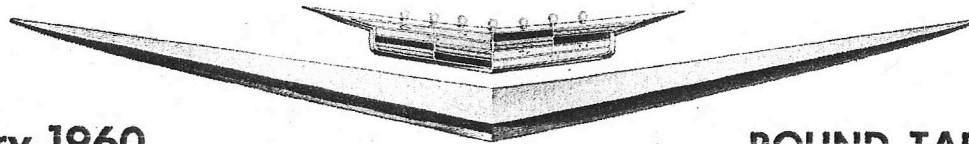


CADILLAC SERVICE ROUND TABLE
Service Summary



January 1960

ROUND TABLE FILM

M^cGOOD RIDES AGAIN
(ON CADILLAC AIR SUSPENSION)

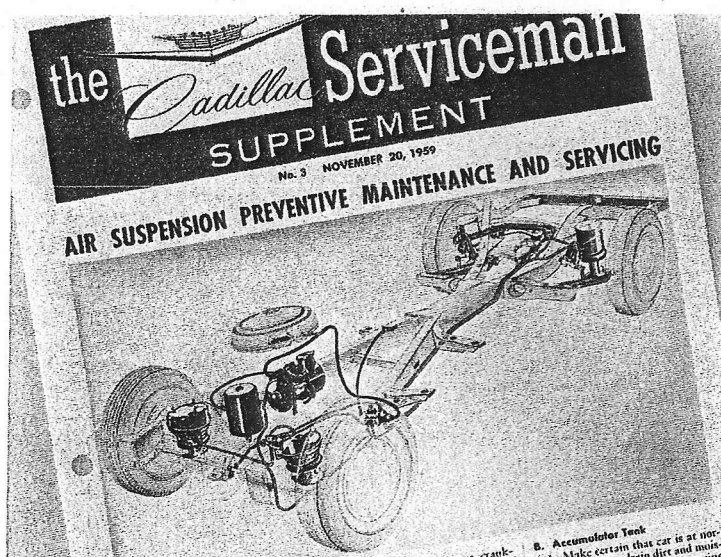
CADILLAC MOTOR CAR DIVISION • General Motors Corporation
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THE ILL-FATED MR. MCGOOD

"McGOOD RIDES AGAIN", -- January's Round Table Film -- is all about Air Suspension servicing on '58, '59, and '60 Cadillacs. The little man in the film who has all the Air Suspension difficulties -- Arthur Sylvester McGood -- is not (as we all know) a typical Cadillac owner . . . not by a long shot. The reason we had him around at all, of course, was to give us a good excuse for updating helpful service information on the correct way to service Cadillac Air Suspension.

But besides giving us a means for reviewing Air Suspension servicing, McGood served to point out some other factors in Air Suspension maintenance . . . such as:

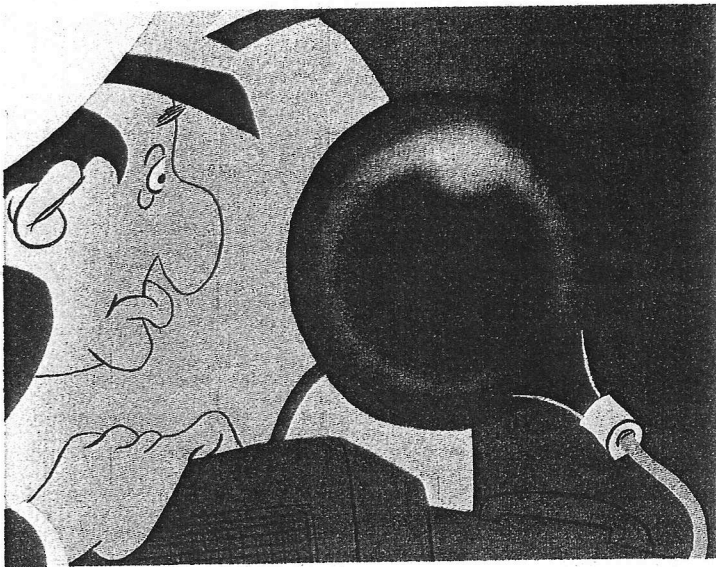


The best way for an owner to stop troubles before they start is to bring his car to us -- an authorized source of Cadillac service -- for his car's preventive maintenance. In terms of Air Suspension, this includes the new yearly check-up, as well as draining the accumulator tank at every lubrication.



Of course, it's our job to sell our Cadillac owners on the benefits of preventive maintenance. If a problem should crop up, it's also our job to give the correct diagnosis, and the correct service remedy.

And we should all realize that an owner can't mistreat Air Suspension (e.g. jumping obstacles on an oil field with the air lift handle pulled out), just as he can't mistreat any suspension system -- without paying the consequences.

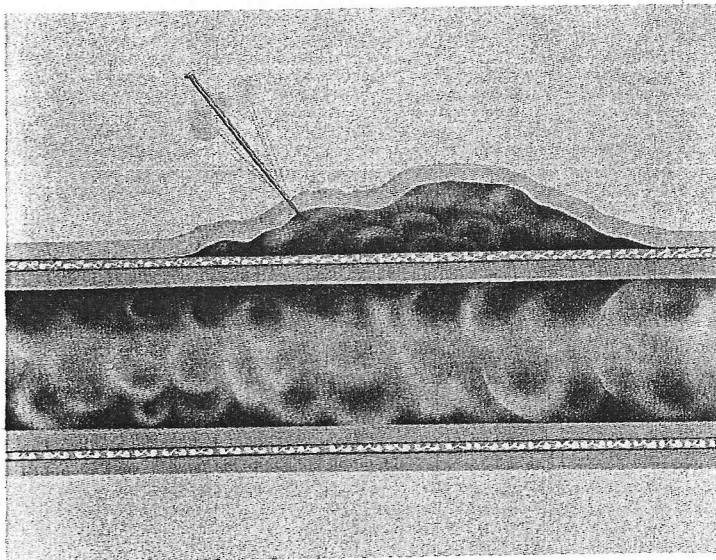


AIR SUSPENSION SERVICING

High Pressure Hose

If you look under the hood of a '58 or early '59 Cadillac equipped with Air Suspension, and see an inflated high pressure hose between the compressor and accumulator tank, don't think it's about to explode. In fact, it may not even be necessary to replace the hose.

The inflation is caused by air seeping between the outer rubber skin and the braided wire of the hose. We can correct the condition by puncturing a small hole in the outer rubber skin . . . since it only serves as a protective coating. However, if the hose looks unsightly after puncturing it, a new pressure hose may be necessary.



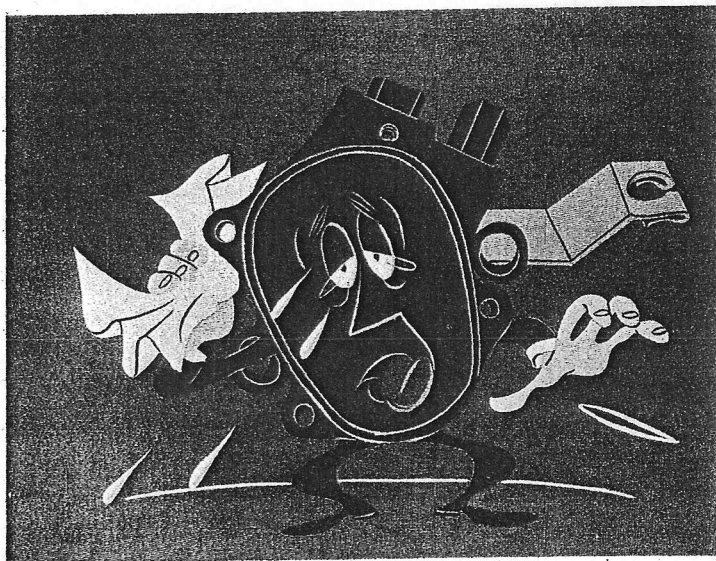
When replacing a high pressure hose, use the late type hose -- the one perforated with tiny little holes that allow the air which causes inflation to seep out, but will not let moisture seep in. The perforated hose was used in production on 1959 model cars -- starting with engine number 043499.

