THINK BEYOND THE JOB AT HAND

This month's session will deal with service situations that can lead to comebacks or repeat themselves prematurely if the problem is not diagnosed to find the cause of the condition. I hope that it will make you Technicians aware of the fact that although parts do wear out, many times there is another condition that is the prime factor contributing to the service job that the car has been brought in for. Obviously, if you think beyond the job at hand and logically analyze each job, and be sure to not only repair the condition, but the cause as well, your chances of a comeback or repeat condition will virtually be eliminated.

Let’s face it; comebacks are costly. Costly to you from a dollars-and-cents standpoint; and costly to the dealership also. A condition that repeats itself prematurely because you failed to correct the cause at the same time you corrected the condition can have a negative effect on customer confidence toward you and the whole dealership.
CONSIDER ALL POSSIBLE CAUSES

In many cases you're right; but—to prevent comebacks or the condition repeating itself prematurely, the possible causes listed for the condition should always be considered. This is especially true if the condition occurs at less than normal mileage intervals. I'm sure that many of you Technicians will consider some of the causes rather remote and in some cases highly improbable; but, to properly service the condition, all possible causes must be considered.

YOU CAN'T CLOSE OUT COMEBACKS

Some people try to solve problems by mentally shutting them out or putting them in a box and closing the lid on them. However, closing the hood on service work done in the engine compartment doesn't shut out the possibility of a comeback if the cause of the service problem is not corrected. Generally speaking, most of the comebacks related to work done under the hood involve tune-up, electrical, carburetor, and cooling system jobs.

PLUGS CAN BE A QUICK TIP-OFF

Any time you get a tune-up job, one of the first things you'll do is remove the plugs. When you do, take a close look at each of the plugs. The condition and color of a spark plug can tip you off to another condition that needs correcting if the tune-up is expected to last a reasonable length of time.

TOO MUCH FUEL

A plug that is covered with fuel carbon has a dry black appearance and is covered with deposits that closely resemble soot in texture and appearance. This condition is caused by an over-rich mixture being burned in the combustion chamber. In the carburetor itself, the cause can be a rich air/fuel mixture, or improper idle mixture, a faulty choke, float level setting that is too high, or a dirty carburetor. Outside the carburetor it can be caused by a partially clogged air cleaner, or spark plugs of the wrong heat range, improper timing, or a weak coil or condenser. If the condition appears on only one or two plugs, check for faulty ignition cables.
TOO MUCH OIL
It isn’t hard to spot a wet fouling condition. In this case the condition is caused by the plug being saturated with oil. The oily deposits on the plug are caused by oil entering the combustion chamber as a result of worn rings, faulty valve stem oil seals, or worn valve guides.

CARBURETORS — LINKAGE IS MOST IMPORTANT
Since very few carburetor problems occur inside the carburetor, start to look on the outside. Obviously, the first thing to check is to make sure that incorrect ignition timing isn’t causing poor performance before assuming it’s the carburetor that’s at fault. If the ignition system checks out okay, check the carburetor linkage. A great majority of all carburetor problems are caused by dirty, sticking, external linkage and incorrect external adjustments. Keeping the external linkage clean and properly adjusted is very important to good performance.

DON’T JUMP THE GUN
Too many Technicians jump the gun on carburetor problems and want to rebuild the carburetors. Save your time and the customer’s money. If the car is running at all it’s a pretty good bet that the problem is not inside the carburetor. About the only internal adjustment that should be checked is the float level height.

CHECK FOR AIR LEAKS
You might save yourself a lot of unnecessary work by making one small check. A small air or fuel leak can also act just like carburetor trouble. So check all vacuum hoses to the distributor and the carburetor to make sure that they are securely on the fitting and in good condition. Also check the carburetor mounting nuts and the manifold cap bolts to make sure they are tight and correctly torqued.

