SHOP TIPS FROM Autolite Ford

VOL. 6, NO. 5 JANUARY, 1968

Beginning This Month A New Feature...PERFORMANCE CORNER...Page 2

Technical parts and service information published by the Autolite-Ford Parts Division and distributed by Ford and Lincoln-Mercury dealers to assist servicemen in Service Stations, Independent Garages and Fleets.

LEARN ALL ABOUT FORD'S **NEW** AUTOMATIC RIDE LEVELING SYSTEM

PERFORMANCE CORNER

MODIFYING THE

If you've been looking for information about the world's leading performance cars—Ford, then this is the place for you . . . "Performance Corner." A special section of timely topics and tips straight from the people who design and build everything from LeMans and Indianapolis-type winners to outstanding performers for the street and/or drag strip. This first article deals with Ford's big one . . . the 427 wedge. It features information on the parts and specifications required to build "hot-setups" for . . . (1) trophey winning "strip" or "street" use, and (2) an all-out competition package that's strictly for the "strip" *only*.

WHAT'S YOUR PLEASURE?

If there's a special article or subject you want covered, let us know, by writing:

Performance Corner
Autolite-Ford Parts Division
Merchandising Services Dept.
P. O. Box 3000
Livonia, Michigan 48151

FORD'S 427 CID "WEDGE" ENGINE

Modern combustion chambers come in a number of shapes—with the oval or "Hemi" (as used in Ford's 427 DOHC engine) and the "wedge" (as used in the production car 427 engine) being the most popular. The term "wedge" arises, of course, from the shape of the cylinder head cross section (Fig. 1). It produces a highly efficient "swirling" action of the incoming combustion gases, that produces the smoothest operation of any street performance engine. The wedge-head design also has proven to be a strong, economical and dependable design—which indeed goes for the whole 427 engine. It's a *true* performance engine, yet reliable. In other words, Ford builds plenty of performance into the 427 for strictly "street" use, yet there's lots of room to modify for even more performance. Which makes the 427 an ideal engine for the performance enthusiast . . . a fact that has made it a winner on the street and track, since its introducion in 1963.

Figure *1—Wedge-shaped Combustion Chamber*

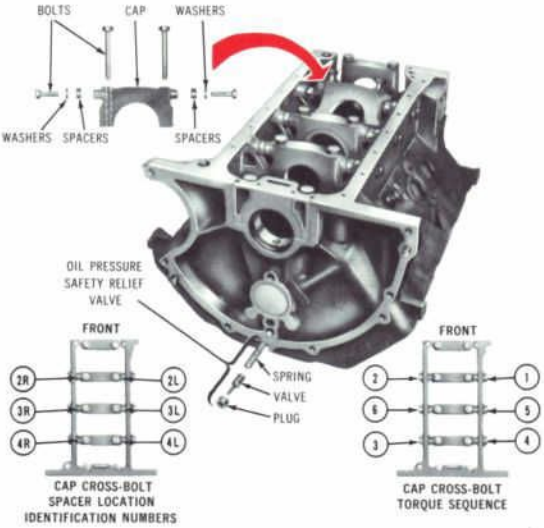


Figure 2—427 Cylinder Block

Figure 3—Impact-extruded Piston and Special Connecting Rod

NOTE: Some modifications may affect the warranty. Be sure and discuss this situation with the dealer.

The 427 features a deep super-strong "Y" shaped block of precision-cast alloy iron . . . reinforced for precise bearing alignment and greater rigidity with Ford-pioneered "cross-bolted" main bearing caps (Fig. 2) . . . large oil galleys . . . and an oil pressure safety relief valve (Fig. 2) to help prevent excessively high oil pressure during cold engine operation.

To withstand the 427's high torque output, the crankshaft is of forged steel for greater durability . . . with special steel-backed, copper-lead alloy replaceable bearing inserts. Impact-extruded pistons and special forged-steel connecting rods (Fig. 3) . . . together with a precision ground, high lift-type cam and lightweight valve train

IN THIS ISSUE

Be sure and file this and future bulletins for ready reference. If you have any suggestions for additional information that you would like to see included in this publication, please write to: Autolite-Ford Parts Division of Ford Motor Company, Merchandising Services Dept., P.O. Box 3000, Livonia, Michigan 48151.

The description and specifications contained in this book were in effect at the time the publication was approved for printing. The Ford Motor Company, whose policy is one of continuous improvement, reserves the right to discontinue models at any time, or to change specifications or design without notice and without incurring obligation.

Autolite Ford

VOL. 68 FPM 41 LITHO IN U.S.A.

427 FOR STREET/STRIP

. . . lets the 427 operate easily in the ultra-high 7000 rpm range.

Excellent breathing characteristics, achieved by means of cylinder heads with smooth, extra-large ports and fully machined combustion chambers, round out just a few of the leading features that make Ford's 427 wedge a potent and one of the most reliable mass-produced performance engines on the market today.

Since its introduction in 1963, the 427 has come in one basic block design—with cross-bolted main bearings. Improvements and minor modifications have been made from time to time, but most are rated about the same as the 1966-67 versions. And that is . . .

	4V	8V
Horsepower	410 @ 5600 rpm	425 @ 6000 rpm
Torque	476 @ 3400 rpm	480 @ 3700 rpm

. . . and remember, that's strictly stock, or just as they come in the crate from the factory.

If you want more "go" than the production 427 provides, exotic modification and expensive components aren't necessary . . . thanks to a wide range of Ford performance equipment, available at Ford and Lincoln-Mercury dealers. This is the best part of owning a 427, namely the availability of "factory" performance equipment the average enthusiast can afford and maintain. For instance, look at what can be built using almost strictly Ford parts.

STREET AND STRIP PERFORMANCE

High performance and high rpm's generally go together. The camming and carburetion required for performance, however, usually don't contribute to a smooth-running car at relatively low street rpm's. But as previously pointed out, the 427 wedge-head design lends itself to smooth street performance—even with a solid lifter cam. Overall smoothness drops but slightly with the following modifications:

(1) Every engine to be used in competition should undergo a comprehensive check of clearances, balancing, Magnafluxing and a "boilout" in degunking fluid. For "street" only use, it's not a bad idea either; but for "strip" use it's mandatory. The stress and strain created within an engine while popping the clutch off the line at the strip, and running through the gears around 7000 rpm is something else again. The best insurance for peak performance and durability under these conditions is to clean, check and blueprint the engine.

(2) If you have a used block, boil it out and have it Magnafluxed. Take a close look at the webbing, main bearing caps, cap bolts, and the cylinder head area around the head bolts for stress cracks. Either eyeball it very carefully, or use one of the spray-on crack finders. Nicks and scratches should be smoothed from all machined surfaces. Check for flatness with a steel straight-edge. Grind away any casting flashings, clean all oil galleys with a wire brush and check tapped holes. Balance parts and assemblies. The specification chart on page 6 lists several critical balance weights. If the block is new, you can skip the boiling operation, but not the Magnafluxing. One last thing. Check the block for trueness in the bottom end. If it's out of specifications, have it line bored. Remember, this is a racing engine and everything about the crankshaft centerline must be right on the money.

(3) Install special 12.5:1 high compression "eyebrow" pistons (Ford Part No. C8AX-6110-A with Dyke ring), stock cylinder heads (Ford Part No. C5AZ-6049-C) and 0.015" thick steel shim head gaskets (Ford Part No. C3AZ-6051-B) to obtain a compression ratio of 12.5:1. Piston to deck height (Fig. 4) should be 0.025" with a 90 cc. cylinder head volume. This combination is acceptable for the street and strip.

Figure 4—Measuring Deck Height Clearance

Individually fit each piston to a cylinder, then mark or stamp the piston to show the cylinder number it was fitted for. Piston skirt clearance should be 0.007", measured even with the pin boss and perpendicular to the pin itself. Fit the piston pins to the connecting rods with a clearance of 0.0007" to 0.0009". Use stock Ford piston pin retainers.

(4) Install a stock forged steel crankshaft (Ford Part No. C5AZ-6303-C). It should be Magnafluxed, balanced and checked for straightness. Assemble the crank to the block on stock Ford main bearings (Ford Part No. C5AZ-6333-AA *lower* and C5AZ-6333-AB *upper*). Main bearings AND rod bearing clearance should be 0.0025" to 0.003" for street use. For the strip, clearance should be 0.003". Connect pistons to the crankshaft with stock Ford connecting rods (Ford Part No. C5AZ-6200-D). A later type connecting rod with a "J" suffix has been released. If available, they should be used instead of the "D". Both rods are the same except for a little heavier cap on the "J". No matter which connecting rod is used, polish the rods the full length of the shank and remove all sharp edges or small pits that might cause a fracture under extreme loads. Remember, the engine may be wound up as tight as 7500 rpm when it comes off the line. That's no time for a failure, so polish the rods—first with a wheel, then with paper.

Assemble the rods to the crank and check rod side-clearance (Fig. 5). A stock 427 will be about 0.019". This should be increased to a minimum of 0.025" by machining the inner facing surfaces of the connecting rods. Then have the complete rod assembly balanced before fitting it to a balanced crankshaft. A balanced, stock flywheel (Ford Part No. C5AZ-6375-P), weighing 30 pounds, should be bolted to the crank. These balancing operations are all most critical. They're NOT an option; they're a MUST.

