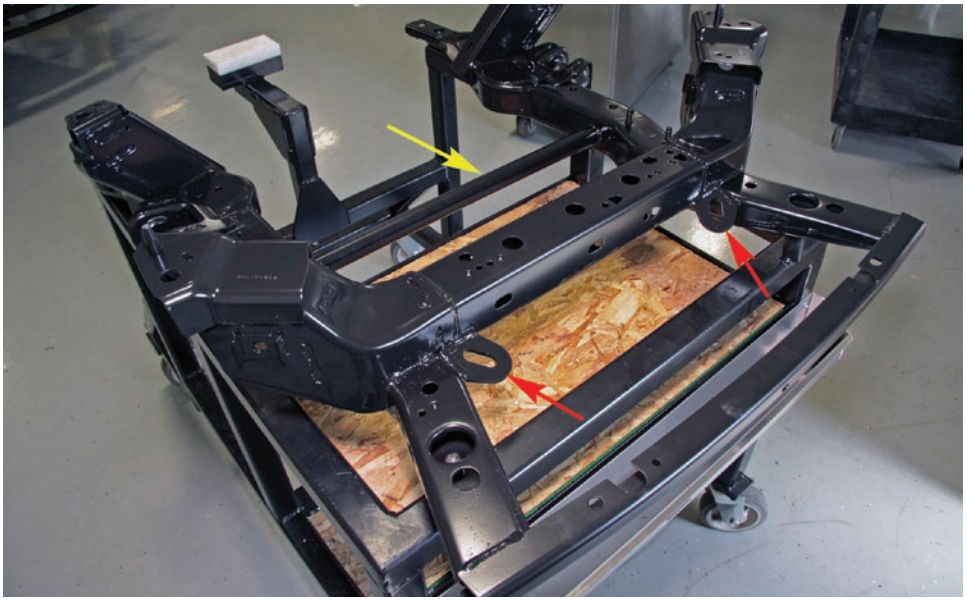
Once the long blocks return to the race lab, they are fitted with their induction and fuel injection hardware, along with engine electrical harnesses. In the case of the 427, induction is via this Chevrolet Performance/Holley 'Hi-Ram' intake. Injector flow rates vary from 42 lb/hr on the 427 to as high as 105 lb/hr on the 4.0L-blown 327's.



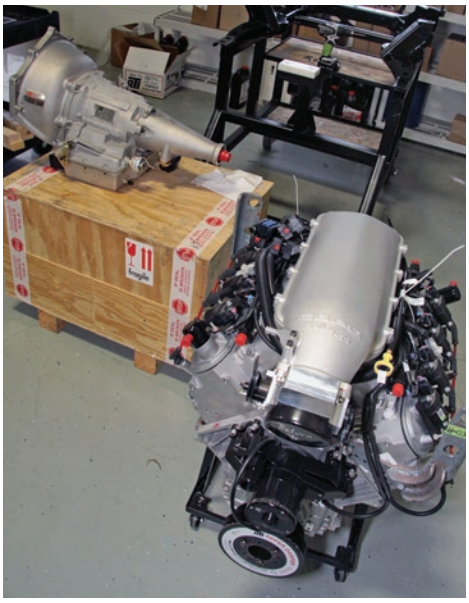
Naturally, various dyno cells were employed at different stages of COPO engine development, but this one's a little more than "just" an engine dyno. Seen from back to front here, this is a complete drivetrain dyno where an engine, transmission and differential can be run as a functioning unit. Though Corvette C6R hardware was on the dyno during our photo visit, for COPO Camaro purposes, this cell was primarily used to test overall drivetrain durability.

NOW BACK TO THE COPO BUILD CENTER

Once assembled, the engines are shipped from Wixom to the COPO Build Center, where they will be dressed as necessary, mated with their transmission, and mounted to a modified production Camaro cradle, before being inserted as a unit up into the engine bay. In this section, we follow that process primarily with a 427, but have a section at the end to show specific differences related to hardware and installation of the supercharged 327 engines.



For use in the COPO, a production Camaro engine cradle is modified in two areas. First, a large stamped crossmember is removed and a tubular replacement (yellow arrow) that will provide much less weight and greater clearance for the oil pan is welded in. Second, a pair of tie-down brackets is welded in place. As with nearly all COPO-specific parts, this modified cradle is available through COPO Parts Direct.



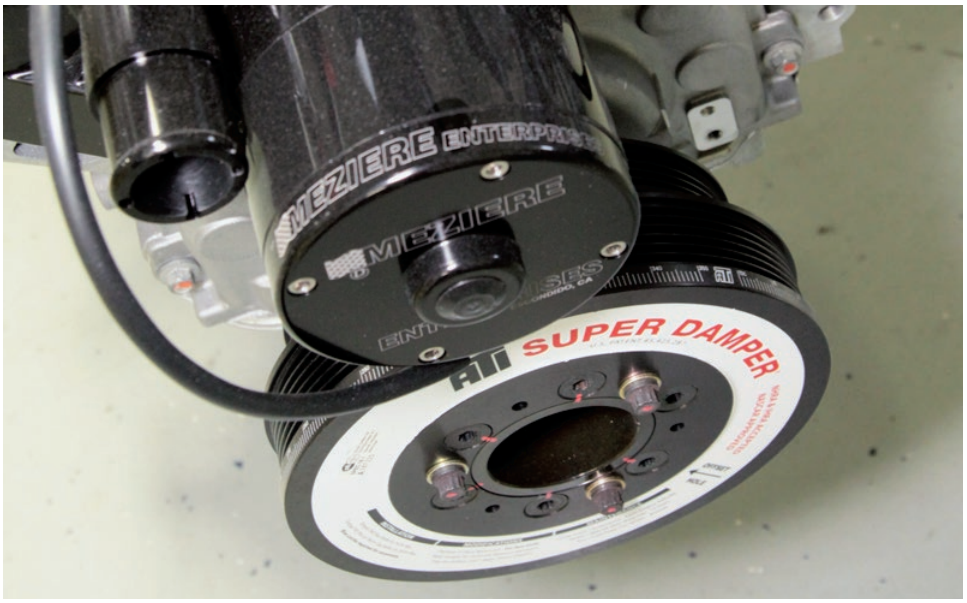
The joining of engine and 2-speed ATI "Pro Glide" automatic takes place in a dedicated corner of the Build Center. Incidentally, the cradle itself is fastened to a stout rolling assembly stand both to allow working at a comfortable height and for ease of movement.

The first component to be installed on the cradle is the COPO's manual steering rack, which simply bolts in place.

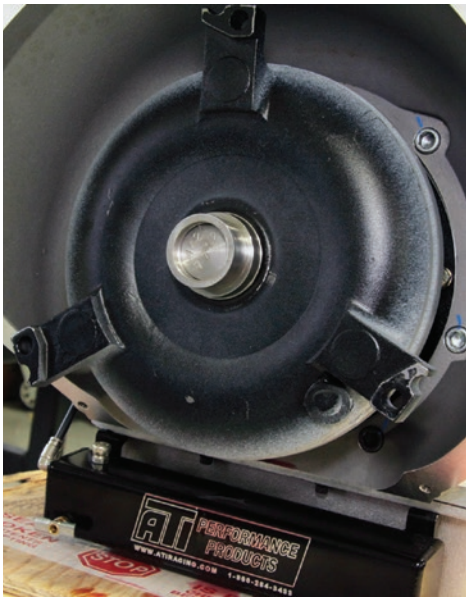
Then these solid engine mounts go on (part of the Chevrolet performance COPO Powertrain Mounting Kit P/N 22950652). These bolt up from beneath with a single fastener.

The cast-aluminum engine-side mounts (production Camaro pieces) are then bolted to the block.

Lift brackets are bolted on the heads and the engine is then hoisted up onto its cradle, where the upper and lower mounts are, for now, loosely bolted together.

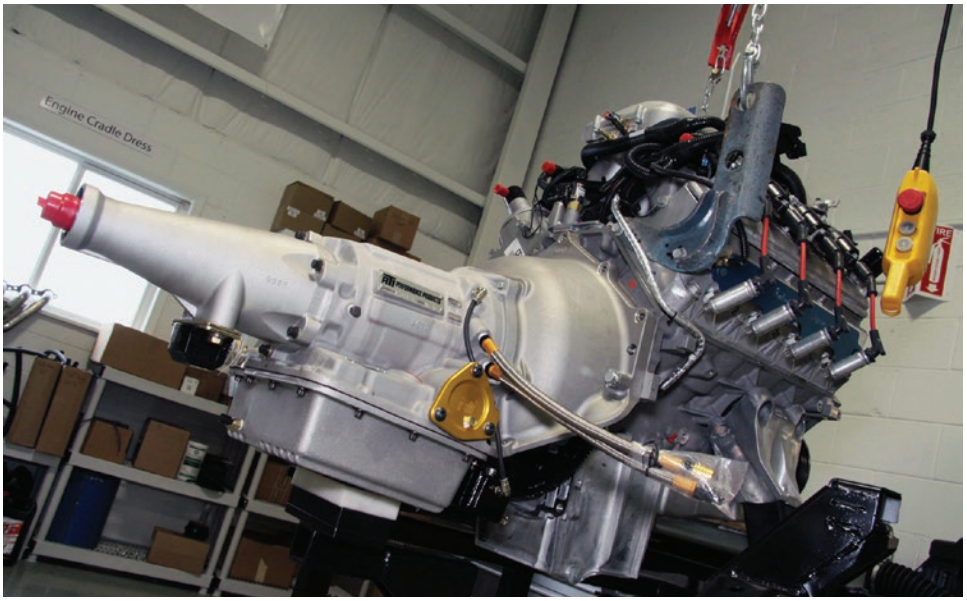


All COPO engines are shipped with an ATI Super Damper, and the 427 gets a Meziere electric water pump. (The pair of blown 327's utilize a stock mechanical water pump.)



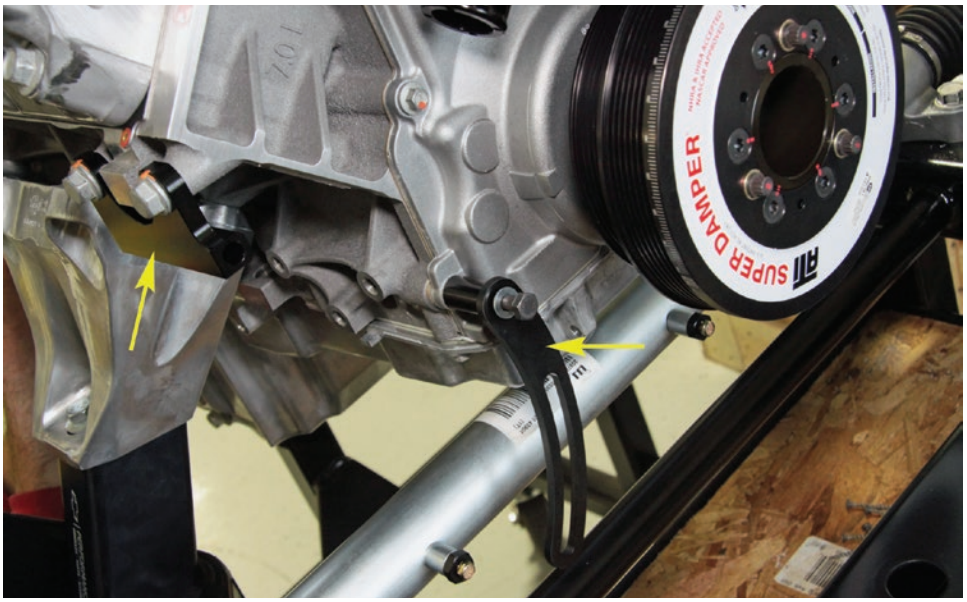
Turning to the transmission, the naturally aspirated 427 and the 327/2.9L Whipple engines get 8-inch torque converters, while the 327/4.0L gets a 9-inch version. All are from ATI Racing Products' "Treemaster MRT" series. Beneath, you can see the tranny's fluid overflow catch-can.

With converter in place, the transmission assembly is mated to the block. When shipped from ATI, each transmission is imprinted with its target COPO's serial number, both because of the converter differences and because the 327/4.0L combos get an extreme strength Vasco-material turbo spline input shaft, while the other two engines have a shaft made of 300M alloy.



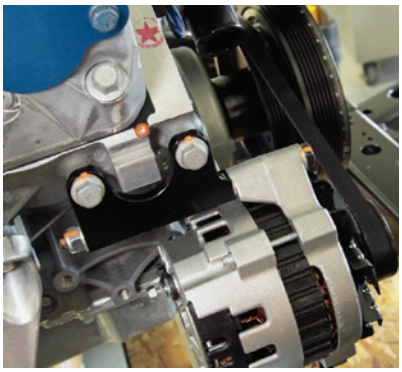
The transmission cooler flex lines are rather obvious in this shot. Less obvious is that not all the bellhousing bolts are installed quite yet, awaiting some accessories ...

... like the transmission filler/dipstick tube, seen fitted here. Also, at this stage, the torque converter has been bolted to the flexplate.



Next to go on are the two alternator mounting brackets (available through Chevrolet Performance P/N 19299546).

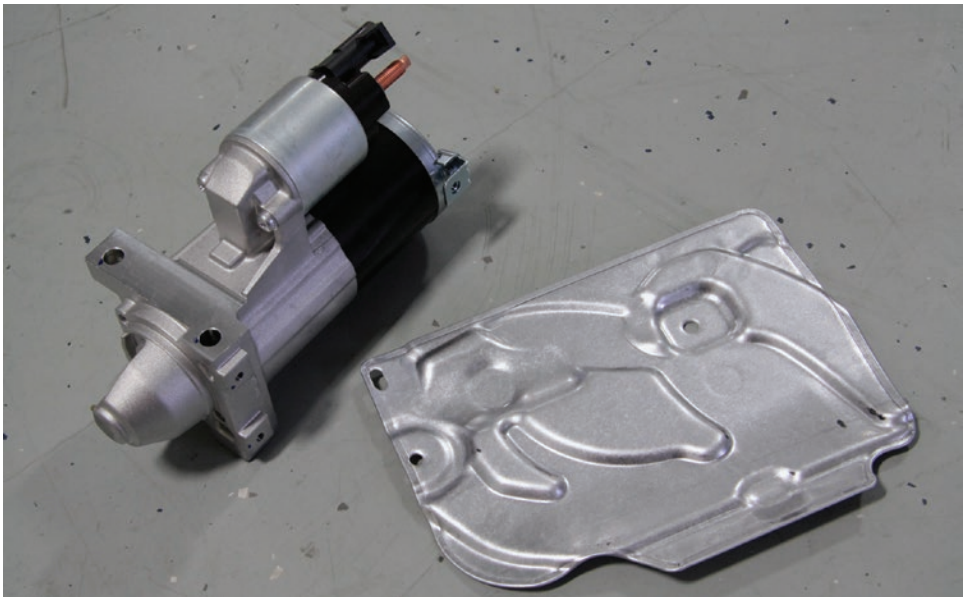
Followed by the alternator itself (CP #10480003). By the way, the alternator belt carries Gates P/N K040315.



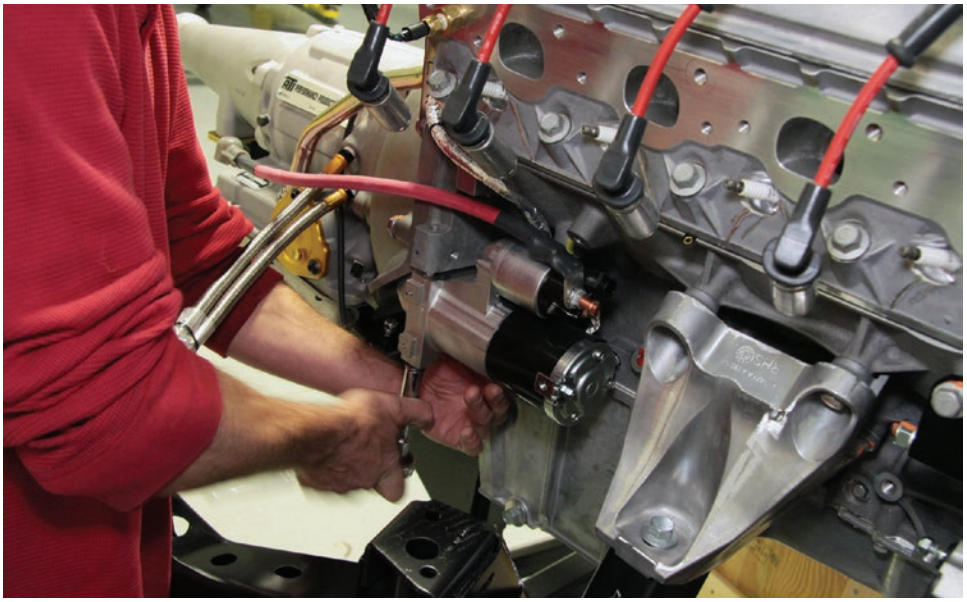
Just about time for the headers. All three engines share the same American Racing Headers 304-stainless long-tubes, with 2-inch primary diameter, 30-inch primary length, and flow-enhancing merge – or venturi – collectors.

With the spark plug wires tucked up out of the way, the left side header is now gasketed and bolted in place. Man, if only all header installations could take place with an engine on a stand.

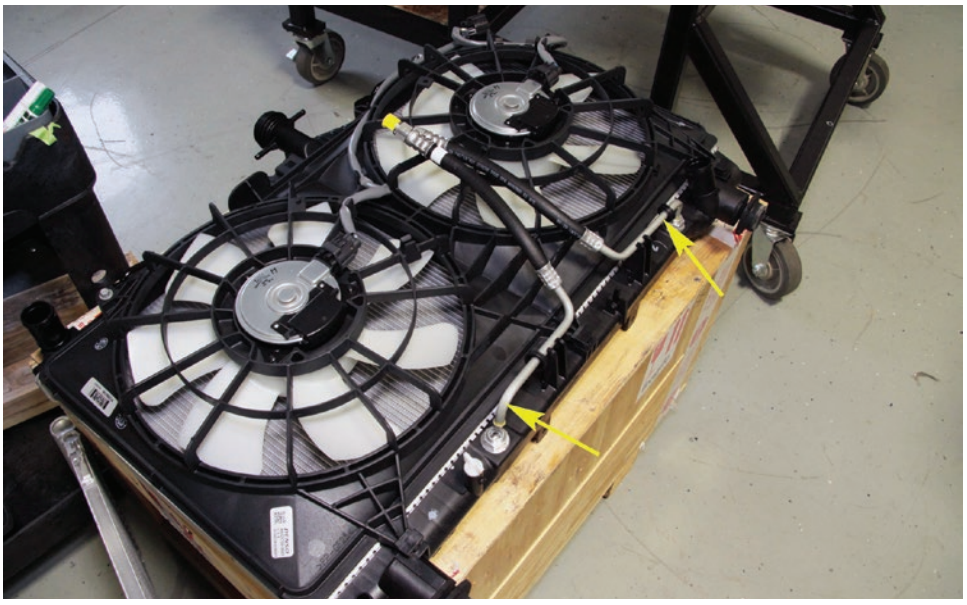
NOTE: *The headers are equipped with oxygen sensor bungs but, because the COPO uses an open-loop, speed density injection system, these are sealed off with plugs (though the bungs will still prove useful for dyno-tuning sessions).*



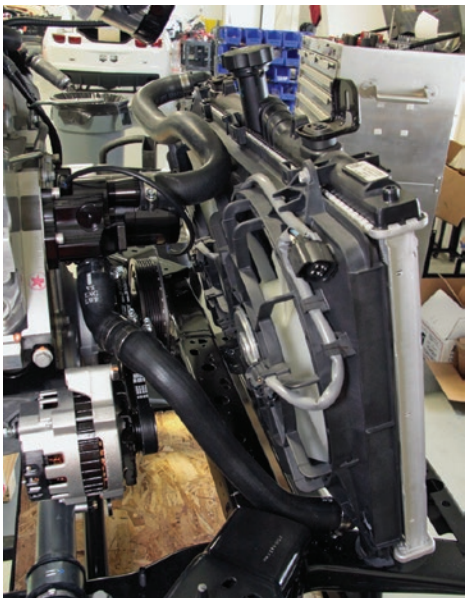
Before the right-side header goes on, it must be preceded by the starter motor and heat shield. (Production Camaro parts.)



The starter is bolted up, and its power cable attached (the other end of this cable will go to the terminal previously installed on the unibody's front bulkhead). The starter's heat shield then bolts on, followed by the right-side header.



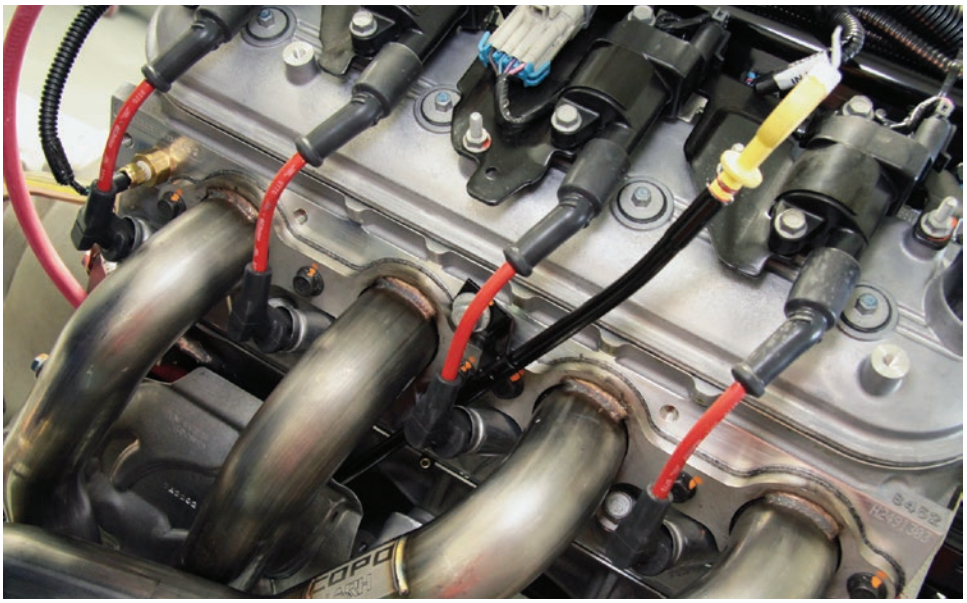
The 427 COPO (and those with the 327/2.9L combo) uses a stock Camaro's radiator/twin-fan assembly, but the stock transmission cooler lines (arrows) are removed.



Also, the air conditioning condenser, seen here leaning against the crate, comes off.

The radiator pack is then set into the cradle, and its hoses are connected to the electric water pump. The blown 327's use a different hose set.

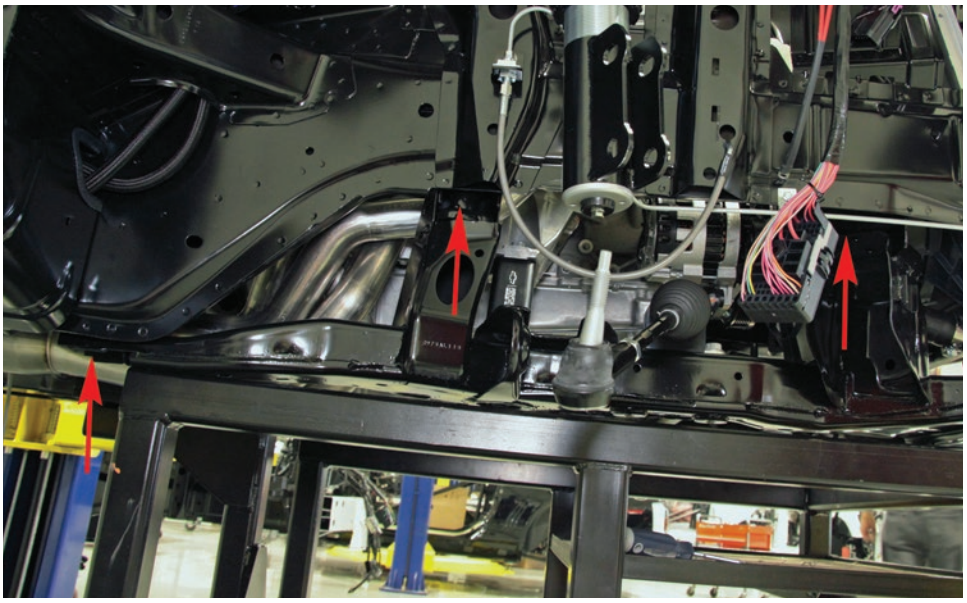
A pair of brackets is bolted to the radiator, and then a new Earl's-manufactured transmission cooler goes in place. This same cooler is used on all three COPO engine options. The cooler and its associated hard lines are available through COPO Parts Direct.