On the Holley four-barrel, double check the fuel bowl screws to make sure they are properly tightened and do the same to the air horn screws on the Carter AVS four-barrel.
OVERTORQUING CAN ALSO CAUSE PROBLEMS

Overtightening the air cleaner on the one-and-a-half-inch BBD carburetor will warp the air horn and cause a leak between the fuel bowl and the venturi section. To correct this condition, install Chrysler Service Parts Package number 3579031. A Service Bulletin has been issued and should be consulted for repair procedures.

USE PARTS PACKAGE AND SERVICE BULLETIN TO REPAIR WARPED AIR HORN ON 1-1/2" BBD

Fig. 7—Corrects condition caused by overtightening

FUEL PUMP AND MANIFOLD HEAT CONTROL VALVE

There are a couple of things that are rather remote from the carburetor that can affect its performance and should be checked. A sticking manifold heat control valve can cause poor acceleration performance and choke operation. A restricted fuel filter or low fuel pump pressure can cause poor acceleration and top-end performance; and, excess pump pressure can cause rough idle from an over-rich mixture. And, don’t overlook the possibility of incorrect valve lash causing poor idling.

IT MIGHT BE THE FUEL ITSELF

Last, but not least, check to make sure that the fuel system is free of any type of contamination . . . water and sediment are the two most common contaminants found in gasoline.

LOW LEAD CAN MEAN LOW OCTANE

Also make sure that the owner is using fuel with the correct octane rating. Most no-lead or low-lead fuels on the market — commonly referred to as low-pollutant fuels — are only about ninety-one octane. Even engines rated for regular gas may not run too well on some low-lead fuels.

CHRONIC SPARK KNOCK CAUSED BY FUELS

If you have a complaint of chronic spark knock and everything is okay in the fuel and ignition

Fig. 8—Water and sediment most common contaminants

Fig. 9—Low-lead fuels cause spark knock
systems, it may be wise to find out if the owner is using a low-lead or low-octane fuel and advise him accordingly. Of course, low-lead fuels should never be used in engines designed for premium fuel.

**NO-LEAD NO GOOD FOR VALVE SEATS**
The accompanying photograph (Fig. 10) is an actual photograph of a section cut from the exhaust port area of a cylinder head with 10,000 miles of service. It shows what can happen to an exhaust valve seat of an engine that is operated on clear gasoline having no lead or other valve lubricating additives. The condition is known as valve seat recession and is easily recognized by the valve seat being very badly worn.

![Fig. 10—Valve seat becomes very badly worn](image)

**LEAD LUBRICATES VALVES**
When leaded fuel is burned in the combustion chamber, the lead additives form new compounds which have good lubricating qualities. These compounds coat the exhaust valves and valve seats with a light film which eliminates excessive wear of these parts.

**A LITTLE LEAD CAN DO A LOT**
Some low-lead fuels will not cause valve seat recession. If a low-lead gasoline contains as little as one-half of a gram of lead or seven one-hundredths of a gram of phosphorus per gallon, it will provide enough lubrication to prevent excessive exhaust valve seat wear. But, remember... most low-lead fuels are only about ninety-one octane. So, if the owner insists on using these fuels, remind him that he may be sacrificing performance to do so.

![Fig. 12—Lead or phosphorus prevents valve seat wear](image)

**PCV VALVE CAN AFFECT PERFORMANCE**
Another item that can affect the performance of an engine is the PCV valve. If it becomes inoperative, the crankcase fumes are forced back through the crankcase air cleaner and into the carburetor.

![Fig. 13—inoperative PCV valve affects performance](image)
This results in poor fuel economy and, because the PCV valve is so closely tied into the emission control system, also causes poor idling. The PCV valve should be inspected every six months and replaced once a year under normal service. Frequent short trips or excessive idling would mean more frequent replacement.

COOLING SYSTEM
Many conditions in the cooling system can cause overheating problems. Probably the most common mistake that is made in diagnosing overheating is the assumption that the thermostat is at fault. Actually, a failed thermostat will usually stick in the open position when it fails, and will seldom cause overheating.

