

TRUCK SUSPENSION



This 1/2 ton F-150 has been enhanced with Bell Tech components, 16" Centerline wheels and General high-performance tires.



The GMC Syclone LSR prototype broke the 200 mph barrier at Bonneville and became the fastest truck on the planet in 1990. The suspension was lowered using many of the same Bell Tech parts that any enthusiast can buy.

HOW LOW CAN YOU GO?

In the glory days of American muscle cars during the 1960s, the got-to-have-it look on the street was a high performance image. Everyone wanted a low riding vehicle that reflected the racing hardware of the day: the Cobras, Corvette Stingrays and Ramchargers. Unfortunately, this led to rock-hard springs and super-stiff shocks. Handling was improved but the ride shook fillings out of your teeth.

Today's hot street truck look once again stems from racing, the "sport truck." But, unlike the 1960s, a jarring ride is not compulsory for improved performance or the ground hugging "slammed" look. This is the 1990s and suspension technology has made a quantum leap into the high-tech era.

For on-highway trucks and sport-utility

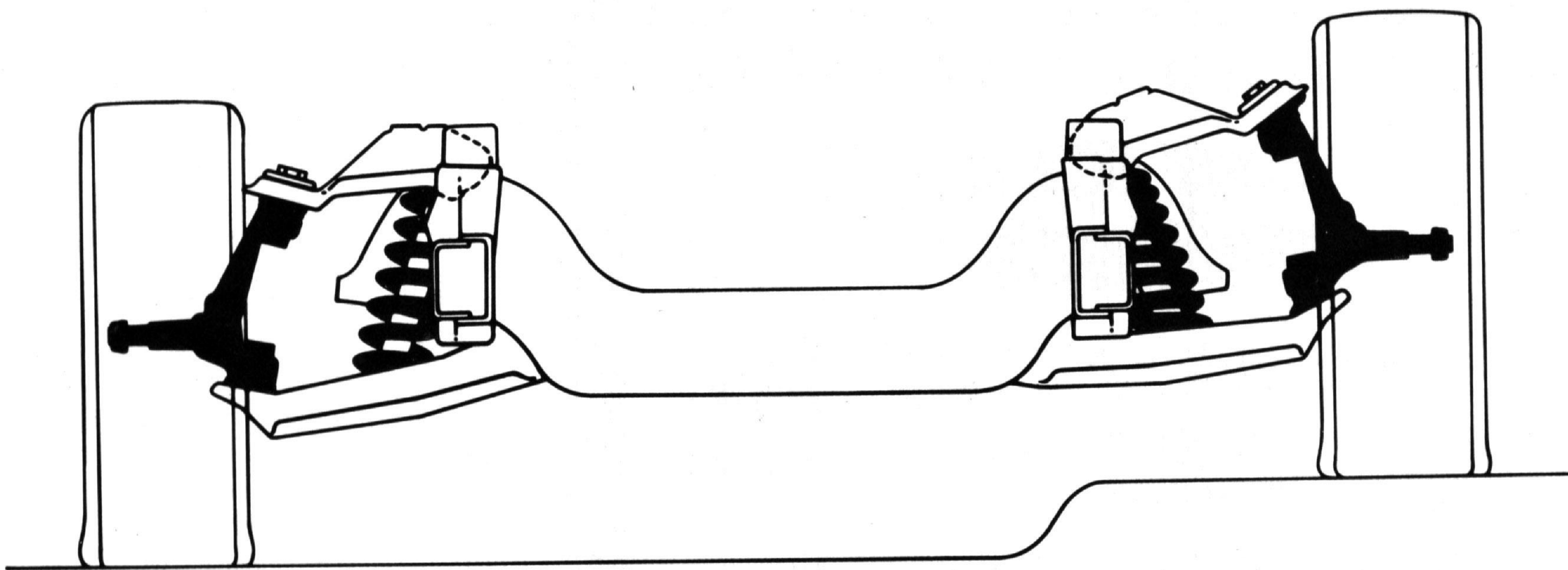
vehicles, lowering is by far the most popular suspension modification. Lowering can be accomplished in several ways, but owners should have a clear idea of their goals before beginning work. As we explore the ways to lower a truck, let's make sure we're speaking the same language.