The engine oil dipstick is now inserted and bolted to the cylinder head. Notice the cool "COPO by ARH" plate welded to the header primary.

Ready to meet 2012 COPO chassis #35, this cradle now rocks with dragstrip determination. An all-aluminum 427 cubic inches; 425 factored horsepower – it's like 1969 all over again.

Much like the rear axle was installed, the rolling cart and a hoist make for a quick and effortless means of mating powertrain cradle and unibody. There are conical dowel pins in the cradle that line up with holes in the unibody's subframe to accurately align everything so the cradle's six beefy bolts can be torqued in place.



The cradle bolts to each subframe at the arrowed points. Here, you can also see that the front flex lines for the soon-to-be-installed brakes have been connected to their hard line fittings.

Now, the transmission crossmember is bolted to brackets that had been welded to the subframes way back in the unibody prep phase. We didn't detail fitment of these brackets at that time because, if you're using a different automatic or a manual gearbox on your own COPO, a different bracket location would apply. (The crossmember and brackets are part of the COPO Powertrain Mounting Kit P/N 22950652.) With the crossmember in, it can then be secured to the tranny mount.

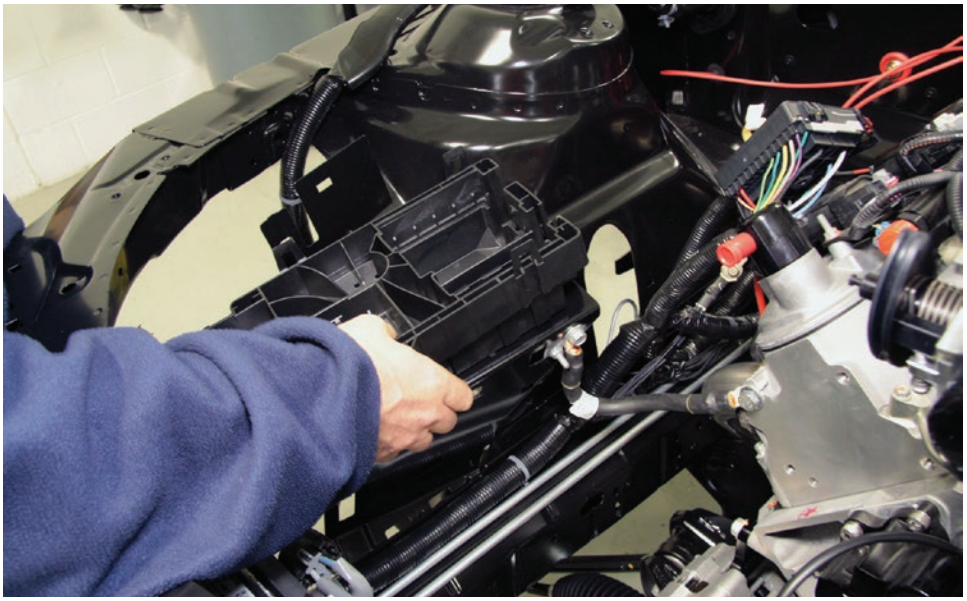
Meanwhile, up top, the upper and lower sections of engine mount are torqued to spec, the radiator can be bolted to the core support, and some electrical harnesses are connected.

Now that the powertrain cradle is in, the spindle/brake/hub assembly is bolted – loosely for now – to the bottom of the strut and to the tie-rod ends …

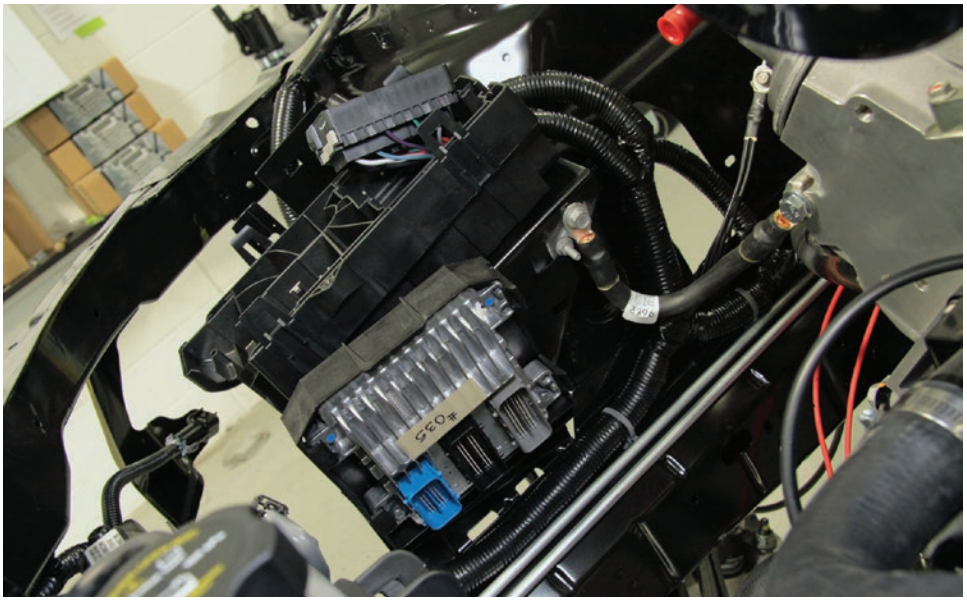
… followed shortly by bolting in the stock production Camaro front control-arms.

Final tightening of the suspension hardware is done with the spindle tightly clamped to the struts. This provides the proper suspension camber setting. At this point, the brake flex lines can be connected to the calipers.

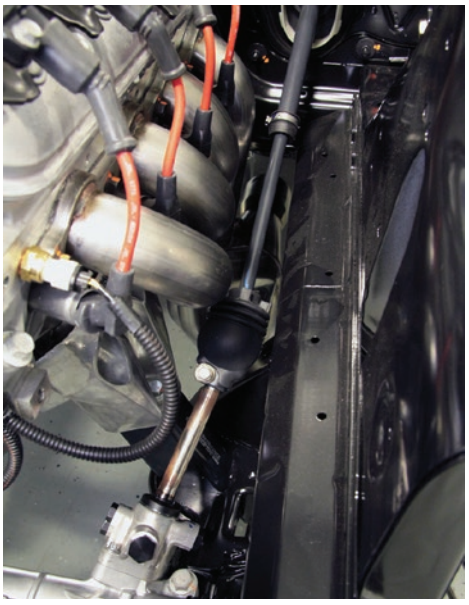
Up front, hard lines are connected to the transmission cooler and routed down along the top of the passenger-side subframe (arrow), soon to connect with the transmission flex lines.



In some electrical headway, the engine ground strap is attached from cylinder head to the power distribution box bracket, and the plastic distribution box itself is fastened to that bracket ...

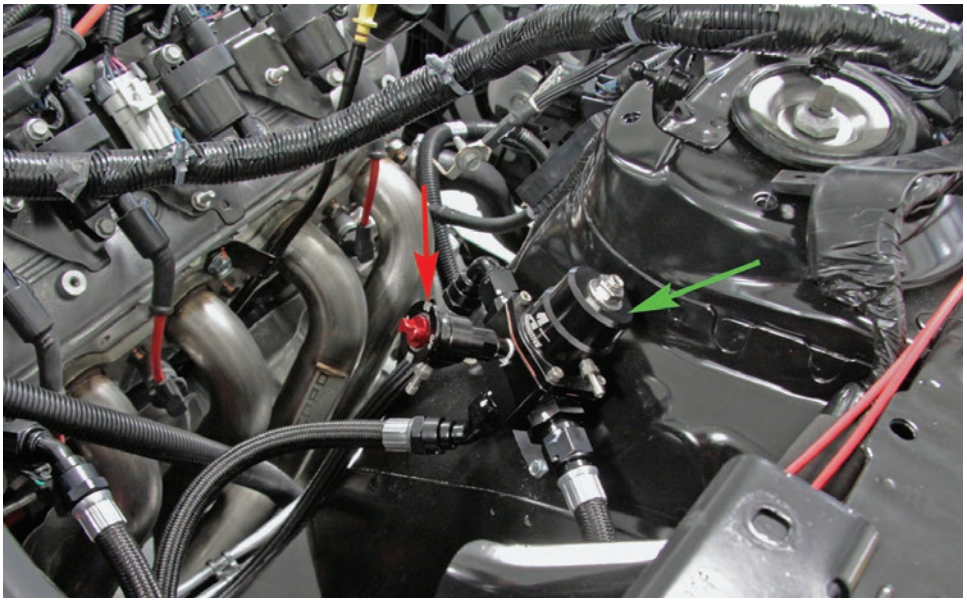


... and the Delphi engine control module (ECM) also comes onboard. Notice that the ECM bears a tag identifying it specifically for car #35. COPO tuning calibration obviously bears little resemblance to that of a stock Camaro, and that calibration also differs significantly between naturally aspirated and supercharged COPOs.

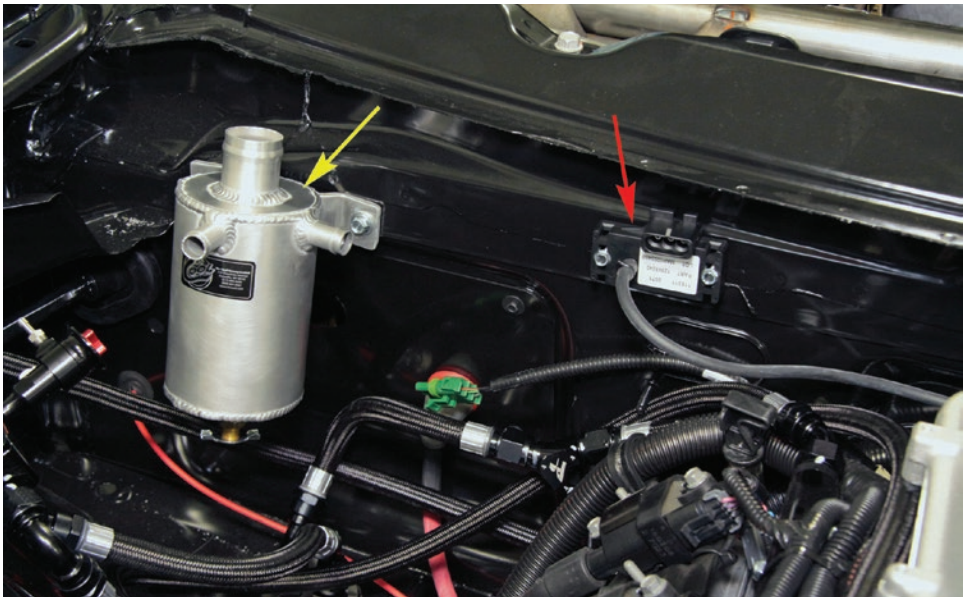


Over on the driver's side, the steering's intermediate shaft is now expanded and bolted to the rack's input shaft.

Final plumbing of the fuel system is next. First, the underhood braided fuel lines are connected to the fuel rails – supply lines to the front of each rail; return lines to the rear.



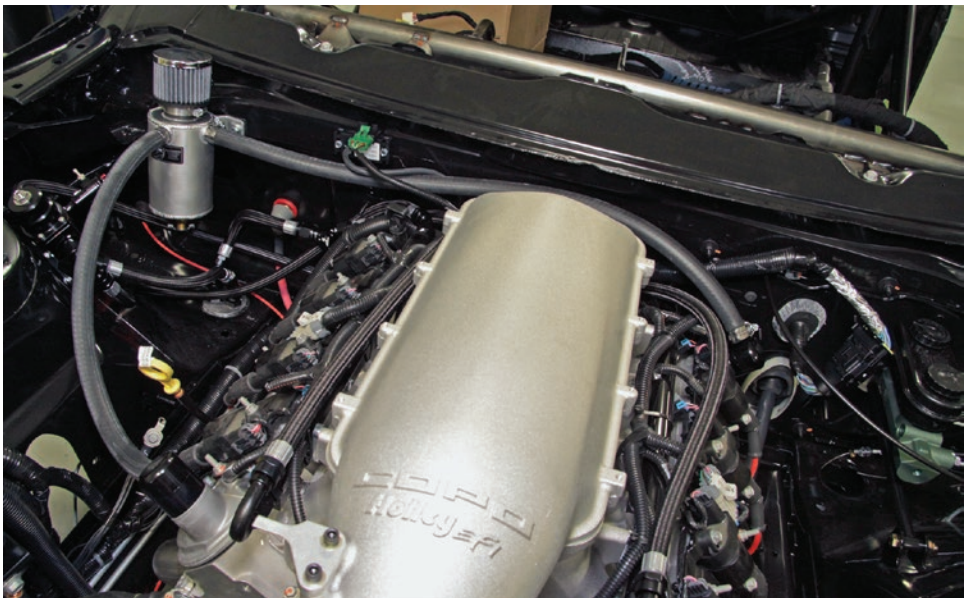
Then, the COPO's fuel pressure regulator (green arrow) is bolted to the strut tower and plumbed with the fuel return lines. (The main fuel feed line splits at a Y-connector to directly feed the front of the rails. All connections to the regulator are off the return side of the rails.) The red arrow is pointing to a fuel sampling valve – to keep the NHRA inspectors happy – threaded into the regulator. That finishes the fuel system.



Two important items now bolt to the passenger side of the cowl – a PCV canister (yellow arrow), and a manifold absolute pressure (MAP) sensor. The PCV canister will connect with a hose from each valve cover ...

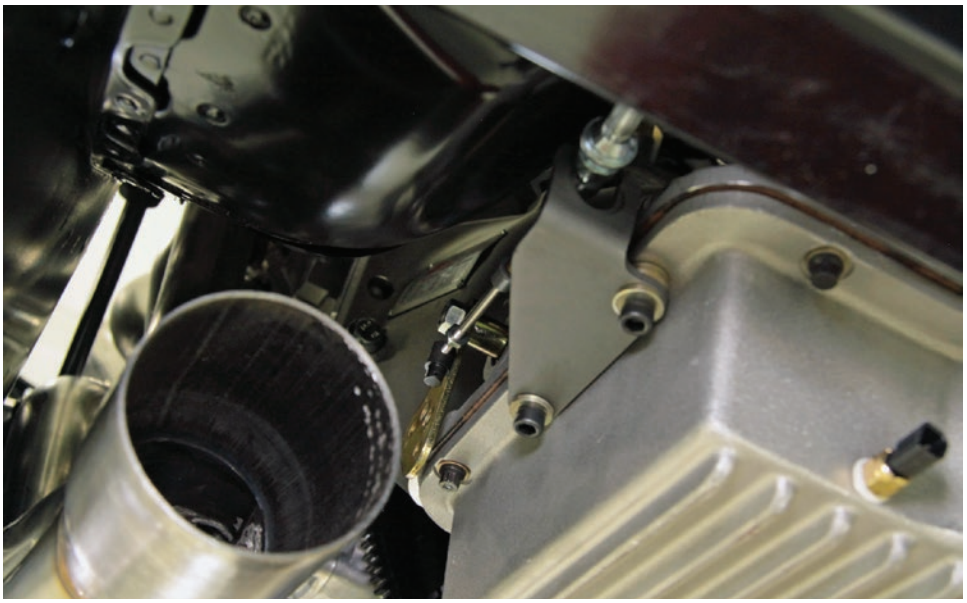
... while the MAP sensor takes its vacuum signal from a port on the back of the manifold.

A short extension harness is used to connect the MAP sensor to the factory wiring harness.

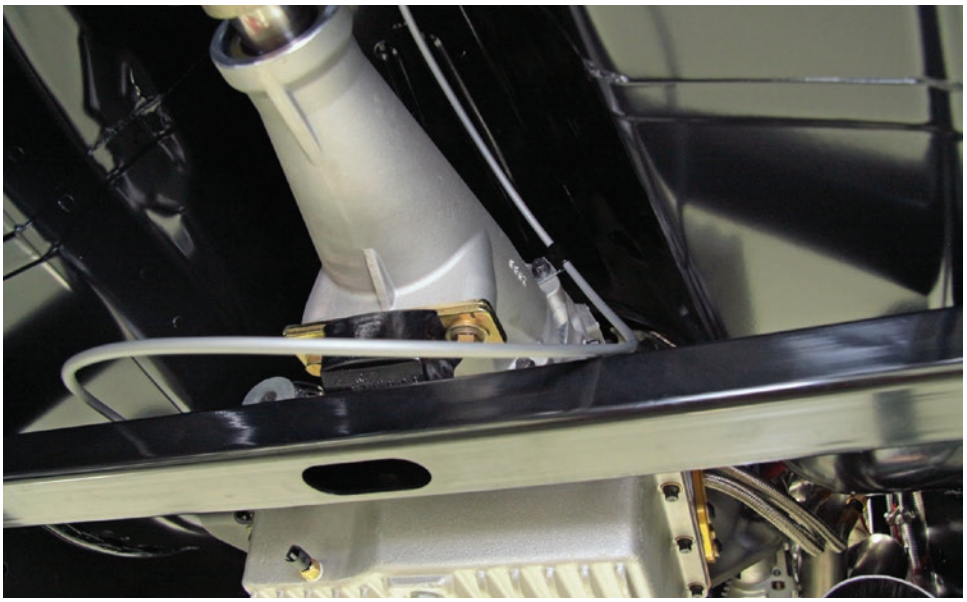


An overall view of all this top-of-engine plumbing. The hoist now gets raised for a final few steps before moving the car on to the next station.

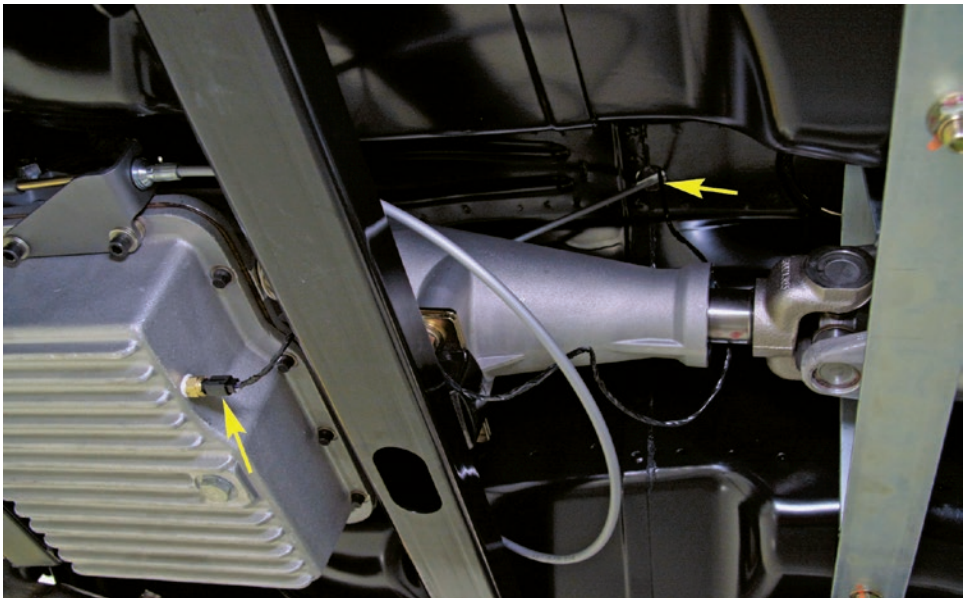
On the left side of the transmission pan, a couple of fasteners are removed and a bracket is then bolted in place for the shifter cable.



And that cable is connected to the transmission linkage.



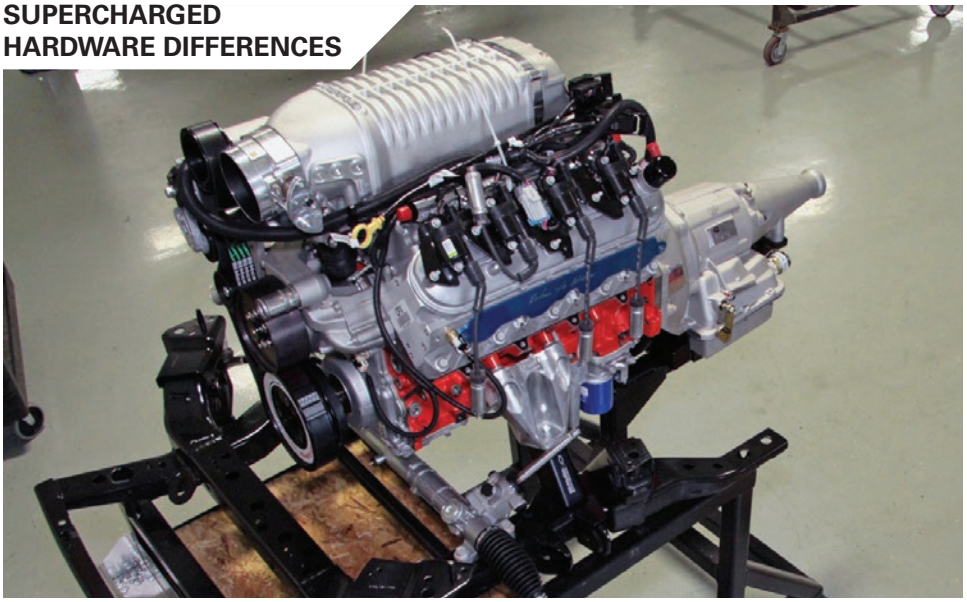
A small bracket then bolts to the right side of the tranny to support the shifter cable, as shown. Also, the tranny cooler flex lines visible just above the right side header are now connected with the hard lines that route to the cooler.



And in a final tranny connection, a wire for the transmission temp gauge connects to the sender on the pan and is fed up through the hole in the tunnel. After this shot was taken, this wire was zip-tied to the shifter cable to keep things neat.

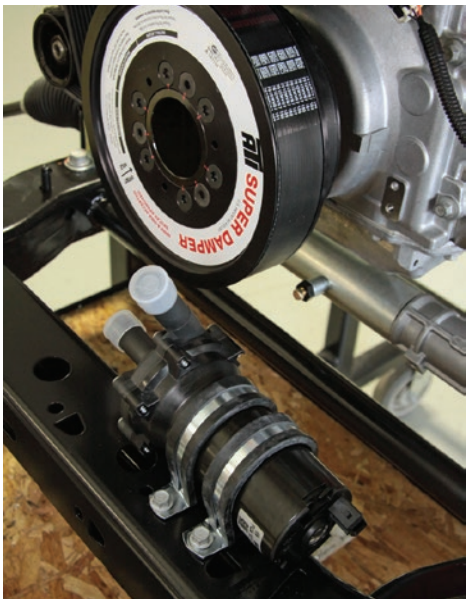
Finally, the COPO's 4-inch aluminum driveshaft is bolted up, pretty much putting the wraps on the naturally aspirated 427 powertrain installation. Our next few photos look at the specific hardware and installation differences for the two supercharged engines. Full specs of the driveshaft are detailed elsewhere in this text, and is available through COPO Parts Direct.