COMMON OVERHEATING CAUSES
Aside from poor circulation or leakage directly connected to the cooling system, the following are common causes that may be overlooked but should always be checked. Make sure the ignition timing is correct. Check the temperature-operated vacuum bypass valve to make sure it is working properly. Check the operation of the radiator pressure cap. And check the condition of the pressure cap gasket and the seat on the filler neck of the radiator.

WATER PUMP BEARING FAILURE
Another component closely related to proper cooling is the water pump. If the water pump bearing fails prematurely, it could mean a comeback if you replace it without checking to make sure it wasn’t caused by one of the following: overtightened fan belts, or a fan that is loose, bent, or unbalanced. A water pump bearing will not last if any of these conditions exist.

DRIVE BELTS
If a customer complains of frequent or premature drive belt replacement, check to make sure that the pulleys have not been damaged and that they are in proper alignment. It is also important to keep the belts adjusted to the proper tension. The preferred methods using a belt tension gauge or torque wrench are outlined in the Service Manual and should be used.

Fig. 15—Use gauge or torque wrench to adjust belts

Fig. 14—Bearing will not last under these conditions

Fig. 16—Colder climates affect batteries more

ELECTRICAL SYSTEM
A very common condition in colder climates is a dead battery or what appears to be a dead battery. A battery charge or new battery will not always solve the problem. Always test the battery to make sure there isn’t a dead cell before you charge it. If the test shows the battery to be good, check the cables for corrosion and looseness. Even power from a brand-new battery will not be sufficient if it has to work through loose or corroded cables.

Fig. 42—TestData

Photo Credit: MyMopar.com
STARTER CIRCUIT
If the key is turned to the start position and the engine will not turn at all and only a click is heard, a dead battery is the best bet. If there isn’t even a click heard, look for problems in the starter circuit. The best thing to do is to make a detailed circuit check to determine that the problem is not in the ignition switch, the starter relay, or the starter safety switch, also called the neutral safety switch, on the transmission. Check the Service Manual for detailed instructions to test each component.

HEADLIGHT FLARING AND BURNOUT
Headlights will eventually burn out during normal service. However, if you get a case of headlight flaring or a complaint of frequent headlight burnout, check the charging rate and the ground circuit. Find the cause and fix it! If not, the next burnout may short the owner’s temper and he’ll blow his cool along with the headlights.

AIR CONDITIONING
Some of you Technicians may not get involved in air-conditioning service very often. But, if you get a car in with low refrigerant, start looking for a leak somewhere in the system. Refrigerant just isn’t used up during normal service. Use Special Tool C-3569-A, commonly called a “sniffer”, and your Service Manual to test the system for leaks.

OTHER CIRCUITS
Circuit checks are not the easiest thing in the world to perform; but, if you ever find a blown fuse, find what caused it to blow and make the necessary repairs. Replacing the blown fuse may remedy the situation temporarily; but, a bare wire or short that only grounds on bumpy roads is a sure comeback in the near future.

RUNNING GEAR SERVICE SITUATIONS
I’m sure that at one time or another most of you Technicians have performed a service job on some part of the drive train only to have the customer back in a very short time complaining that the problem has returned, and that the job wasn’t done right. In your own mind you know that you did the best possible job that could be done. However, did you stop to consider what caused the problem in the first place, and correct the cause at the same time?

CHATTERING CLUTCH IS GOOD EXAMPLE
Let’s say you replace a clutch assembly that’s chattering, and a couple of month’s later you get a customer complaining that it’s chattering again with less than five thousand miles on it. If you
made the mistake of assuming that the clutch had just worn and all you had to do was replace it, no wonder you’re in trouble. A lot of parts do wear out. But, always look for another condition that could have caused the problem at hand, especially if you get a case of premature wear.

USE THE SERVICE MANUAL
All you have to do is check the Service Manual. Every section has a complete diagnosis breakdown that lists all conditions, possible causes, and corrective measures. For instance, there are two conditions in the engine that could be causing the clutch to chatter. A bad rear main bearing oil seal that is throwing oil on the disc will make it slip at first and eventually chatter. Another thing to check for is a loose or broken motor mount. If you replace the clutch disc without correcting either of these conditions you can bet on a comeback.