PERFORMANCE CORNER

MODIFYING THE

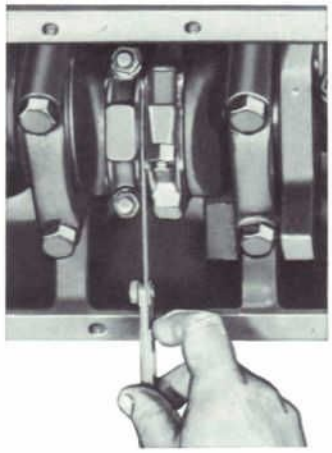


Figure 5—Checking Connecting Rod Side-clearance

Install stock Ford rod insert bearings (Ford Part No. C5AZ-6211-G). Torque the rod bearings to 58 foot-pounds and the main bearings 105 foot-pounds. Refer to Figure 2 for the correct tightening sequence. Tighten main bearing cross bolts to 42 foot-pounds. And here is a reminder about torque wrenches. Tighten bolts in increments of 10 foot-pounds. This is no place to see how fast you can get the job done, so easy does it. If you apply pressure and the bolt doesn't feel right, STOP, and find out why. Check for nicks or burrs that can cause binding. If a bolt suddenly seems to tighten too easily, there's a good chance it's beginning to fatigue. That can mean trouble ahead, so take a little extra care when assembling the engine.

(5) Install solid lifter cam (Ford Part No. C4AE-6250-B). It has a "lift" of 0.500" (theoretical) and a "duration" of 324° (theoretical). This makes it a little hotter grind than the production cam (0.500" lift and 306° duration). Complete specifications are shown in the Camshaft Chart on page 4. Usually with a new cam it's advisable to install new valve springs, surge dampers, retainers, lifters, etc. Either new or used parts, however, may be used as long as the spring pressure specifications shown in the Camshaft Chart on page 4 are met.

(6) Assemble cylinder head (Ford Part No. C5AZ-6049-C) with hollow intake valve (Ford Part No. C5AZ-6507-N) and sodium-filled exhaust valve (Ford Part No. C5AZ-6505-N). Make sure the intake valve seat and face angle is 30°. The valve seat width should be 0.035" at the outer edge of the valve for drag strip racing *only*. For street use, the width should be 0.070".

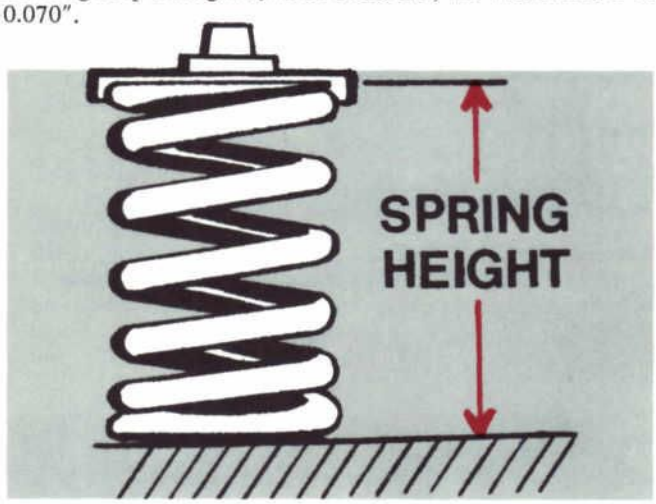


Figure 6—Checking Spring Pressure Height

CAMSHAFT SPECIFICATIONS	STREET/STRIP PERFORMANCE		STRIP ONLY PERFORMANCE	
Camshaft Part Number	C4AE-6250-B		C8AX-6250-D	
Lifter Type	Mechanical		Mechanical	
Rocker Arm Ratio	1.76:1 Adjustable		1.76:1 Adjustable	
TIMING	**Intake**	**Exhaust**	**Intake**	**Exhaust**
Checking Clearance	0° 0.100" lift	0° 0.100" lift	0° 0.100" lift	0° 0.100" lift
Opens (BTC) (BBC)	56° (BTC) 0° (BTC)	88° (BBC) 31° (BBC)	60° (BTC) 13° (BTC)	94° (BBC) 47° (BBC)
Closes (ABC) (ATC)	88° (ABC) 28° (ABC)	56° (ATC) 3° (ATC)	90° (ABC) 39° (ABC)	56° (ATC) 5° (ATC)
Overlap	112°	112°	116°	116°
Duration	324°	324°	330°	330°
VALVES				
Head Diameter (Max.)	2.195"	1.733"	2.195"	1.733"
Angle of Seat & Face	30°	45°	30°	45°
Lift (Max.)	0.500"	0.500"	0.600"	0.600"
SPRINGS			Recommend Holman & Moody or Crane Spring Kit.	
Outer Valve Closed (Max.)	90 lbs. @ 1.82"	90 lbs. @ 1.82"	Spring pressure and installed spring height specifications included with kit	
Outer Valve Open (Max.)	305 lbs. @ 1.32"	305 lbs. @ 1.32"		

NOTE: Timing and lift specifications must be those found at the Cam when checking clearances are set as specified above.

For drag racing, valve seat and face angle for the exhaust valve should be 45°. The valve seat width should measure 0.050″ at the outer edge of the valve. The exhaust seat can be increased to 0.080″ for street only use. Figure 7 illustrates how to make these measurements.

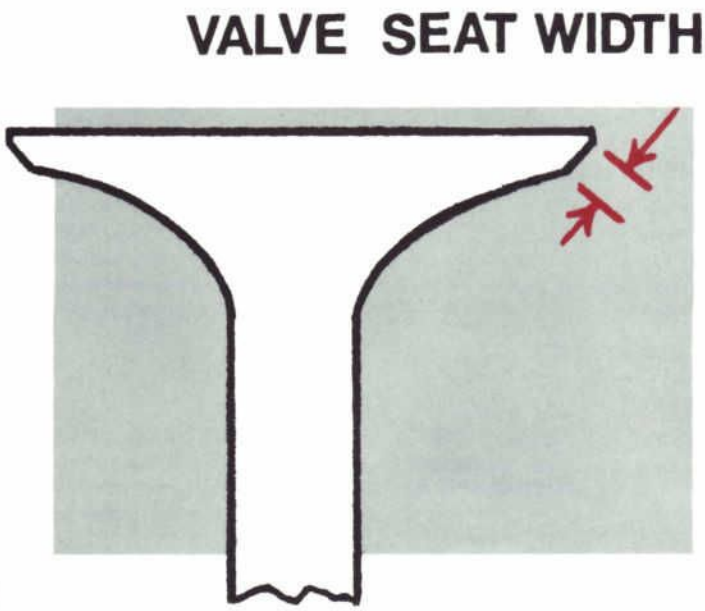


Figure 7—Valve Seat Measurements

With the camshaft in place with the timing chain, etc., and the pistons, rods, crankshaft and heads assembled to the block, check the piston-to-valve clearance. *Again*, this is a MUST operation!

The *absolute minimum* piston-to-valve clearance is 0.120″. Since the clearance is 0.120″ and the valve lash is 0.025″, a feeler gauge of 0.145″ inserted between the valve stem and rocker arm can be used to check the clearance. Manually, turn engine over twice. If the piston does not hit the valve, you have the proper *minimum* clearance. Check all eight cylinders. Pistons may have to be flycut around the eyebrows, in some cases, to provide adequate clearance.

(7) Install an 8V (2 4-bbl.) aluminum, single plane intake manifold (Ford Part No.C8AX-9424-A) and a pair of 652 cfm Holley 4-bbl. carburetors (Ford Part No. C8OF-9510-AC) and C8OF-9510-AD) as shown in Figure 8. This "single plane" type induction system will substantially increase the breathing capacity of the engine. Appropriate changes to the accelerator linkage are also necessary to complete installation of this system.

Some experimentation with the jets is necessary to obtain the optimum air/fuel ratio. When running without an air cleaner, it usually takes an increase of three to four sizes over standard to get a good mixture. However, the exact mixture is a function of temperature, altitude, humidity, etc. As a starter, it's recommended that jetting begin with Holley number 77's in the main metering (primary) jets, and with 71's in the secondary jets.

(8) Install a set of smooth, lightweight, tube-type "headers" to help exhaust the increased volume of air/fuel charge and exhaust gases being handled by the engine through the previous modifications. This step alone usually adds from 10 to 15 horsepower over the standard exhaust system.

(9) Install Autolite BF-32, BF-22, or BF-12 spark plugs. BF-22 is the most popular plug of this group.

(10) Set the timing to match the distributor curve shown on page 6.

(11) Use the *highest* octane fuel available.

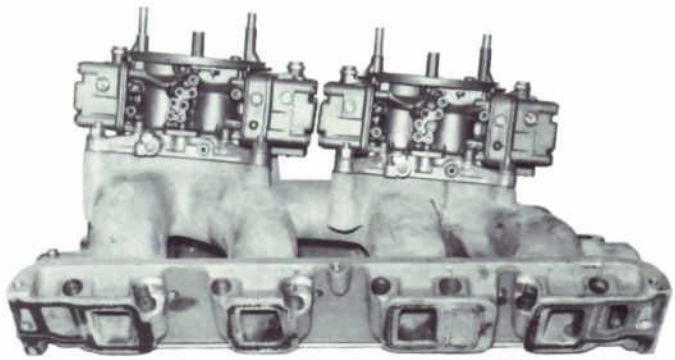


Figure 8—Dual 4-bbl. Holley Carburetors on "Medium" Riser Manifold

ALL-OUT COMPETITION (Strip Only)

Except for a few different parts and some specification variations, the information for "street and strip performance" also applies for all-out competition cars. The only essential difference is that engines setup for maximum performance at the drag strip usually run so rough at street rpm's that they must be trailered to the track. Here are the things that change a "street and strip" engine to a "strip only" performer.

(1) Install special pistons (Ford Part No. C8AX-6110-A) which use an upper Dyke Piston Ring. Piston to deck height should be 0.012″, with a cylinder head volume of 80 cc. to obtain a compression ratio of 14.0:1. Of course, you again use the steel shim head gaskets.