Leveling Valves

If the front leveling valve on a 1958 Cadillac becomes overheated -- which may happen when the car idles for an extended period of time -- the shaft seal is likely to develop a leak. When this happens, replace the leveling valve with a 1959 type -- Part Number 5552593 -- that has been modified to fit a 1958 car.

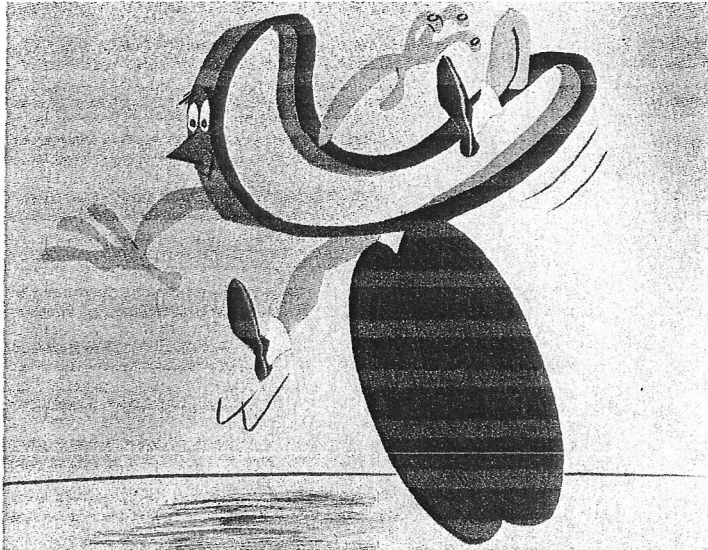
The shaft seal on the '59 leveling valve is not so likely to develop a leak since it is designed to withstand higher operating temperatures. However, if a leak should develop, we can simply replace the "O" ring shaft seal, since the '59 valve is completely serviceable.

Another hint on the '58 leveling valves -- the adapters may rust to the valve body, making them difficult to remove. To break the bond of rust, use a few drops of rust solvent.



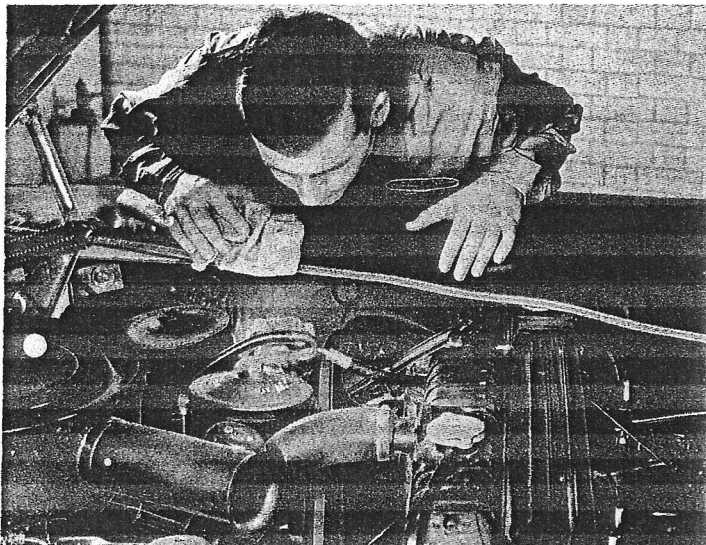
If one or more leveling valves operate erratically, inspect the valves internally for carbon or rust particles. Carbon originates in the air compressor, and rust in the accumulator tank. In either case, the leveling valves -- along with the rest of the system that is affected -- should be cleaned and blown out.

Air Compressor and Air Compressor Belt



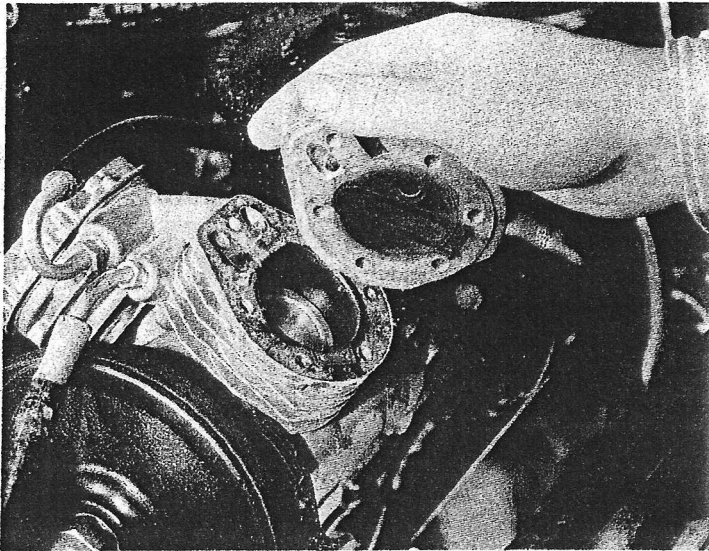
There are several conditions which may cause the compressor belt to jump the air compressor pulley.

First of all, it may just be a case of an improperly adjusted compressor belt -- which we can check by using our Belt Tensioner Gage, J-6733.



It could also be a defective compressor belt, in which case it is possible to detect a wavy motion -- that is, a side to side motion -- that can be seen if we sight along the top edge of the belt with the engine running. This wavy motion should be distinguished from the slight amount of up and down motion of the belt, which is normal and nothing to worry about.

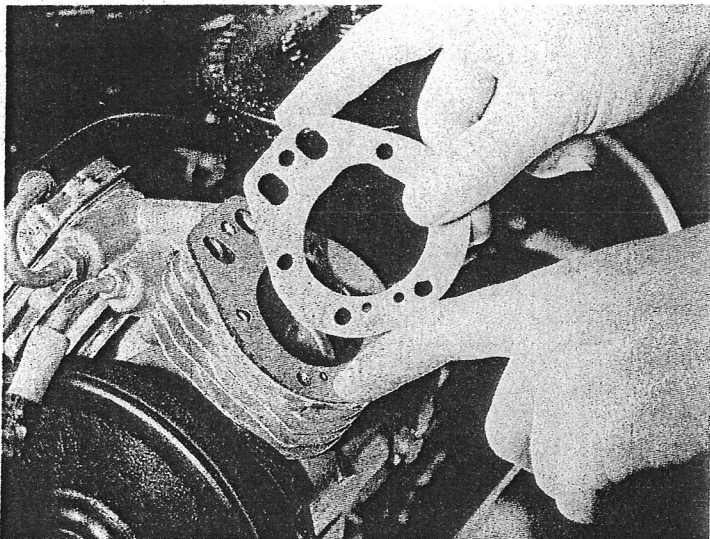
On early 1958 cars, the single strength compressor mounting bracket may bend when the belt is tightened to the specified tension. In a case of this type, the bracket should be replaced with a double strength bracket -- Part Number 3511638 -- along with an additional rear brace -- Part Number (for the kit) 3631500. The double strength bracket was used in production in the middle of the 1958 model year after engine number 044720, and the rear brace was added in 1959 after engine number 067300. (This rear brace is also the service fix for the occasional 35 - 40 MPH vibration caused by the compressor.)



A build-up of carbon deposits on the heads of the compressor will cause the belt to stretch. The best way to test for carbon deposits is to remove the outboard head -- the one on the left hand side of the compressor -- since traces of carbon are likely to form in this cylinder first, because it operates at a higher temperature. Only a thin film of carbon will cause a substantial increase in pressure in the cylinder since the compression ratio of the compressor is so high.

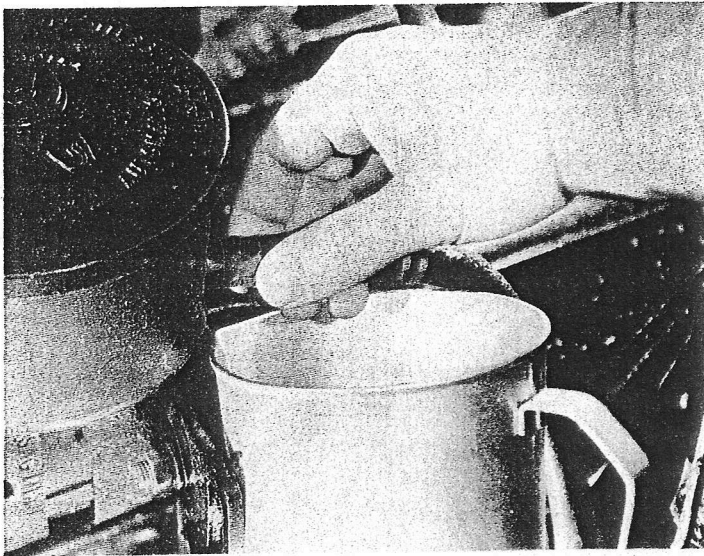
Before we remove the head of the compressor we should disconnect the high pressure hose at the accumulator tank to release the pressure in the compressor. If this isn't done, the compressor head is likely to come flying off once it is tapped loose.