CLUTCH HOUSING ALIGNMENT
Clutch chatter will also develop after very little mileage if the clutch housing is not aligned properly. A sure sign of housing misalignment is a pilot bushing that shows irregular wear. The clutch housing should be aligned at reassembly whenever an engine block or clutch housing is replaced for any reason.

Fig. 19—Misalignment will cause clutch chatter

FIND THE CAUSE AND CORRECT IT
Many Technicians have learned through the years not to take any job for granted and treat it as a routine repair or replacement. One thing they can’t afford is comebacks. And, as long as they find the cause of the condition, tell the owner, and correct it at the same time, they won’t have comebacks.

Fig. 20—Correcting cause eliminates comebacks

GET THE OWNER TO HELP
Blaming any service condition on the driver can be a pretty touchy situation. But, if you come into contact with him, and you can handle the situation diplomatically, leave him with a little reminder that keeping the clutch pedal free play adjusted properly can prolong the life of the clutch.

Fig. 21—Give advice to owner diplomatically

PROP SHAFT ANGULARITY
Universal joints should last the life of the car. The most common cause of universal joint noise and failure is improper prop shaft angularity. The Service Manual has a very thorough procedure for checking prop shaft angularity. By using Tool C-3976A, it is possible to check the angularity at the engine and at the differential and carrier.

SPRING ARE USUALLY THE CAUSE
Improper prop shaft angularity is almost always caused by another condition that must also be
corrected. Rear springs that are sagging, broken or have shifted off-center should be repaired or replaced before aligning the prop shaft. On high-performance models, look for spring wind-up caused by full-bore acceleration.

**COLLISION DAMAGE**

When replacing universal joints, take a close look at the rear-end sheet metal for signs of collision or collision repair. You might discover structural damage that has not been corrected. This could cause prop shaft misalignment and subsequent universal joint failure. The collision could also have broken a shock mounting that was never repaired.

**BAD SHOCKS CAUSE SEVERE ANGLES**

A shock with a broken mounting or one that has lost its damping power will allow excessive rear axle travel over bumps and chuckholes. The constant severe angles that the universal joints are subjected to under these conditions can cause failure. So, it's a good idea to check the shocks any time you do a universal joint job.

**REAR AXLE GEARS**

Never replace a set of rear axle gears for noise only without first running a tooth contact pattern. On a low-mileage car, you may be able to correct the condition by merely adjusting the depth of the pinion gear. If the rear axle gears must be replaced, always run a tooth contact pattern after the new gears are installed to make sure you have the proper pinion gear depth. If the pinion depth isn't properly set, the gears will become noisy in a very short time.

**DON'T GO BY PART NUMBERS ALONE**

It's a well-known fact that rear axle gears must be replaced as matched sets. However, don't go by the part numbers. A matched set of ring and pinion
gears may not have consecutive part numbers. Master Tech Session No. 70-12 or 71-1 gives the lowdown on how to tell a matched set of gears by means other than the part number.

**CASE RUNOUT AND AXLE SHAFT END PLAY**

Another thing that should be done when you adjust or replace noisy gears is to check the case runout and axle shaft end play. Excess case runout will almost mean a sure comeback in a very short time. You'll need a dial indicator to check the runout and the Service Manual gives the complete procedure for each axle size.

![Image of dial indicator and axle shaft](image1)

**PINION FLANGE SURFACE**

Any time you have to replace a rear axle pinion oil seal, check the condition of the surface of the pinion flange where it contacts the oil seal. If this surface is rough or grooved, it can ruin the sealing lip of the seal, so install a new flange even if the groove is smooth.