(2) Install solid lifter camshaft (Ford Part No. C8AX-6250-D). This all-out competition cam has a lift of 0.600″ and a duration of 330°. Special Holman and Moody or Crane Engineering valve springs, lightweight pushrods, retainers and lifters are recommended with this cam. Your Ford or Lincoln-Mercury dealer can help you obtain these parts.

If the special Holman and Moody or Crane Engineering valve spring retainer assemblies are *not* used, 0.100″ must be milled off the top of the cylinder head valve guides. This is to prevent an interference condition because of the cam's high lift (0.600″) characteristics.

(3) The stock 427 oil pump is adequate for just about all conditions. However, a special oil pickup (Ford Part No. C5AE-6622-B) and a deep-sump oil pan (Ford Part No. C5AE-6675-N) are recommended. This added capacity keeps oil away from the crankshaft throws. With the deep-sump pan, you can run 9 quarts of oil with filter. A low-restriction filter (Ford Part No. C8AE-6714-B) is also recommended.

PERFORMANCE CORNER

MODIFYING THE

GENERAL SPECIFICATIONS TO TUNE FOR MAXIMUM PERFORMANCE

The following specifications which apply to the 1967 production 427 (and most previous 427's), should be used to prepare cars for the drag strip as well as the street.

Blueprinting Specifications and Modifications for All Engines Regardless of Cam Used

Critical Dimensions

Piston skirt clearance	.007"
Rod bearing clearance	.0025"—.003"
Main bearing clearance	.0025"—.003"
Rod end clearance	.025"
Wrist pin clearance	.0007"—.0009"
Valve seat and face angle—intake	30°
—exhaust	45°
Valve seat width—intake	.035" at outer edge of valve (drag strip racing only, .070" for street use)
—exhaust	.050" at outer edge of valve (drag strip racing only, .080" for street use)
Hand hone cylinder wall	Approx. 5 minutes per cylinder with 150-180 grit stone.

Critical Bolt Torques

Bolt—cylinder head	100 Ft. Lbs. Tighten in following steps: 30, 50, 70, 85 and 100 ft. lbs. max.**
Bolt—intake manifold	28 Ft. Lbs.
Bolt—connecting rod	58 Ft. Lbs.
Cross bolt—main bearing cap	42 Ft. Lbs.
Vertical bolt—main bearing cap	105 Ft. Lbs.
Bolt—rocker shaft hold down	50 Ft. Lbs.

**Refer to shop manual for cylinder head and cross bolt torque sequences.

Balance

Critical static weights:	
Piston	660 to 666 gms.
Connecting rod	833 to 845 gms.—pin end 254-260 gms. —crank end 579-585 gms.
Weight of oil in crankshaft end	15 gms.

Have dynamic balancing performed.

Distributor Curve

Distributor RPMs	250	750	800	1250	2000
Distributor degrees	0°	0°	2½°	5°	9°

Distributor: Maximum safe full advance—38°
If pre-ignition or detonation prevails, retard lead as necessary.

Install BF-32, BF-22, BTF-1, or BF-601 spark plugs, depending upon heat range required.

Gap at .025"-.035".

Carburetors and Fuel System

652 — 715 CFM Holley's
77 Main metering jets (recommended as a jet to start with).
71 Secondary jets (recommended as a jet to start with).

Install electric fuel pump and set for 5½-6 psi at fuel filter.

Use the highest octane fuel available.

General Modifications

Install lightweight fabricated headers.

Use Detroit Automotive Products' limited slip differential (obtained from Holman and Moody, Municipal Airport, Charlotte, N.C.), and Ford high performance differential lube service No. C2AZ-19580-D (Ford part number M2C57-A). The proper lube comes in 1-gallon containers.

Install clamps on the rear springs (two clamps, front and rear) and put a spacer under the rubber pinion nose bumper elevating it to about ½-inch below the bumper plate. Install heavy duty shock absorbers. This should eliminate wheel hop.

To aid power shifting, remove teeth on second and third gear blocker rings. Remove handle retaining bolts in shift tower, install a flat washer, re-install bolts. This will compress the rubber to a near solid condition.

For all-out drag strip performance, the following are strongly recommended for the protection of your engine:

Rear sump oil pan C5AE-6675-N; pick-up C5AE-6622-B.

Use 9 quarts of oil.

Low restriction oil filter C8AE-6714-B.

Minimum piston to valve clearance—.120". Check clearance as follows: Use .120" valve lash (example: if valve lash is .025", feeler gauge should be .145"), insert feeler gauge between valve and rocker arm and turn engine over twice by hand. If valve does not hit piston, you have proper clearance.

427 FOR STREET / STRIP

HOW TO ORDER HIGH PERFORMANCE PARTS

High performance parts for servicing and modifying vehicles equipped with Ford high performance engines can be ordered for you by your Ford or Lincoln-Mercury dealer through one or more of the following sources:

MASTER CATALOG PARTS–Many of these parts are "stock" inasmuch as they are used on the production vehicle. They are classed in the parts book as "A", "B", "C", etc., according to expected sales volume. Class "A" parts, for instance, have a high volume and thus are stocked in all warehouses. This makes them quickly and easily obtainable. Class "C" parts have a lower demand and are stocked in the National Parts Depot in Livonia, Michigan. As is the case with the many special classes of parts stocked in various warehouses, they are nevertheless easily ordered in the same manner as standard parts.

HIGH PERFORMANCE PARTS BOOK–This special parts book lists three types of high performance parts . . . (1) Ford high performance parts (many of which are in the regular Master Catalog Parts Book) . . . (2) Holman and Moody high performance parts and . . . (3) Shelby American high performance parts.

Ford high performance parts are ordered in the same manner as parts from the regular Master Catalog Parts Book. Holman and Moody parts can be ordered on standard Ford Motor Company order Form (FD-419) or on a dealer's purchase order form. Parts can also be ordered directly from:

Holman and Moody
Charlotte Airport
Charlotte, North Carolina 28208

Shelby American high performance parts can likewise be ordered on Ford order forms, or from:

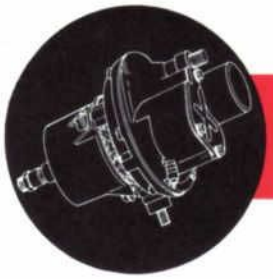
Shelby Parts Company
4320 190th St.
Torrance, California 90504

D.S.O. PARTS–In addition to the many classes under which Ford high performance parts are available, some parts are called D.S.O. These are special order parts, and require special handling. If a part number is classed "D.S.O."–or the class is not known–your Ford or Lincoln-Mercury dealer can order from his facing parts depot Form FD-419-M. The order should be marked, "SPECIAL ORDER HIGH PERFORMANCE PARTS." To facilitate handling and help avoid discrepancies, it is recommended that special order parts always be ordered in writing–on a form or by telegram–rather than by telephone.

In order to get the best possible service, it is suggested that you contact the parts or service manager of your local dealership and review with him the specific parts required. At this time you may wish to determine the effect your proposed modification will have on the warranty. If you wish to order major assemblies, such as transmissions, rear axles, carburetors or alternators, it is helpful if you furnish as complete information as you can. For example, if you wish to replace a major component, any stampings or tags on the unit should be checked for numbers or other data which will assist in identifying the proper assembly.

Frequently Ordered 427 High Performance Parts

PART NAME	PART NUMBER	CLASS
Cylinder Head	C5AZ-6049-C	C
Head Gasket (0.015" steel)	C3AZ-6051-B	A
Crankshaft	C5AZ-6303-C	C
Block	C6AZ-6010-D	C
Valve Intake	C5AZ-6507-N	A
Valve Exhaust	C5AZ-6505-N	A
Connecting Rod Bearing	C5AZ-6211-G	A
Connecting Rod	C5AZ-6200-D	C
Main Bearing (lower)	C5AZ-6333-AA	C
(upper)	C5AZ-6333-AB	C
Center Main Bearing (lower)	C5AZ-6337-AA	C
(upper)	C5AZ-6337-AB	C
4V Manifold	C6AZ-9424-M	C
4V Carburetor Assy. (785 cfm)	C6AZ-9510-AP	C
8V Manifold	C5AZ-9424-G	C
8V Carburetor Assy. (715 cfm)	C6AZ-9510-AH	C
8V Manifold (Aluminum—single plane	C8AX-9424-A	D.S.O.
8V Carburetor Assy. (652 cfm) (Primary)	C8OF-9510-AC	D.S.O.
(Secondary)	C8OF-9510-AD	D.S.O.
Piston (Dyke Ring)	C8AX-6110-A	D.S.O.
Dyke Ring (piston upper)	C8AX-6150-A1	D.S.O.
Camshaft	C8AX-6250-B	D.S.O.
Camshaft (Street & Strip)	C4AE-6250-B	D.S.O.
Camshaft (Strip Only)	C8AX-6250-D	D.S.O.
Flywheel	C5AZ-6375-P	D.S.O.
Water Pump (Aluminum)	C5AE-8501-H	D.S.O.
Deep-sump Oil Pan	C5AE-6675-N	D.S.O.
Fiberglass Hood	C6OX-16610-A	D.S.O.
Oil Filter (Low restriction)	C8AE-6714-B	D.S.O.
Oil Pickup (Special)	C5AE-6222-B	D.S.O.



AUTOMATIC RIDE

DESCRIPTION AND OPERATION

An automatic ride leveling control system is available, as an accessory option, on 1968 Ford and Mercury passenger cars and station wagons, as well as the Lincoln Continental. It pneumatically supplements the load carrying capacity of the rear suspension springs to maintain the vehicle at the proper trim height when carrying heavier than normal loads. The system features a design that allows the springs to support the vehicle if air pressure should be lost for any reason.