Four Major Components

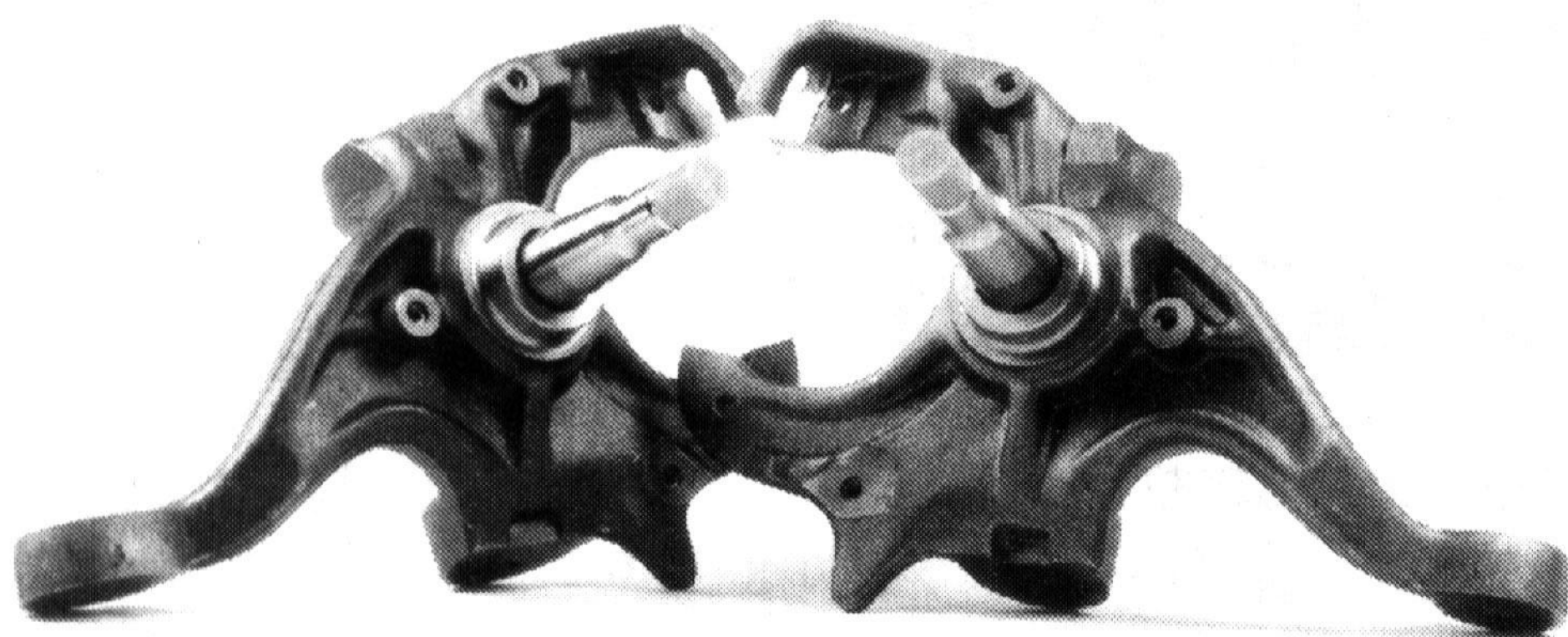
All suspension systems have four major components:

- 1) Springs absorb vertical suspension movement. If the springs are too soft, the vehicle will bottom on the ground or the suspension will run out of travel and crash into the frame. Too stiff, and the tires will bounce

by Don Alexander & the Staff of Truck & Sport Utility Performance



Above: This diagram shows all the major components of independent front suspension. Spindles are in dark gray, as are the coil springs. Upper and lower control arms are in light gray; they attach to the top and bottom of the spindles. Shock absorbers are within the helix of the coil springs, better seen on the left side.



Left: It may look like the Terminator's pelvic bone, but these are a pair of lowered spindles from Trail Master. Dropped spindles are a safe and effective way to make a moderate front drop. Cost is low and ride is not compromised.

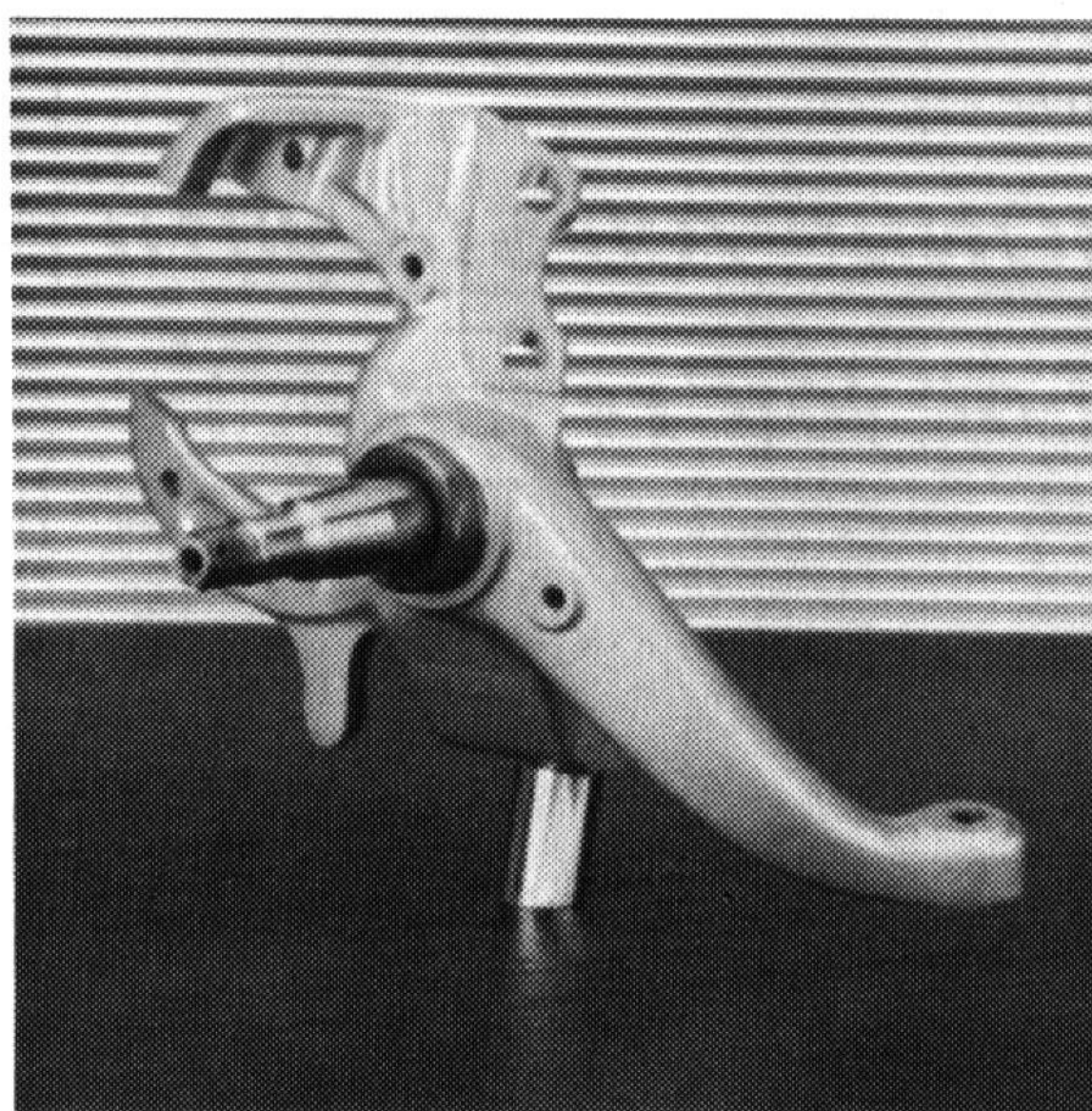
off the road like a skateboard. Within this range is a large margin for tuning and preferences.

