

How To

Reframe a Late-Model Truck

When it comes to stuffing massive amounts of rubber under the back end of a truck, there are basically two ways to go about it. The easiest, quickest, and least expensive way is to bolt up a pair of duallie fenders, cut out all of the stock sheet metal that hangs down into the new, expanded wheel well, mount up the desired wheels and tires, and head on down the road.

Of course, mud flaps would probably be needed at this point, and navigating on narrow roads would require a bit more care and attention. Then there is the matter of driving through crowded parking lots, and trying to park in spaces barely wide enough for a mid-sized car.

Also, if impressively huge tires were being used, the back of the truck would be riding at a distinctively high altitude. This is perfect for those who like a whole lot of rake in their rigs but far from ideal for the rest of us. A lowering kit for the rear would have to be purchased and installed, messing with the stock suspension geometry and substantially stiffening up the ride. And it could only get dropped so far before the tires would be smacking into the top of the bed's wheel wells, anyway.

The other school of thought here is guided by one overriding goal: Do whatever it takes to keep everything within the original outside dimensions of the truck. Although catering to this priority definitely requires a more sophisticated and complicated

Build it correctly with new Chassisworks kits and products!

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► The Chassisworks 4-link suspension, rear sub frame kit, and steel truck wheel tubs, plus the Koni coil-over shocks and a narrowed rear end, let the widest tires available fit inside the stock fenders.



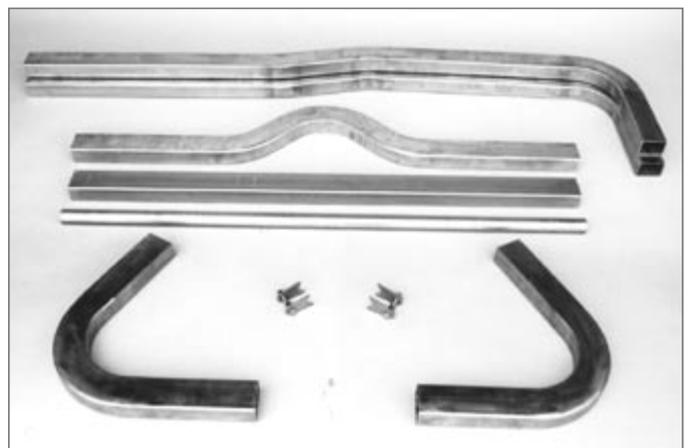
approach, and substantially more effort, it is well within the reach of the competent home builder.

For those who subscribe to this point of view, Chassisworks offers this new rear subframe kit for latemodel GM trucks (kits are also available for other makes, and for both full-size and mini-trucks). Utilizing our proven Pro Street 4-link suspension with a narrowed rear end, Koni coil-over shocks, adjustable

lower shock mounts, and our steel truck tubs, this kit keeps even the widest tires available completely under the truck, and glued to the ground as well. And it does so while allowing the back end to reside at any altitude you desire.

The frame rails on the earlier Chevy trucks, the ones with the infamous side-saddle fuel tanks, are narrow enough to use this race-bred suspension without necessarily

► Here are most of the pieces of the Chassisworks rear sub frame kit for trucks. Mandrel-bent, .120-wall, 3x2inch boxed tubing is used for the frame rails, drop loops and crossmembers, while 1-114-inch and 1-5/8-inch round tubing is used for the upper-shock crossmember (shock mounts included) and diagonal bracing.



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cutting out and replacing the stock rear frame. Although it was probably a good idea for GM to reposition the tank within the rails of its late-model trucks, the frame rails had to be placed further apart to accommodate the tank. Unfortunately, this puts



▲ The stock wheels and tires are dwarfed by the MIT Sportsman 33x21.5-15 tires, mounted on Center Line 15x15 Convo Pro wheels, that will replace them on the rear.

the rails right where the rear tires need to go when a 4-link is installed. Consequently, Chassisworks developed a new subframe kit to take care of the problem.

The 1993 Chevy extended-cab, half-ton, short-bed Fleet-side truck shown here was chosen for this development project. Parked in the midst of the various race cars being built in the Chassisworks in-house chassis shop at the time, it was cut up and put back together again, all under the watchful eye of our cameras. The rearend was narrowed, and the frame rails were replaced to allow room for the 4-link suspension and giant Mickey Thompson Sportsman 33x21.5-15 tires, surrounding a pair of Center Line Convo Pro 15x 15 wheels, that were stuffed underneath.