**PINION FLANGE NUT**

If you get rear axle noise on coast at any speed, check the pinion flange nut before you tear the axle apart. If the nut is loose, the pinion can move in and out a small amount and this is what will cause the noise. In this case, you can usually eliminate the noise by tightening the pinion flange nut, following the procedure given in the Service Manual. Be extra careful if the axle has a collapsible pinion bearing spacer. Over tightening the flange nut compresses the spacer too far. Then, if you back off the nut to get correct bearing preload, the spacer remains collapsed and the nut will more than likely loosen again. Then you'll be right back where you started.

![Image of over tightening nut](image2)

**EXCESS OIL IN REAR AXLE**

If more than one of the seals in the rear axle assembly are leaking, chances are the seals are not at fault. If the oil level is too high or the vent is plugged, the excess oil will be forced past the seals. So check the vent and oil level before replacing any seals. Unplugging the vent and draining the excess oil may solve the problem.

**LOW FLUID IN AUTOMATIC TRANSMISSIONS**

Fluid level is also very important in automatic transmissions. When a customer comes in and complains of delayed engagement and slipping on upshifts, don't think that a band adjustment is the only answer. Oftentimes low fluid level is the real culprit. So always check the fluid level before making unnecessary adjustments. Low fluid level lets the oil pump take in air with the fluid. Air bubbles...
make the fluid spongy and compressible and pressure builds up slowly in the clutches and servos. In addition to poor operation, you can also get disturbing noises from the pump and governor.

**HIGH FLUID LEVEL IN TRANSMISSION**
On the other hand, a high fluid level can work up foam and also cause slipping conditions. It also causes overheating which, in combination with foam, can form varnish and make valves stick. A light coating of varnish may only require a fluid and filter change. A heavy coating of varnish calls for a complete teardown and cleanout.

**WATER TURNS FLUID MILKY**
If the transmission fluid appears to have a milky look it may indicate coolant leakage at the oil cooler unit in the radiator. Water mixed with transmission fluid swells transmission seals and softens friction material. The transmission will need a complete cleanout and reconditioning after any cooling system leaks are fixed.

**CHECK THROTTLE AND SHIFT LINKAGE**
Another thing that should be closely checked is the throttle and transmission shift linkage — even in the extreme case of a burned-out transmission that has to be completely overhauled. Faulty linkage adjustment may be what started the breakdown on its way; and if it isn’t corrected, the overhauled transmission will go just as fast.

**DO A LITTLE OWNER EDUCATING**
Many TorqueFlite problems, if caught in time, can be taken care of with a band adjustment, throttle or shift linkage adjustment, or fluid level adjustments. Complete reconditioning is seldom needed unless the condition has gone too long without being corrected. Of course, there is the owner who causes the condition by neglecting to have regular,
routine maintenance service. If you have the opportunity to come into contact with the customer, do a little educating. Explain what caused his problem and remind him that the chances of recurrence are pretty good if he fails to hold up his end by keeping things in good shape. If you can’t tell him personally, the Service Manager or Write-up Man should be clued in and take the responsibility.

FRONT WHEEL ALIGNMENT
Wheel alignment is a maintenance service that needs attention regularly. However, certain things can cause premature front-end misalignment. Actually, the following items should be checked any time a front end is aligned. Check the front suspension height and adjust the torsion bars if required. Check the condition of the front shock absorbers. Remember, if the shocks are weak, the car will not sit closer to the ground or sag to one side; however, they will allow extreme front suspension travel over bumps and chuckholes and cause front-end misalignment much the same as weak rear shocks cause prop shaft misalignment. Check the front wheels to make sure they are properly balanced.

HEADLIGHT AIMING
Remember this: if the front suspension height needs adjusting, it should be done before the front end is aligned. Another thing that should be done is that the headlights should be re-aimed if the front suspension height is adjusted. Of course this should be done after you adjust the torsion bars. Actually, if a car needs the headlights re-aimed, it’s a good idea to check front suspension height and look for weak or broken rear springs.