2) Shock absorbers dampen the motion of the springs. Without shocks, or with shocks that are too soft or worn, the vehicle would bob down the road every time a bump is encountered. If too stiff, the shocks will overpower the springs, creating a rough ride and a wheel-lifting traction loss over bumps.

3) The suspension arms control tire motion up and down over irregularities. The nature of the arms, and their geometric layout, determine suspension travel and how the tire contact patch stays on the ground over bumps and while the body rolls in a corner. Camber change is the term for how close a wheel is to vertical while cornering or during suspension movement. Altered camber occurs within all suspensions. Negative camber means that the top of the wheel leans in toward the vehicle slightly. Some systems have less camber change than others.

4) The fourth component of the

suspension system is the antiroll bar, commonly called the sway bar. As the name "antiroll" implies, this bar reduces body roll during cornering. By limiting roll, camber



This lowered spindle from Bell Tech maintains all the factory mounting points as well as preserving stock front track. It can be used alone or in combination with lowered springs and/or control arms.

change is also limited, allowing the tire to keep more tread in contact with the road. When properly designed for the application, front and rear antiroll bars improve handling balance. This can increase steering response and cornering

speeds.

Improperly designed antiroll bars can cause traction loss at one end of the truck as the limits of adhesion are reached. The front tires may break away first, causing the vehicle to plow straight ahead, even though you try to turn. This is understeer or, in NASCAR racing parlance, "push." If the vehicle tries to spin out as traction limits are approached, that's the opposite condition, called oversteer or "loose."

Altering ride-height by lowering a vehicle will have an effect on suspension geometry. With too large a drop the result is almost always adverse. The tire contact patch may become tilted in a corner, reducing the area of the contact, and lowering traction. This can also increase braking distances.

Remember, if you alter one suspension component, the others are affected. This doesn't mean that the entire system must be changed. It does mean that changes or modifications to a single item must be made so that the total effect is positive. When you plan to lower a vehicle, take the following information into account.

How Low Will You Go?

First, you must know *why* you are lowering. If all you want are the improved visual lines of a "slammed" body, relax, it's easy. You have several options including dropped spindles, shorter coil springs, lowered control arms or a combination of the above.

If you are looking for better handling, more cornering power and razor sharp steering, either 2" drop spindles and 1" lower springs or dropped control arms are preferred. The dropped control arms are designed to produce negative camber under load, keeping the tire contact patch at maximum as the body rolls, improving hard cornering.