During the course of this project, the truck never went near any of the shop's chassis jigs. To duplicate

the conditions under which the Chassisworks mail-order customer would likely be operating, a flat and level concrete floor acted as the base of operations. And to keep everything straight, square and precise in the rebuilding process, no super-trick, laser-sighted, computer controlled widgets were required; rather, a simple length of kite string worked quite nicely.

It may seem somewhat incongruous to be relying on a piece of string for the successful completion of such a high-tech frame and suspension transplant, but Chassisworks takes great pride in making such installations as uncomplicated and painless as possible for the home builder. The string is pulled tight down the exact center line of the vehicle and taped securely to the floor, and all side-to-side measurements are then referenced from this string line. Assuming that neither the vehicle



▲ The front end is blocked up at its new, substantially lower ride height, as measured at the top of the fender well, as the truck is prepared for this project.



▲ This Chisholm 4-inch drop kit (two inches from the lower A-arm and two inches from the dual-rate spring) will be installed up front to keep the truck level once the rear is lowered.



▲ After the bed is removed and the undercoating scraped off, the main reference line is marked 24 inches forward of the rear-axle-housing centerline.



▲ With the driveshaft, gas tank and shocks out of the picture, the back half of this half-ton truck looks fairly pitiful



▲ A piece of string is one of the most important tools in this rebuilding procedure. With the frame stripped to the bone and the truck at the desired ride height, squares and tapes are used to find the center of the frame front and rear, and the string is taped to the floor on those marks.



▲ A square is used to help find the distance from the string center line to the rear bed-mounting holes. A measurement is also taken from a reference point up front.

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nor the string itself gets moved in the meantime, all critical factory dimensions can be exactly located within the new assembly, and the new frame rails will wind up exactly where they are supposed to be.

In addition to those taken from the string line, a couple of other measurements are needed to make sure everything goes back where it belongs. With the bed removed and the truck sitting on the tires, a line is drawn on the forward crossmember, directly above the driveshaft center line. When installing the new raised crossmember, the peak of the loop must be located at this point.

The other measurement concerns the front-to-back location of the rear-end housing. Another reference line is marked on the stock frame, exactly 24 inches forward from the rearend housing center line. This will be used to get the new wheels and tires to return to the original location after installing the 4-link bars, and also to determine where to cut off the stock frame rails. (As a helpful hint, be sure to scrape the factory-applied undercoating off the frame where all reference marks and cutting lines are drawn.)

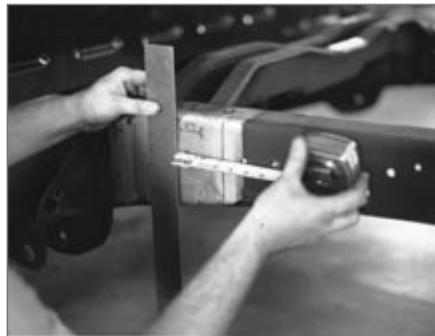
Now, the serious dismantling begins. The first step is to remove all the wheels and tires and the rearend housing, and then set the truck up on blocks or jack stands at the desired ride height.

To keep the truck fairly level once the back end was lowered, a Chisholm drop kit was installed up front. After figuring in the advertised four inches of drop and taking into account the difference in the diameters between the stock front tires and the new Mickey Thompson

255/60-15 Competitors (mounted on Center Line 15x8.5 Convo Pro wheels, with a 4-1/2-in. backspace), the front end was set at the new height, with the upper lip of the front wheel well being used as the reference point.

Once the correct altitude is found for the rear of the truck, the frame must be propped up from under the cab, and the jack stands removed from the rear frame rails. This is the time to get out the string, squares and tape measures, and fabricate the low-dollar, low-tech "chassis jig" on the garage floor.

Picking a spot just south of the cab, a couple of squares are set on the ground and up against the frame rails, at the identical place on either side. A tape is then run between these squares, and the exact center is marked on the floor. The same procedure is followed at the rear of the frame, and then the string is drawn down the center of the truck, hitting both of these marks, and taped down.