SUPERCHARGED HARDWARE DIFFERENCES



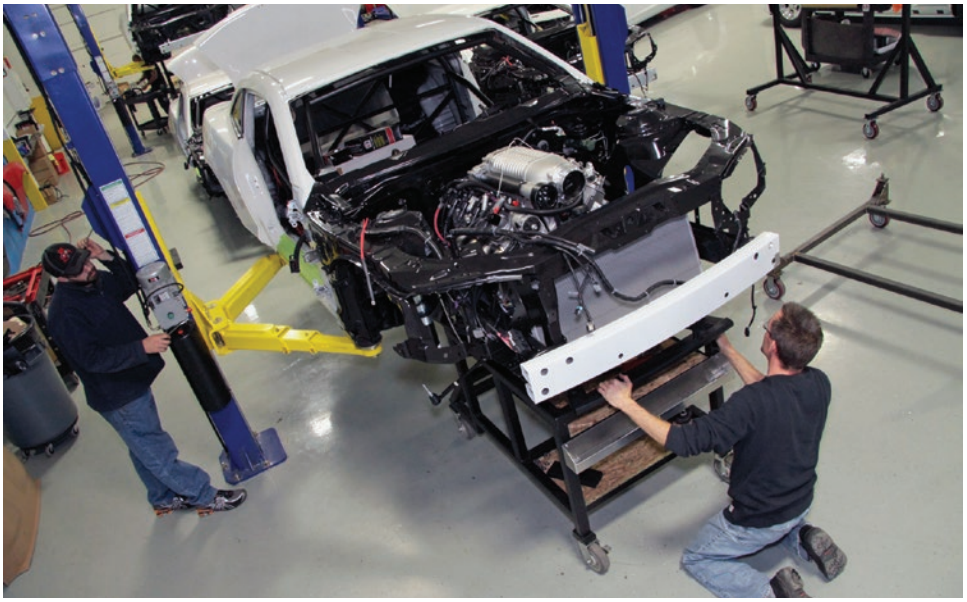
On the cradle here is a 327 with 2.9-liter Whipple supercharger. It uses the same transmission, torque converter, and factory Camaro radiator/fan pack as the 427.

NOTE: *Cars with the 550-hp 327/4.0L blower combo get this COPO-custom radiator (made by Be Cool) with greater cooling capacity. Even so, the factory Camaro twin-fan pack is also used with this radiator. As previously mentioned, 327/4.0L COPOs get a 9-inch diameter torque converter, and a 4.10 gear set in place of the 4.29 gears found downstream of the 427 and 327/2.9L engines. Available from Chevrolet Performance (22951633).*

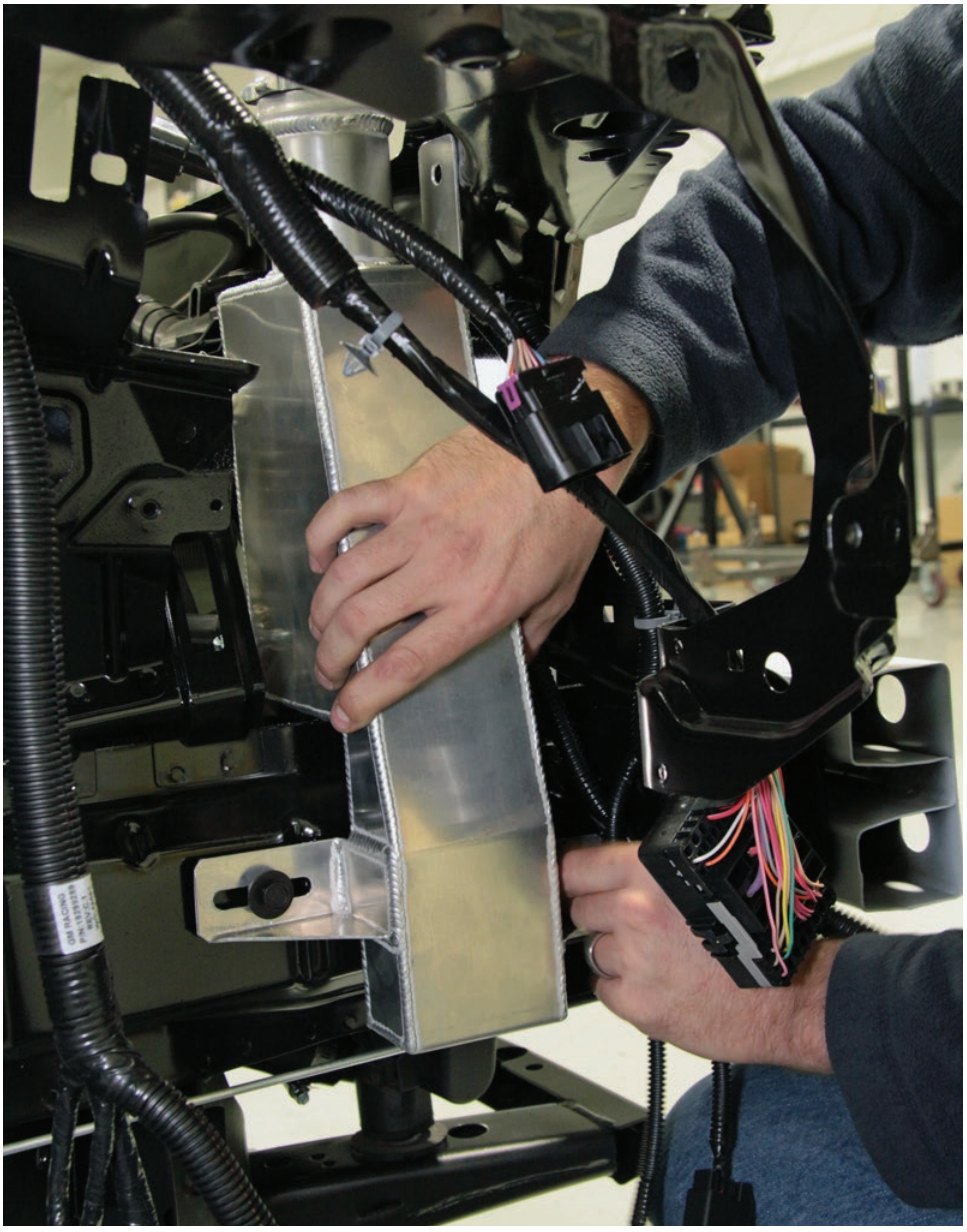


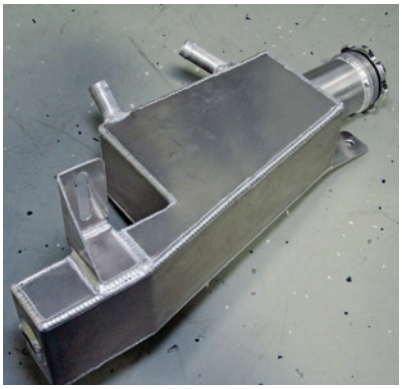
Both supercharged engines get this intercooler coolant pump (Chevrolet Performance P/N 22718756) attached to the cradle.

Because of their mechanical water pumps, both 327 engines use a different set of (production Camaro) radiator hoses than the 427 with its electric water pump. The alternator and brackets are common to all three engines.



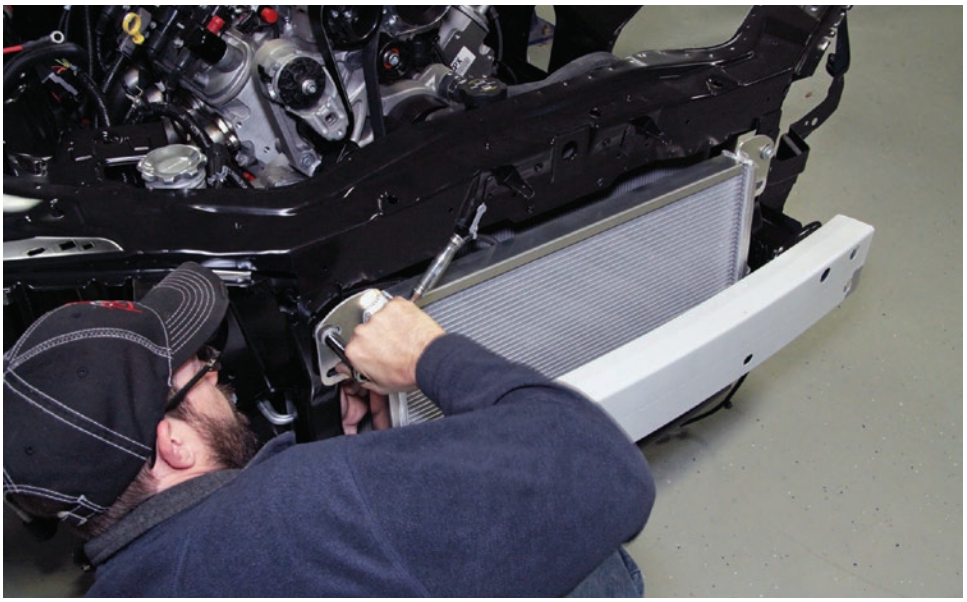
With radiator in place on the cradle, the 327/2.9L combo powertrain now meets its chassis (in this case, 2012 COPO #48).



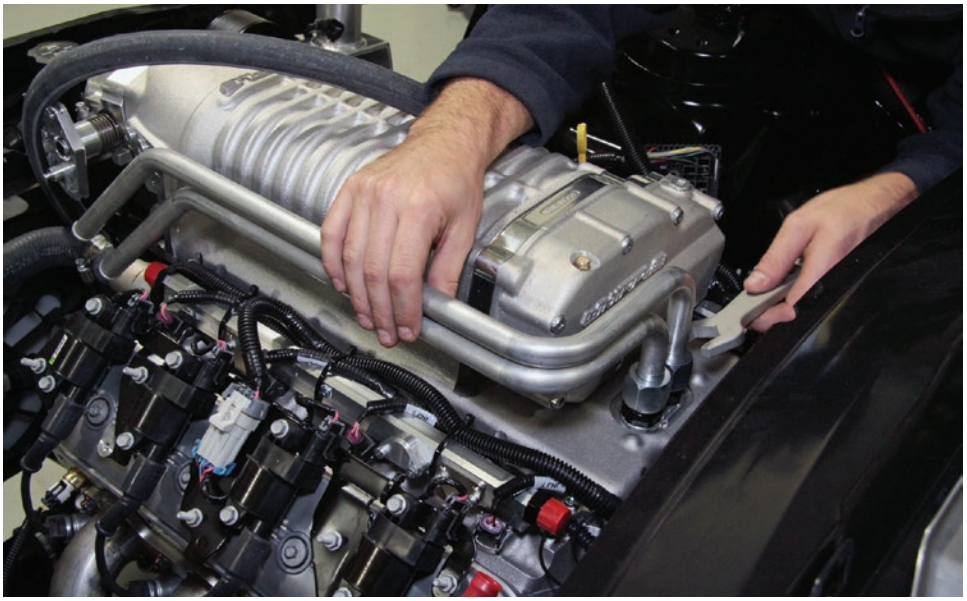


This fabricated aluminum intercooler coolant tank is shared by both blown 327's.

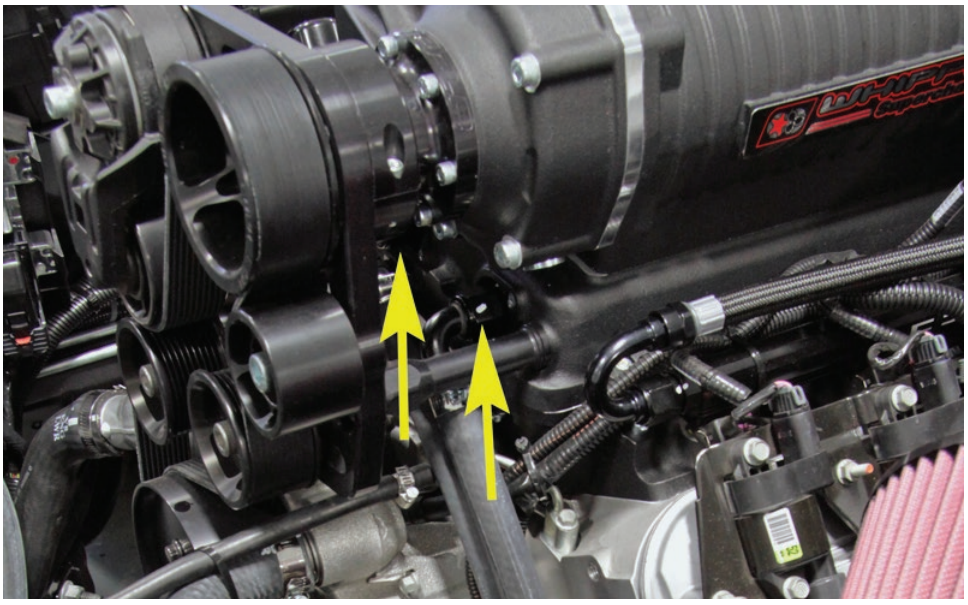
It bolts to existing holes on the passenger-side subframe and, up top, to an existing hole in the radiator core support.



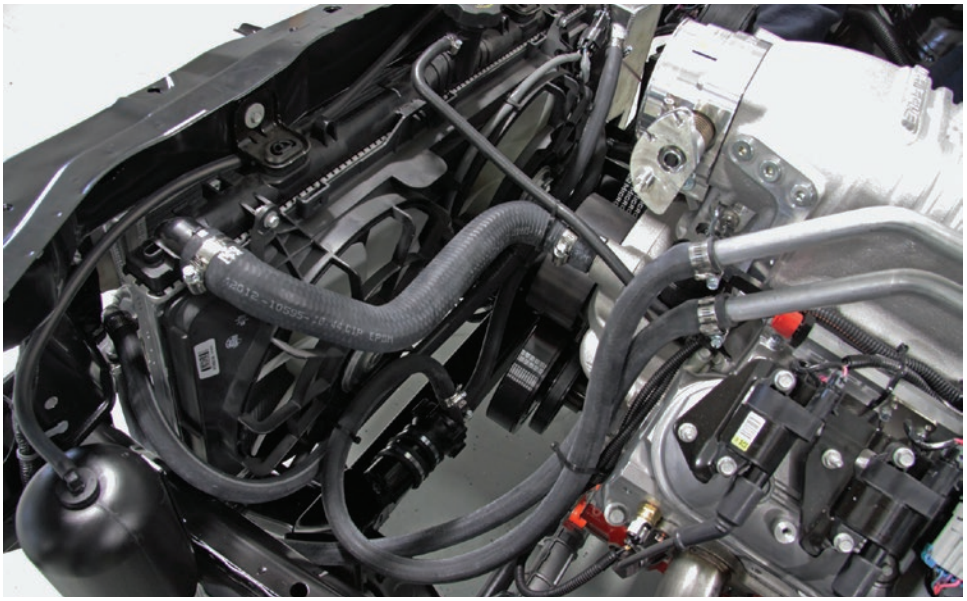
The COPO's custom intercooler heat exchanger (common to both 327's) now bolts to existing holes on the front of the core support. The heat exchanger and coolant tank is available through COPO Parts Direct.



The 2.9L supercharger uses a front air inlet and a pair of hard lines to route to and from its intercooler inlet and outlet ports on the back of the blower.



By contrast, the 4.0L Whipple – with its rear air inlet location – has its cooler ports located up front, and so connects directly to the rubber hoses.



Rather than use multiple photos, a schematic explanation of the intercooler plumbing is perhaps best. From the intercooler pump outlet side, coolant goes up through the intercooler core beneath the blower and then out to the lower port on the core-mounted heat exchanger. From the heat exchanger's outlet (top fitting), it then flows to the top (inlet) fitting on the coolant tank, and then out through the bottom fitting to return to the inlet on the end of the pump.

In wrapping up our look at 2012 COPO powertrains, it's worth noting that each of the three engines uses a different air inlet tube and filter arrangement (the combo for the 327/2.9L is shown here). All three inlet setups, with mounting brackets, are available in the 2013 Chevrolet Performance catalog.

[CHAPTER 7]

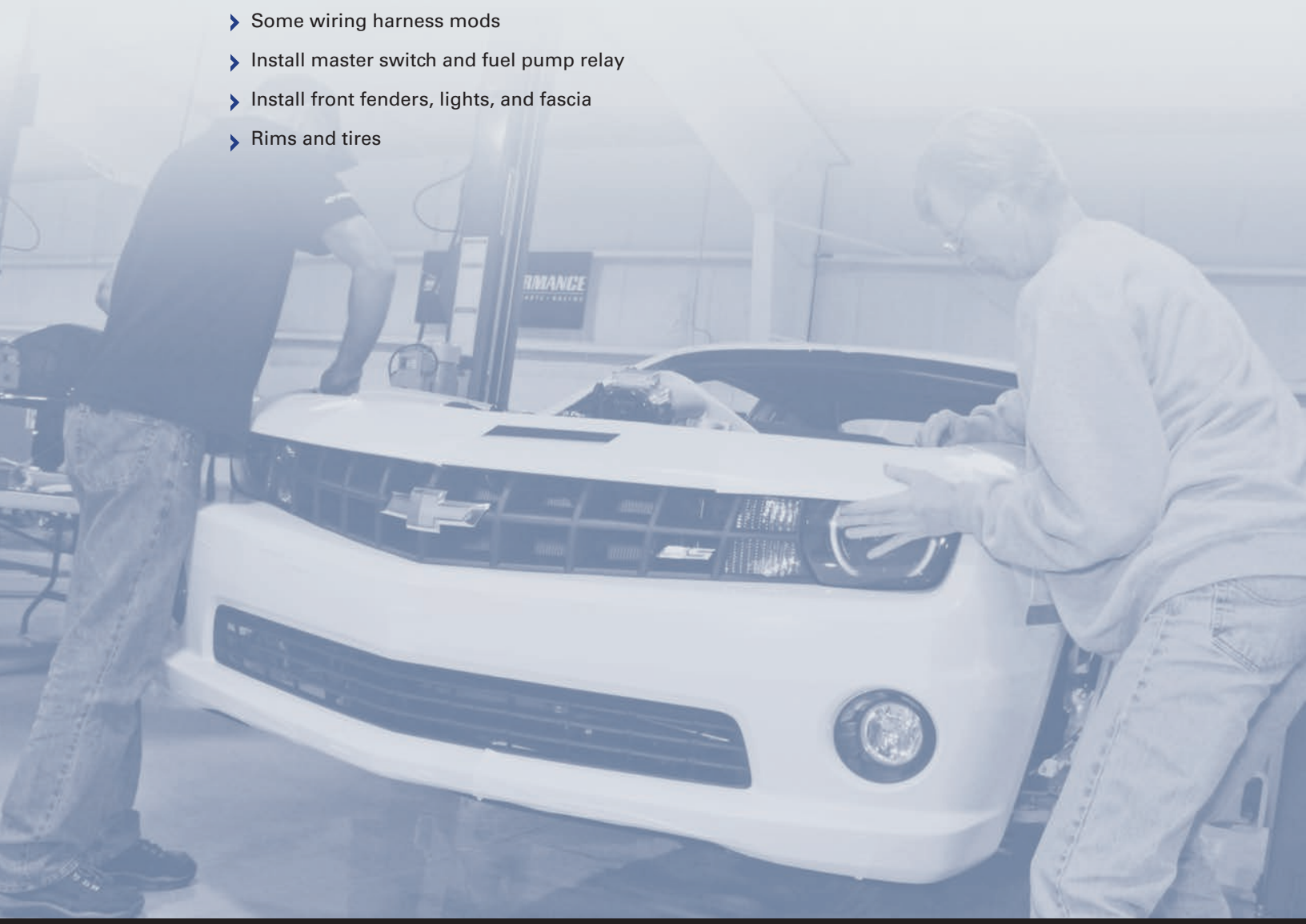
MAKING IT ALL WORK

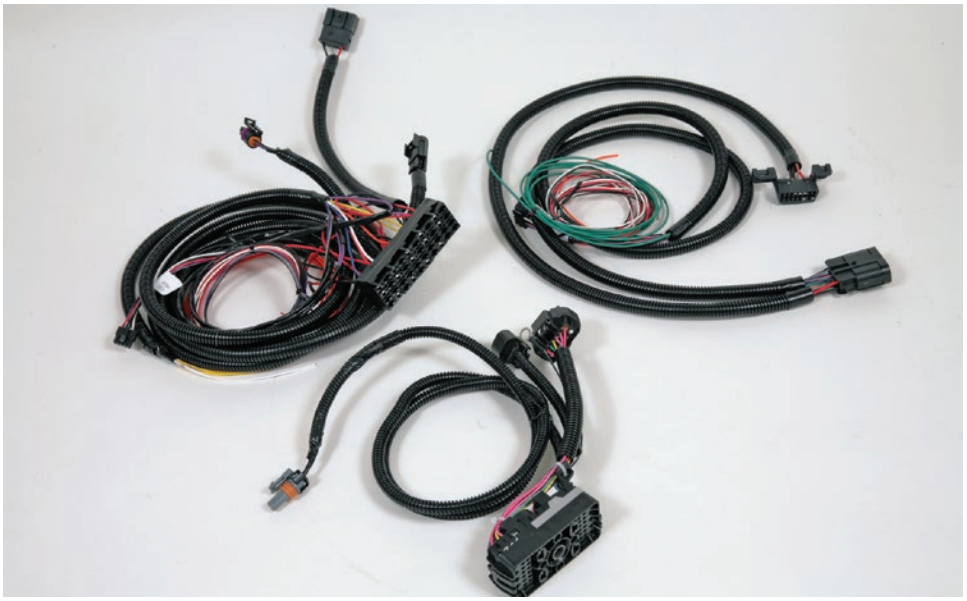
With the powertrain onboard, the COPO now has raw muscle just itching to do its job and is a major step closer to becoming a race car. At the moment, though, that muscle is just an inert mass, lacking a vehicular nervous system to communicate with its electronic master – the ECM – or to be tuned or diagnosed, or even to connect to 12V power. As with many build stations along the COPO assembly line, this next one sees a mixed bag of components added, but a main focus here is installing, connecting and integrating the wiring and switchgear that will soon bring the heartbeat to life. **We'll document here, in general terms, the 2012 COPO's electrical scheme, but plans are in the works to alter overall wiring for the 2013 build and to offer such revised wiring harnesses through Chevrolet Performance for those building their own stock or S/S COPO Camaros.**

Also, by the time the COPO leaves this station, it will look less like a metal skeleton and much more like an actual Camaro, and will no longer have to be rolled around on a dolly – it will instead move ahead on its own wheels and tires for the first time.

IN THIS CHAPTER:

- 2012 COPO wiring harnesses, switchgear and instrumentation
- Filling and fitting the dash
- Some wiring harness mods
- Install master switch and fuel pump relay
- Install front fenders, lights, and fascia
- Rims and tires





For the 2012 COPO build, three unique electrical harnesses were created to integrate between the production Camaro electrical system and the COPO-specific hardware, instruments, switch-gear and other electrical oddities. The one in the foreground is, among other things, the new method of triggering the starter motor, as that command now comes from a dash-mounted switch. The one on the right will supply signal and power to the new tach, and also has an OBDII port that will be located in the glove box for troubleshooting and engine recalibration. And the harness on the left will be spliced into a factory underhood harness and plug into the new switch and gauge panels.

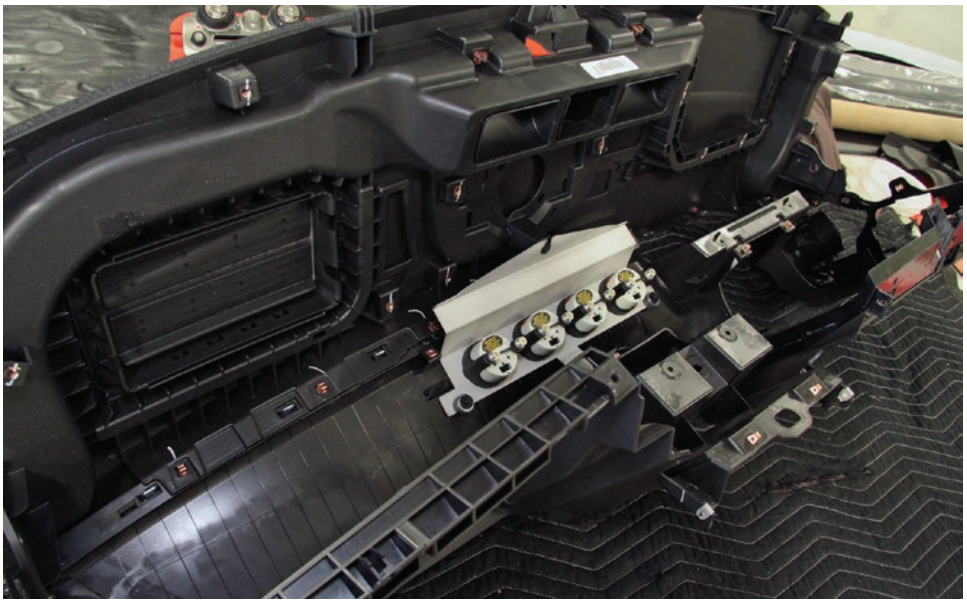
Powertrain switch kit (available in the 2013 Chevrolet Performance catalog as P/N 22950650) includes switches and jumper connector to plug into COPO wiring harness (not included). Switches include engine start/stop, ignition, fuel pump and auxiliary fan.