If carbon is allowed to build up in the compressor, it is likely to spread through the system -- causing erratic behavior of the leveling valves and the air lift valve.



If considerably more carbon has formed on the outboard head compared to the inboard head, two special shims, Part Number 5549900, and a new gasket should be installed between the outboard head and block of the outboard cylinder. The shims will lower the compression ratio of the outboard cylinder, equalizing the pressure (and thereby the carbon build-up) in the two cylinders.

If an excessive amount of carbon is present in both cylinders in a 1958 air compressor, the transmission fluid in the power steering pump (which lubricates the compressor) should be replaced by GM Synthetic Fluid, GMPD Part Number 577080. Two quarts of fluid are needed for this change since some fluid is used when the old oil is flushed out of the system.



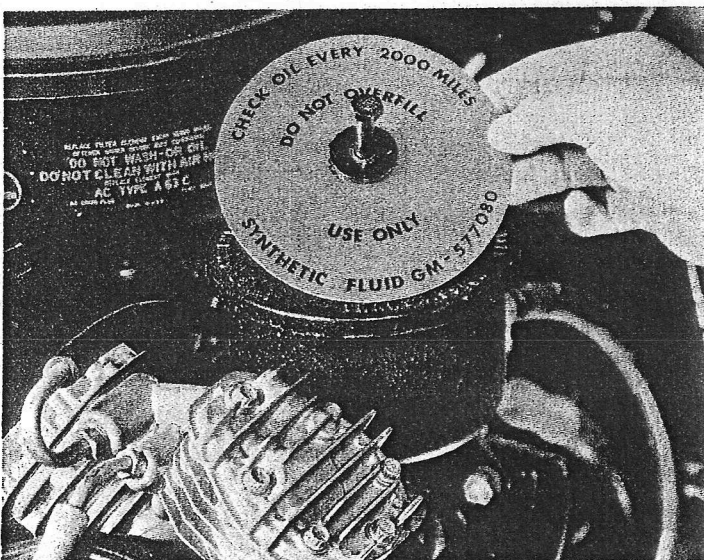
To drain the old transmission fluid from the steering system, the following procedure should be followed (with the engine turned off).

- Raise front end of car and place on jack stands.
- Remove pump cover and oil return line at pump, and drain oil into container.
- Insert air hose in pump reservoir and blow any remaining oil out of pump.
- Drain oil from steering gear through oil return line by turning wheels against turn stops several times.
- Connect oil return line.

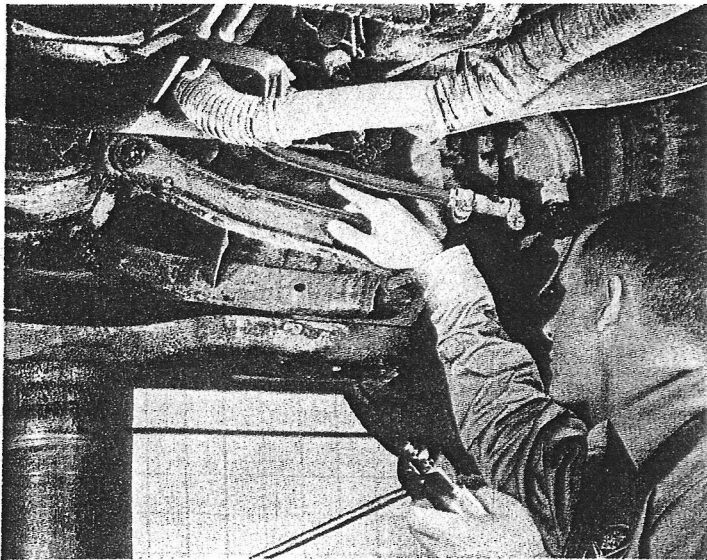


To flush the system of the old oil, add 2/3 quart of GM Synthetic Fluid to pump reservoir, and work fluid through system by turning wheels against stops several times. Drain this oil, using the same procedure as in draining the original fluid.

After the system has been flushed, add the remaining fluid (1-1/3 quart) to the pump reservoir, and install the pump cover.

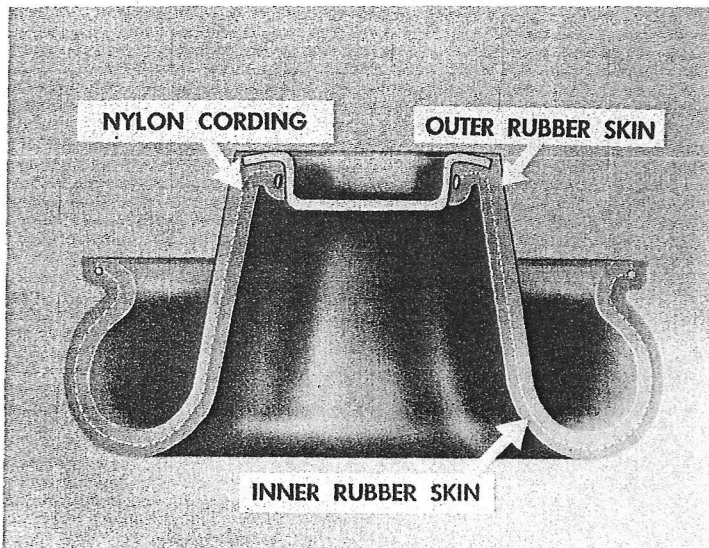


This special plate -- GMPD Part Number 577090 -- should be placed over the pump cover after the synthetic fluid has been added. It's important to identify the synthetic fluid in this manner since it will not combine with the transmission fluid.

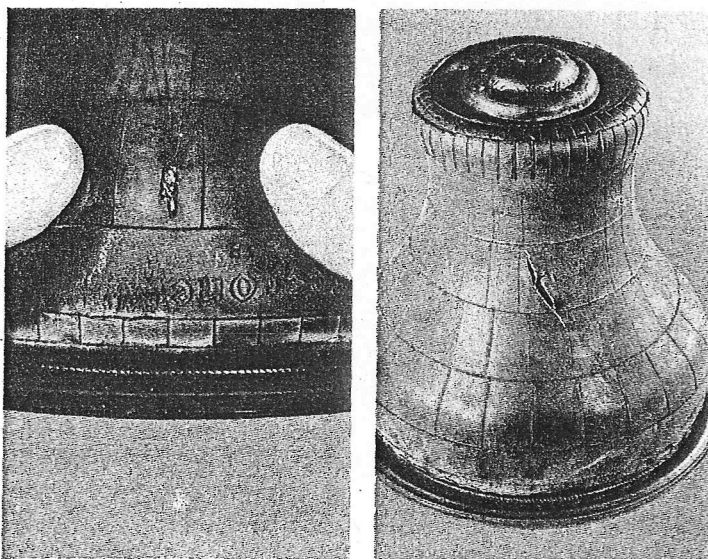


Bellows

A visual inspection of the bellows is a good, quick way of determining the condition they're in . . . providing, of course, we can tell a good one from a bad one. Some scorings on the bellows are of no concern, while others may indicate a real danger. To help understand which scorings are safe, and which are not, it's helpful to know something about the construction of the bellows.