▲ This line, three inches to the rear of the 24-inch reference point, is where the stock frame rails will be cut off

(If there are kids residing in the house attached to the garage where one of these conversions is being carried out, this would be a good point to declare a "no-touch" zone around the truck for a while, to keep it from getting jostled off of its mark. Any movement of the truck before the new frame rails, crossmembers and gussets are welded up should be strenuously avoided, as this will add unnecessary difficulty to the project.)

The locations of the bed-mounting holes in the frame must be determined and recorded, both from the string line out and from front-to-back. This can be accomplished by running a straightedge across the forward bed-mounting holes, and measuring back from there.

A vertical line is then drawn on the stock frame rails, three inches to the rear of the original, 24-inch mark. This is where the rails will be cut off, after which the reassembly can begin.

The drop loops provided in the 4-link subframe kit are positioned on



▲ With the frame torched off and ground smooth, this 120-degree drop loop is positioned the specified distance from the ground for the new ride height, and then marked for cutting. When installed, it will be on the inside of the frame rail.



▲ The raised crossmember is cut to fit and welded in between the two drop loops. The high point of the loop is positioned directly above the driveshaft.



▲ Using the string line, tape and square once again, the position of the rear frame rail, as determined by tire size, is marked on the raised crossmember.

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the outside of the remaining ends of the frame rails at the specified distance from the ground, and marked for cutting to size. These are then tacked to the inside and bottom of the frame, after the tops are trimmed and notched to clear the contours of the factory crossmember. The raised crossmember is then cut to fit and welded into place.

Next, a tape measure is set across the string and a square is used to mark the outside location of the new frame rails on the raised crossmember. The width of the new frame should be as wide as possible; this is determined according to the detailed Chassisworks instructions

and assembly drawings, which take into account the wheel and tire sizes, as well as the amount of backspacing in the wheel.

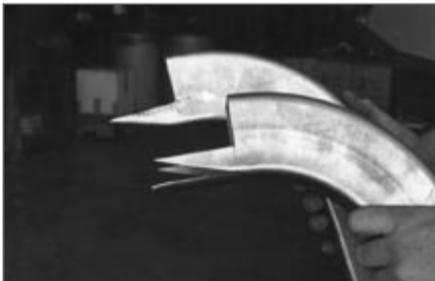
The frame rails must be cut to the proper length and trimmed to fit the raised crossmember, and then it's time to put them in. With the front of the frame rail tacked to the raised crossmember, the trailing end must be positioned and supported at both the correct height from the ground and the specified distance from the string. After repeating the process for the second rail, the rear crossmember goes in across the back; the string, squares and tapes are used once again to pinpoint the location of the new bedmounting brackets, which are fabricated from left-over pieces of the frame rails.

With the new rear framework now in place, it's time to move on to the task of installing the narrowed

rear and the 4-link suspension. The capabilities of this suspension system have been graphically proven by the use of basically the same parts and pieces in the sixsecond, 200-mph Pro Mod cars that roll out of the Chassisworks chassis shop. However, a few changes have been made to adapt the 4-link for safe, reliable Pro Street use.

The link bars for race cars are threaded at both ends, with a couple of jam nuts per bar; this allows quick and easy tuning of the suspension to compensate for differing race-track conditions. In this application, they are constantly checked, adjusted and tightened.

However, in street vehicles, the bars are generally installed, adjusted, and then ignored. If the street-inspired vibrations happen to cause a jam nut to loosen, the result could be (and has been!) a bar that



▲ These are the frame-rail ends, notched to fit onto the crossmember. A cleaner look is achieved by cutting the rail as shown on the bottom, and bending and welding the "flap" to smooth out the appearance.



▲ With the front of the new frame rail tacked to the raised crossmember, the rear of the rail is positioned at the desired ride height and the correct distance from the string line.



▲ Once both frame rails are tacked in place, the rear sections are checked to verify that they are level.



▲ After installing the rear crossmember, the rear bed-mounting brackets are located and attached. These brackets, as well as the additional braces and gussets, are fabricated from the pieces left over when the main frame tubing is cut to size.



▲ With the new subframe in place, the narrowed rearend housing is positioned and centered in the frame, using tapes, squares, and the reference surface. Lines marked on the frame at the beginning of the project.