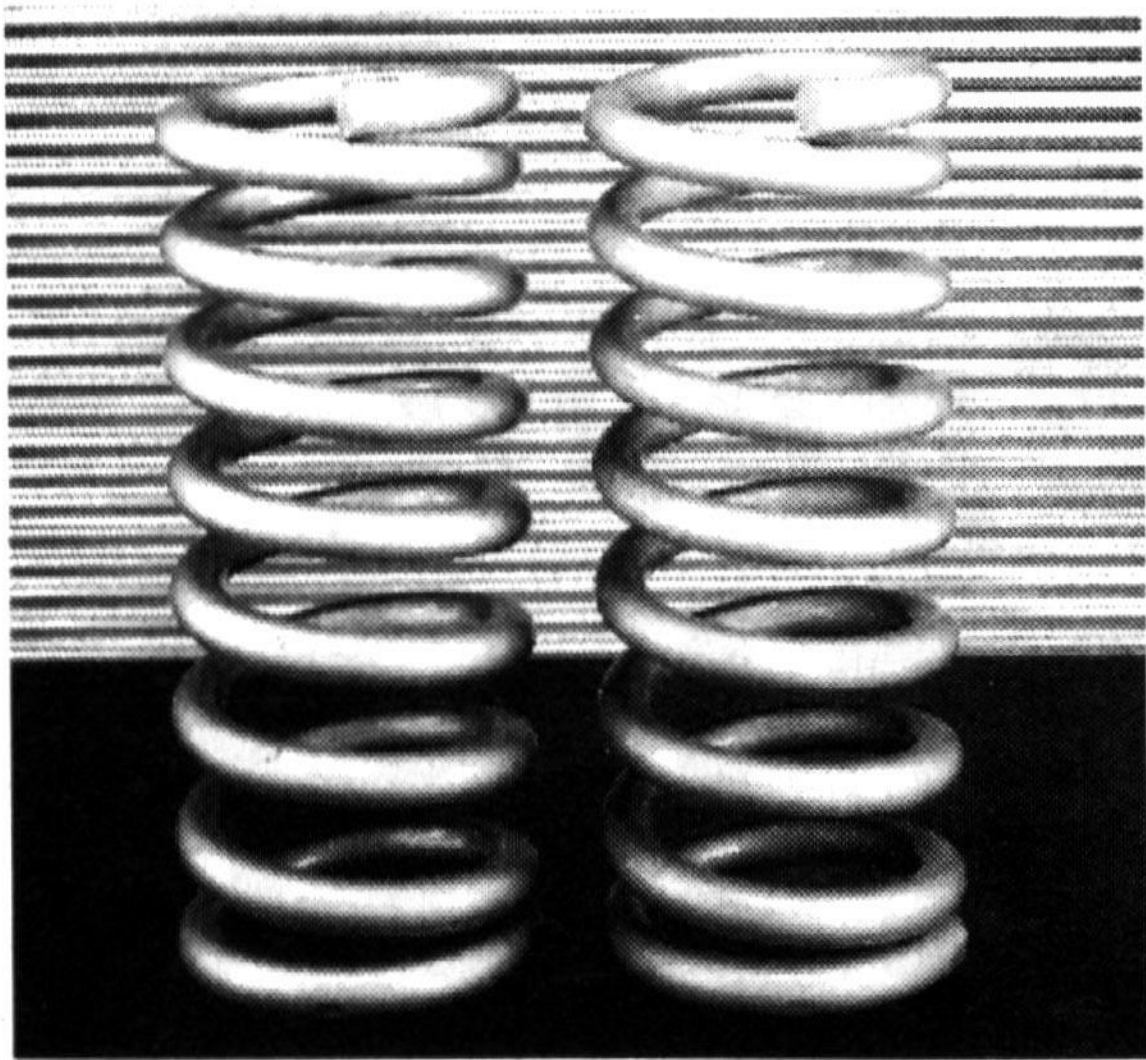
Next, you have to decide *how*

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much you plan to lower. Keep in mind that, as a rule of thumb, you will want to lower the rear about 2" more than the front, typically making a 1"-2", 2"-4" or 4"-6" combination.

For most stock trucks, a 2" front drop is ideal. It can be accomplished with spindles or springs or control arms. Any of these components will keep the suspension within legal limits.

A 3" drop requires more thought. A 2" spindle plus 1" shorter springs work well together but are very close to the legal limit for ground clearance with 15" wheels. This problem can be avoided by moving to a 16" wheel and tire combination. Using Bell Tech components, a 2" drop spindle and 2" shortened spring may still be legal with a 15" tire. A 4" front drop is nearly always



Shorter and higher-rate springs, such as these from Bell Tech, are an easy way to drop a front end.

illegal, but it is still very popular. Again, larger wheels and lower profile tires may be the answer.

Six Ways to Lower a Truck

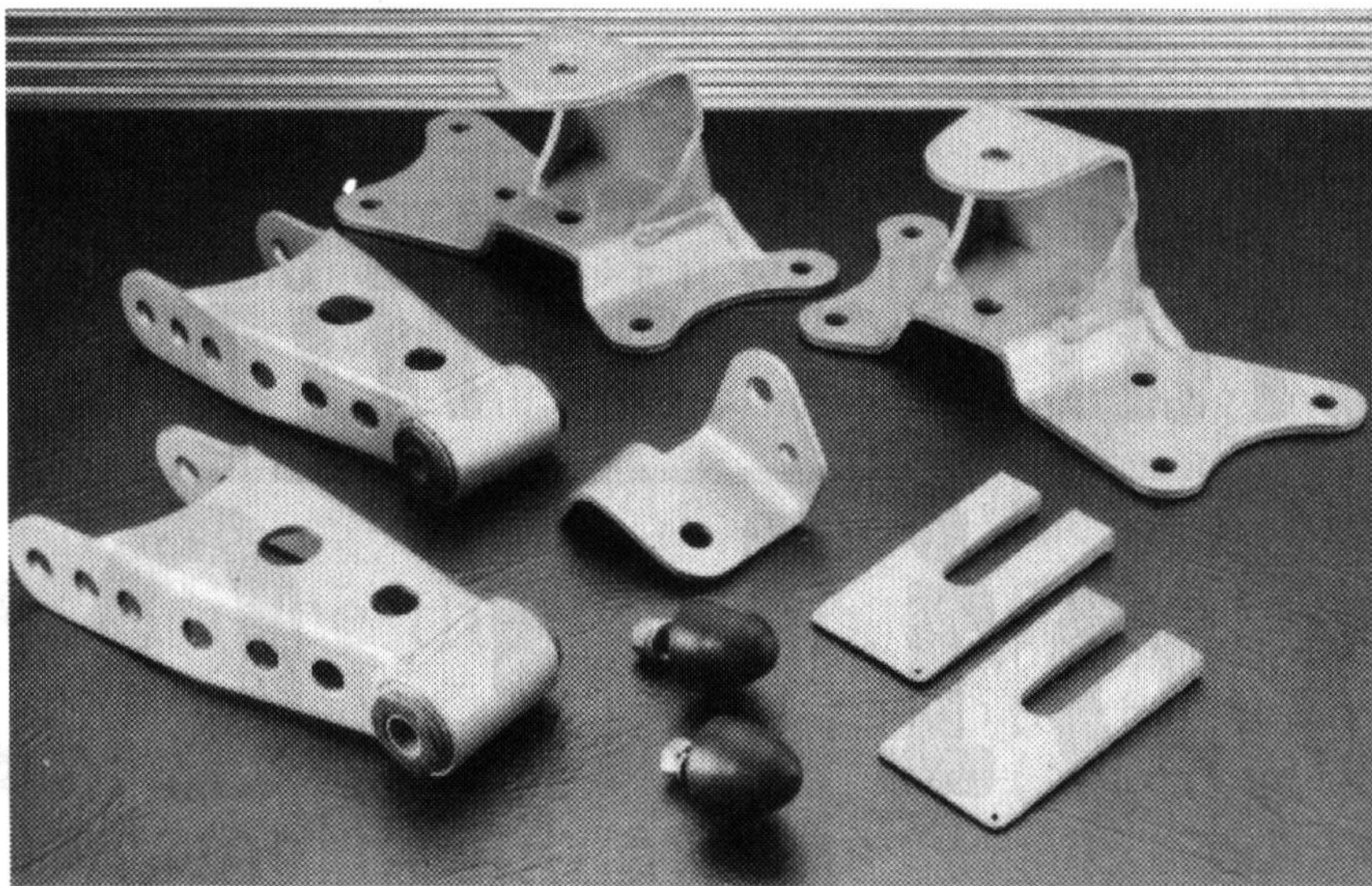
1) Springs can be cut. It's not a good idea to cut stock springs because without a corresponding increase in spring rate, bottoming and poor handling often result. Not recommended.