The major components are a vacuum operated air compressor, height control valve, two air cylinders (inside coil springs of Ford and Mercury (Fig. 1), integral with shock absorbers of Lincoln Continental), and connecting lines and fittings.

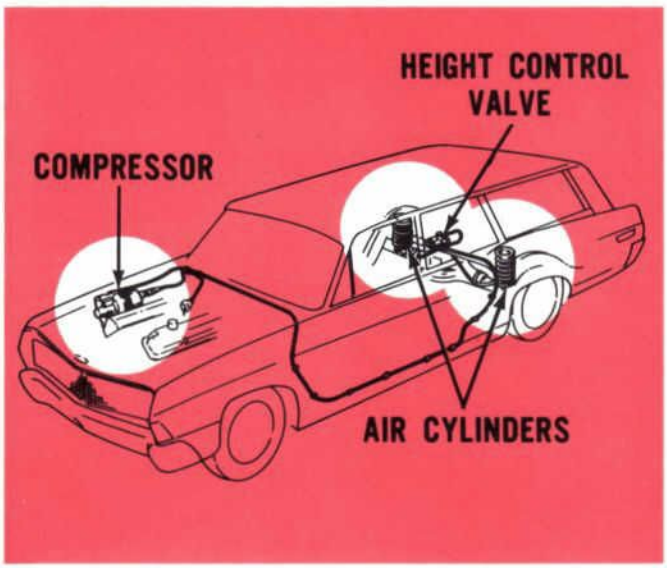


Figure 1—Automatic Ride Leveling System

An air compressor, operating off engine vacuum and atmospheric pressure, supplies pressure to the air cylinders through a height control valve. The valve senses rear riding height position by means of a link (Fig. 2) attached to the suspension control arm. Adding or removing weight from the vehicle moves the link and actuates the height control valve. Adding weight lowers the body. The link actuates the valve so as to allow air into the cylinders (Fig. 3) to raise the vehicle, commensurate with the additional weight. Similarly, as weight is removed, the body raises and the link actuates the valve so as to exhaust air from the cylinders, commensurate with the weight removed (Fig. 4).

A damping piston within the height control valve acts as a time delay mechanism. It prevents rapid air transfer—to or from the air cylinders under normal operation while the vehicle is in motion.

Figure 2—Height Control Valve Link

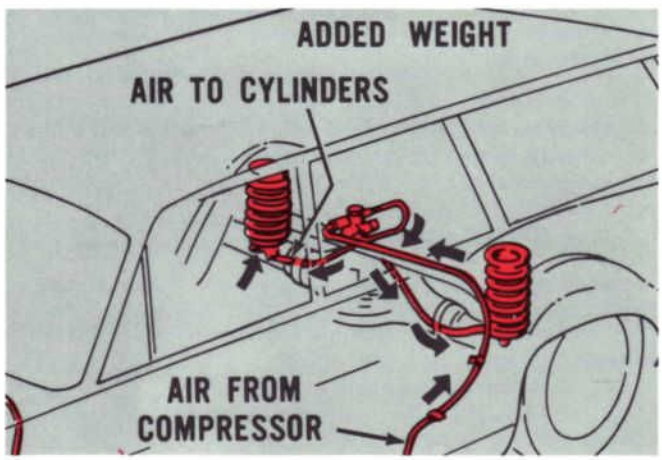


Figure 3—Added Weight

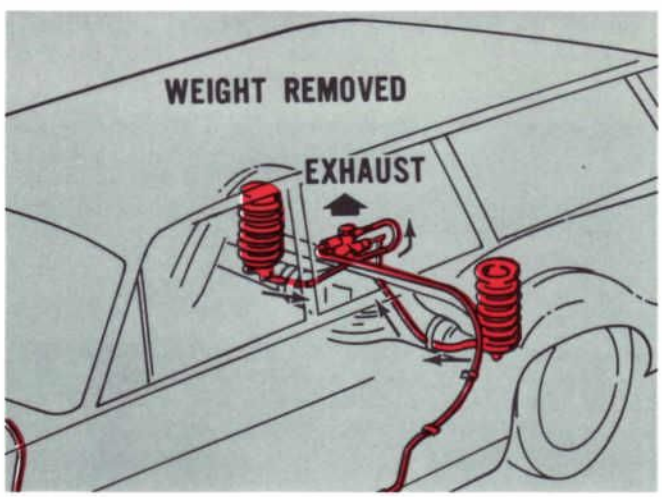
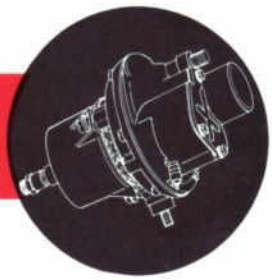


Figure 4—Weight Removed

LEVELING SYSTEM .....



A check valve at the exhaust port of the height control valve retains 2-4 psi residual pressure in the air cylinders, when there is little or no load, to resist scuffing of the butyl rubber air cylinders by the coil springs of Ford and Mercury vehicles.

COMPONENTS

Compressor

The compressor is mounted on the right fender apron of the engine compartment. It supplies air at a maximum pressure of 20 psi, by means of a vacuum actuated mechanism. One side of a diaphragm is open to engine manifold vacuum. (Fig. 5) and the other side to atmospheric pressure. The pressure differential cycles the diaphragm and piston back and forth, until pressure in the output line balances atmospheric pressure. The compressor stops cycling and remains at rest until the system requires air; at which time it again cycles until a balanced condition exists. The pressure needed to achieve a balanced condition may vary from 12 to 20 psi, depending on atmospheric pressure and driving conditions.

The compressor has two port connections. The pressure outlet port is connected to the height control valve by a nylon tube. The vacuum port is connected by a rubber hose to the intake manifold.

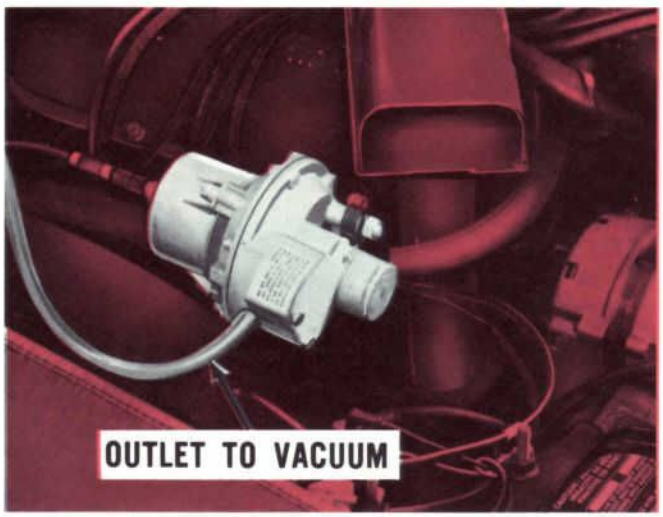


Figure 5–Vacuum Actuated Compressor

The compressor also has two filtered openings (Fig. 6). The primary filter admits atmospheric air to *operate* the compressor. The secondary opening filters the atmospheric air to be *compressed* in the unit.

Height Control Valve

The height control valve is mounted on the crossmember near the rear axle. It responds to changes in suspension height through a link to the upper suspension control arm. When a load is added (Fig. 7) the body moves down and the connecting link forces the valve actuating level upward, rotating the lever shaft. As the flat side of the lever shaft leaves the cam follower, its camming action forces the guide upward, compressing the spring. Spring compression causes a counteraction returning the follower to the flat side of the shaft and swinging the actuating arm off center. This forces the damping piston to displace fluid by itself from one side of the cylinder to the other. As the damping piston moves, it allows the valve arm to activate the air valve assembly upward and the inlet valve is unseated. High pressure air passes through the valve to the air cylinders. When sufficient air pressure levels the body, the actuating lever is returned to the horizontal position, closing the valve.

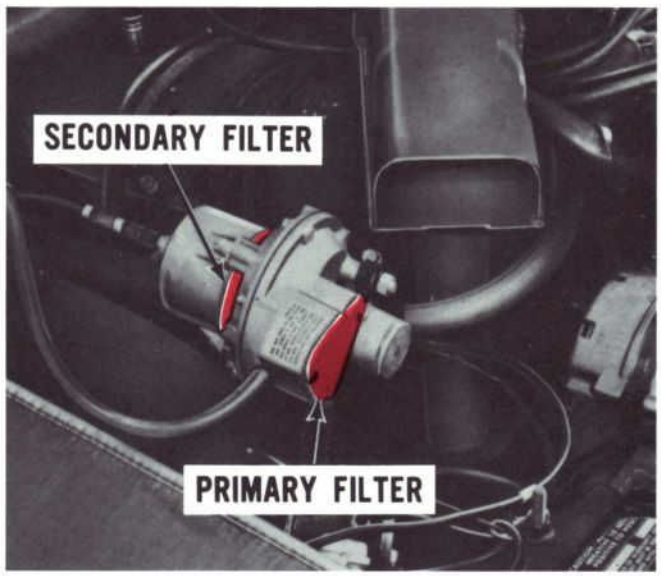


Figure 6–Compressor Air Openings

When the load is decreased (Fig. 8), the body raises and the valve actuating lever is pulled downward, reversing valving action.