NOTE: *Camaro production radio panel not included - COPO factory installation replaces radio screen with switch kit.*

And here's the COPO's auxiliary gauge panel, filled with AutoMeter/ Chevrolet 2 ⅝-inch oil pressure, water temperature, fuel pressure and transmission temperature gauges. (Gauges and panel are separately available in the 2013 Chevrolet Performance catalog.)

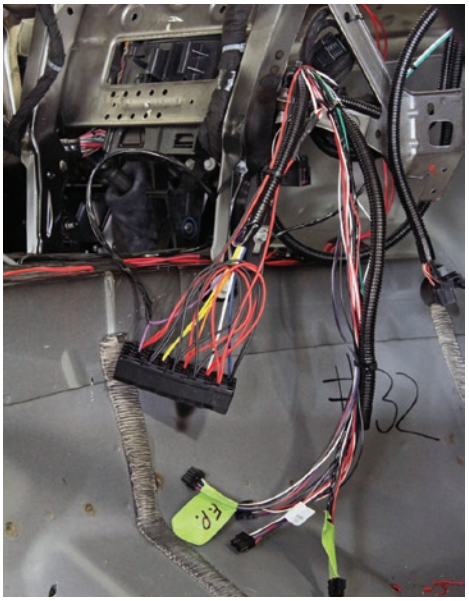
Likewise, the COPO's 5-inch tachometer (it comes with a shift light not shown here) is a current catalog item.

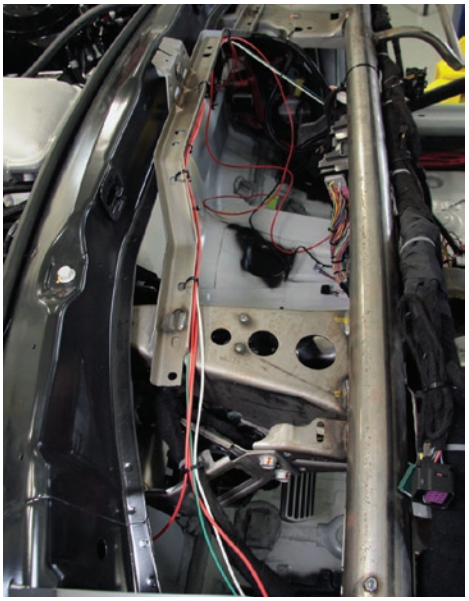
But all these gauges and switches need a place to roost, and that place is a production Camaro dash modified with a pair of cutouts to clear the roll cage structure.



Before going into the car, the dash is fitted with the COPO gauge panel. This panel simply screws in place on the back side of the dash, using half-inch spacers on each of the three mounting screws (one of which is hidden in this shot).

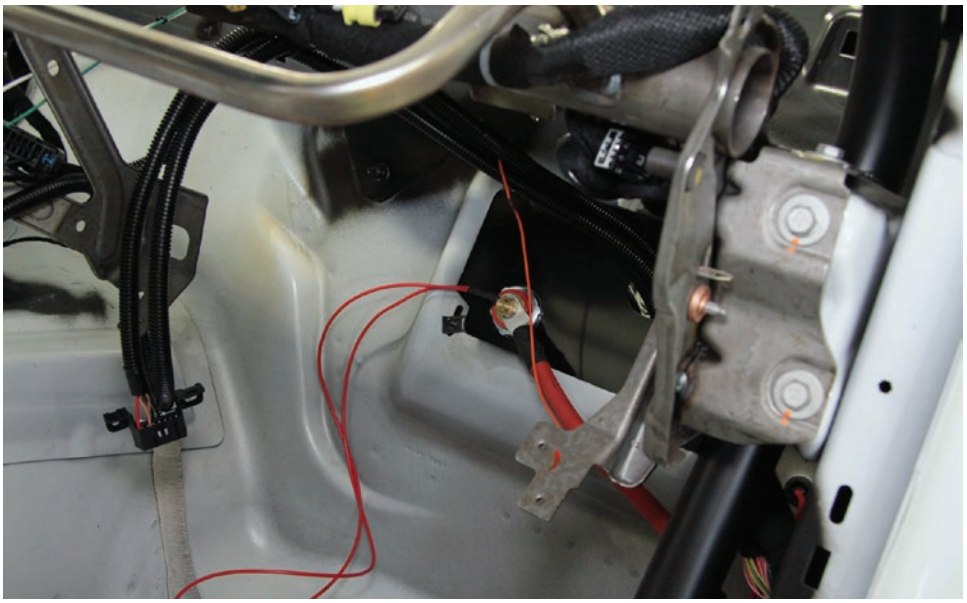
The installed gauge panel has a very factory look. Note that the production vent registers have also been installed here, but neither the factory speedometer cluster nor the new COPO switch panel will be inserted until after the dash goes in the car.



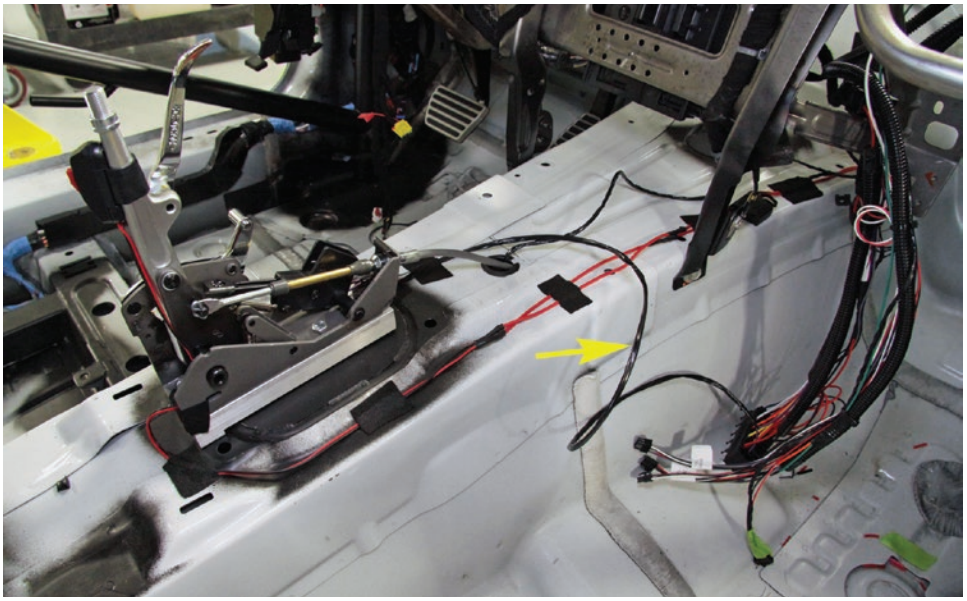


Before the dash goes in, the COPO-specific harness that integrates with the new gauge and switch panels is laid in place on the IP structure. Another branch of this harness routes up toward the power distribution box in the engine bay, where it will be spliced into a factory harness as we'll document in upcoming photos.

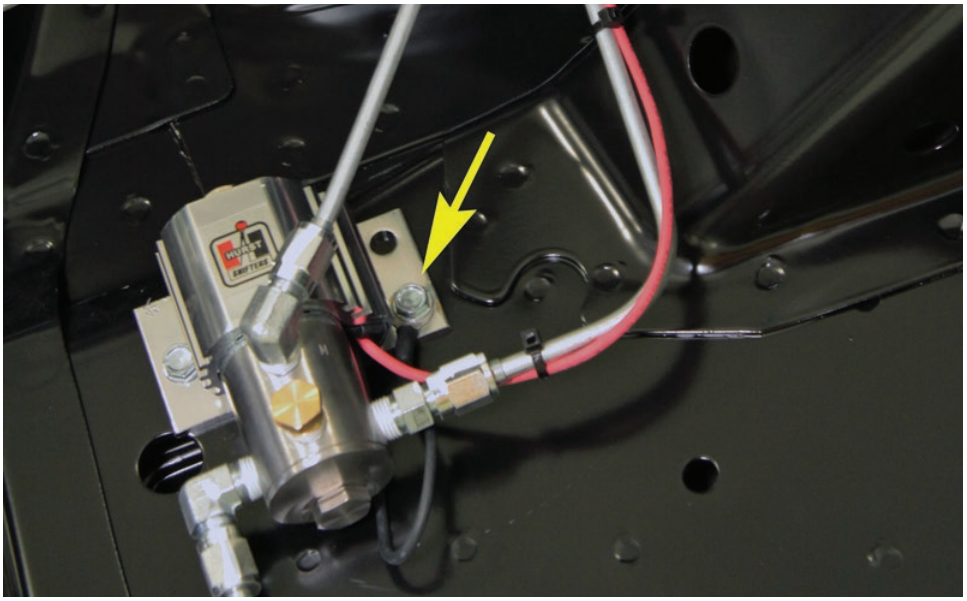
Also, three wires in a harness for the tach and one more to power the line-lock solenoid are strung across, and zip-tied to, the top of the instrument panel substructure.



Those red power wires for both tach and line-lock are connected directly to the main battery terminal on the front bulkhead. Also, take note of the orange wire visible here. It runs from the dash fuel pump switch to a fuel pump relay soon to be mounted in the trunk.



The line-lock engagement switch attaches to the shifter and is wired, with an in-line fuse, in series between the power terminal and the line-lock solenoid. Also, the black wire (arrow) connects from the shifter's neutral safety switch to the vehicle harness.



The downstream side of the line-lock switch routes out through the front bulkhead and connects to the solenoid's red wire. The solenoid is grounded at its own mounting bracket (arrow).

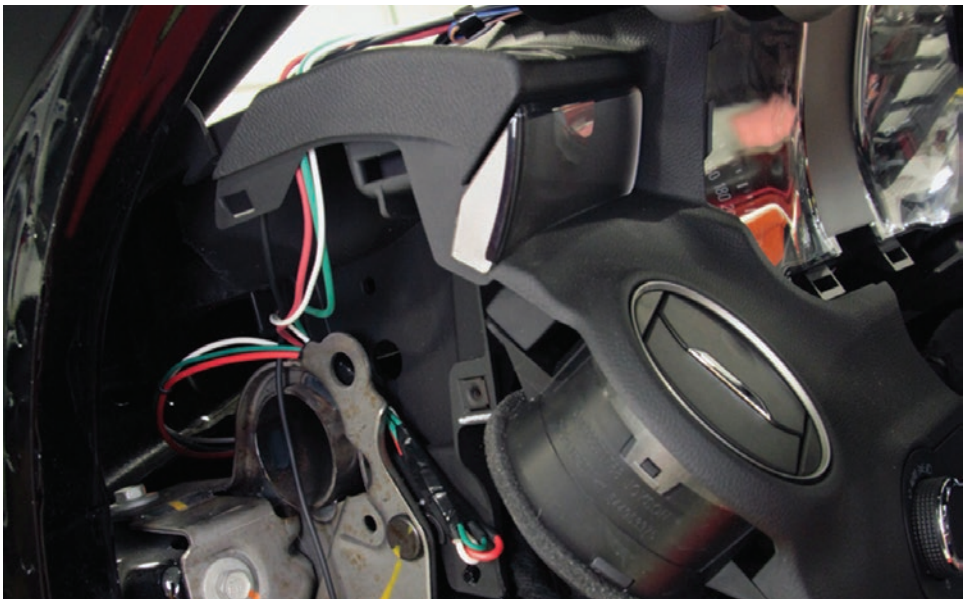
The previously mentioned cutouts in the dash allow it to slide in around the roll cage structure for a finished look (it's not yet fully seated here). As an aside, our arrow points to the COPO's serial number plate which is riveted where a production Camaro's VIN plate would be.

That plate tells the world this COPO's particular sequence number within the 69-car 2012 build run.

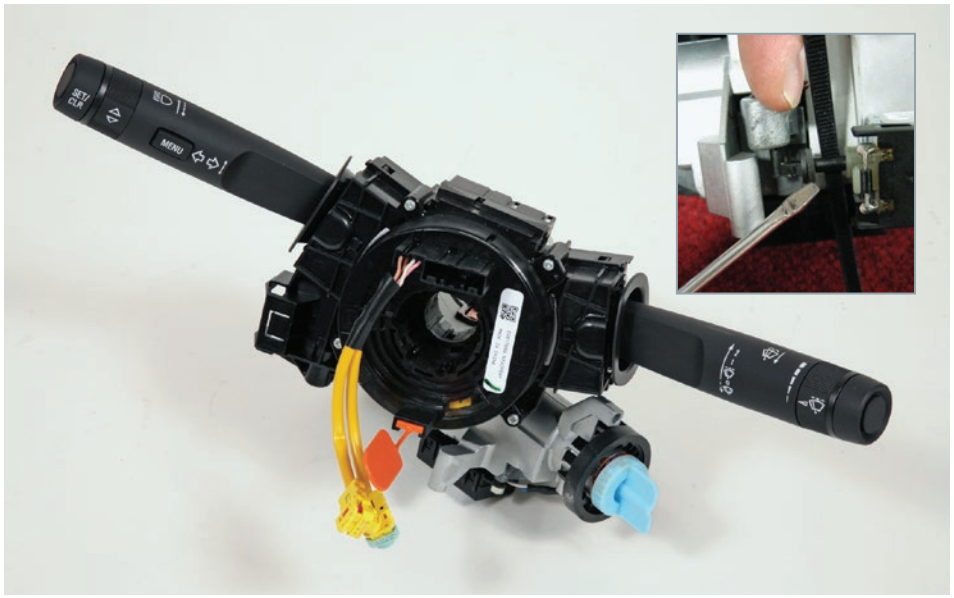
With the dash secured, the gauges are connected, the new switch panel plugs into the waiting harness and mounts to the dash. Needless to say, the radio controls do nothing but look good.

Before the speedo cluster is bolted in, a black patch is put in place over the center section to cover the factory warning lamp area.

With the factory warning lights covered, the cluster then goes in the dash. It will shortly be framed and finished off by the bezel trim plate. Also, at the upper left, you can see that the new tach's ball mount has been bolted around the roll cage bar.

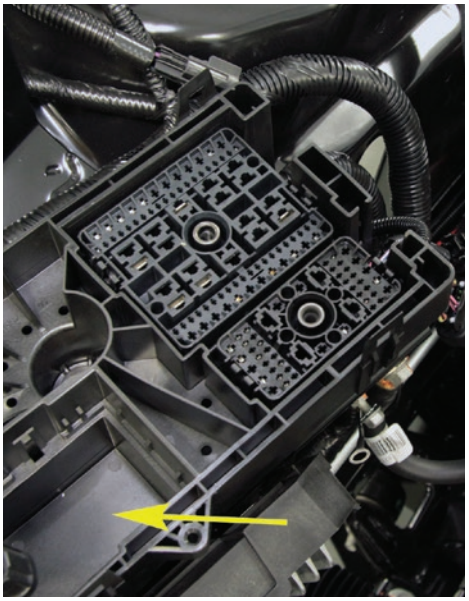


The tach connects at the left side of the dash to three wires previously strung across the top of the IP structure. The green wire is the rpm signal, red is power, white is illumination, and the black wire grounds to the metal IP substructure.



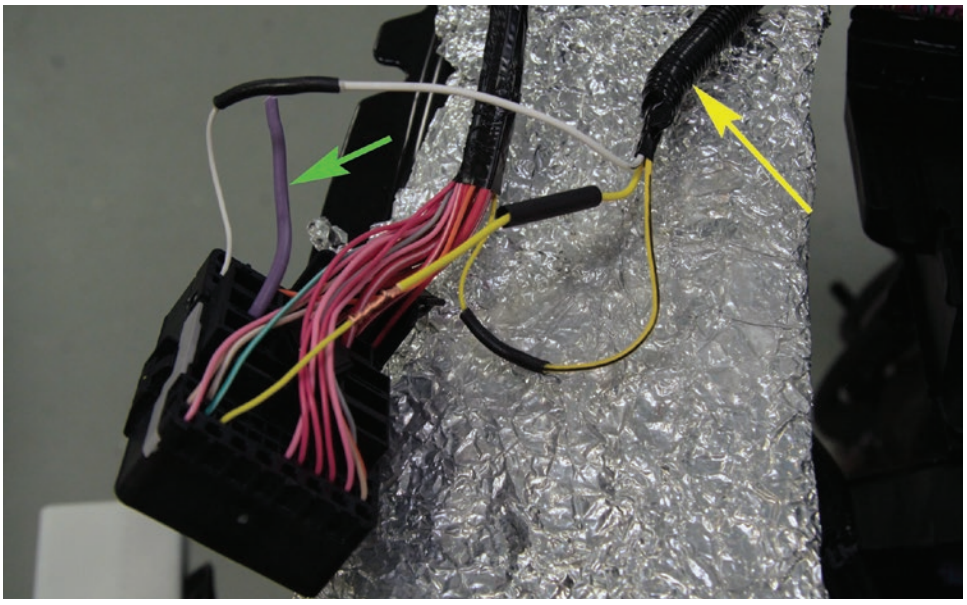
With the switch assembly installed on the tilt/telescope column, it is finished off with plastic surround panels. The tach and cluster bezel are also obvious here, but you can see that the key (no longer ignition) switch is not yet installed. Not quite visible in this shot, the production headlight switch also goes in the dash to the left of the column.

That multi-function assembly gets a low-tech, but critically important, modification. The lever under the technician's finger is pulled to the left and a zip tie is inserted and wrapped around the exposed shaft, thereby keeping that lever/shaft assembly from moving back to the right. Because of the COPO's specific wiring, without this modification, once a key was inserted in the ignition switch and turned on, it could neither be returned to the off position nor could the key be removed.

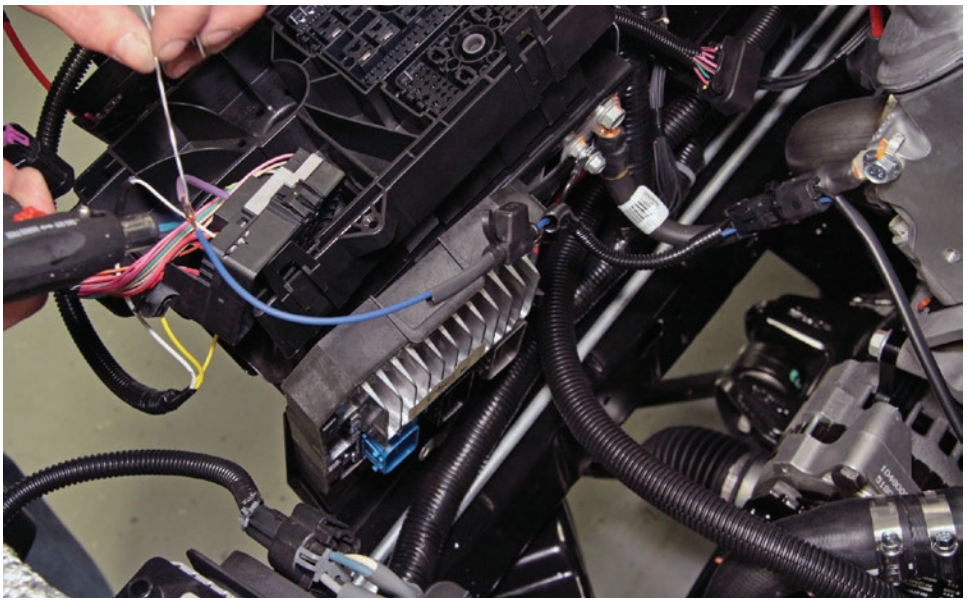


Next on is this multi-function switch assembly, some of which – like the wiper, cruise, and menu controls – will no longer work. But the high-beam flasher and turn signal functions will.

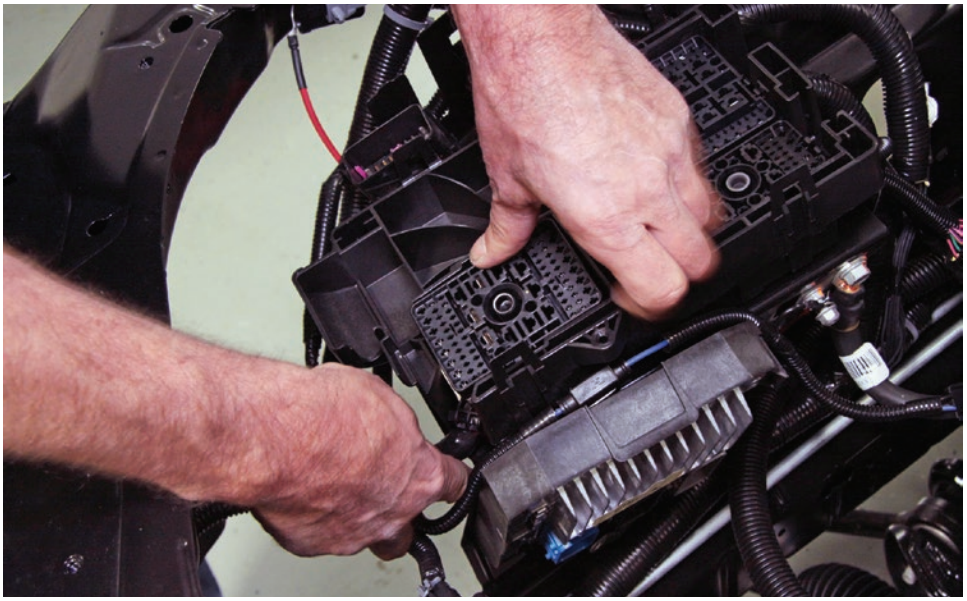
We now go underhood for a look at some splicing into the factory harness connector that will ultimately reside in this corner of the power distribution box (PDP – also known as the body electrical center, or BEC).



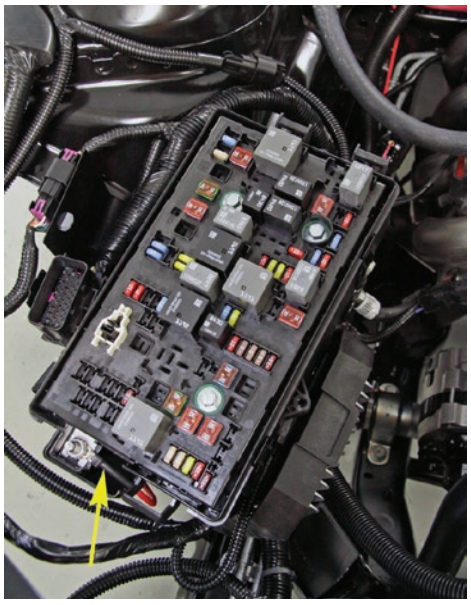
Three wires in that factory harness block are cut – the yellow, white and heavier gauge purple wires – two of which are now spliced into the harness on the right (yellow arrow) that leads to the new COPO switch panel and gauges. In production Camaros the yellow wire is used to trigger the starter via the ignition switch. This circuit is now interrupted and runs in series through the yellow and yellow/black stripe wires on the right across the new COPO ignition switch. The white wire is the factory gauge illumination circuit, now tapped into to light the new gauges. We'll explain the purple wire next.