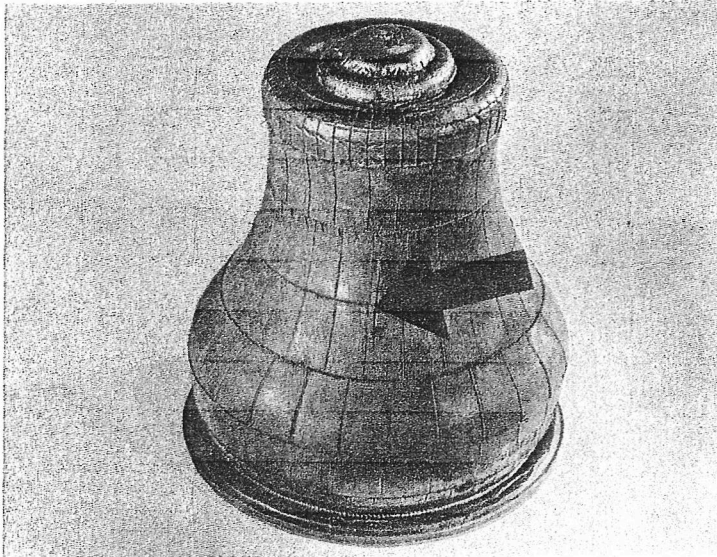


The bellows is composed of three layers -- an outer rubber skin, a layer of nylon cording, and an inner rubber skin. The outer rubber skin is merely a protective cover -- much like the paint on the body of the car, or the outer rubber casing on automobile tires. The strength of the bellows is in the nylon cording. The inner rubber skin prevents air from leaking out. Keeping this in mind, we can see why the only scorings we have to worry about . . .

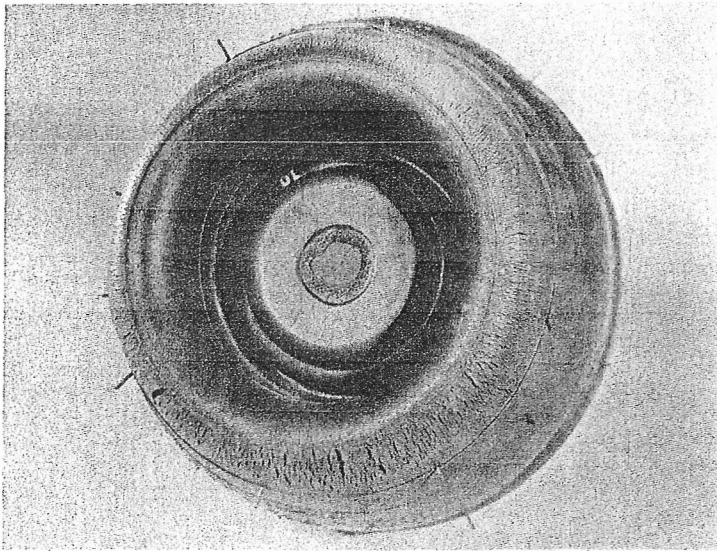


. . . are those that are deep enough to reveal the nylon cording . . .

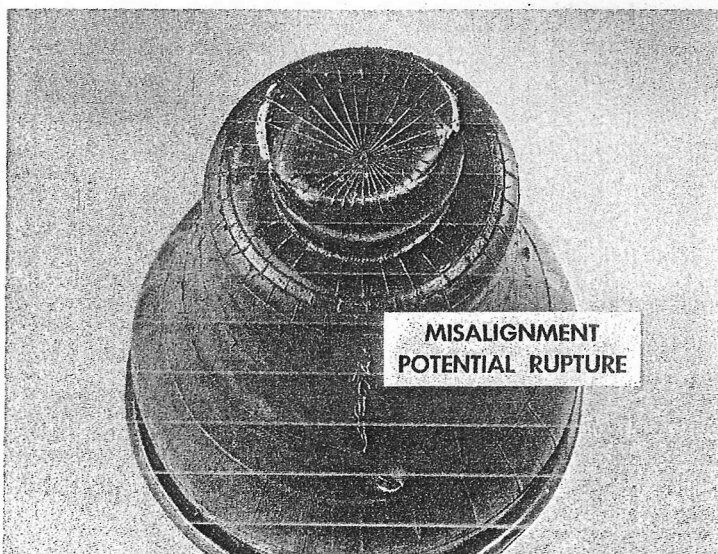
. . . or a slit which runs parallel to the nylon cording -- since a diagonal slit of this type indicates a defect in the nylon cording, and is a strong indication that the bellows may be ready to rupture.



If the slit is vertical or horizontal, it is not running parallel to the cording, and -- as long as the slit is not deep enough to reveal the nylon cording -- the bellows should not be replaced.

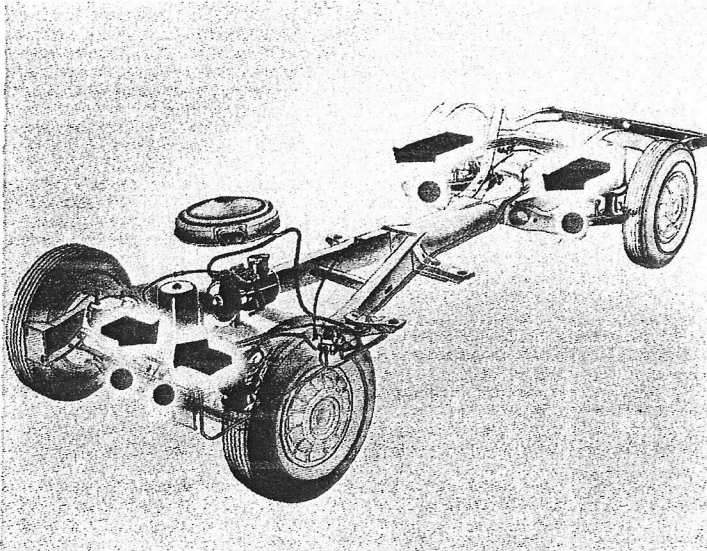


Cracks like this -- called ozone cracks -- are also all right, as long as they do not reveal the nylon cording. You've probably seen cracks like this on the side wall of tires. Just as tires are not weakened by these cracks, neither are the bellows. Ozone, by the way, is a form of oxygen, and is formed by a discharge of electricity in the air. It's also important to check the bellows for correct alignment and positioning.



If the bellows is not properly aligned, it will not sit squarely on the piston, and the bellows may become kinked and eventually rupture. On the illustration to the left, you can see where the bellows was mispositioned on the piston.

The positioning of the rear air domes is greatly affected by the alignment of the rear center upper control yoke. Be sure to check the positioning of the rear domes after any service work is performed on the yoke of a car equipped with Air Suspension.

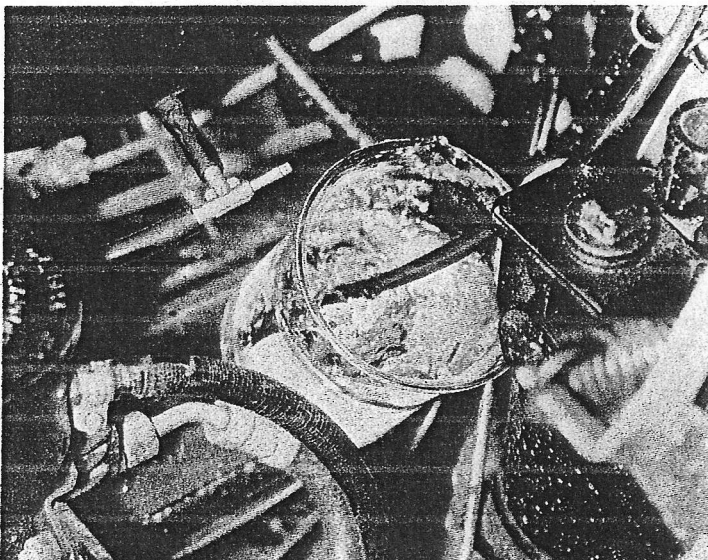


Also, the air domes should be positioned directly over the pistons. If they are not, an excess load on the suspension bushings will result.

The bellows should be correctly positioned in the air dome. The correct position is obtained by aligning the yellow dot painted on the outer skin of each bellows, with the pivot point of the suspension. The yellow dot marks the overlapping seam of the nylon cording.

Lift Valve

The rubber seal in the hex plunger on the 1958 lift valve is dependent on the travel of the bowden cable for positive sealing against air leaks. Such an air leak will cause air to escape from the exhaust hose at the "tee" fitting on the air cleaner.