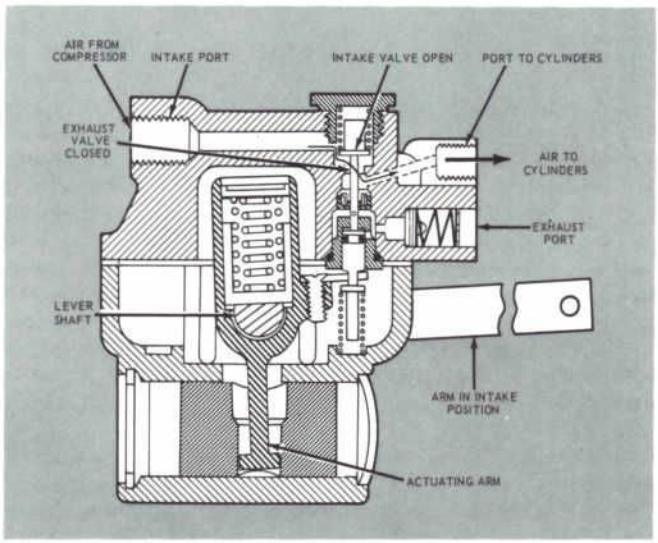
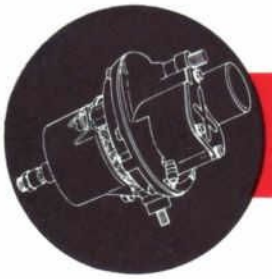


Figure 7–Height Control Valve–Vehicle Loaded



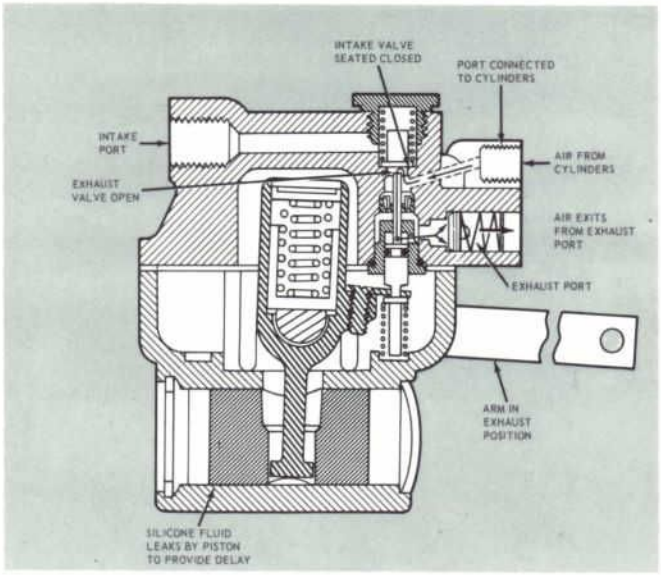


Figure 8–Height Control Valve–Vehicle Unloaded

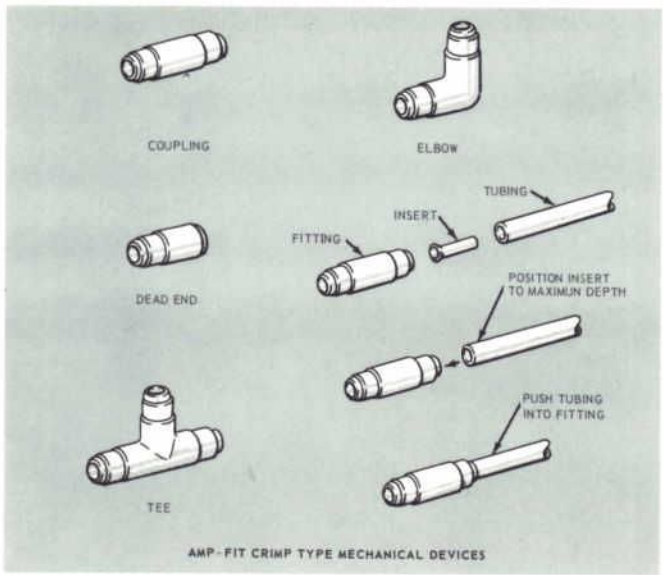


Figure 9–Service Connectors

The inlet valve then remains seated. The exhaust valve is pulled away from the inlet valve and excess air from the cylinders is exhausted throughout the hollow valve stem and out the exhaust port. When sufficient air is released to level the vehicle body, the actuating lever is returned to the horizontal position, closing the valve.

During fast movements of the lever shaft, the cam follower and actuating lever arm which operate the air valve, cannot follow the shaft due to the viscous restriction of the damping piston. Thus, the cam follower rides off the flat in either direction, so the valve remains closed.

Air Cylinders, Lines and Fittings

Butyl rubber air cylinders are located within the rear coil springs of Ford and Mercury models. The air cylinders are integral with the shock absorbers of Lincoln Continentals which employ leaf springs.

Throughout the system, ¼-inch nylon tubing and nylon fittings are used, except for a short piece of ¼-inch steel tubing used at each air cylinder to protect against the exhaust pipe. At the compressor, a ⅛-inch female nylon pipe thread adapter is used. A connector is crimped (Fig. 9) to the adapter and to the line. Both intake and exhaust ports of the valve contain ¼-inch nylon male adapter fittings. The intake side is connected to the compressor output line by a 90-degree crimped connector and the exhaust to the cylinder line in the same manner.

A crimp type "T" splits the main air supply line to each air cylinder. A special brass fitting is connected to each cylinder line by a crimped connector. These special fittings thread onto the cylinder valve stems.

DIAGNOSIS AND TESTING

Most problems will be described as . . . the system does not operate properly, or that unloaded, the vehicle rides too high. The diagnostic road maps (Figs. 13 thru 19) will help you pinpoint the exact cause of the problem. However, a couple of quick checks should be performed first.

Operational Check

Begin the operational check with the engine off. Fill fuel tank, or simulate full fuel tank at the rate of 6 lbs./gallon–otherwise the car should be empty. Raise the vehicle on a hoist so the wheels and suspension still support the weight of the car. Add additional weight to the tailgate or rear bumper to obtain a measurement of 3 inches ± ¼-inch between the rear axle housing and frame rail (Fig. 10).

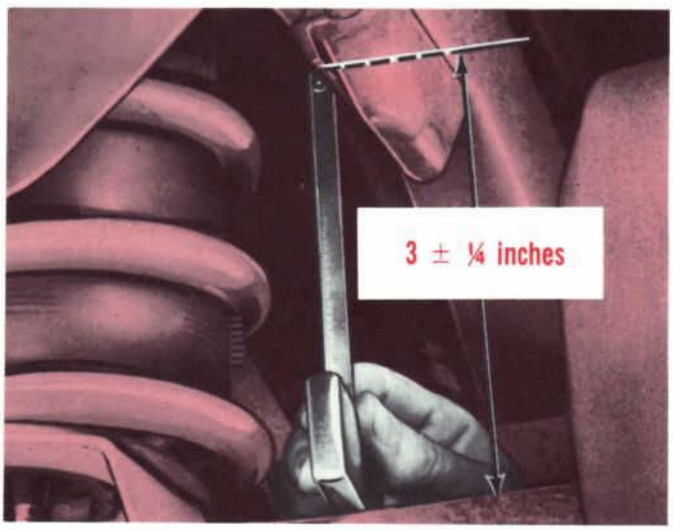


Figure 10–Measuring Trim Height–Loaded

LEVELING SYSTEM . . . . . .

Start the engine and let it idle for two minutes. The vehicle MUST RAISE and the distance between the axle housing and the frame MUST increase at least ¾-inch. If it doesn't, the system is malfunctioning.

If the vehicle DOES raise, remove the load and again observe the rear end. Air should exhaust through the height control valve, and the vehicle should return to the normal empty height.

Leak Tests

Leak tests should be performed whenever diagnosis dictates, or the system has been opened. With the engine operating at idle, apply a solution of soap and water to the fittings at the rear of the compressor. Bubbles will appear if there is a leak.

To check the height control valve for leaks, disconnect the operating link from the valve control arm. Support the arm (up) in the intake position. With the engine idling, check all connections, the air cylinders and the control valve. Reconnect the link after the test.

If diagnosis indicates that comprehensive testing is required, perform in the following order:

1.–Compressor Output

2.–Control Valve Intake

3.–Control Valve Exhaust

4.–Control Valve Time Delay

5.–Trim Height Adjustment

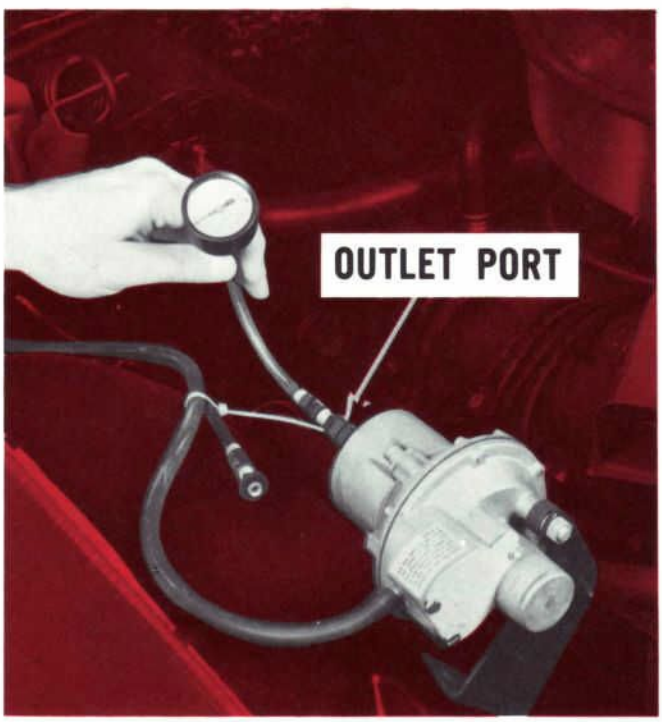


Figure 11–Compressor Output Test

Compressor Output Test

Disconnect the air pressure line and connect a pressure gauge to the outlet port (Fig. 11). Start the engine and observe the gauge reading. It should be between 12 and 20 psi within ten seconds. If the compressor does not deliver this pressure, check the vacuum supply with a vacuum gauge. Also check the condition of the air filters. If these are okay, and the compressor continues to malfunction, it probably should be replaced.