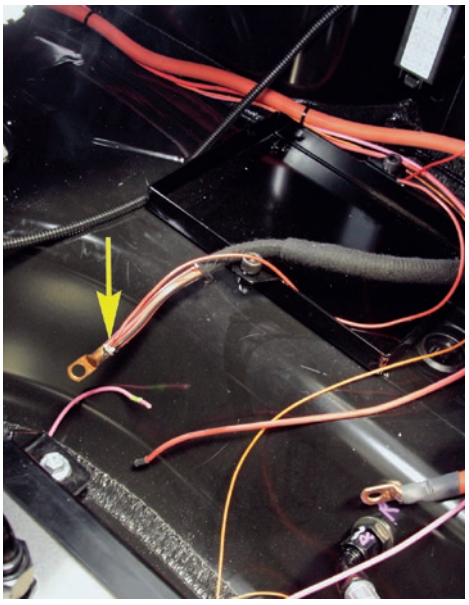


That heavier-gauge purple wire normally feeds the production Camaro's rear defroster. The wire is now re-tasked to power, in the case of 427 COPOs, the Meziere electric water pump via the blue wire seen here. On the supercharged 327's, this purple wire is instead used to power the intercooler pump. As noted, both are activated by the new panel's pump switch.



With the splicing and heat-shrinking complete, the harness connector is now secured in place in its corner of the power distribution box, and various grounds are connected ...



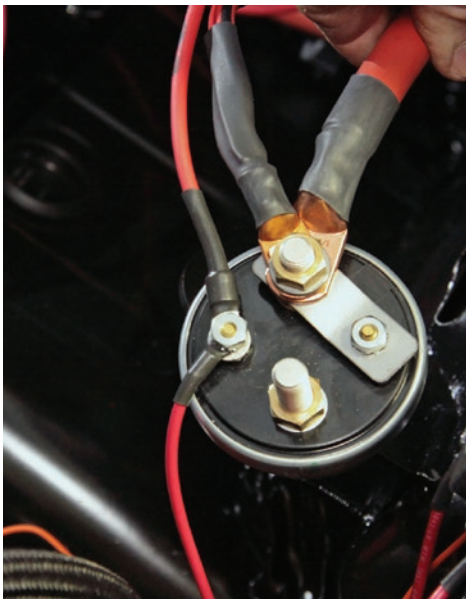


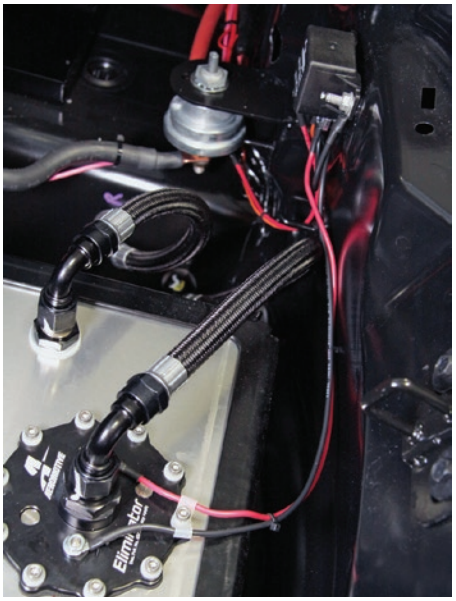
... and the PDB's breaker panel is set in place on top, completing – and protecting – the circuits between the trio of harnesses beneath. Our arrow here points to the red power feed from the alternator, a branch from which also routes back to the trunk-mounted master switch.

So let's go back to the trunk to check out some of the critical wiring there. We're looking into the right rear corner here at the #2-gauge battery cable, and the red (alternator), pink (power window) and orange (fuel pump switch) wires coming through from the cabin. The arrow is pointing to a new connector merging a couple wires from a factory wiring harness with a new red power wire that will feed the new trunk-mounted voltmeter, as seen in the next photo.

That voltmeter will show at a glance the battery status once the trunk-mounted master switch is turned on. So let's have a look at the master …

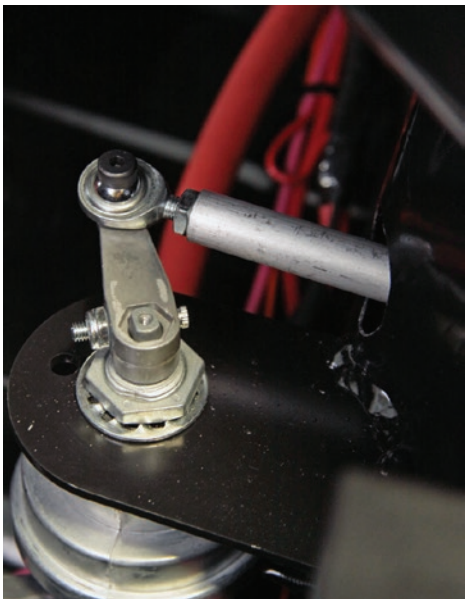
The main switched terminal – the downstream side – on the master has the COPO's #2 gauge cable attached, as well as the aforementioned connector that merges the factory harness power leads and the voltmeter lead.





The smaller switched terminal carries the alternator lead, as well as a power supply wire for the fuel pump relay vaguely visible on the right of the photo. The other large terminal will obviously host the battery positive cable.

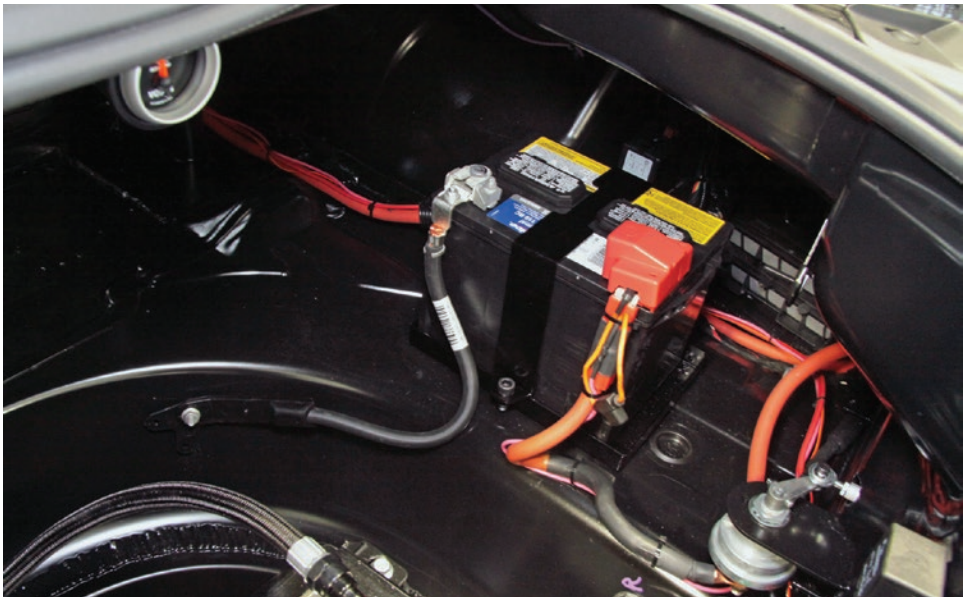
That relay is triggered by the orange wire from the fuel pump dash switch, and powers the in-tank pump, as seen here.



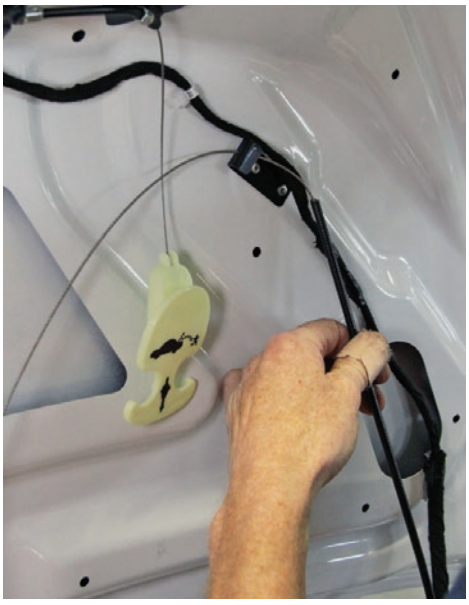
The pink lead to feed the power window circuit is wired (with an inline fuse) directly to the positive battery terminal, thereby bypassing the master switch and sending full-time power to those windows.

The master's actuating lever is installed and connected to the push-pull rod that exits out through a hole in the rear fascia…

... looking something like this.



With the battery eventually installed in its mount, the trunk's completed power circuitry will look something like this, with the negative cable grounded to a stud mounted in the trunk well.



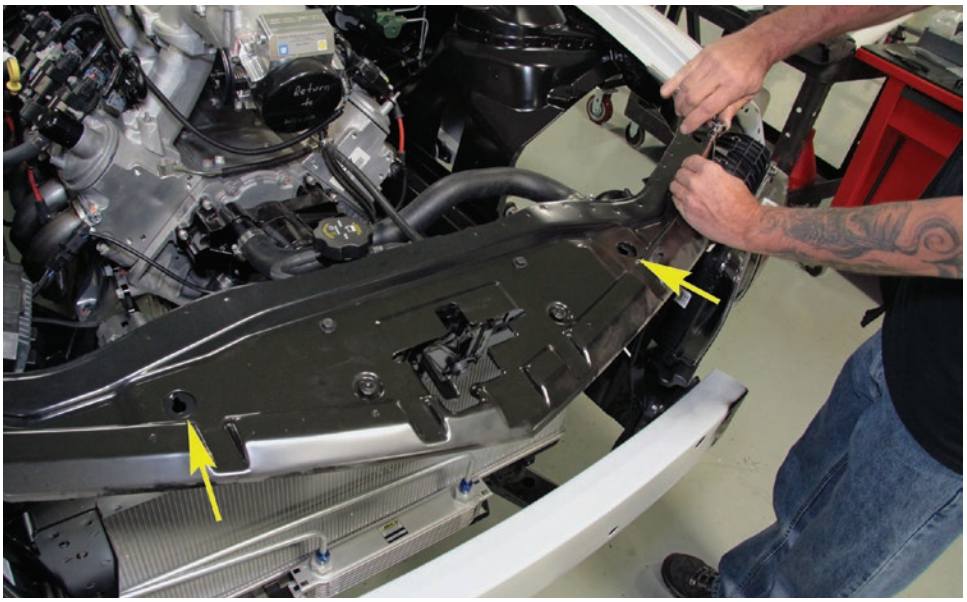
Still in the trunk, remember that manual trunk release cable that was mounted earlier inside the fuel filler door? It now gets connected to the actual release mechanism in place of the inside-the-trunk release lanyard seen dangling here. The ends of the two cables visible here get cut off ...

... and joined together with a small cable clamp.

Wrapping up the trunk area, remaining harnesses are connected, the plastic taillight close-out panels are push-pinned in place, the production rear spoiler is bolted on, and the underside trim pad is installed using push pins.

Meanwhile, brake fluid has been added and the brakes bled, and now attention turns to the front of the car, where the very same set of fenders originally unbolted from the body-in-white way back at the beginning of the build process are bolted back on.

Next, the production Camaro headlight assemblies are connected and bolted in.

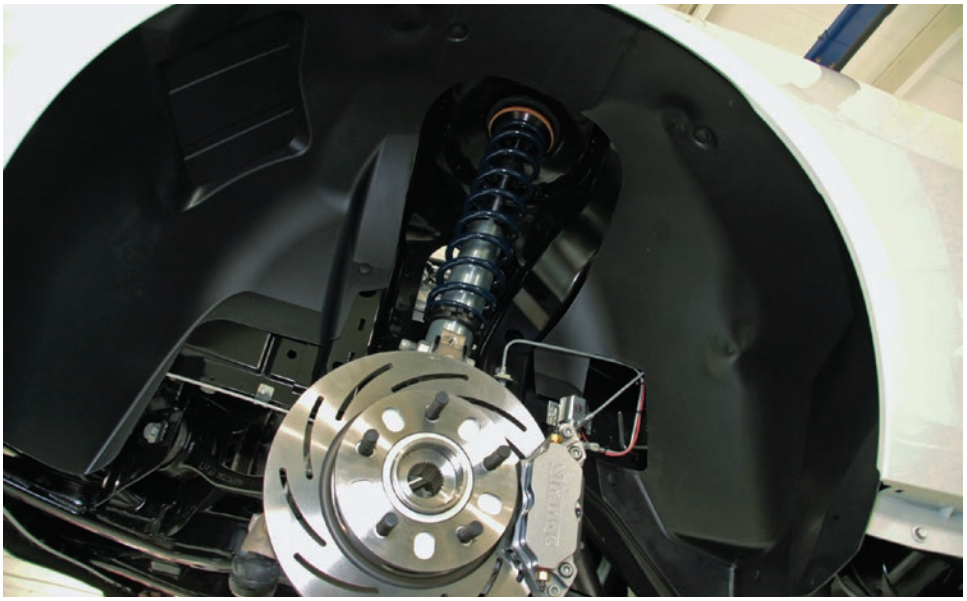


The hood latch and release cable are now installed, followed by the fascia top close-out panel seen being bolted in place here. A couple rubber hood bumpers will also go in at the arrowed places.

Then, a production Camaro SS fascia mounts with its factory collection of clips and fasteners. Note the "SS" badge beside the parking light ...

... it will shortly be removed in favor of this much more suitable replacement.

Next to go in are the production front wheelwell liners which, like so many other modern trim pieces, attach by way of clips and a few fasteners.



The only thing of particular note on the liners is that the driver's side has been trimmed to clear the brake lines and wiring of the Hurst line-lock solenoid.

Which brings us, at long last, to the COPO's rolling stock package of 15x10 rear rims mounting 9.0/30.0R-15 Lightweight Radial Hoosiers, and 28.0x4.5 Hoosier Drag Fronts on 15x3.5 rims.

The rims are from Bogart, have forged outer rings and billet centers, and all carry unique "COPO" lettering on a spoke.

Seen here on a 327/4.0L COPO about to leave the same build station, having the rims and tires onboard visually brings the Camaro that much closer to completion, as it now moves ahead to receive its interior and other trim pieces.

[CHAPTER 8]

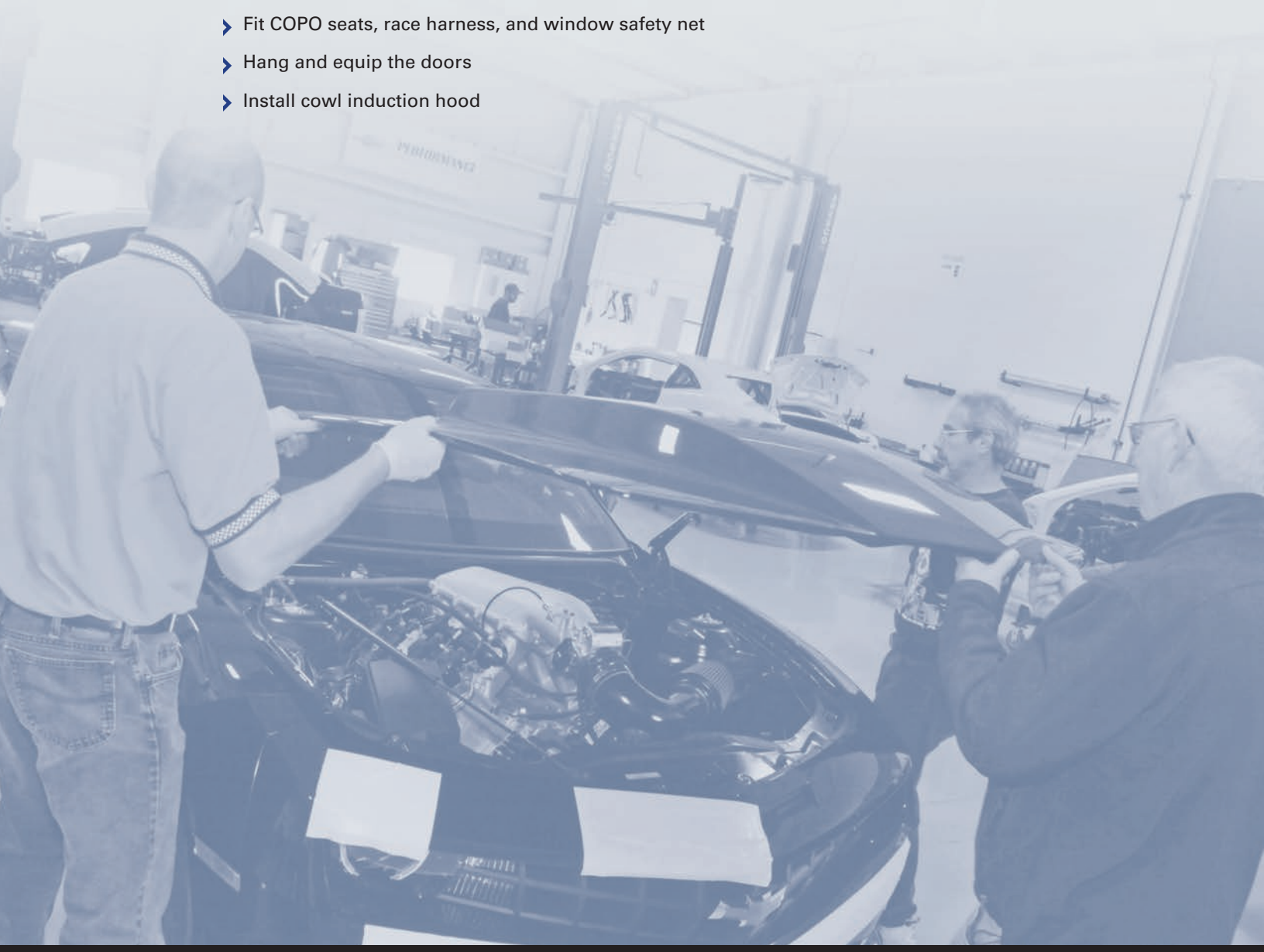
INTERIOR AND FINAL ASSEMBLY

As suggested by their very names, NHRA Stock and Super Stock classes require entrants to forego the stripped-and-gutted tuna-can cockpit look in favor of finished and upholstered, near-stock interiors. Aside, then, from the necessary roll cage and other race-specific hardware like the gauges, switch panel, shifter, seats, and 5-point seat harness, the 2012 COPO shares most of its interior finish trim with the production Camaro. Except for the lack of a rear seat, that is.

That interior is installed at this, the final build station, as are the doors, the windshield and backlight, along with the door glass and window trim. And let's not forget the menacing cowl-induction hood which is about the last major piece to come on as another COPO nears the end of the production line. When it leaves this station, the 2012 COPO Camaro is just about ready to roar to life for the first time.

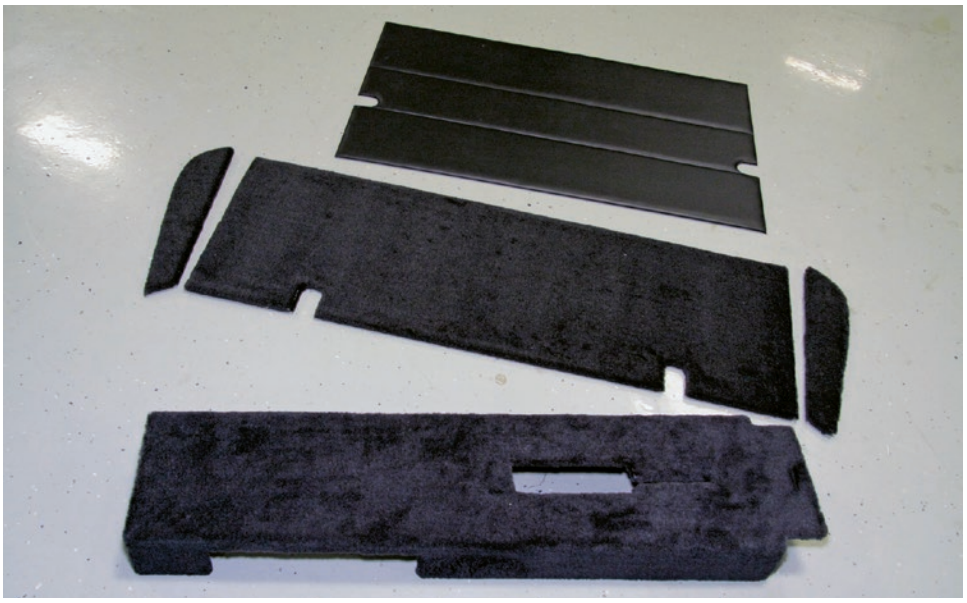
IN THIS CHAPTER:

- Trim the interior
- Install front and rear glass
- Fit COPO seats, race harness, and window safety net
- Hang and equip the doors
- Install cowl induction hood



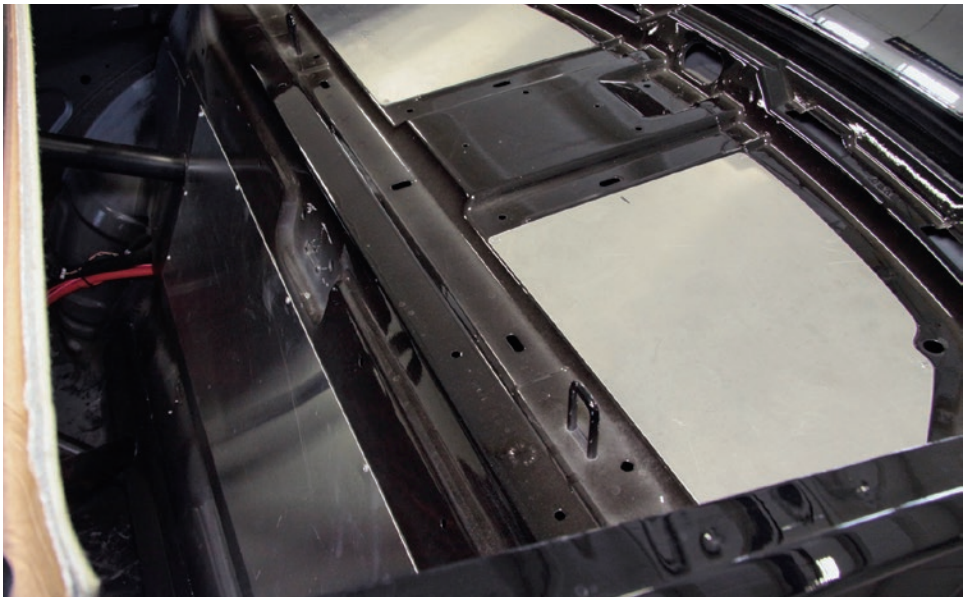
As you can imagine, the build process can get a bit messy, what with metal shavings, remnants of stripped wire or insulation, and just plain old dust gathering throughout the various construction/assembly steps. Every build station along the way makes an effort to clean up after itself but, before the interior installation gets underway, the cabin and trunk areas receive a thorough vacuuming and a dust wipe-down.

This is just a partial sampling of some of the Camaro production interior trim panels used in the COPO, most of which simply clip in place, and all of which can, of course, be acquired new through your local Chevy Dealer, or used through wrecking yards or online sources. Plastic cabin trim may not be the first thing that comes to mind when building a drag car, but a near-factory interior is a requirement in Stock or Super Stock competition.

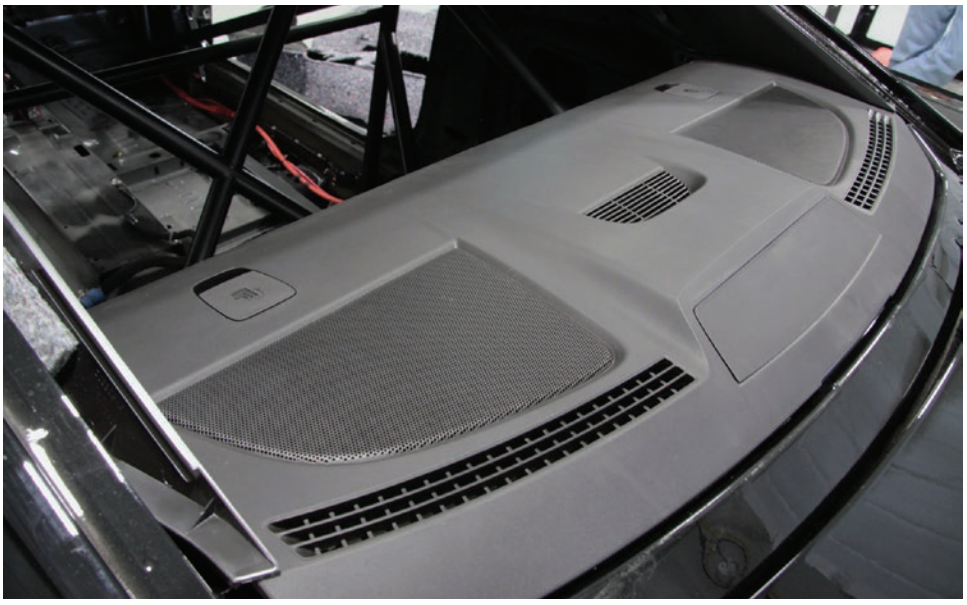


Some interior trim, however, is custom made for the COPO. Its carpet-covered console is shown at the bottom, while above it are the rear-seat-delete finish panels, the lower of which is also carpeted, with the upper panel being trimmed in vinyl. This kit is available through COPO Parts Direct.