PREMATURE BRAKE WEAR
Premature brake lining or pad replacement can be the result of something mechanical ... like dragging brakes. In this case, make sure the parking brake cable is releasing and the automatic adjusters are not overadjusting. There can also be a human cause ... like the driver. Resting the foot on the brake pedal, while driving, is a quick way to wear
out the pads or linings. Spotted brake drums are a
sure sign of excessive hard braking. Remember, if
you say anything to the customer about his driving
habits, be sure you are right and do it in a friendly,
courteous manner.

TRAILER HITCHES
So far, in this Reference Book we have discussed
many secondary conditions that sometimes are re-
move or overlooked. In essence, these conditions
are the real cause of the obvious condition that the
owner wants fixed, and must be repaired at the
same time to avoid a comeback or a premature
repeat condition. However, there is one item that
has not been discussed. That item is the trailer
hitch. When a Technician spots a trailer hitch on a
car, he should bear in mind during his diagnosis
that it might possibly be causing the condition he
is about to repair.

HITCH CAN'T DO IT ALONE
It isn't the trailer hitch itself that causes the
problem, but the way the driver is using it. The
next thing to take into consideration is whether or
not the car is equipped with a trailer-towing
package to make the towing job easier on the car
itself. Of course, even a trailer-towing package
won't help if the owner is in the habit of
overloading the hitch and therefore the suspension,
brakes and cooling system.

SOME OF THE PROBLEMS
CAUSED BY OVERLOADING
Even if the car is equipped with a complete trailer-
towing package, the maximum trailer weight for
compacts is 2,000 pounds, for intermediates it is
4,000 pounds, and for full-size cars it is 5,000 to
5,500 pounds . . . depending on the model. The
following problems can occur if the car is used for
towing and is not equipped with a trailer-towing
package or if the car is equipped with a trailer-tow-
ning package and the maximum weight is exceeded.

Cooling. Pulling heavy loads calls for more power
and this in turn puts more heat into the engine's
cooling system. The factory-installed trailer-towing
package includes the necessary cooling system
equipment to maintain engine temperature control
if the trailer does not exceed the maximum weight.

Drive-Line Noise. Overloading the rear of a car can
cause severe universal joint angles which can cause
noise, vibration and eventually, failure. Shiny spots
where the carrier nose bumper contacts the under-

body or a bent pinion bumper bracket is an indica-
tion that the hitch has been overloaded.

Brakes. Heavy-duty brakes or disc brakes are not
enough to stop a heavy car plus a heavy trailer.
Many trailers are heavy enough to require their
own brakes to insure safe stopping. Also, there are
laws in many areas that require brakes on trailers
that exceed a certain weight. Check into the laws
in your area governing trailer brakes to make sure
that none of your customers get into trouble with the
authorities.

Turn-Signal Flasher. If you have to replace a burn-
ed-out flasher, check for a heavy-duty flasher that
comes with the trailer-towing package. If you re-
place it with an ordinary flasher, the turn signals
will flash too fast when connected to trailer lights
and won’t last very long.

Rear Axle. If the trailer is used to launch a boat,
keeping the car wheels and rear axle housing out of
the water is very important. If the car axle is sub-
merged, axle oil and wheel bearing grease will be
contaminated and must be replaced.

Clutch and TorqueFlite. Constant overloading of a
trailer hitch can put extreme loads on the clutch in
a manual-transmission car and on the TorqueFlite
transmission if the car is so equipped. The result
may be slipping in the TorqueFlite and the same in
the clutch with possible premature failure. Suggest
either a numerically lower rear axle ratio for the
TorqueFlite and a heavy-duty clutch for the
manual transmission.

IN CONCLUSION
Many owners who use their cars for towing have
ordered the car with the trailer-towing package and
do not tow trailers over the maximum weight.
However, any time you spot a trailer hitch, it is
always a good idea to consider it as a cause of the
service job you’re about to tackle. It all boils down
to the main theme of this session: CURE THE
CAUSE. Think beyond the service job at hand and
check all possible causes of the condition and cor-
rect them at the same time. You’ll be surprised at
how comebacks and repeat conditions will
decrease.