Height Control Valve Intake Test

To test the height control valve, first disconnect the link from the valve control arm. Disconnect the line to the air cylinder from the output port and connect a pressure gauge to the outlet port (Fig. 12). Start the engine and let it run at idle.

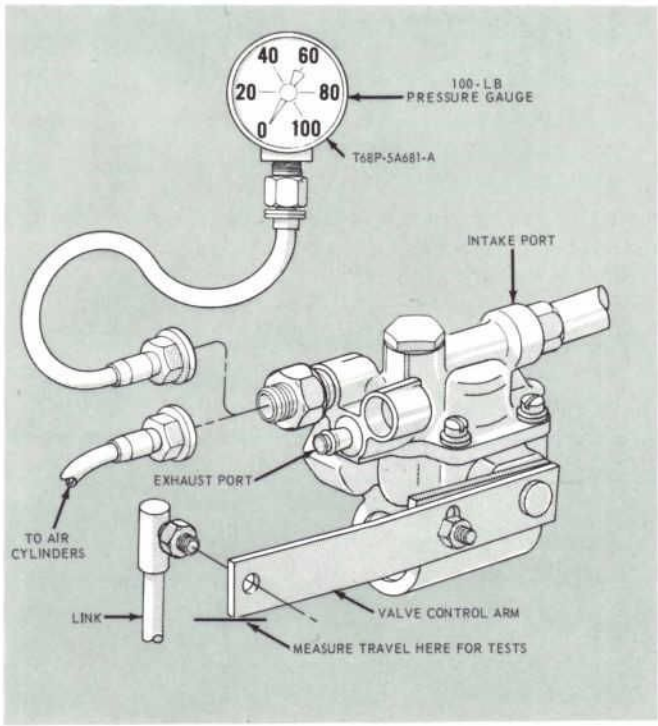
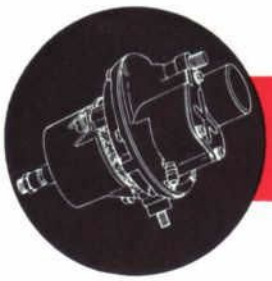


Figure 12–Height Control Valve Intake Test

Hold the control arm UP in the intake position. The test gauge should read 12 to 20 psi–the same reading obtained at the compressor. It must HOLD this pressure when the arm is returned to neutral. No leaks are permitted.

Height Control Valve Exhaust Test

Next . . . to test for exhaust operation, pull the control arm down to the exhaust position (Fig. 20). The test gauge pressure should drop to between 2 and 4 psi. If the height control valve does not operate according to specifications, it should be replaced.



AUTOMATIC RIDE

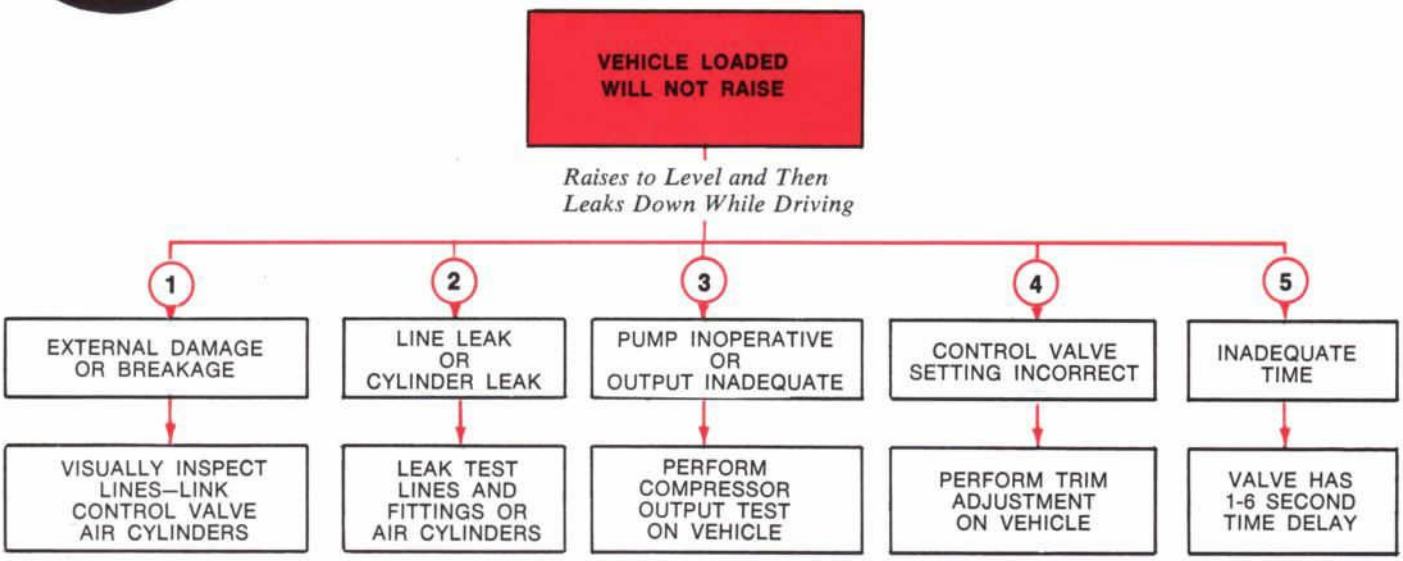


Figure 13—Vehicle Loaded Will Not Raise

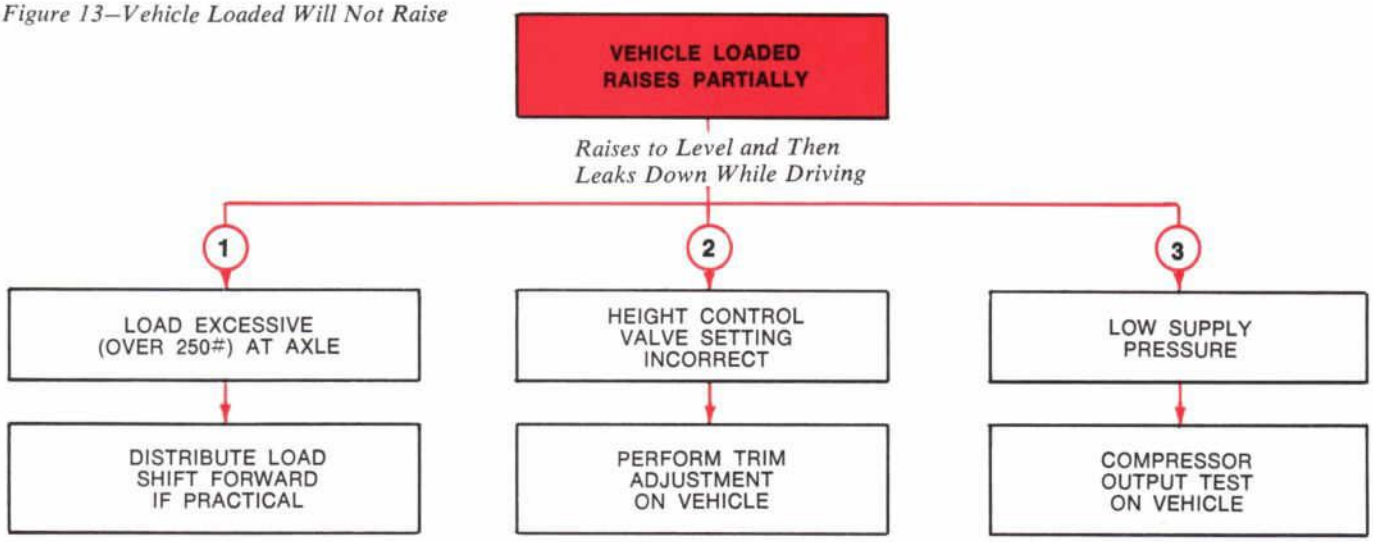


Figure 14—Vehicle Loaded Raises Partially

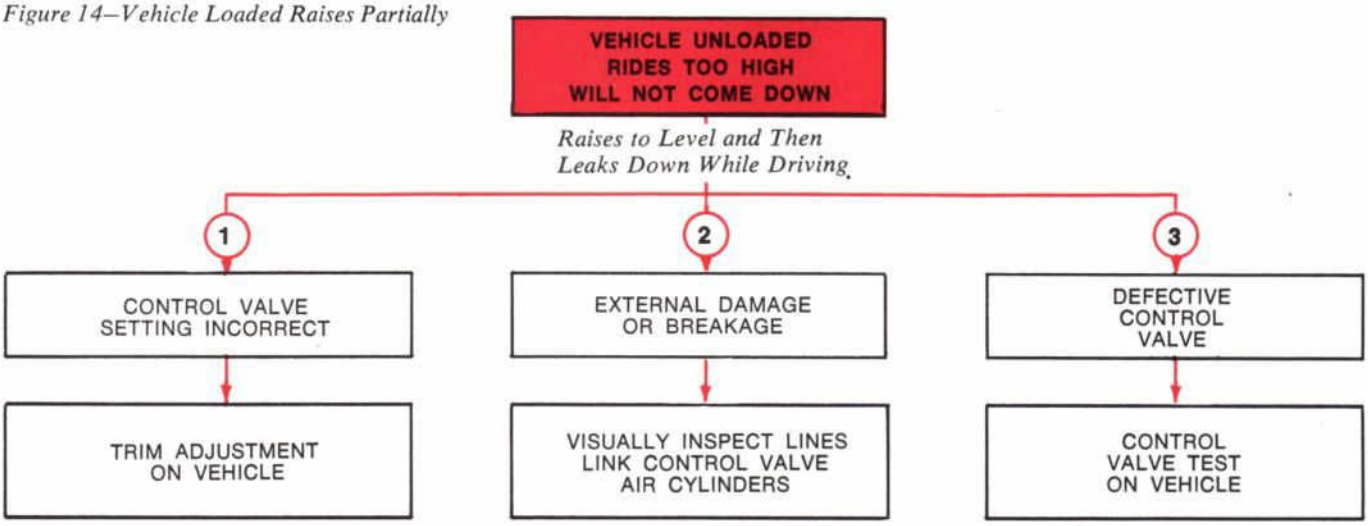


Figure 15—Vehicle Unloaded Rides Too High

LEVELING SYSTEM .....