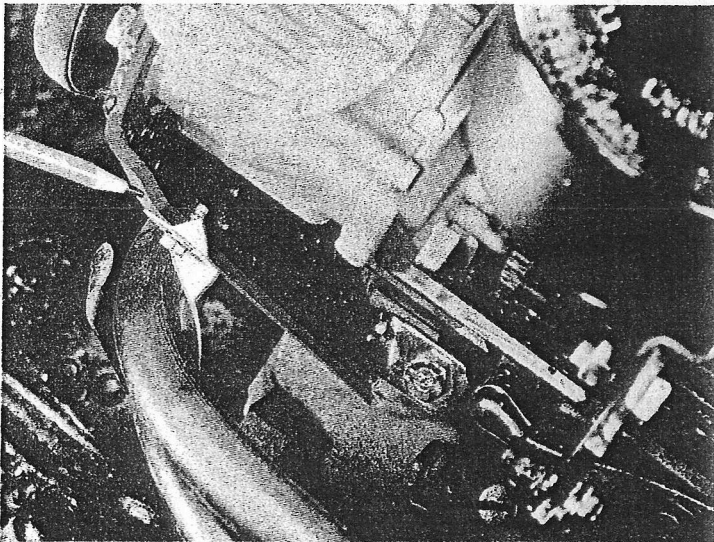
A leak of this type can be detected by placing the air cleaner end of the exhaust hose in a container of water; air bubbles indicate a leak in the hex plunger. We should make this check at both positions of the air lift handle.

When a leak is detected on a '58 lift valve, readjust the travel of the bowden cable on the lift valve. This will reseal the "O" ring in the hex plunger. Of course, when there is no more travel on the bowden cable adjustment, the hex plunger should be replaced. There is no need to replace the entire lift valve, unless the condition repeats itself -- in which case the improved '59, '60 modified type valve, Part Number 5557569 should be used on '58 car.

IMPROVEMENTS IN AIR SUSPENSION, 1958—1960

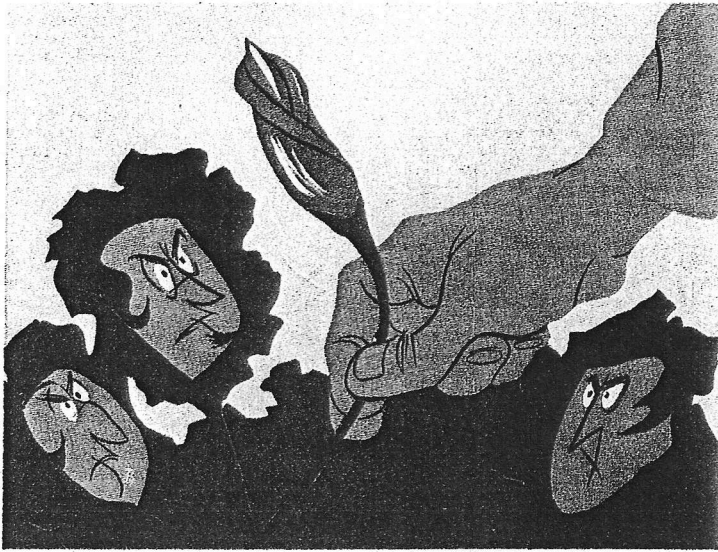


Fortunately for us, most of our owners haven't experienced nearly the amount of troubles as the ill-fated Mr. McGood, who is a very extraordinary, and unlikely fellow. And, of course, the Air Suspension system has been greatly improved and refined since 1958.



- The high pressure hose is now perforated with small holes, eliminating the inflation of the outer skin.
- The compressor is more rigidly mounted, resulting in fewer cases of jumping compressor belts and vibrating compressors.
- The compressor is now lubricated with engine oil rather than transmission fluid from the power steering pump, lessening the chances of carbon build up.
- Leveling valves are improved and completely serviceable.
- The bellows have a longer life expectancy.
- The rubber seat in the hex plunger of the lift valve is now spring loaded, rather than dependent on the travel of the bowden cable, lessening the chances for lift valve air leaks.

AIR SUSPENSION PREVENTIVE MAINTENANCE



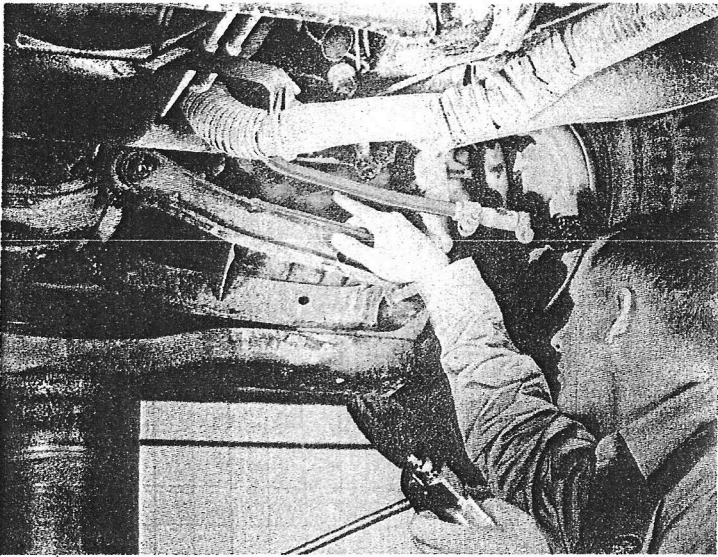
We have said quite a bit about Air Suspension servicing, and we have reviewed some of the important advances in Cadillac Air Suspension since 1958. However, our story of Air Suspension would be incomplete without stressing the importance of preventive maintenance -- since, after all, this is the type of service we can give that will nip Air Suspension problems right in the bud.

There are two types of Air Suspension preventive maintenance we should concern ourselves with. The first is the maintenance we give every time the owner comes in for lubrication -- draining the accumulator tank, adding wood alcohol to the accumulator if needed, and checking the condition, position and alignment of the bellows. The second preventive maintenance is a relatively new recommendation, and very important -- a yearly Air Suspension check-up . . . a thorough going over of the entire system.



Draining the accumulator tank of water is an extremely important item when it comes to Air Suspension preventive maintenance. In a period of one month as much as one quart of water may have accumulated. That's why, just in case an owner has gone somewhere else for his lubrication, it's a good practice to drain the accumulator tank every time a car equipped with Air Suspension comes into our shop. Also, if the temperature gets down around the freezing point, we should add 1/2 pint of Methyl (wood) alcohol to the accumulator tank every time it is drained.

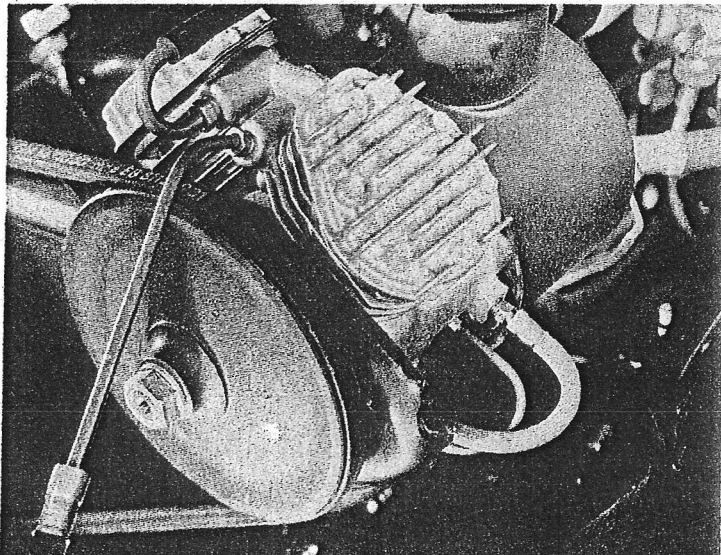
If water is allowed to remain in the accumulator tank, rust will form on the interior of the tank. After a while, rust flakes will break away and spread through the system neatly lodging themselves in every valve and orifice they can find. When this happens, we have to clean the entire Air Suspension system, and may even have to replace the accumulator tank.



At every lubrication -- in fact, every time we get an Air Suspension car on the hoist, -- we should check the alignment, positioning, and condition of the bellows. Usually any defect in a bellows will show on the outer rubber surface quite a little while before the bellows ruptures.