▲ The pinion angle is set at 1-to-2 degrees downhill by using a protractor set against the rear-cover mounting surface.

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continues to twist and turn until a rod end gets completely unscrewed and the suspension collapses onto the ground. Whether this turns out to be a mild annoyance or a complete catastrophe depends on where and when it comes apart, but certainly no good can ever come from this scenario.

To eliminate any chance of this happening, the Chassisworks Pro Street 4-link bars have been engineered with one welded and one threaded rod end. This can take a few more moments for the initial set-up, but it will then be worry-free



▲ The rear 4-link brackets are then assembled and tacked in place, using the steel sleeves from the urethane rod-end bushings as spacers. The location is determined according to the Installation instructions and assembly drawings, which take into account wheel and tire size and the amount of wheel backspacing; the middle mounting hole lines up directly beneath the axle-tube centerline to set the correct rotation.



▲ The Chassisworks-exclusive notched front 4-link brackets are then positioned as per the instructions, directly in line with the rear brackets, and tacked onto the raised crossmember.

from that point on. If a jam nut does vibrate loose, all it can do is just rattle around a bit, without causing or allowing any further damage.

Another difference between the race and street versions concerns the rod ends. The solid rod ends that contribute to race-car rigidity, consistency and performance are just downright unacceptable for street use. The ride would be severely harsh, and everything on (and everyone in) the truck would take a serious beating as it goes down the road. To soften things up, rod ends with urethane bushings are used.

The track locator, essential in keeping the rear housing centered side-to-side in a 4-link application, also needed a bit of extra attention. The resulting Chassisworks Pro Street track locator features unique double-clevis, dual-pivoting ends that allow the housing to go through its full range of motion and travel without binding. A total of four urethane bushings over steel sleeves reside in the locator.

Another seemingly minor, but actually quite significant, change concerns the positioning of the coilover shock absorbers. Chassisworks race cars are built with the shocks running straight up to the shockmount crossmember, but setting up street vehicles this way tends to produce an unacceptable amount of body roll and sway. Tilting the tops of the



▲ After welding both the bracket to the axle tube and the included gusset plate to the back of the bracket, the lower shock mount is tacked onto the gusset. The height of the shock bracket itself is determined by the desired ride height, and it angles inward 10 degrees.

shocks in towards each other at a 10-degree angle takes care of this rockin' and rollin', greatly enhancing the stability of the vehicle.

The positioning of the narrowed rear and the installation of the 4-link brackets and tubes are fairly straightforward procedures, as shown in the photos. Paying careful attention to the measurements and installation instructions will result in a professional-quality job, with all components precisely located under the frame and ready to roll on down the road.

That inboard-mounted gas tank will need to be trimmed down in length, to clear the new raised crossmember. It will ultimately end up losing about a third of its capacity in this operation, which is best left to a qualified gas-tank repair shop. With the tank and the mounting tray cut to fit, they will nestle snugly back in the original location under the cab.

At this point, all that remains to be done is the installation of the heavy-gauge Chassisworks steel tubs in the bed of the truck. Once again, competent cutting and welding techniques, coupled with the use of the detailed assembly instructions, will lead to a perfect fit and finish (not to mention a severely reduced cargo-carrying ability!). Since these tubs are steel, it is also a good idea to get them painted, or at least primed, before the truck spends too



▲ The upper shock mounts and crossmember are positioned so the shock is dead-on vertical front-to-back, while leaning inboard 10 degrees. A shock simulator is used here to facilitate these alignments.

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much time outside. Of course, the bare steel of the new rear subframe should also be protected with paint.

Immediately after the truck was completed it was taken on a trouble free, successful, and highly visible 1000-mile test drive from Sacramento, California, to Medford, Oregon. The occasion was a Pro Mod race, and our project truck looked

so good that it was pressed into service as the tow vehicle for Trevor Lowe's immaculate, scaled down, Chassisworks-built, supercharged '57 Chevy.

The truck's owner reported back that it rode smooth, straight and true under every operating condition, even with a few burly race-car crewmen and a bunch of tools on board. Additionally, the 4-link suspension and the wide Mickey Thompson tires have just about eliminated the throttle inspired slip-and-slide common to light-tailed pickups.

The only drawback he has found

concerns a certain lack of privacy.