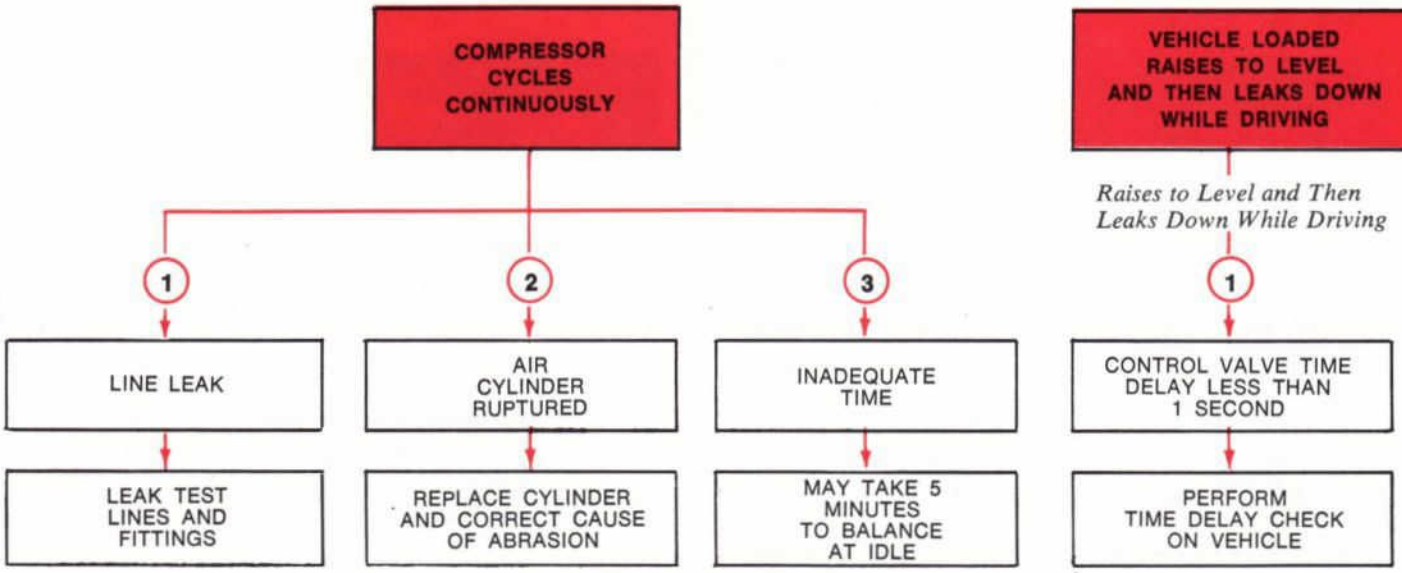


Figure 16–Compressor Cycles Continuously

Figure 17–Vehicle Loaded, Raises to Level and Then Leaks Down While Driving

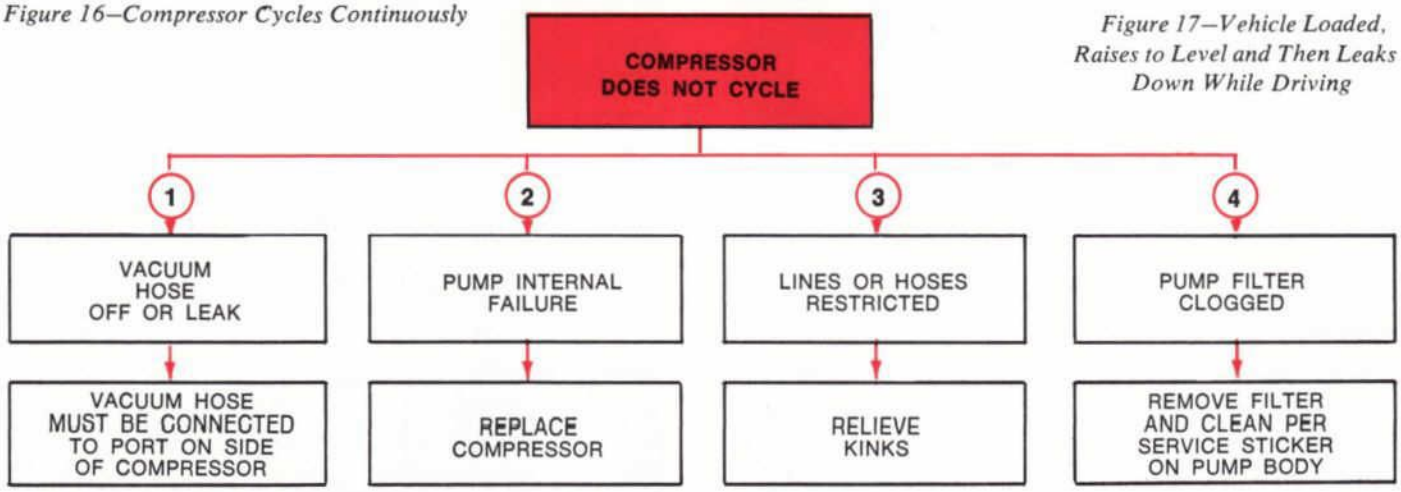


Figure 18–Compressor Does Not Cycle

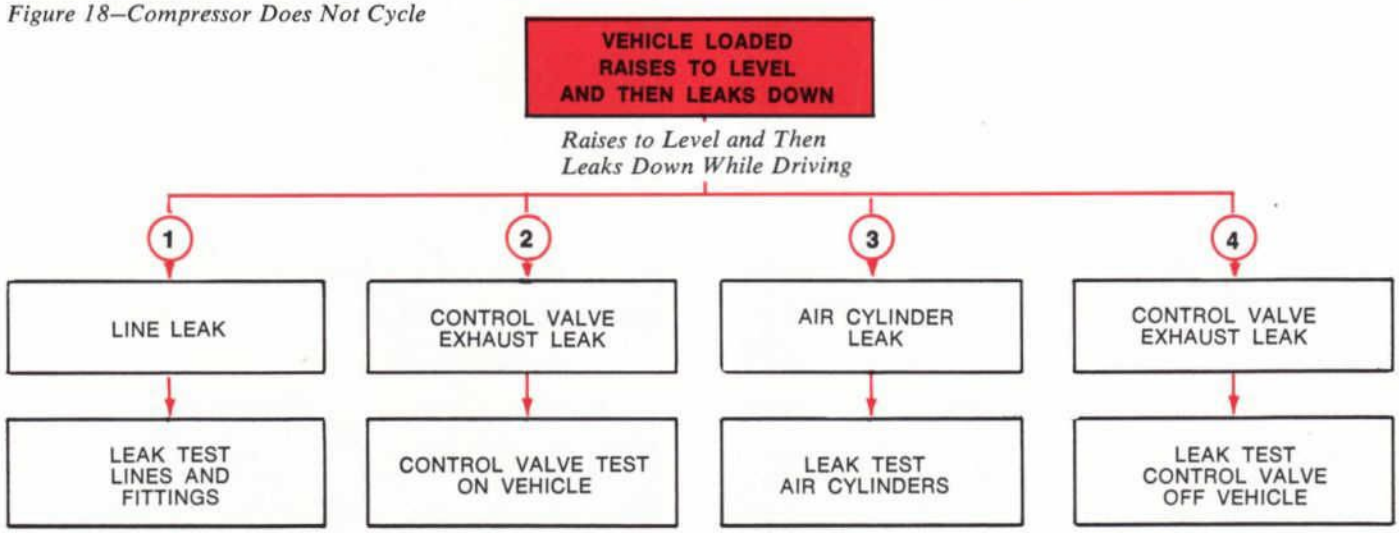
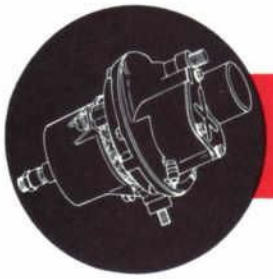


Figure 19–Vehicle Loaded, Raises to Level Then Leaks Down



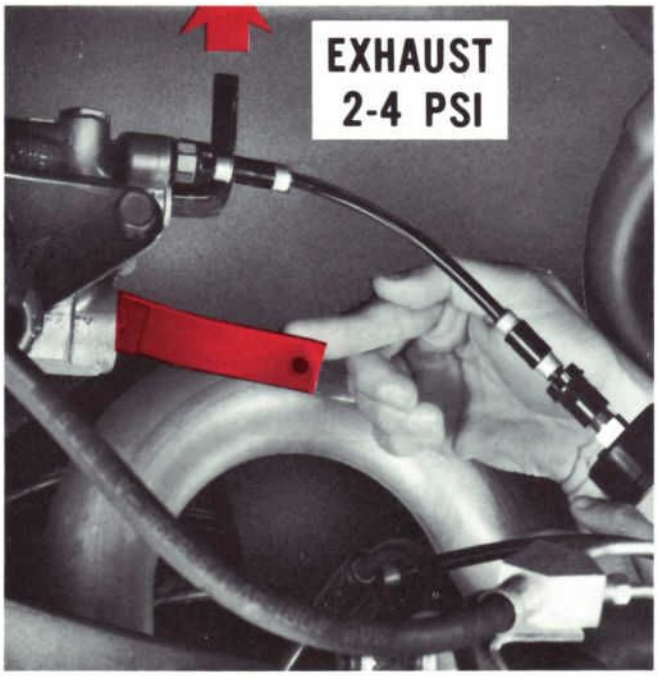


Figure 20—Height Control Valve Exhaust Test

Time Delay Test

The time delay test has two parts—*air intake* and *air exhaust*. Both are performed with the control arm disconnected from the link.