Among the first trim to go on are the A-pillar trim panels, a snap-in process that is made particularly simple without a windshield in the way.



Looking down through the back window, this is just a reminder of the aluminum panels that have been riveted into the COPO to act as a complete bulkhead between the trunk and the cabin, in compliance with NHRA rules.



This area looks a lot better with the Camaro's production parcel shelf trim panel installed over the top.

Next on are the C-pillar trim (yellow arrow) and rear quarter window trim. Again these are regular production parts that for the most part just snap in place.

The production Camaro carpet – with jute backing – now gets wrestled in place, and trimmed as necessary to clear the roll cage structure. As previously mentioned, cars early in the COPO build run did not have the jute backing, and therefore had a shorter shifter pedestal beneath the Quarter Stick.

With carpet trimmed and tucked, the COPO's new sheetmetal-framed console comes onboard. For easy removal, it just sits atop the transmission tunnel with its side tabs squeezing the tunnel for a friction fit. You can see in this shot how the shifter now sits at just the right height.

Speaking of the shifter, its aluminum trim plate can now go on.

Each side's lower rear-quarter trim is next but, because of all the roll cage tubing, the easiest way to squeeze these large panels in is through the back window opening.

See what we mean? Note the bubble wrap on the roll cage to protect its finish as the panels are negotiated into place.

Once again, this panel primarily clips in place. At its lower/forward edge it will be overlapped by the sill/carpet-retainer trim. Up in the front footwells, the kick-panel trim can also be snapped in place now that the carpet is in.

Above the side window openings, the drip rail molding rivets in place.

Followed by the plastic instrument panel close-outs on either end of the dash, and the rubber door seals that surround the perimeter of the door openings.

Door striker plates are now bolted on.

Finishing off the door openings, the sill/carpet retainer trim is clipped in along the rocker areas.

The COPO-specific rear seat delete trim is now fitted using Velcro along its outboard edges. Not yet installed in this photo, a carpeted trim panel will finish off the remaining bare floor area visible here.

The COPO is fitted with a pair of reclining race buckets, with carbon-fiber-look accents and custom "COPO" lettering on the seatback. These are available through MPR.

More details of the seat configuration can be seen here. The COPO's driver side bucket also gets a set of RJS 5-point race harnesses. The inboard lap belt attaches to the lug (arrow) welded in place way back at the fabrication stage (the outboard belt bolts to a tab on the cage structure). A matching passenger seat is also installed, though without any race harness.

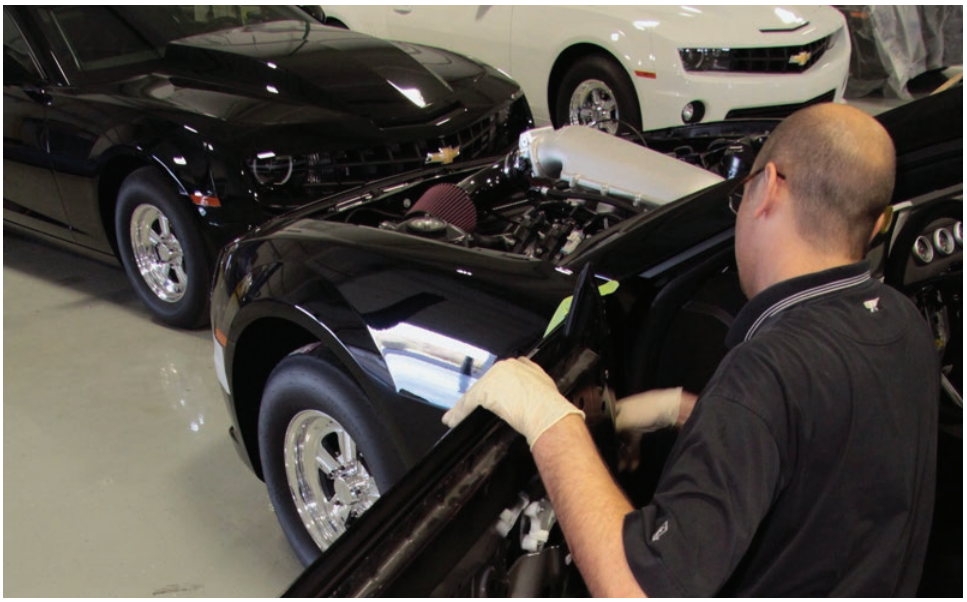
A production Camaro steering wheel is then bolted on its shaft. But, no, despite all the buttons you can't initiate hands-free phone calls from your COPO steering wheel.

BEFORE

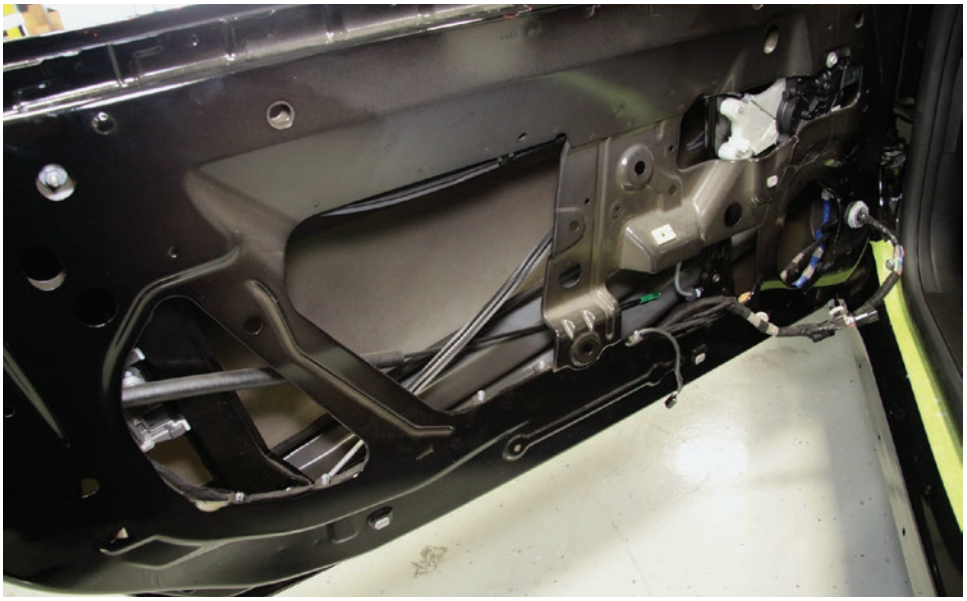
AFTER

And when the steering wheel hub goes on, its air bag module seen here in the "before" image will have been removed.

About now, the windshield and backlight glass are bonded and sealed in place using urethane – the same process used at the factory.



With the interior pretty much buttoned up, the original doors are now re-hung. As they arrived on the body-in-white, these doors were empty metal shells …



… and so must be kitted out with the internal window and latch/handle hardware, along with the window electrical harnesses. As previously noted, the COPO retains full power window function, but not power locking.

The side window glass is now set into the installed tracks. The battery visible on the floor is connected to a remote switch allowing the technician to raise and lower the window for fitment.

On the exterior, these “ditch moldings” are set in place on the roof, and the area beneath the doors is finished off with rocker panel trim.

Once the side glass is in, the inner and outer seal/wiper strips are clipped on ...

... the side mirror plastic trim plates are secured...

... and the mirrors themselves are bolted on.

The production rubberized door seal sheets are stuck on the doors, and harness connections are made on the door trim panel before clipping it in place …

… giving the COPO interior a rather dressy look for a quarter-mile warrior. That said, not only is there no power door lock function, but the internal lock hardware itself is not even installed.

Wrap up steps for the interior include installing the ignition lock in the column, hanging the RJS window safety net and putting some NHRA-mandated padding (not yet installed here) on the roll cage in the vicinity of the driver's head.

The last big piece of the COPO body puzzle is its composite cowl-induction hood (Chevrolet Performance P/N 22950678) which bolts onto the factory hood hinges and provides plenty of clearance for all three induction systems. It also provides just the right attitude.

Just visible in the last shot connected to a bracket atop the strut tower, the hood even gets a telescoping support rod.

The underside of the hood – finished in matte black and unmistakable in its markings – is just as cool as the top side.

FINISHED INTERIOR

[CHAPTER 9]

GETTING READY FOR DELIVERY

All these man-hours and materials have finally morphed into a real Bowtie race car, now missing only some vital fluids, chassis adjustments, finishing touches, and final inspection before it can be delivered for a date with dragstrip destiny in the hands of its new owner.

Still, this final preparation can't be rushed, and every COPO must pass the scrutiny of a pre-delivery checklist – and some operational tests – before the keys change hands. Let's wrap this thing up ...

IN THIS CHAPTER:

- Underbody audit and initial chassis setup
- Top up fluids
- In-car engine and transmission test run
- Final detailing and stripe installation

Even at this stage, the COPO is not quite done with hoists, but this final one is a roll-on version where the Build Center's "underbody audit" takes place. Among other things, this entails a thorough inspection of fasteners, checking for leaks and correct delivery tire pressures, and performing an initial chassis setup.

After tire pressures are set (relatively high for delivery) the rear axle assembly is measured to ensure it is laterally centered under the car. Any necessary adjustment is done by altering the length of the Panhard bar. Once the axle is centered, the Panhard's jam nuts are tightened down.

Next, ride height is checked. As-delivered COPO front ride height varies somewhat between the naturally aspirated and supercharged engines, but targeted rear height is 8.5 inches (as shown).

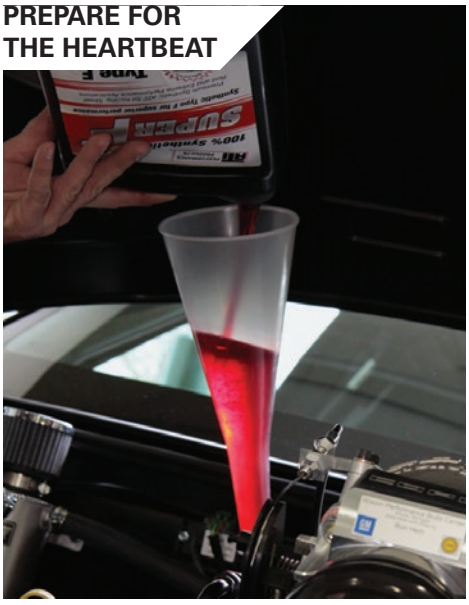
NOTE: *All suggested initial suspension settings are detailed in the COPO User's Manual found in the Appendix of this book.*

Ride height adjustment is made via the threaded spring perches on the coil-over dampers. The appended COPO User's Manual also specifies the as-delivered damper compression and rebound settings. Also notice the paint daubs, indicating the fasteners have been torqued to proper specs.

With ride height verified, the pinion angle is then set by adjusting length of the upper control arms. The as-delivered pinion angle is set at -2.3 degrees. All adjustments are made with the anti-roll bar links loosened so there is no pre-load.

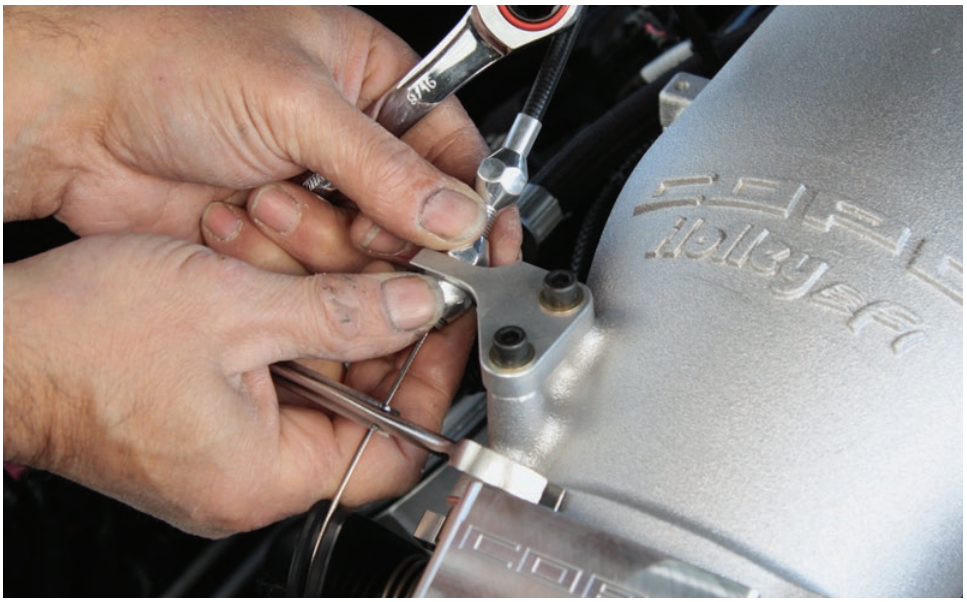
Up front, initial toe-in is adjusted to 3/16 of an inch, and that's about it for the underbody audit.

PREPARE FOR THE HEARTBEAT



Fluid time. Both the transmission and the cooling system (including the intercooler on blower cars) are juiced up. Late-season deliveries received a 50/50 coolant mix of water and RV antifreeze, in case they were headed directly into winter storage.

We're edging ever closer to engine start, but first, some race fuel is added to the cell, and fuel pressure is adjusted at the regulator. The setting is 90 psi for the 427 engine or 70 psi for the blown 327's.



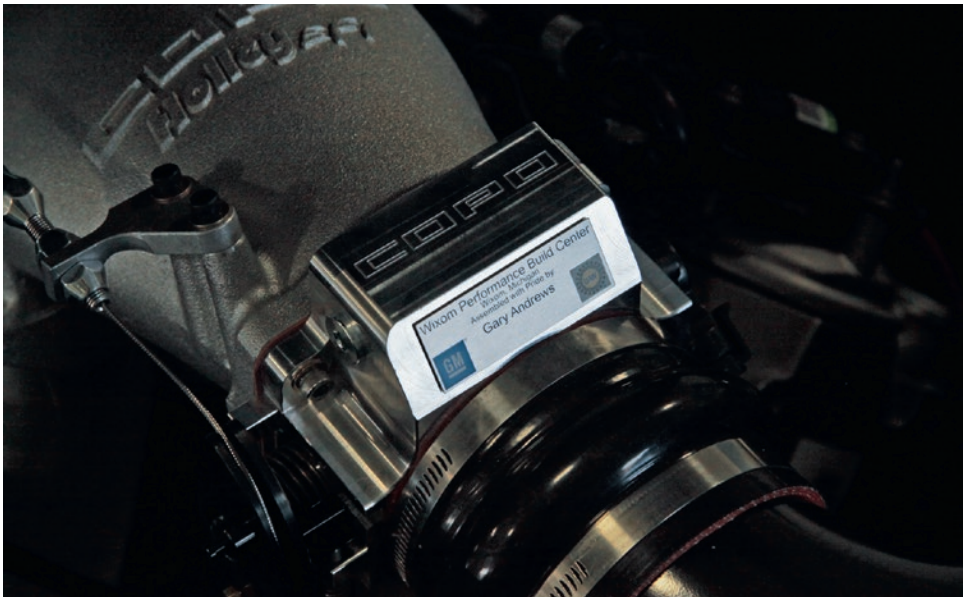
With an assistant in the driver's seat, each car's throttle cable is adjusted to ensure complete opening of the throttle blade.

Time to go loud. The moment of truth finally comes as each COPO is rolled outside for engine start, propped up on axle stands so full transmission function can also be verified. During the tests, a laptop is plugged into the OBDII port in the glove-box to monitor readings.

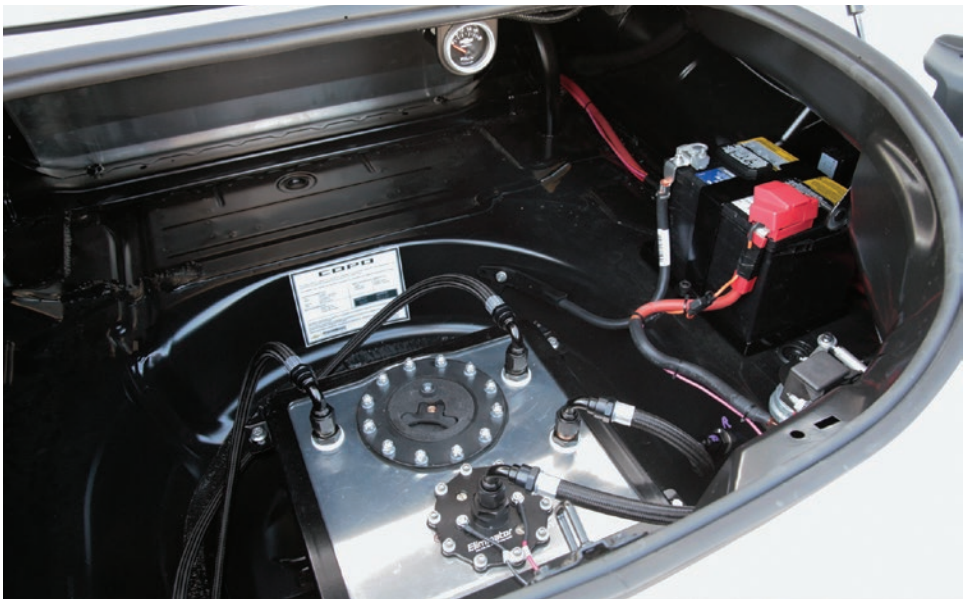
An infrared temp sensor is used for a quick reading of individual exhaust primaries to verify function of each cylinder.

DETAILS, DETAILS

With test run complete, the COPO then comes back inside for finishing touches, none of which will make it any quicker, but will certainly add to its unique personality. Among these touches is this subtle but meaningful badge that goes in place on the fascia top close-out panel, just to the left of the hood latch.



Each of the sixty-nine 2012 COPO engines also bears a plate with the name of the builder or car owner who assembled its long-block at the Wixom Performance Build Center.



A second peel-and-stick certificate of authenticity, identical to the one put in place before the headliner went in, goes on the front of the trunk well on each 2012 COPO.

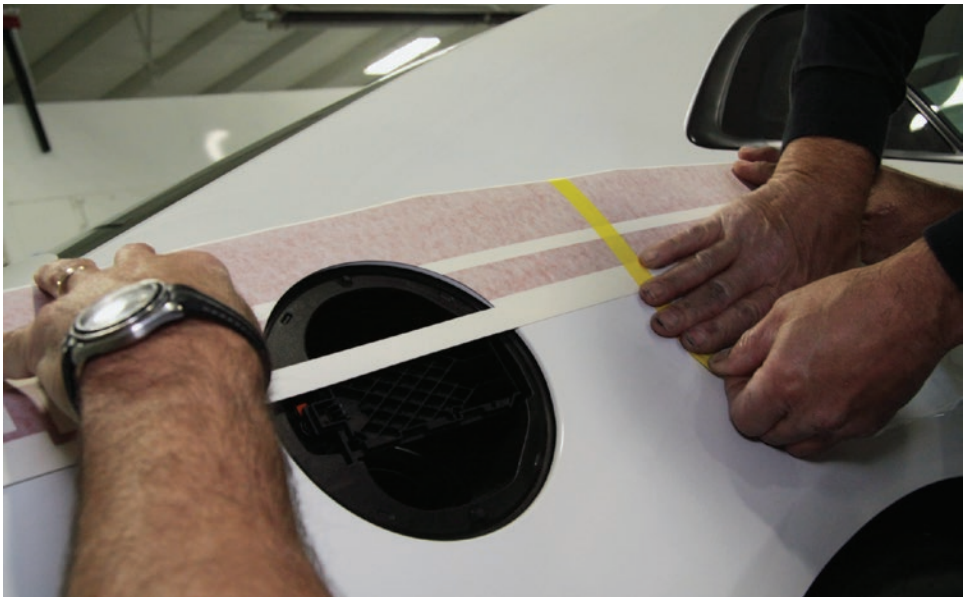
Prior to delivery, every factory COPO is detailed inside and out and, in the case of those receiving stripes, the relevant areas on the hood and rear quarter panels are wiped down with wax and grease remover.

SOME GRAPHIC CONTENT

If ordered (and most, but not all 2012 COPO buyers opted for them) the optional reflective graphics (as found in the 2013 Chevrolet Performance catalog) are about the last step in a COPO build. Proper positioning is critical as they are installed dry at the COPO Build Center. The long rear quarter stripes are taped in place at about their mid point and then the backing paper is peeled one side at a time to lay down the stripe.

The stripes come with these template cuts that reference rear body lines to greatly aid initial alignment.

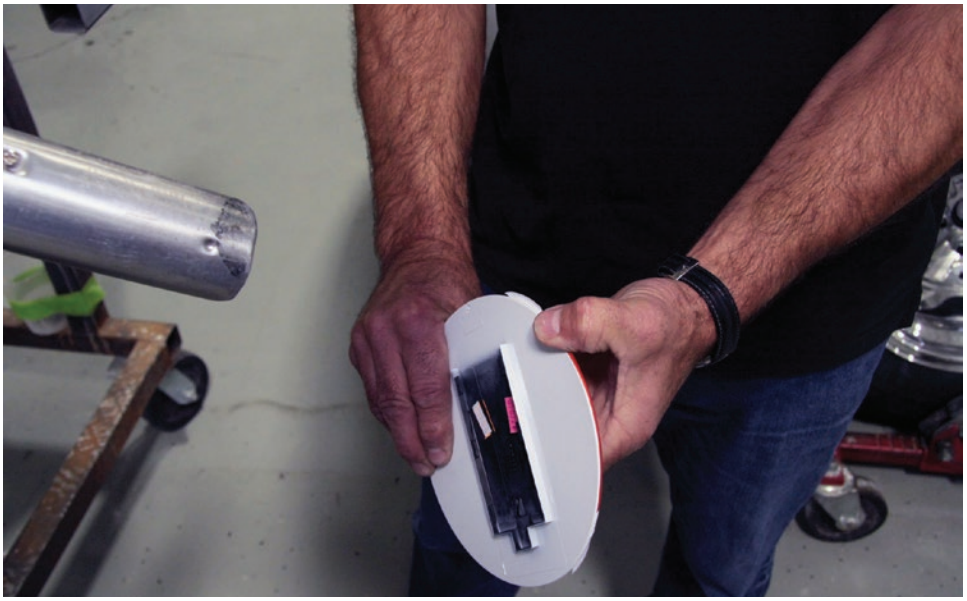
With the stripes on, it's important to remove the top waxy paper by pulling it parallel to the panel – not pulling perpendicularly away, which can lift the graphic and spoil the day.



Stripe positioning around the fuel filler opening needs particular attention. Note this is done with the filler door removed, as the graphic has a separate piece for it. A key item is to position the stripe so there is just enough material to wrap into the upper perimeter of the filler opening, as seen in the next photo.

Here, a heat gun has been used to carefully work the graphic around the lip of the opening.

Then the filler door is temporarily slid back on so its stripe section can be aligned with the surrounding graphic, and pressed down in place.



The tube you see at the left of this shot is the nozzle of a heat gun. A good tip is that, as it warms, the vinyl of the graphic is drawn towards the heat source, so having the back side of the door towards the heat helps the vinyl wrap itself around the lip of the fuel door.

ALL DRESSED UP WITH SOMEWHERE TO GO

And with that, our build story ends, as another 2012 COPO awaits delivery in front of a trio of others already wrapped in their "COPO"-imprinted car covers. Automotive history has been made once again and we hope interested readers are now inspired to make some history of their own – a quarter-mile at a time.