2) Shorter, but stiffer, springs can be used at the front, with lowering blocks, or de-arched leaves, on the rear. This is the least expensive method for lowering your truck that we would consider recommending. Handling will improve but at the expense of ride quality.

3) Drop spindles work very well for lowering. 2" dropped spindles with 1" lower springs give a good blend of ride and handling. Stiffer springs are still recommended to prevent bottoming out.

4) Control arms can be lowered to drop the front suspension. Pioneered by Suspension Techniques and available from Bell Tech, Trail Master and others, the lowered control arms cost about the same as spindles but allow you to retain stock springs.

5) Frame notching is necessary for larger rear drops. A 6" flip kit would cause the axle to bang into the frame if the frame were not cut and notched. A reinforcing brace goes with the kit and makes the modified frame as strong as stock if



Due to the simpler layout of a rear suspension, it's easy to make a clean "slam." These Bell Tech shackles and eye hangers replace the factory parts and lower suspension by changing the attachment points of the semi-elliptical leaf springs. Parts are low in cost and many enthusiasts can perform this work themselves.

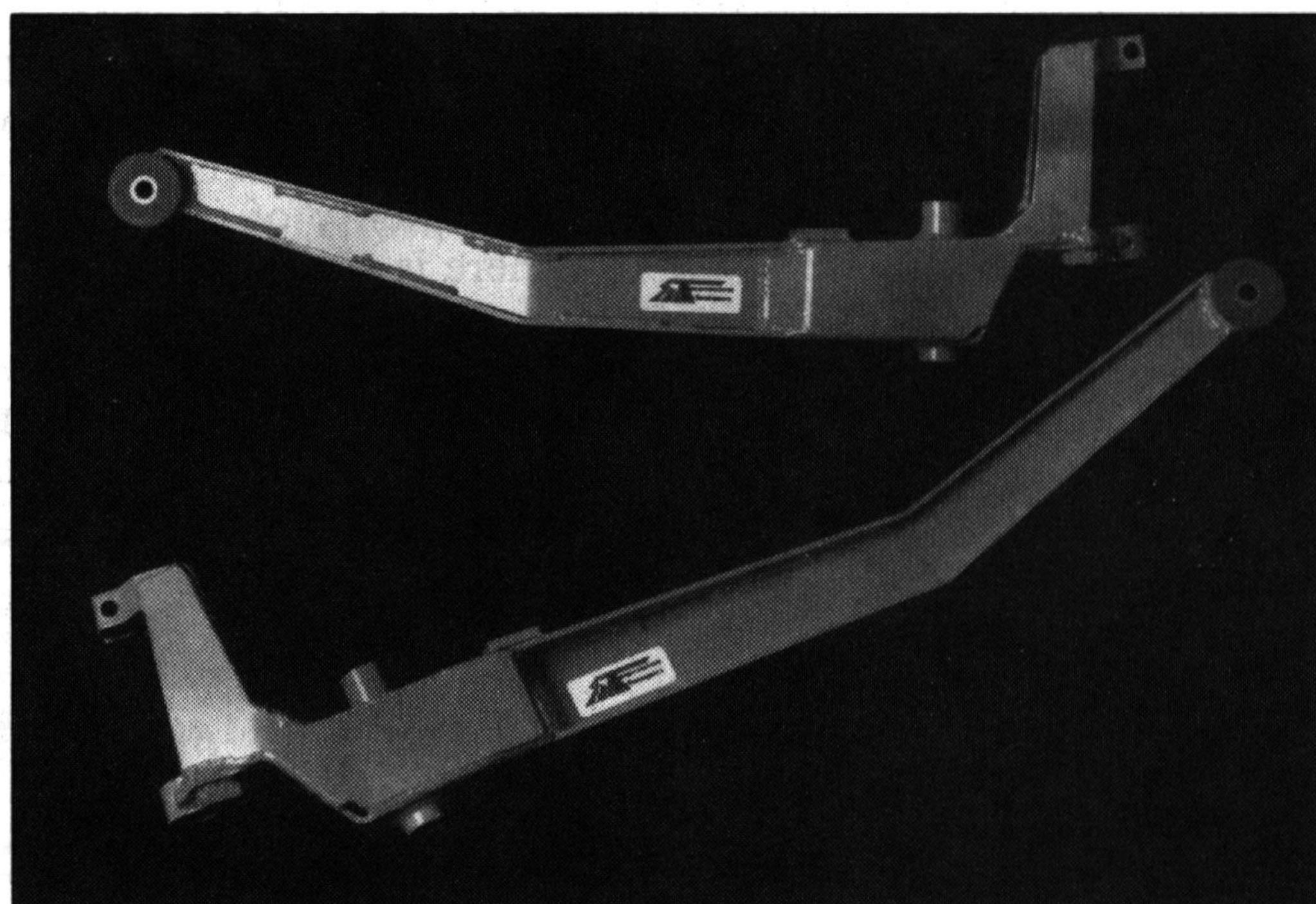
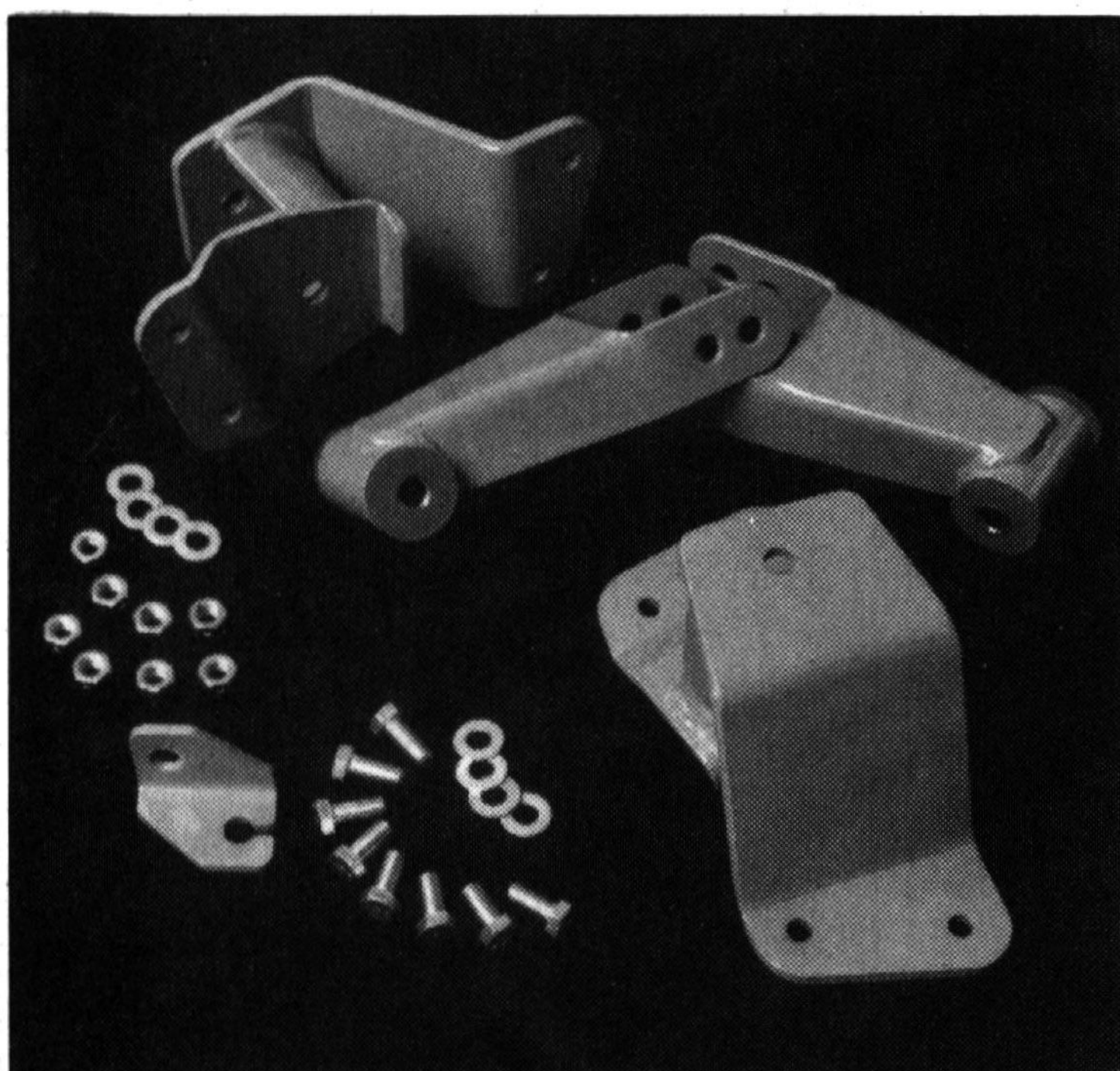
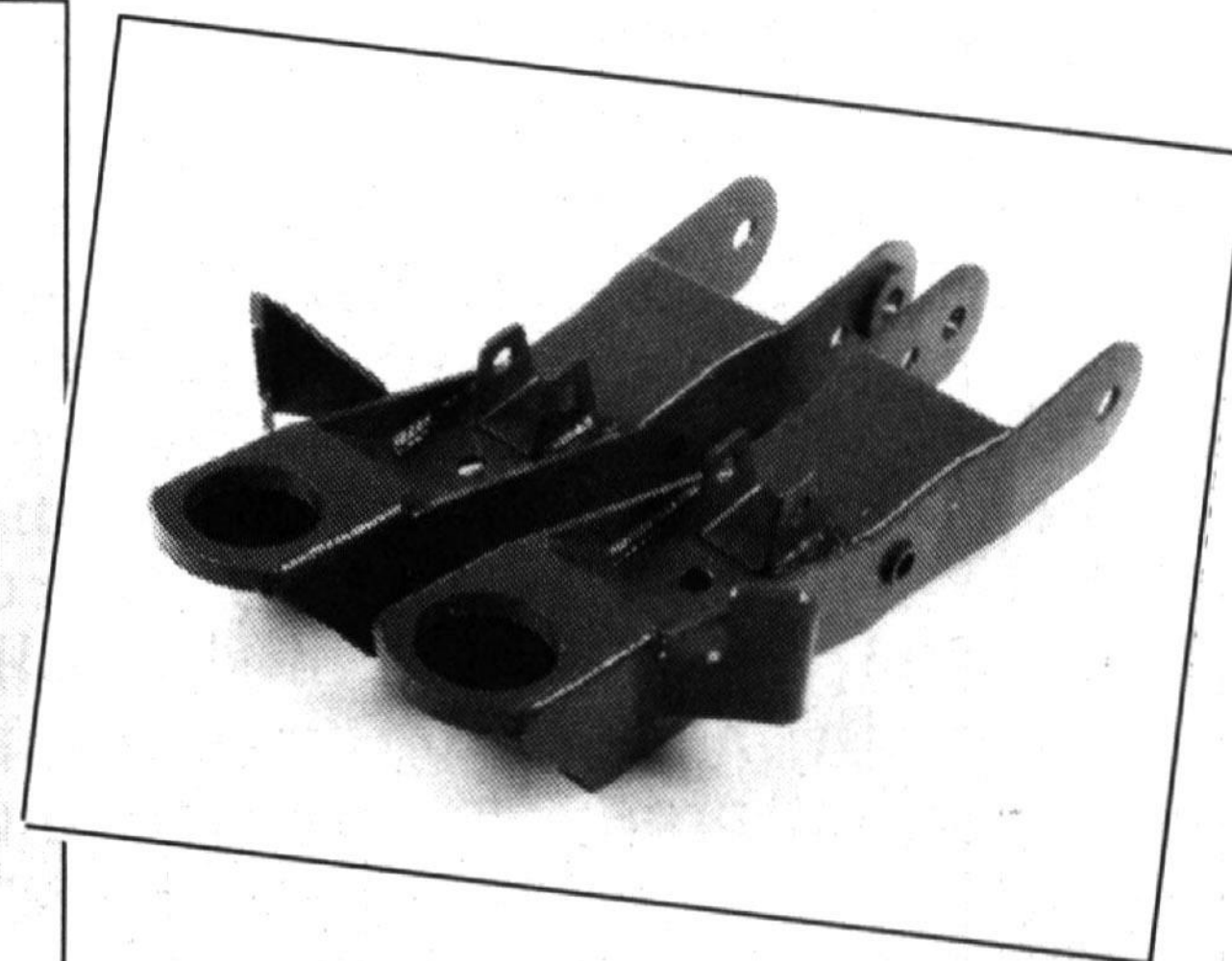
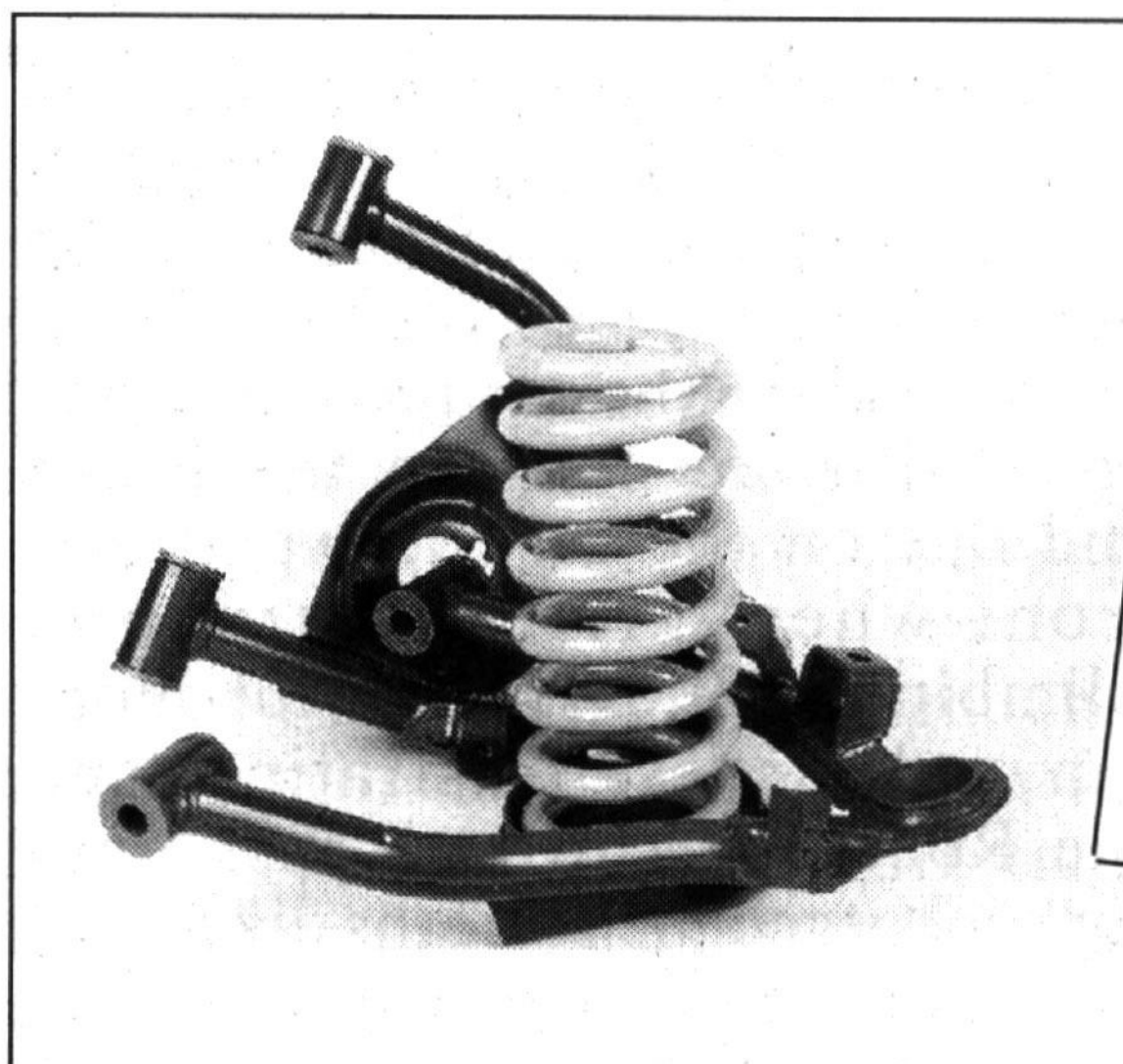
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Lowered control arms, shown for GM products at right and a Nissan pick up at far right, preserve handling while giving the front of the truck a low and mean look.