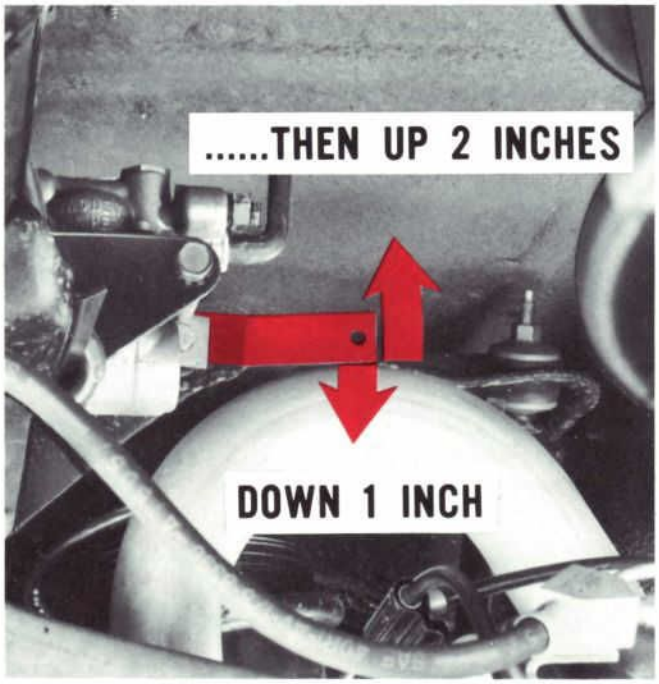


Figure 21—Intake Time Delay Test

Intake Time Delay—Open the pressure outlet port of the valve by disconnecting the cylinder line or pressure gauge. Start the engine and let it operate at idle. Move the control arm DOWN about one inch, measured at the end of the arm. Then, quickly move it upward two inches (Fig. 21).

At the same time, count the number of seconds it takes before the air is expelled from the open port. It should take from *one to six seconds*. Repeat the test if necessary to get an accurate time.

Exhaust Time Delay—To test exhaust time delay, reconnect the air cylinder line to the valve port. Leave the link disconnected. With the engine operating at idle, hold the control arm up in the intake position. Charge the air cylinders this way until the compressor stops cycling. Then move the arm to the neutral position.

Next . . . raise the arm about one inch, then quickly lower it two inches. Count the number of seconds that elapse before air is expelled from the exhaust port. It should be from one to six seconds (Fig. 22). Again, if the valve doesn't operate to specifications, it should be replaced.

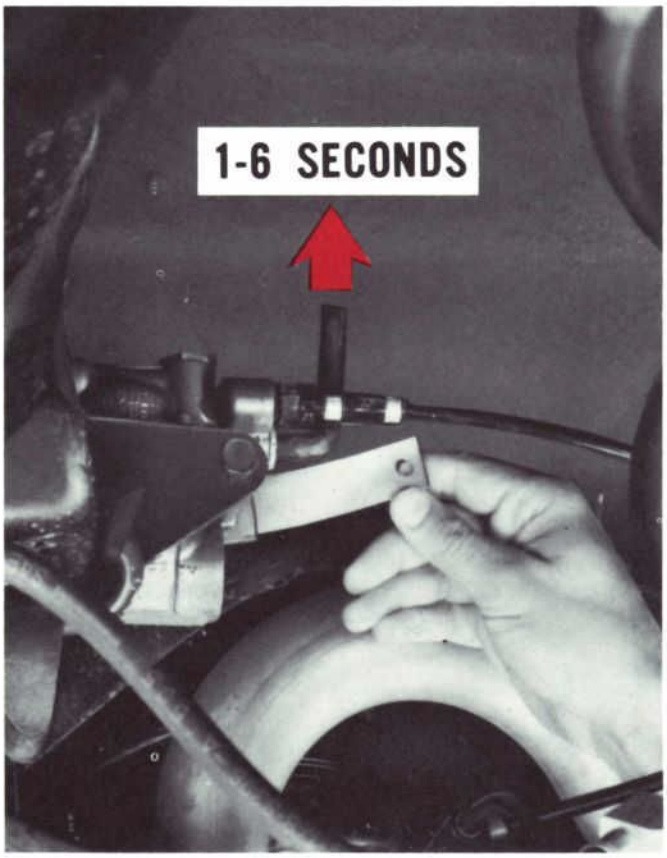


Figure 22—Exhaust Time Delay Test

LEVELING SYSTEM .....

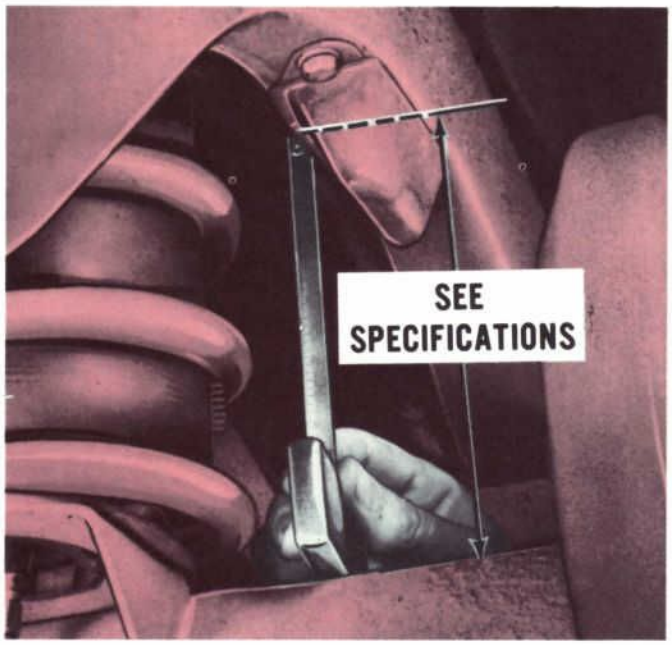


Figure 23–Trim Height

Trim Height Adjustment

To adjust trim height, raise the vehicle on a hoist or jack stand that will support the rear axle. Jounce the rear end to neutralize the suspension. Trim height is measured between the top of the rear axle and the bottom surface of the frame side rail (not the suspension bumper) as shown in Figure 23.

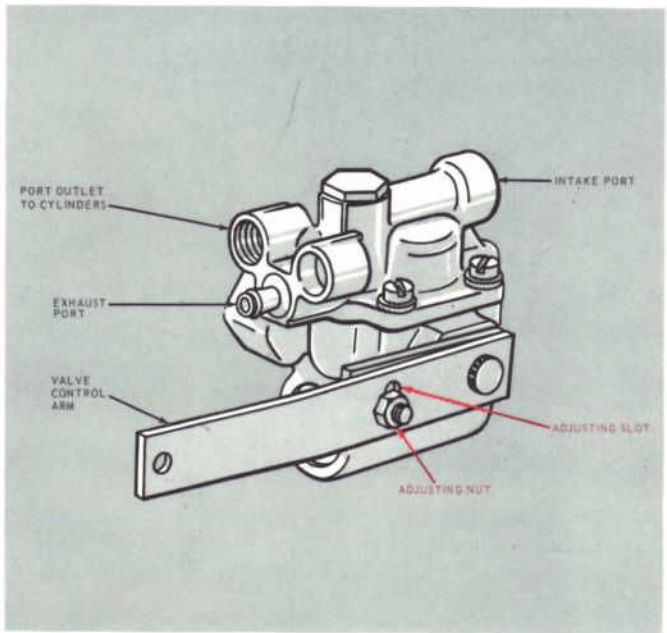


Figure 24–Trim Height Adjusting Nut

REAR TRIM HEIGHT SPECIFICATIONS
1968 VEHICLES

FORD	4 13/16"
MERCURY	4 13/16"
LINCOLN CONTINENTAL	7 3/8"

Loosen the trim adjusting nut on the control arm of the valve (Fig. 24) and allow the arm to neutralize itself. Load the vehicle as required to obtain the trim heights shown in the chart. Tighten the trim adjusting nut and remove the weight.

SERVICE OPERATIONS

Components of the load leveling system are not to be repaired. A malfunctioning compressor, valve or cylinder requires replacement. Air leaks can be repaired at the nylon fittings and adapters. A leak in the line requires replacement of the complete line assembly.

MAINTENANCE

The only maintenance required is to the compressor. And that consists of just cleaning the primary filter plate every 6 months or 6,000 miles according to instructions on the decal on the unit (Fig. 25). The compressor requires NO lubrication.

Figure 25–Filter Maintenance Instructions

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4. **Sta-Ful Reservoir** keeps plates covered longer, minimizing the chance of plate damage. Plates are lower in the case, hence, require water only three times yearly in normal use!
5. **Vacuum-dried Plates** mean Autolite Batteries stay fresh and fully-powered on the shelf. No energy is released until electrolyte is added, *after* the sale!
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