COPO SPECIFICATIONS

GENERAL INFORMATION:

- NHRA horsepower ratings:
  - 327 / 4.0L supercharged – 550
  - 327 / 2.9L supercharged – 500
  - 427 Naturally aspirated – 425
- NHRA shipping weights:
  - 327 / 4.0L – 3175 lbs
  - 327 / 2.9L – 3250 lbs
  - 427 / N/A – 3195 lbs
- Specs for 3-speed auto and manual transmissions submitted
  - NHRA for use in Stock and Super Stock classes
- Recommended max engine RPM – 7500

CHASSIS:

- Chromoly cage • NHRA certified to 8.50 ET
- Sub-frames tied together
- Front engine cradle modified to accept additional oil pan clearance
- Rear sub-frame modified to accept unique COPO–NHRA Stock Eliminator suspension

REAR SUSPENSION:

- 4-bar with adjustable top links
- Adjustable Panhard link
- Double-adjustable Strange Engineering coil over shocks
- Anti-roll bar

FRONT SUSPENSION:

- Adjustable Strange Engineering coil over struts
- Sway bar removed

STEERING:

- Production steering gear modified for manual (non-assist) operation

BRAKES:

- Lightweight vented rotors
- Billet 4-piston lightweight calipers
- Lightweight tandem master cylinder
- OEM pedal modified to mount master cylinder
- All components provided by Strange Engineering

WHEELS:

- Bogart Racing lightweight with unique COPO logo
- Forged outer ring
- Billet center
- 15" x 10" rear – 5/8" studs
- 15" x 3.5" front – 1/2" studs
- 3.875" Back Spacing
- 4 3/4" bolt circle pattern

TIRES:

- Rear – 9.0 / 30.0R – 15 94.0" Radial
- Front – 4.5 / 28.0 – 15 Drag only

GEARS & AXLES:

- Strange Engineering 9" aluminum center section
- Lightweight steel spool
- Strange 9310 alloy
  - 327 / 2.9L and 427 – 4.29:1 ring & pinion set
  - 327 / 4.0L – 4.10:1 ring & pinion set
- Strange Engineering 35-spline axles
- Strange Engineering chromoly yoke

DRIVE SHAFT:

- 4" OD x .125" wall 6061-T6 aluminum tube
- Chromoly end caps
- Forged chromoly slip yoke
- Heavy-duty 1350 universal joints

TRANSMISSION:

- ATI Racing Products "Pro Glide"
  - SFI-approved ATI "Super Case"
  - 1.80 ratio – 9310 straight cut gear set
  - Precision balanced carrier with 4340 tool steel output shaft
  - Turbo spline input shaft:
    - 327 / 4.0L – Vasco material
    - 327 / 2.9L and 427 – 300M material
  - 7-clutch high gear pack
  - Billet clutch hub
  - High flow front pump with heat-treated pinned stator tube
  - Deep aluminum pan
  - Hard Chrome Rings
  - Fluid overflow catch can

TORQUE CONVERTER:

- ATI Racing Products "Treemaster MRT" Series
  - 327 / 4.0L – 9" diameter housing
    - Furnace brazed impeller and turbine fins
    - Precision pump drive tube
    - Heavy duty needle bearings
    - 22 element sprag with dual cage construction
  - 327 / 2.9L and 427 – 8" diameter housing
    - Furnace brazed impeller and turbine fins
    - Precision pump drive tube
    - Heavy duty needle bearings
    - Investment Cast Cover

SHIFTER:

- Hurst "Quarterstick" – 2-spd. automatic
  - Forward pattern
  - Built-in neutral safety switch
  - Lightweight aluminum cover

COPO SPECIFICATIONS

327 ENGINE:

- Chevrolet Performance "LSX" cast iron block with steel main caps
- 4.065" bore x 3.150" stroke
- Static compression ratio – 10:1 nominal
- Callies 4340 crankshaft – double-keyed snout
- Callies 4340 H-beam "Ultra" rods
  - 6.350" C-C length
  - .928" pin bore diameter
- Clevite H-Series heat-treated tri-metal rod & main bearings
- Mahle 2618 alloy forged domed pistons
  - Grafal coating
  - Hard-anodized top ring groove
  - Friction-coated skirts
- Mahle .043" x .043" x 3mm piston rings
  - Ductile iron top with radius molybdenum face
  - Plain cast-iron tapered 2nd
  - Chrome-plated oil rails with low-tension expander
- Comp Cams steel billet hydraulic roller camshaft
  - Duration – 246° IN / 254° EX @ .050" lift
  - Theoretical valve lift - .630" IN / .630" EX
  - Lobe centers – 117°
- Valvetrain:
  - Chevrolet Performance "Ceramic Ball" high-RPM hydraulic roller tappets
  - 3/8" diameter LS7 pushrods
  - 1.8:1 ratio LS7 rocker arms with roller trunnions
  - PSI "Max Life" beehive valve springs
  - Hardened steel spring seats
  - Lightweight steel retainers
- Fully CNC'd aluminum cylinder heads – based on LS7
  - 275cc nominal intake port volume
  - 89cc nominal exhaust port volume
  - 70cc nominal combustion chamber volume
  - Del West titanium intake valves – 2.205" head diameter x 7mm stem
  - Lightweight sodium-filled exhaust valves – 1.615" head diameter x 7mm stem
- Fel-Pro Performance multi-layer steel head gaskets with raised cylinder sealing bead
- Internal wet sump oil pump
- Deep-sump cast aluminum oil pan – 6-quart capacity
- ATI Performance Products SFI-approved damper – 10-rib shell
- Whipple twin-screw supercharger
  - 327 / 550 – 4.0L
  - 327/ 500 – 2.9L
- Whipple billet throttle body
  - 327 / 550 – 172mm oval blade
  - 327 / 500 – 109mm round blade
- Headers:
  - 2" x 30" primary with 30" merge collectors
  - 304 Stainless Steel

427 ENGINE:

- Chevrolet Performance LS7 aluminum block
- 4.125" bore x 4.00" stroke
- Static compression ratio 13:1 nominal
- Callies 5140 crankshaft
- Callies 4340 H-beam rods
  - 6.100" C-C length
  - .928" pin bore diameter
- Clevite H-Series heat-treated TriMetal rod & main bearings
- Mahle 2618 alloy forged domed pistons
  - Grafal coating
  - Hard-anodized top ring groove
  - Friction-coated skirts
- Mahle .043" x .043" x 3mm piston rings
  - Ductile iron top with radius molybdenum face
  - Plain cast iron tapered 2nd
  - Chrome-plated oil rails with low-tension expander
- Chevrolet Performance steel billet hydraulic roller camshaft
  - Duration – 233° IN / 276° EX @ .050" lift
  - Theoretical valve lift – .630" IN / .630" EX
  - Lobe centers – 107°
- Valvetrain:
  - Chevrolet Performance "Ceramic Ball" high-RPM hydraulic roller tappets
  - 3/8" diameter LS7 pushrods
  - 1.8:1 ratio LS7 rocker arms with roller trunnions
  - PSI "Max Life" beehive valve springs
  - Hardened steel spring seats
  - Lightweight steel retainers
- Fully CNC'd aluminum cylinder heads – based on LS7
  - 275cc nominal intake port volume
  - 89cc nominal exhaust port volume
  - 70cc nominal combustion chamber volume
  - Del West titanium intake valves – 2.205" head diameter x 7mm stem
  - Lightweight sodium-filled exhaust valves – 1.615" head diameter x 7mm stem
- Fel-Pro Performance multi-layer steel head gaskets with raised cylinder sealing bead
- Internal wet sump oil pump
- Deep-sump cast aluminum oil pan – 6-quart capacity
- ATI Performance Products SFI-approved damper
- Meziere billet electric water pump
- Chevrolet Performance / Holley "Hi Ram" intake manifold
- Whipple billet throttle body – 102mm blade
- Headers:
  - 2" x 30" primary with 30" merge collectors
  - 304 Stainless Steel

SPECIFICATIONS CONTINUED

FUEL SYSTEM:

- Aeromotive "Eliminator" fuel pump – free flow rating = 800 lb/hr
- Aeromotive A1000 pressure regulator with manifold pressure compensation capability
- Aeromotive 10-micron high-flow filter
- Light-weight black nylon braided -8 AN hoses
- Black anodized aluminum -8 AN hose ends and fittings
- Fuel Pressure:
  - 327 – 70 PSI Base (1 to 1 boost compensation used for supercharged engines)
  - 427 – 90 PSI Base
- High-impedance fuel injectors
  - 327 / 550 – 105 lb/hr @ 43.5 psi with EV1 connector
  - 327 / 500 – 80 lb/hr @ 43.5 psi with EV1 connector
  - 427 / 425 – 42 lb/hr @ 58 psi with EV6 / USCAR connector

ENGINE CONTROLS & IGNITION:

- Delco MEFI 5A electronic fuel injection processor
  - Speed density operation
  - Interfacing software & hardware available in the aftermarket
- Cable-actuated throttle
- Production LS7 ignition coils
- Production LS7 secondary wires
- GM sensors

ELECTRICAL:

- Dash-installed control switches:
  - Starter
  - Ignition
  - Fuel pump
  - Cooling fan
  - Intercooler pump/water pump, depending on engine package

GAUGES:

- Autometer with gold "Bowtie" logo on dials:
  - 5" 10K RPM tach with shift light
  - Electronic water temp with 2 1/16" face and 100°- 260°F range
  - Electronic trans temp with 2 1/16" face and 100°- 260°F range
  - Electronic oil pressure with 2 1/16" face and 0 - 100 psi range
  - Electronic fuel pressure with 2 1/16" face and 0 - 100 psi range
  - Voltmeter with 2 1/16" face and 8 – 18v range

SAFETY:

- RJS Safety Equipment 3" driver restraints
- RJS Safety Equipment window net

COPO 327– 2.9L VEHICLE TECHNICAL SPECIFICATIONS REQUIRED FOR CLASSIFICATION

VEHICLE PARAMETERS: STOCK

Vehicle Manufacturer: Chevrolet
Model Name: COPO Camaro
Model Year(s): 2012
Wheelbase: 112"
Shipping Weight: 3250
Body Style (2 door, etc.): 2 door Coupe

ENGINE PARAMETERS: STOCK

SAE Max Horsepower: 500
Max Torque: 450
Fuel Tank/Cell Capacity: 5 US Gal.
Engine Location (frt, mid, rear): frt
Number of Cylinders: 8
Displacement (cid): 327
Compression Ratio (max): 11.15

CYLINDER BLOCK:

Block Material: Iron
Casting Number: 19212322
Block Deck Height (min): 9.220"
Deck Clearance (min): 0.010" above deck
Cylinder Bore (max): 4.065"
Piston Stroke (max): 3.150"
Main Bearing Housing Diameter: 2.751"

CYLINDER HEAD:

Head Material: Aluminum
Casting Number: 12578452
Head Part Number: 17802818
Combustion Chamber Volume (min) (cc): 66
Compressed Gasket Thickness: 0.051"
Runner Volume:
Intake: 280cc
Exhaust: 95cc

VALVE SYSTEM:

Number of Valves per Cylinder:
Intake: 1 **Exhaust:** 1
Valve Head Diameter (max):
Intake: 2.205" **Exhaust:** 1.615"
Valve Material: Titanium, Steel
Valve Spring Type: Conical (beehive)
Valve Actuation Type (pushrod, finger follower, etc.): Pushrod

ENGINE INTERNALS:

Piston Type:
Flat:
Dish Depth:
Dome Height: 0.165"
Piston Mass (min): 504 g
Connecting Rod Length (Center to Center): 6.350"
Connecting Rod P/N: 17802816
Connecting Rod Material: Steel
Connecting Rod Big end Diameter: 2.225"

ENGINE INTERNALS CONTINUED

Connecting Rod Small end Diameter: .928"
Connecting Rod Mass: 638 g
Piston, Pin, Rod & Ring(s) Mass (min): 1298 g
Crankshaft P/N: 17802815
Crankshaft Mass (min): 47 lbs
Crankshaft Rod Journal Diameter: 2.100"
Crankshaft Main Journal Diameter: 2.559"
Camshaft ID #: 54-000-11
Camshaft P/N: 17802829
Location/# of Camshafts: 1 cam in block
Lift @ Lobe (max):
Intake: 0.356" **Exhaust:** 0.356"
Lift @ Valve (max):
Intake: 0.641" **Exhaust:** 0.641"
Rocker Arm Ratio: 1.8
Tappet Type: Hydraulic roller

INTAKE MANIFOLD:

Type of Induction System: 2.9L Whipple Supercharger
Supercharger Part Number: 17802813
Manifold Material: Aluminum
Casting Number: WHPL-LS7-R1
Manifold Part Number: 17802811
Location of Injectors: Above int. to head mating point
Number of Injectors per Cylinder: 1
Throttle Body Bore Dia. (max): 4.295"
Throttle Body Part Number: 19300083
Crank Pulley Diameter (max): 8.00"
Supercharger Pulley Diameter (min): 3.75"

DRIVETRAIN

TRANSMISSION:

Number of Forward Speeds: 2
Manufacturer: GM/ATI
Gear Ratios:
1st: 1.80 2nd: 1.00 3rd: 4th: 5th: 6th:

Number of Forward Speeds: 3
Manufacturer: GM/Tremec
Gear Ratios:
1st: 2.52 2nd: 1.52 3rd: 1.00 4th: 5th: 6th:

Number of Forward Speeds: 6
Manufacturer: GM/ATI
Gear Ratios:
1st: 3.01 2nd: 2.07 3rd: 1.43 4th: 1.00 5th: .84 6th: .57

FINAL DRIVE:

Differential Type:
Open: **Limited Slip:** x
Differential Manufacturer: GM/Strange
Axle Ratio: 4.29
Ring Gear Outside Diameter: 9"

COPO 327– 4.0L VEHICLE TECHNICAL SPECIFICATIONS REQUIRED FOR CLASSIFICATION

VEHICLE PARAMETERS: SUPER STOCK

Vehicle Manufacturer: Chevrolet
Model Name: COPO Camaro
Model Year(s): 2012
Wheelbase: 112"
Shipping Weight: 3175
Body Style (2 door, etc.): 2 door Coupe

ENGINE PARAMETERS: SUPER STOCK

SAE Max Horsepower: 550
Max Torque: 450
Fuel Tank/Cell Capacity: 5 US Gal.
Engine Location (frt, mid, rear): frt
Number of Cylinders: 8
Displacement (cid): 327
Compression Ratio (max): 11.15

CYLINDER BLOCK:

Block Material: Iron
Casting Number: 19212322
Block Deck Height (min): 9.220"
Deck Clearance (min): 0.010" above deck
Cylinder Bore (max): 4.065"
Piston Stroke (max): 3.150"
Main Bearing Housing Diameter: 2.751"

CYLINDER HEAD:

Head Material: Aluminum
Casting Number: 12578452
Head Part Number: 17802818
Combustion Chamber Volume (min) (cc): 66
Compressed Gasket Thickness: 0.051"
Runner Volume:
Intake: 280cc
Exhaust: 95cc

VALVE SYSTEM:

Number of Valves per Cylinder:
Intake: 1
Exhaust: 1
Valve Head Diameter (max):
Intake: 2.205"
Exhaust: 1.615"
Valve Material: Titanium, Steel
Valve Spring Type: Conical (beehive)
Valve Actuation Type (pushrod, finger follower, etc.): Pushrod

ENGINE INTERNALS:

Piston Type:
Flat:
Dish Depth:
Dome Height: 0.165"
Piston Mass (min): 504 g
Connecting Rod Length (Center to Center): 6.350"
Connecting Rod P/N: 17802816

ENGINE INTERNALS CONTINUED:

Connecting Rod Material: Steel
Connecting Rod Big end Diameter: 2.225"
Connecting Rod Small end Diameter: .928"
Connecting Rod Mass: 638 g
Piston, Pin, Rod & Ring(s) Mass (min): 1298 g
Crankshaft P/N: 17802815
Crankshaft Mass (min): 47 lbs
Crankshaft Rod Journal Diameter: 2.100"
Crankshaft Main Journal Diameter: 2.559"
Camshaft ID #: 54-000-11
Camshaft P/N: 17802829
Location/# of Camshafts: 1 cam in block
Lift @ Lobe (max):
Intake: 0.356" **Exhaust:** 0.356"
Lift @ Valve (max):
Intake: 0.641" **Exhaust:** 0.641"
Rocker Arm Ratio: 1.8
Tappet Type: Hydraulic roller

INTAKE MANIFOLD:

Type of Induction System: 4.0L Whipple Supercharger
Supercharger Part Number: 17802814
Manifold Material: Alum.
Casting Number: WHPL-LS7-R1
Manifold Part Number: 17802811
Location of Injectors: Above int. to head mating point
Number of Injectors per Cylinder: 1
Throttle Body Blade Width x Height (max): 5.827" x 2.835"
Throttle Body Part Number: 19300085
Crank Pulley Diameter (max): 8.00"
Supercharger Pulley Diameter (min): 3.75"

DRIVETRAIN

TRANSMISSION:

Number of Forward Speeds: 2
Manufacturer: GM/ATI
Gear Ratios:
1st: 1.80 2nd: 1.00 3rd: 4th: 5th: 6th:

Number of Forward Speeds: 3
Manufacturer: GM
Gear Ratios:
1st: 2.52 2nd:1.52 3rd: 1.00 4th: 5th: 6th:

Number of Forward Speeds: 6
Manufacturer: GM/Tremec
Gear Ratios:
1st: 3.01 2nd: 2.07 3rd: 1.43 4th: 1.00 5th: .84 6th: .57

FINAL DRIVE:

Differential Type:
Open: **Limited Slip:** x
Differential Manufacturer: GM/Strange
Axle Ratio: 4.29
Ring Gear Outside Diameter: 9"

COPO 427 VEHICLE TECHNICAL SPECIFICATIONS REQUIRED FOR CLASSIFICATION

VEHICLE PARAMETERS: STOCK

Vehicle Manufacturer: Chevrolet
Model Name: COPO Camaro
Model Year(s): 2012
Wheelbase: 112"
Shipping Weight: 3195
Body Style (2 door, etc.): 2 door Coupe
Engine Parameters: Stock
SAE Max Horsepower: 425
Max Torque: 500
Fuel Tank/Cell Capacity: 5 US Gal.
Engine Location (frt, mid, rear): frt
Number of Cylinders: 8
Displacement (cid): 427
Compression Ratio (max): 14.58

CYLINDER BLOCK:

Block Material: Aluminum
Casting Number: 12598723
Block Deck Height (min): 9.220"
Deck Clearance (min): 0.010" above deck
Cylinder Bore (max): 4.125"
Piston Stroke (max): 4.00"
Main Bearing Housing Diameter: 2.751"

CYLINDER HEAD:

Head Material: Aluminum
Casting Number: 12578452
Head Part Number: 17802818
Combustion Chamber Volume (min) (cc): 66
Compressed Gasket Thickness: 0.051"
Runner Volume:
Intake: 280cc
Exhaust: 95cc

VALVE SYSTEM:

Number of Valves per Cylinder:
Intake: 1
Exhaust: 1
Valve Head Diameter (max):
Intake: 2.205"
Exhaust: 1.615"
Valve Material: Titanium, Steel
Valve Spring Type: Conical (beehive)
Valve Actuation Type (pushrod, finger follower, etc.): Pushrod

ENGINE INTERNALS:

Piston Type:
Flat:
Dish Depth:
Dome Height: 0.330"
Piston Mass (min): 454 g
Connecting Rod Length (Center to Center): 6.100"
Connecting Rod P/N: 17802817
Connecting Rod Material: Steel
Connecting Rod Big end Diameter: 2.225"
Connecting Rod Small end Diameter: .928"
Connecting Rod Mass: 600 g
Piston, Pin, Rod & Ring(s) Mass (min): 1174 g
Crankshaft P/N: 12568820 or 12611649
Crankshaft Mass (min): 49 lbs
Crankshaft Rod Journal Diameter: 2.100"
Crankshaft Main Journal Diameter: 2.559"
Camshaft P/N: 88958723
Location/# of Camshafts: 1 cam in block
Lift @ Lobe (max):
Intake: 0.356" **Exhaust:** 0.356"
Lift @ Valve (max):
Intake: 0.641" **Exhaust:** 0.641"
Rocker Arm Ratio: 1.8
Tappet Type: Hydraulic roller

INTAKE MANIFOLD:

Manifold Material: Alum.
Casting Number: 701R243B
Part Number: 17802810
Type of Induction System: N/A single blade throttle
Location of Injectors: Above int. to head mating point
Number of Injectors per Cylinder: 1
Throttle Body Bore Dia. (max): 4.020"
Throttle Body Part Number: 17802828

DRIVETRAIN

TRANSMISSION:

Number of Forward Speeds: 2
Manufacturer: GM/ATI
Gear Ratios:
1st: 1.80 2nd: 1.00 3rd: 4th: 5th: 6th:

Number of Forward Speeds: 3
Manufacturer: GM
Gear Ratios:
1st: 2.52 2nd: 1.52 3rd: 1.00 4th: 5th: 6th:

Number of Forward Speeds: 6
Manufacturer: GM/Tremec
Gear Ratios:
1st: 3.01 2nd: 2.07 3rd: 1.43 4th: 1.00 5th: .84 6th: .57

FINAL DRIVE:

Differential Type:
Open:
Limited Slip: x
Differential Manufacturer: GM/Strange
Axle Ratio: 4.29
Ring Gear Outside Diameter: 9"

2012 COPO CAMARO P/N 20129562 USER'S MANUAL

The P/N 20129562 COPO Camaro is illegal to use on-road and is intended only to be used for drag racing. As a racing vehicle, COPO requires proper preparation and maintenance prior to every run.

This manual provides specifications and instructions for proper COPO use. In addition to the specific items contained in this manual it is recommended that frequent bumper-to-bumper inspections are performed on fasteners, hoses, belts, tires, etc. to assure reliable and safe operation.

STARTUP INFORMATION

Before starting the engine make sure all fluids are at proper levels. Engine starting is done by powering up the ignition and fuel toggle switches then depressing the starter button until the engine fires. If engine does not start immediately it may be necessary to slightly depress the throttle until engine does start. Once the engine is running the water pump switch should be turned on and at 125 degrees F the low-speed fan will automatically turn on. The high speed fan can be activated with the remaining toggle switch.

WARM-UP PROCEDURE

After engine is warm enough to idle with stability it is recommended that the vehicle be driven in the pits or on stands, if permitted, to warm up the transmission, driveline, and brakes. It is also preferred to allow the vehicle to gradually cool down after first warm-up of the event.

PRE-RACE PREPARATION

Prior to running, execute the brake pad break-in procedure (bedding) by performing 8-10 brake applications increasing in harshness, while allowing brakes to cool slightly in between; do not keep the brakes applied between stops. After the last stop, the brakes should be allowed to cool completely. It is recommended for supercharged cars that the intercooler system be filled with the coldest water possible to achieve best performance. Baseline tire pressure settings are 20 psi rear and 32 psi front. Wheel stud torques must be checked – 75 ft. lbs. front and 100 ft. lbs. rear. Tires must be monitored to ensure pressure is equal before making a run, especially the rear. It is also recommended that the battery is fully charged.

POST-RUN PROCEDURES

After a run is completed, the engine should be cooled down by running the switched fan and electric cooling pumps. It is recommended that once engine coolant temperature is below 150°, both engine and intercooler water are drained and refilled with cool water. If engine coolant is not drained it is highly recommended that after every run the radiator pressure is relieved by loosening the radiator cap enough to uncover the overflow port, and to also drain the overflow bottle. Battery should be charged, fuel cell filled, and tire air pressures checked. We also encourage racers to perform visual bumper-to-bumper inspections after each run.

POWERTRAIN MAINTENANCE

Engines are built with hydraulic tappet camshafts, thus no valve lash setting is required. It is recommended that compression and leak-down testing is performed and recorded after each event, and engine oil and filter are changed after three events. Automatic transmission band adjustment is necessary to ensure proper function. This should occur after the first run on the vehicle, then after five more runs another adjustment should be made. Once this procedure has been completed, band adjustments can be made as part of each racing event preparation schedule.