It seems that now, just about every time he parks the truck anywhere but in his own garage, he winds up chatting with someone who wanders over to ask a pile of questions about his radical ride.



▲ The Chassisworks 4-link bars have one welded and one threaded rod end, to allow easy initial adjustment while eliminating the possibility that the bars could vibrate loose and fall out on the street. The use of urethane bushings makes for a much smoother ride than the solid ends used in the race-car 4-links.



▲ With the link bars and the shocks in place, the installer checks for freedom of suspension travel by blocking up one end of the housing and applying all of his weight on the other end.



▲ Chassisworks has developed trick, urethane bushed double-clevis ends for the track locator. Allowing the locator to pivot in any direction without binding, these eliminate the problems associated with street use of race-bred track locaters or panhard bars.



▲ With the link bars installed and adjusted, the welded end of the unique Chassisworks Pro Street track locator is marked for cutting to the proper length.



▲ The narrowed housing is then removed from the frame to have the axle flanges welded back on. Here, a couple of levels and the Chassisworks rearend-narrowing fixture are used to align the flanges.



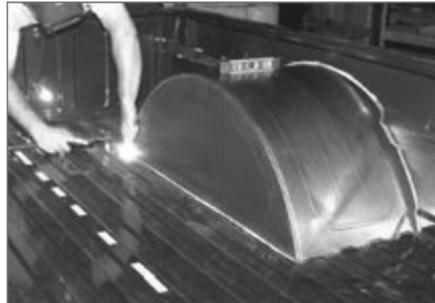
▲ Using strategically placed strips of white tape to aid in the effort, the bed is measured for the installation of the Chassisworks truck tubs. Before the bed was removed, a locating hole was drilled through the stock wheel well, above the axle centerline.

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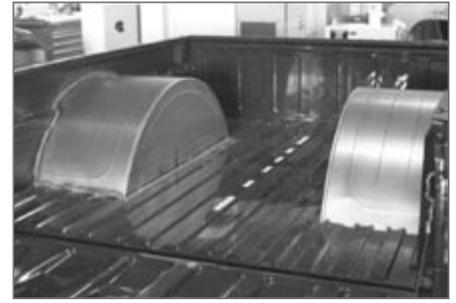
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▲ The 20-gauge Chassisworks steel truck tubs are shipped preassembled (and in fairly large boxes!); here, a template is used to measure and scribe the cutting line on the inner bed wall.



▲ With careful measuring, marking, cutting and welding, a flawless fit is easily attained. This part is a two-man operation, with a cohort underneath the tub holding it in place while the installer tacks it down along the edges.



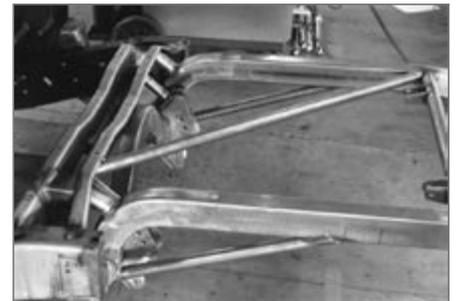
▲ The available cargo space in the pickup bed takes a beating after the tubs are installed, but the result is truly an impressive sight. The tack-welds can be seen on the tub on the right, while the other has already been completely welded.



▲ The gas tank must be shortened to fit back in the truck. This is a job best left to the professionals, as it needs to be cut off right after the rear mounting strap and sealed back up. It loses about a third of its capacity with this operation.



▲ Our installer is definitely a generously sized gent, but he looks relatively small compared to the M/T tire as he mounts it up.



▲ All of the extra bracing required to stiffen everything up can be seen here. Tubing for the diagonal and the lower braces is included in the rear-sub frame kit, while the shorter braces are fabricated from cut-off pieces of the sub frame components.



▲ The stock rear-axle snubbers are trimmed down to the bare essentials and welded to the bottom of the frame rails.



▲ This view shows the muscular new frame and suspension, not to mention some serious rubber on the MIT Sportsman tires. The next step is stripping everything back off of the sub frame and applying a few coats of paint to protect it all (and make it look cool!).



▲ Mickey Thompson tires surround Center Line's Convo Pro wheels at each corner, as the Chevy rolls back out into the daylight. The owner reports excellent handling on all types of road surfaces.

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