Yearly Check-Up

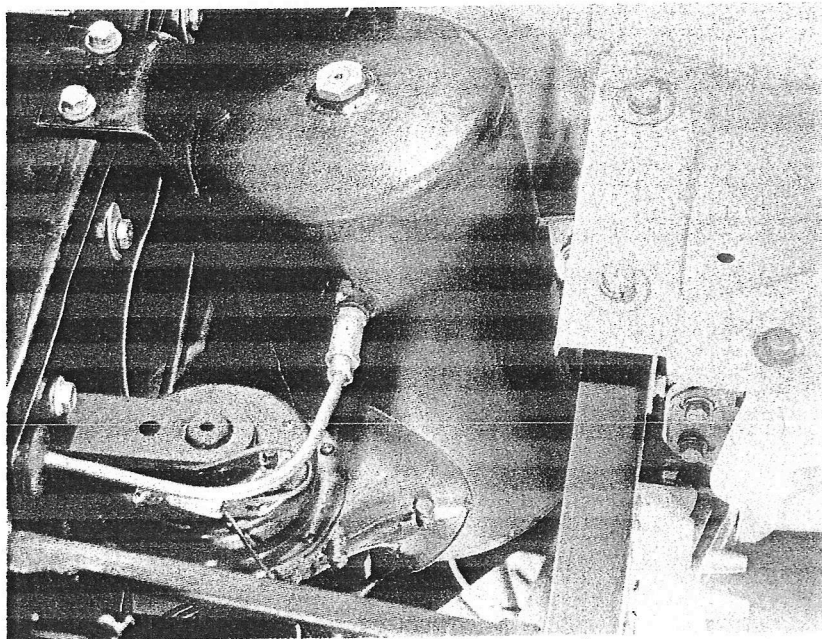
The best way, without a doubt, to catch potential Air Suspension problems before they have a chance to cause the owner some inconvenience, is to give the entire system a yearly check-up. For added assurance, the check-up can be given seasonally, along with the spring and fall conditioning. The time of the year we should give the yearly check-up is not too important; as long as it's done . . . and done thoroughly.



And a good place to begin the yearly check-up is at the beginning of the Air Suspension system -- the air compressor. We should:

- Check belt tension
- Check for oil leaks at the crankshaft oil seal, sump cover plate, and at the connection between the compressor and the power steering pump on 1958 cars.

- On 1958 compressors, check the pump pressure at the test plug. The minimum lube pressure should be 6 psi at slow engine idle, and 16 psi at 1000 engine RPM. If the pressure is above these specifications, there is nothing to worry about. However, if the pressure is low, clean the pump and oil inlet filter screen.
- Inspect for carbon build-up by removing the cylinder heads. When installing the heads, use a new head gasket, and properly tighten the cylinder head bolts.



Accumulator Tank

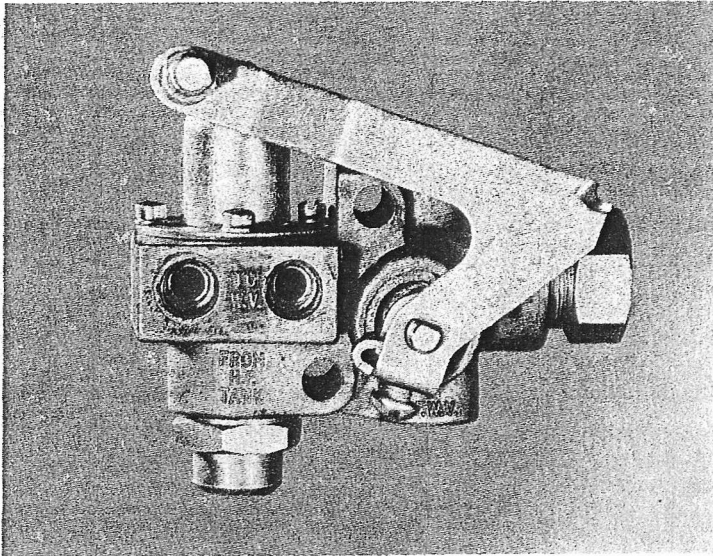
Before checking the accumulator tank, make certain the car is at normal standing height. Then purge the accumulator tank of air by depressing the service valve, and drain dirt and moisture from the tank by removing the valve. If the car does not remain at normal height after the tank is drained, the check valve in the intake adapter on the leveling valve that feeds the low air spring may need cleaning, repairing, or replacing.

With air in the accumulator tank, check the service valve and the check valve for leaks. Replace the valve core of the service valve, or the check valve, if necessary.

The accumulator tank should normally have a minimum pressure of 200 psi -- check this.

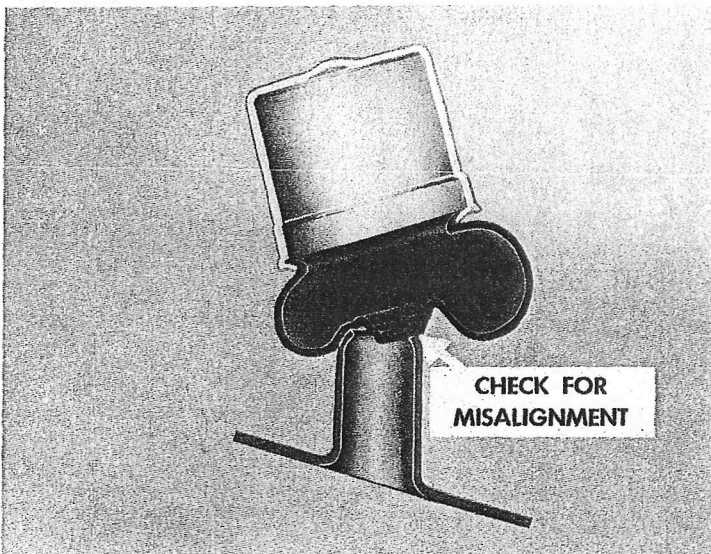
The air flow through the high pressure hose should not be restricted. Check this by disconnecting the hose at the check valve on the accumulator tank. An even flow of air should emerge from the hose with the engine running. After checking the air flow, connect the high pressure hose and tighten the air inlet and outlet fittings.

Finally, of course, check and tighten the accumulator tank mounting bolts.



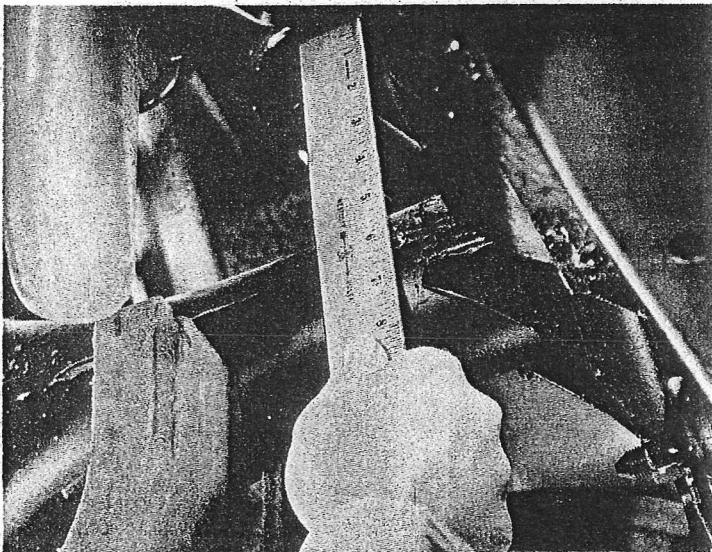
Lift Valves

We should remove and clean the porex filter in the air lift valve. Also, check the operation of the air lift bowden cable for proper travel, and freeness of movement. On 1958 lift valves, apply a few drops of oil on the trunnion, where the cable connects to the valve.