SUSPENSION SETTINGS – AS DELIVERED

Front Wheel Caster	5.9° ± 0.75°
Front Wheel Camber	–0.8° ± 0.75°
Front Wheel Toe-In	3/16" total
Rear Pinion Angle	-2.3
Rear Shock Compression	4 clicks CCW from full CW position
Rear Shock Rebound	3 clicks CCW from full CW position
Front Strut Compression	3 clicks CCW from full CW position
Front Strut Rebound	Full CW position
Front Ride Height*	8-1/8" – 427 engines 7-1/2" – 327 engines
Rear Ride Height**	8-1/2" – both engines
Rear Preload	Not set – must be adjusted prior to track racing. Typical starting point is 25 lbs. on right rear with actual driver in the seat.

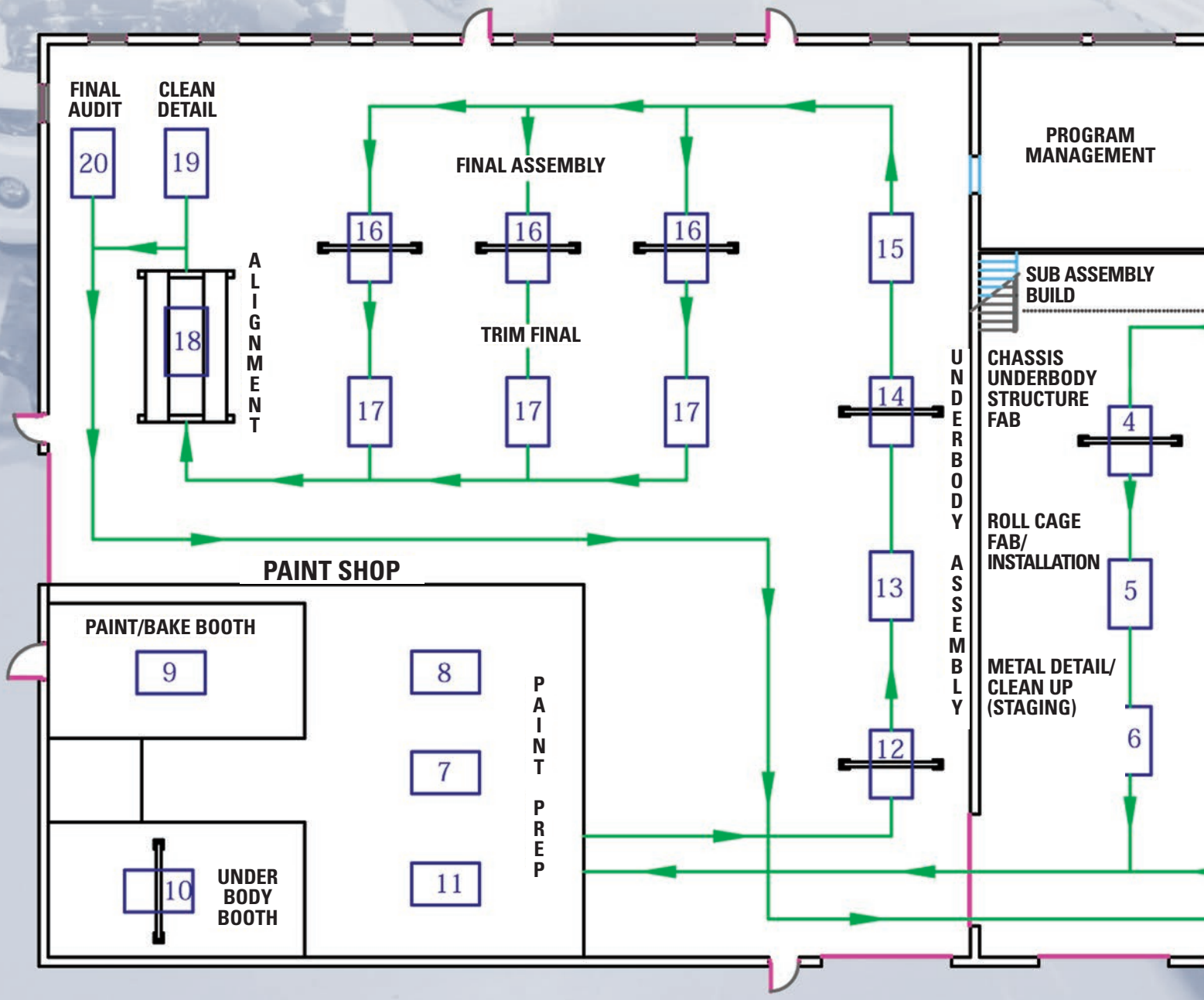
*measured behind the pinch weld seam to the rear of the front wheel opening

**measured behind the pinch weld seam to the front of the rear wheel opening

FLUID/MAINTENANCE SPECIFICATIONS

ITEM	DESCRIPTION	CAPACITY/QTY.
Engine Oil	Mobil 1 Synthetic 15W50 – 327 engines 10W30 – 427 engines	6.5 U.S. quarts
Supercharger Oil	GM Supercharger Oil Part number 12345982	Fill to center of sight glass – approx. 6 fl. oz.
Transmission Fluid	ATI Super F All automatics	8 quarts
Engine Coolant	Distilled water – above freezing RV Anti-freeze – storage near freezing	3 gallons
Intercooler System	Distilled water – above freezing RV Anti-freeze – storage near freezing	2 gallons – approx.
Brake Fluid	GM Super Dot 4 Brake & Clutch Fluid Part number 88958860	2 pints
Gasoline	VP C16 or equivalent – 327 engines VP C12 or equivalent – 427 engines	6 gallons
Rear Differential	Synthetic 75W90	2-1/2 quarts
Engine Oil Filter	AC Delco PF48	1
Fuel Filter	Aeromotive 12601 10 micron	1
Spark Plugs	NGK R5671A-10 327 engines NGK R5671A-7 427 engines	8
Rear Slicks	Hoosier Light Weight Radial, Part number 18212 30" x 9" x 15" DO6 compound	2
Front Tires	Hoosier Drag Front, Part number 18107 4.5" x 28.5" x 15"	2
Rims	Bogart Racing COPO 2012R – Rear COPO 2012F - Front	2 each
Wheel Lug Torques	75 ft. lbs. – front 100 ft. lbs. – rear	Before each event
Air Filter	S&B Filters Part number R0863 – 427 engines Part number TBD – 327/2.9L engines Part number R1274 – 327/4.0L engines	1

COPO CAMARO BUILD PROCESS FLOW



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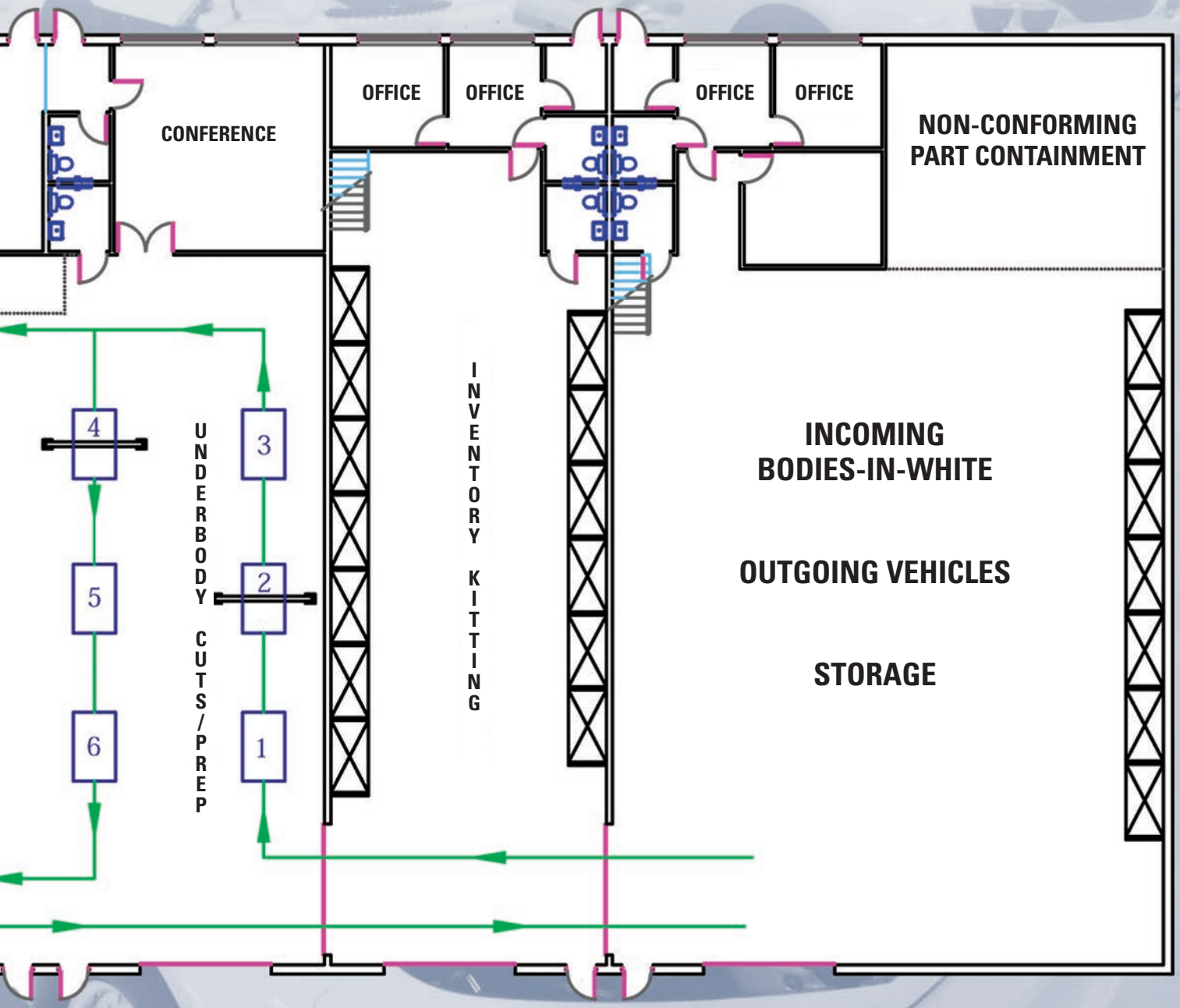
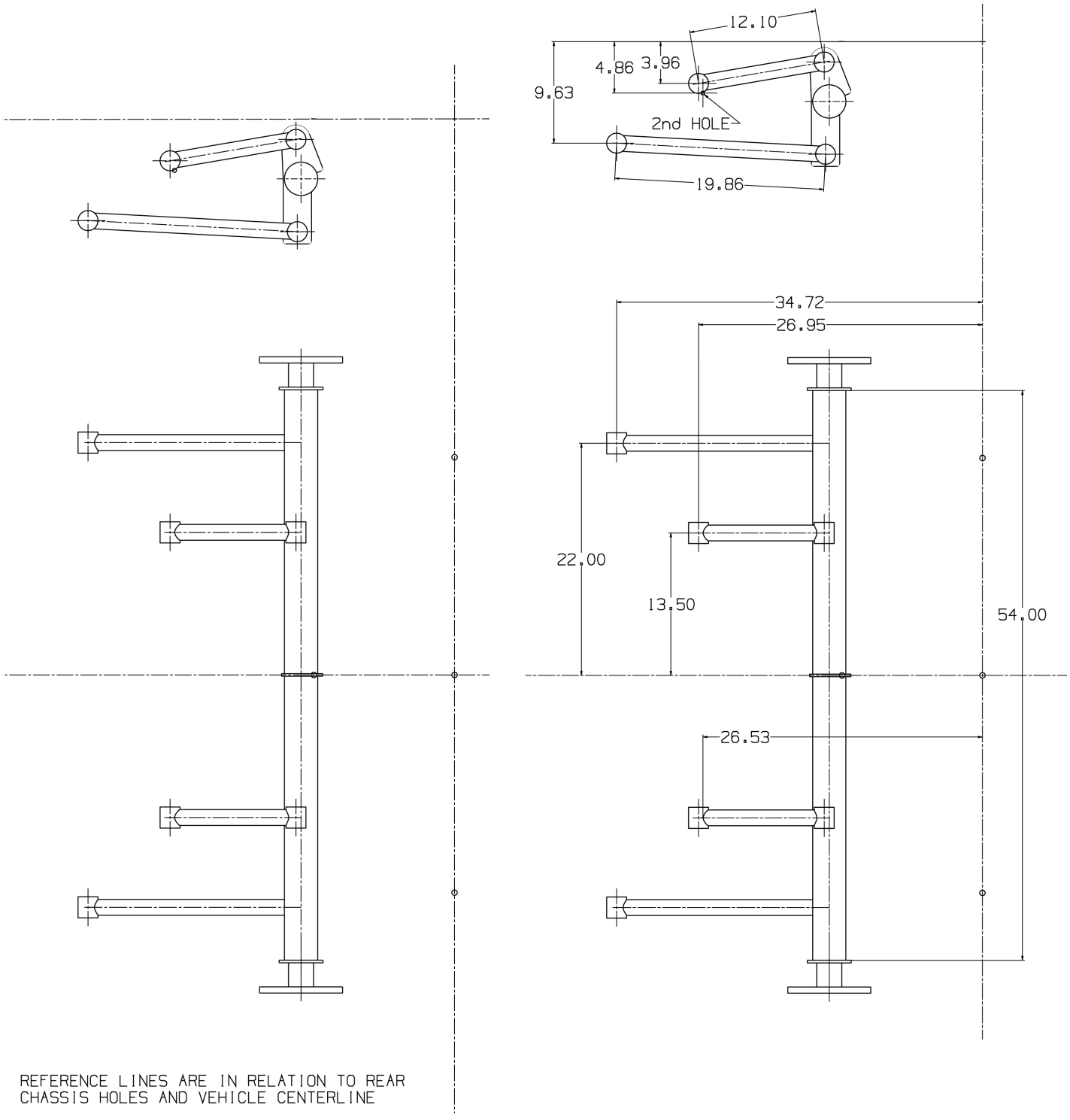
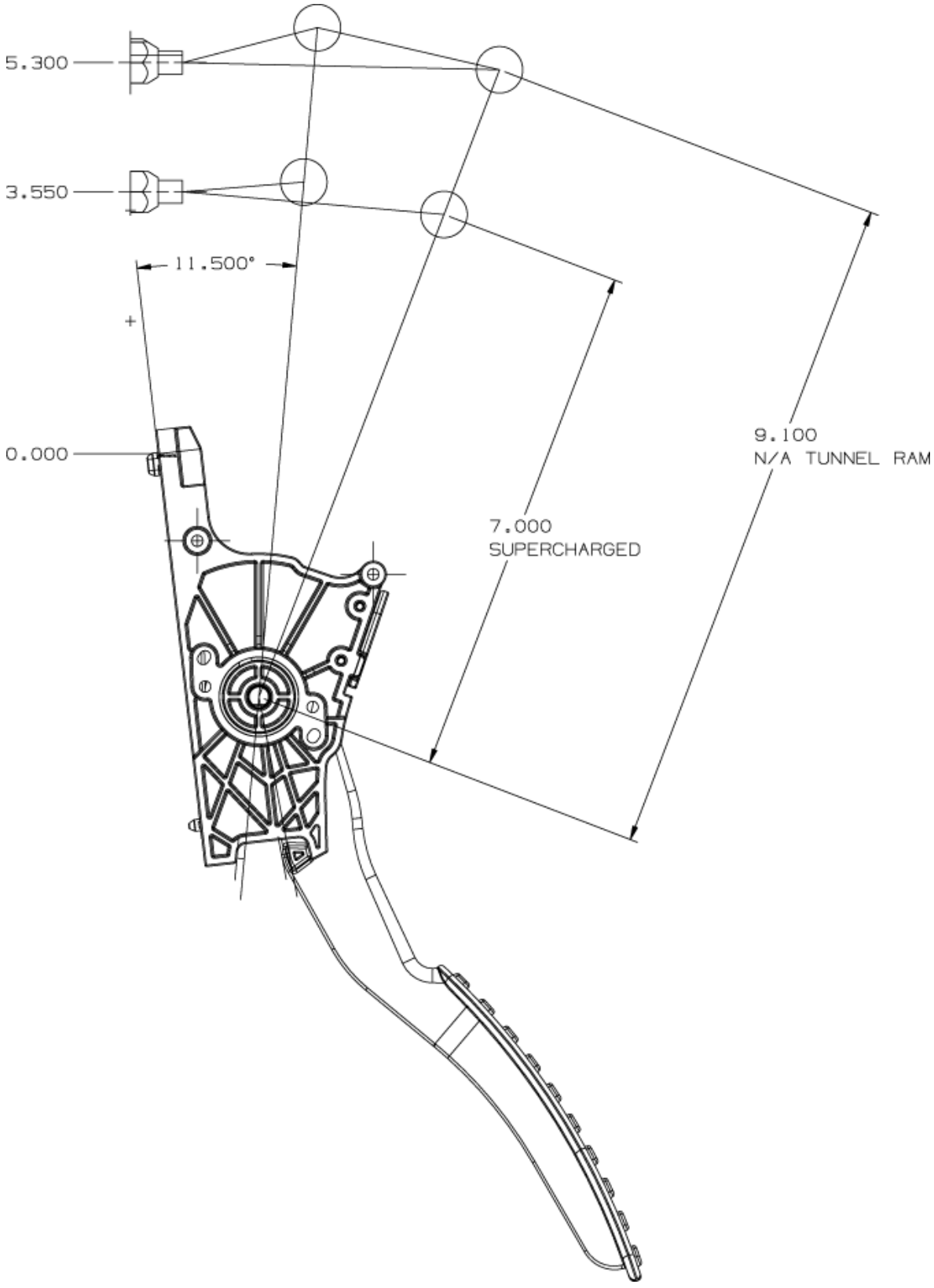
VEHICLES • PARTS • RACING


CONFERENCE
OFFICE
OFFICE
OFFICE
OFFICE
NON-CONFORMING
PART CONTAINMENT
4
3
5
2
6
1
UNDERBODY CUTS/PREP
INVENTORY KITTING
INCOMING
BODIES-IN-WHITE
OUTGOING VEHICLES
STORAGE

COPO CAMARO REAR SUSPENSION DIAGRAM



COPO CAMARO BRAKE DIAGRAM



PARTS LISTINGS

CHEVROLET PERFORMANCE

Camaro Body-in-White	19243374
Rear Suspension Kit	22950665
Camaro Main Body Harness	22862187
Camaro Body Extension Harness	20951243
Camaro Forward Lamp Harness	22915134
COPO 427 Engine	17802825
COPO 327 - 2.9L Engine	17802826
COPO 327 - 4.0L Engine	17802827
Alternator Mounting Bracket	19299546
ACDelco Battery	88865254
COPO Hood	22950678
Air Induction Tube – 427	19299621
Air Induction Tube – 327/2.9	19299624
Air Induction Tube – 327/4.0	19300087
COPO Graphics – Inferno Orange	22951639
COPO Graphics – Chevy Racing Blue	22951636
COPO Graphics – White	22951637
COPO Graphics – Flat Black	22951638

To order, contact an authorized Chevrolet Performance Center or GM Dealer. For more information visit, ChevroletPerformance.com.

MPR

Battery Tray	WC 2651
Front Strut Assembly	SC 2664
Fuel Tank Mount	WC 2653
Rear Axle Assembly	SC 2665
Front Brake Kit (Includes: Master Cylinder, Adapter, Support Rod, Pedal Package, Lightweight Brake Assembly)	MPR SC 2666
Front Wheels & Caps	BRW 2670
Rear Wheels	BRW 2671
Lug Nut Kit	MPR 2672
Front Seat Assembiles (2)	MPRS 2551

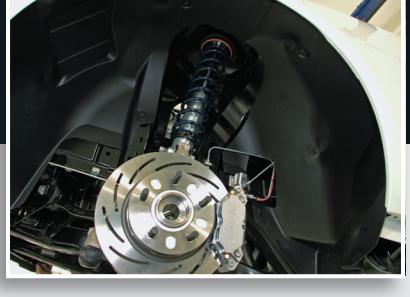
To order, contact MPR at 810-798-8998.

COPO PARTS DIRECT

Accelerator Pedal Assembly	TK40005
IC Hard Line Kit - 327/2.9 (ONLY)	TK40006
IC Radiator & Tank Kit	TK40000
Shifter Mount	TK20002
Trans Cooler & Line Kit	TK20003
Antenna Closeout Kit	TK60001
Bulkhead Closeout Panel Kit – Front	TK10002
Bulkhead Closeout Panel – Rear	TK10003
Trunk Release Kit	TK60002
Drive Shaft	TK20004
Line Lock Kit (Includes: Line Lock Asm, Brake Plumbing)	TK50001
Interior Trim Kit (Includes: Vinyl Cover Panel, Console, Carpet Close-out Panel)	TK70001
Overflow Tank	TK70007
Hose Kit – Radiator (427)	TK40009
Throttle Cable	TK40010
Air Cleaner Bracket – 427	TK40011
Air Cleaner Bracket – 327/2.9	TK40012
Air Cleaner Bracket – 327/4.0	TK40013
Bracket Gauge Panel	TK40014
Drive Shaft Loop	TK20005
Radiator – 327/4.0L	TK40008
Engine Cradle	TK10001
Rear Suspension Install Kit	TK10004
COPO Switch Panel Assembly	TK30001
COPO Powertrain Mount Kit	TK20001
COPO Grill Emblem	TKA072

To order, contact COPO Parts Direct at 855-267-6685 or www.COPOpartsdirect.com.

What the media is saying about the *COPO Build Book*



"When *HOT ROD* first heard the Camaro was returning to production, we were excited to talk with Chevrolet Performance insiders about the possibility of a factory drag package. Now, more than five years later, the COPO is reality. The *Build Book* reveals that there are real hot rodders building real hot rods within Chevrolet."

David Freiburger
HOT ROD Magazine

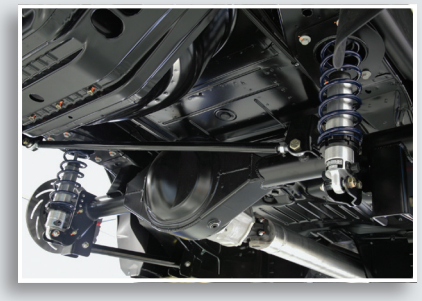
"While Chevrolet might insist this book isn't a step-by-step instruction manual on building a race car from a body-in-white, it does illustrate some pretty in-depth lessons on the intense building required of the new COPO Camaros. Everything from chassis modifications to interior installation is here for the asking with most all the parts available from your local Chevrolet dealership.

These cars have only added to the new performance age we once enjoyed in the '60s and '70s. To think of a car right off the showroom floor with the ability of nine-second elapsed times in the quarter-mile, is a concept we haven't heard of in a long time. And in the case of drag racing, I believe we are all better off now that Detroit is once again selling performance."

John DiBartolomeo
Drag Racing Action Magazine

"The factory drag wars in Stock and Super Stock are back and Chevrolet is more deeply involved than at any time since it got out of the sport in1963. The new COPO Camaros are designed to be the ultimate drag cars for these classes and the *COPO Build Book* is a behind-the-scenes, step-by-step look into what goes into these limited-edition, 8-second strip warriors. The *COPO Build Book* is recorded history and the faithful will want to have it now and 40 years from now."

Jim Campisano
Super Chevy Magazine



"The *COPO Build Book* is an insider's all-access view of what happens when GM engineers factory-assemble a COPO sportsman-class drag race car.

Impressively well organized, photographed and detailed, the book supplies the kind of knowledge and information an enthusiast would need to race and win in NHRA sportsman classes. By documenting Chevrolet's build process, the book conveys a broad understanding of available aftermarket racing parts, showing how to make maximum use of currently-available specialty hardware. That makes it a highly instructional read for anyone interested in working with the Camaro to build a competitive racecar. The book brings a smile to our face because it does justice to the history of Bowtie horsepower development and NHRA sportsman racing, and reminds us that there are a lot of great engineers at Chevrolet who are rabid racing enthusiasts themselves."

John Stewart
SEMA News

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