Below, left: This eye hanger and shackle kit drops a rear suspension 4". It is best used with a 2" front drop to maintain vehicle balance and the correct pitch of the chassis.

Below, right: For vehicles like the Ford F150 and Ranger a dropped front beam, as shown here from Suspension Techniques, is one of the best and safest methods of lowering a vehicle.



**Relax, man!
It's easy.**

not better. Lesser rear drops can be accomplished with shackles and I-hangers, monoleaf springs or progressive rate rear springs such as the Suspension Techniques lowered rear springs that preserve towing capability.

6) Lower profile tires are a simple way to lower a truck, but can only accomplish minimal lowering. Lower tires must be selected to complement other suspension modifications or ride and handling can both be degraded.

Compromises to consider when lowering a truck

1) When a truck is lowered, suspension travel normally will be reduced. This will possibly cause the frame or other components to bottom out on the ground, or the suspension to bottom on its stops. This can cause expensive damage. The lower you go, the more likely this will occur. Stiffer springs

provide the means to keep bottoming from occurring. The lower the ride, the stiffer the springs must be. It is for this reason that cutting springs to lower a truck is not the ideal solution.

2) When a truck is lowered, the suspension geometry will change, most notably at the front. The lower the ride, the greater the change to the geometry. Several companies manufacture lower front control arms that actually improve the negative camber gain under cornering loads, even when lowering is substantial.

3) Since lowering really requires stiffer springs, and stiffer springs will make the ride more harsh, you must decide how rough a ride you are willing to tolerate. The lower you go and the stiffer the springs, the harsher the ride will become. The good news is that a properly designed system allows considerable lowering without creating a really harsh ride. But if you want to go really low, a harsh

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ride is the price you will pay.

4) If you increase spring stiffness, firmer shocks should be part of the system; otherwise, you will bounce down the road like a pogo stick every time you encounter a bump.

5) If your reason to lower is purely cosmetic, antiroll bar changes are not important, but do not expect good cornering performance. If your reason to lower is to create sports car-like handling characteristics for your truck, then finish the program with antiroll bars.

Before you lower your truck, it is best to know what your goals are, and your budget. Simply lowering a truck can cause giant headaches. But a properly designed system can allow you to enjoy every aspect of your lower ride. A little time spent consulting with suspension experts can save considerable grief down the road. ☐

Keeping It Legal

When lowering your truck's suspension, don't run afoul of the law. Most states have similar rulings for vehicle ride height and ground clearance, but it's always best to check with your state's authorities. Actually, you can get away with a lot, if you know what you are doing.

In California, for example, the law states that no suspension component can be lower than the rim of the wheel. This law is designed to keep suspension parts from dragging on the pavement in the event of a flat tire!

Realizing this, you can simply move to Plus One or Two wheels and tires as you lower your suspension and stay legal. Plus One and Plus Two mean replacing the stock wheel and tire with a larger diameter wheel rim and a lower profile tire, which maintains the same overall tire circumference.

However, some experts recommend that you go no lower in profile than a 60 series tire at most. The reason is to maintain sidewall compliance, a genuine factor in ride comfort. With stock spring rates for 1/2 ton pickups as high 900 lbs/inch, that sidewall compliance or flex is a real necessity. ☐



Complete lowering kits are available from Bell Tech, Suspension Techniques, Rancho and others. This ST kit (above) for the '92 Chevy and GMC S-10 or S-15 allows a 2.5" front drop with lowered control arms and a 3" rear drop with lowering blocks. An antiroll bar is included.

At right is another complete kit, this one for '88 to '92 Chevy and GMC 1/2 ton pickups. Along with a set of lowered shocks are the parts for a 3" front drop with lowered control arms and a 4" rear drop. Front and rear antiroll bars are included.



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