Air Springs

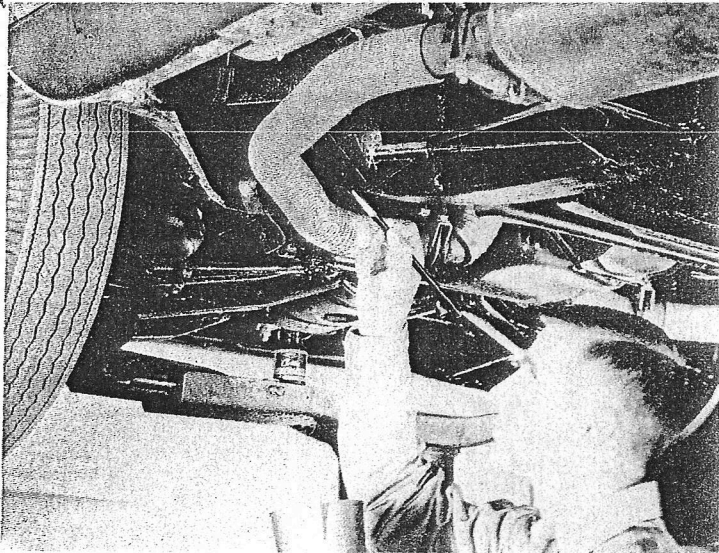
We should check the bellows to see that they are properly aligned on the piston, correctly positioned in the dome (yellow dots facing pivot points of suspension), and in satisfactory condition. Replace the bellows only when a leak is detected, a scoring on the outer rubber skin that reveals the nylon cording, or there is a diagonal slit which runs in the same direction as the nylon cording. Also, tighten all fittings and check for leaks. Visually inspect the lines for rubbing and chafing, and correct as necessary.



Operation of System

Now that we've checked each component of the Air Suspension system individually, we should have an over-all look at the system.

- Check the standing height of the car, following the procedure given in the Shop Manual.
- Road test the car to make sure its riding quality is up to par.

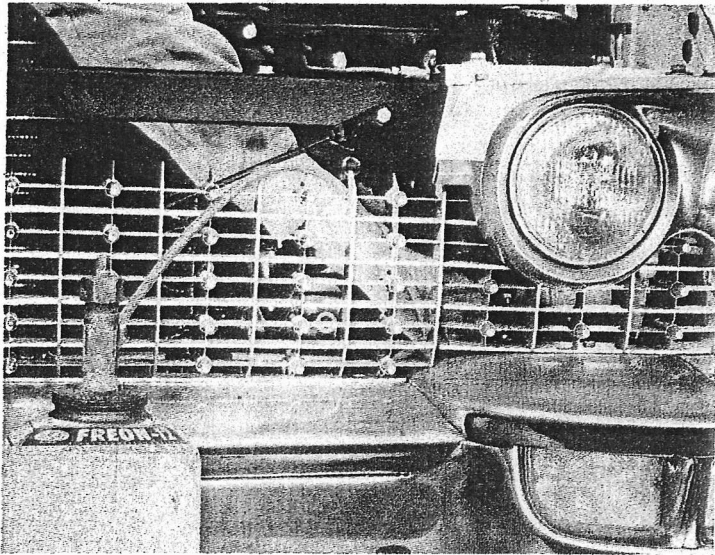


- Time how long it takes for the car to reach its lift position -- and how long it takes to get back down again. The car should take no longer than one minute going up, and five to seven minutes on its way down -- providing that the accumulator tank is up to pressure (at least 110 pounds) before you start.
- Check for internal leaks of the lift valve by disconnecting the exhaust hose at the "tee" fitting on the air cleaner and placing the end of the hose in a container of water, as was previously explained.
- When it comes to checking for leaks, a strong solution of leak detector fluid (or soap and water) -- applied to the leak test points indicated in the Shop Manual -- will detect most leaks.

Freon-12 Vapor Leak Test

However, if the leak is hidden way in there, where it's rather hard to find, charging the system with Freon-12 vapor is probably the best way to find it. A couple of words of caution however, when we employ this method of leak detection.

- First, we should always protect our eyes with a pair of goggles when we're working around Freon-12.
- Second, Freon can damage the Air Suspension system if it's left in the system too long. For this reason we can use the Freon vapor test method, only if we purge the system as soon as we've completed the test, and providing we use just the right amount of Freon-12 vapor when charging the system.



The correct amount of vapor will enter the system if we first purge the air from the accumulator tank, and then charge the accumulator tank with Freon-12 vapor, using the special adapter that will fit the accumulator service valve, Tool Number J-8731. We should charge the system until it reaches drum pressure, at which point you can no longer hear the hissing sound of the Freon vapor entering the accumulator tank. Disconnect the Freon drum.

Do not attempt to charge the system with the Air Conditioning Charging Station, since it is designed to give off Freon liquid, rather than Freon vapor -- which would prove rather devastating to the Air Suspension system.

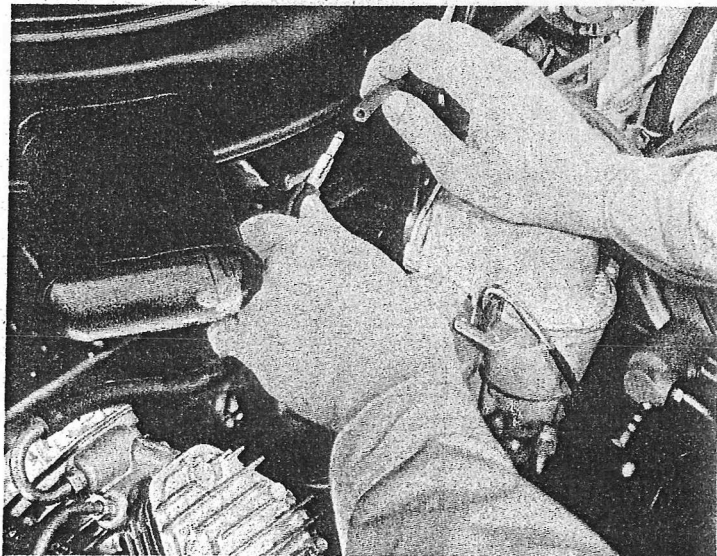
To get the Freon vapor out of the accumulator tank, and circulating around the system, pull out the air lift handle and let the car reach its full lift position. Then let the engine run for a few minutes.

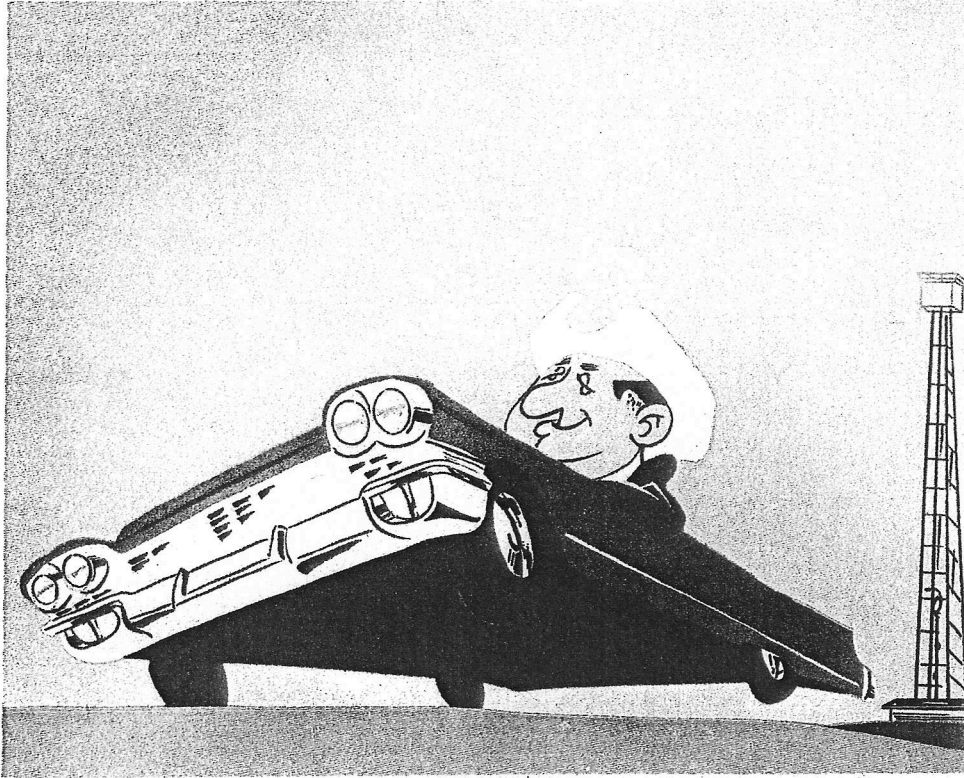
Once we have the Freon vapor circulated throughout the system, we can get the car up on a hoist, and check for leaks. A leak is indicated when the flame in the head of the torch type detector, Tool Number J-6084, changes color. A green flame indicates a small leak; blue a medium leak; and purple a king-size leak. A good way to find out how to use a torch type detector if you're not familiar with it, is to contact your own Air Conditioning man -- and, of course, refer to your Shop Manual.



As we stated before, it's essential that the Freon vapor be purged from the system as soon as we have completed checking for leaks. To do this, we should first purge the accumulator tank by depressing the service valve until the hissing has stopped, and then remove the service valve. Do this with the air lift handle still in out position. When the air is completely exhausted from the system, replace the service valve, and replenish the air supply by running the engine.

When the car has again reached its lift position, disconnect the air return line at the "tee" fitting on the air cleaner (to avoid recirculating traces of Freon vapor) . . . push in the air lift handle . . . and let the car settle to its normal height.





Certainly Arthur Sylvester McGood did have his troubles. Dried up oil fields, short circuited push-button kitchens, and a variety of Air Suspension experiences. Well, as we said right at the beginning, McGood was a very extraordinary and unlikely fellow.

However, even for Arthur Sylvester, hope springs eternal. Now, we can't do much about his oil fields -- nor his kitchen. We can, however, do (and have done) a lot about the Air Suspension.

First, many improvements and refinements have been incorporated in Cadillac Air Suspension since it was introduced back in 1958.

Second, we have learned a lot about servicing Air Suspension. We are no longer in a fog in regards to diagnosing and curing Air Suspension ills. Now we can give the kind of service that we like to be known for -- the kind that does the most good, and is not just a free for all in an effort to cure everything by replacing parts.

And third, we have two constructive Air Suspension preventive maintenance schedules. The preventive maintenance at lubrication time, and the yearly check-up.

Certainly we have every reason to believe that even Arthur Sylvester McGood will continue to ride on air.

CADILLAC CERTIFIED CRAFTSMAN'S LEAGUE

Examination No. 1, 1960

Instructions

1. Read each question and the possible answers carefully.

Example:

Question Z: What is the capacity of the gas tank on 1960 cars?

- | | |
|---------------|---------------|
| 1. 16 gallons | 3. 17 gallons |
| 2. 21 gallons | 4. 22 gallons |

Answer:

Z-2

2. When you have selected the correct answer to the question, turn to the Answer List on Page E, and insert your answer in the space provided.
3. After all the questions have been answered detach the answer sheet and return it to the factory Service Department.

A. Inflation of the high pressure hose on 1958 and early 1959 Cadillacs equipped with air suspension is caused by which of the following?

1. Too high a pressure in the accumulator tank.
2. Air seeping between the outer rubber skin and the braided wire of the hose.
3. An excessive carbon build-up in the air compressor.
4. A leak in the rubber seal in the hex plunger of the air lift valve.

B. Which of the following should be done if the shaft seal in a 1958 front leveling valve develops a leak?

1. Install a 1959 leveling valve which has been modified to fit a 1958 car.
2. Replace the "O" ring shaft seal in the leveling valve.
3. Adjust the travel of the bowden cable.

4. Disassemble and clean out the leveling valve, and blow out all the air lines.

C. How can we detect an improperly aligned bellows?

1. Testing the pressure in the accumulator tank.
2. Road testing the car.
3. Timing how long it takes for the car to reach its "lift" position.
4. A visual inspection of the bellows and piston.

D. Which of the following is a possible cause of a jumping compressor belt on an early 1958 car?

1. An air leak in the service valve of the accumulator tank.
2. An inflated high pressure hose.
3. Compressor misalignment caused by a single strength mounting bracket.
4. An air leak in the shaft seal of the front leveling valve.

E. Which of the following is the best way to check for excessive build-up in the air compressor?

1. Remove the inboard head of the air compressor.
2. Watch for the erratic behavior of the leveling valve.
3. Test to see if the compressor belt jumps the air compressor pulley.
4. Remove the outboard head of the air compressor.

F. In which one of the following model Cadillacs should GM Synthetic Fluid be added to the power steering pump to help eliminate carbon build-up in the air compressor?

- | | |
|---------|---------|
| 1. 1958 | 3. 1959 |
| 2. 1957 | 4. 1960 |

G. Which one of the following types of score marks, when found on the outer rubber coating of an air bellows, is an indication that the bellows is in need of replacement?

1. Ozone cracks which do not reveal the nylon cording.
2. A vertical slit which does not reveal the nylon cording.
3. A diagonal slit which reveals the nylon cording.
4. Scorings caused by dirt on the piston which do not reveal the nylon cording.

H. It is important to drain the accumulator of water at every lubrication for which of the following reasons?

1. To prevent rust from forming on the interior surface of the accumulator tank.

2. To prevent the air pressure in the accumulator tank from raising above 325 psi.

3. To eliminate the noise caused by water in the tank.

4. To avoid the possibility of the service valve developing an air leak.

I. What is the approximate time interval required for a 1959 Cadillac to go from the lift position to normal standing height?

- | | |
|------------------|-------------------|
| 1. 1 minute | 3. 5 - 15 minutes |
| 2. 2 - 3 minutes | 4. 4 - 7 minutes |

J. How much and in what form should the Freon-12 be when leak testing an Air Suspension system using the Freon method?

1. Four pounds in vapor form.
2. Six pounds in liquid form.
3. As much as drum pressure will permit in a vapor form.
4. As much as the Charging Station will permit in liquid form.

K. Which of the following 1960 power steering pump parts are serviced as a complete assembly?

- | | |
|-------------------------|--------------------------------|
| 1. Vanes and pump ring. | 3. End plate and thrust plate. |
| 2. Rotor and pump ring. | 4. Flow control valve. |

L. What can be done to eliminate the "buzzing-fluttering" type noise at the parking brake area of the instrument panel on some early 1960 Cadillac cars?

1. Install a restrictor, Part No. 147-5267, in the vacuum hose.
2. Replace vacuum hose.
3. Tighten connector at fitting on intake manifold.
4. Replace parking brake release lever.

M. How can the correct type of fuel filter gaskets for field use be identified?

1. By a white mark on the edge of the gasket.
2. By a letter "F" stamped on the gasket.
3. By a red mark or no mark on the gasket.
4. By a yellow mark on the edge of the gasket.

N. How many electrical contact points are there for forward and reverse energizing of the Cruise Control electric motor?

- | | |
|---------|--------|
| 1. Four | 3. Two |
| 2. Five | 4. One |

O. What effect does the elimination of the Cruise Control vacuum switch have on the operation of the Cruise Control on 1960 Cadillac cars after Engine No. 006893?

1. It makes a lower speed setting obtainable.
2. It eliminates the "Drive" to "Neutral" cut-off.
3. It has no effect on the operation.
4. It eliminates the brake pedal cut-off feature.

P. When should the vertical aiming be set on the Guide-Matic phototube unit on 1960 Cadillac cars equipped with coil springs?

1. At the 500 mile oil change.
2. Only when Guide-Matic is inoperative.
3. At time of pre-delivery inspection.
4. At time of 2,000 mile inspection.

Q. What oil service designation is recommended for Cadillac engines?

- | | |
|-------|-------|
| 1. ML | 3. MS |
| 2. MB | 4. MC |

R. How many individual units make up the Guide-Matic?

- | | |
|----------|---------|
| 1. Three | 3. Two |
| 2. One | 4. Four |

S. How much steering pump anti-squeal concentrate should be added to power steering pumps when a squealing condition is encountered?

- | | |
|-----------------|-----------------|
| 1. 1-1/8 ounces | 3. 1-1/2 ounces |
| 2. 1-1/4 ounces | 4. 1-3/4 ounces |

T. What part of the radio antenna has been redesigned to permit better drainage and is being used in production beginning with Engine No. 019000?

- | | |
|-----------------------|----------------------------|
| 1. Cover | 3. Mast assembly |
| 2. Escutcheon casting | 4. Lower insulator bushing |