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SEASONAL SERVICE NEEDED BY ALL CARS AT ANY AGE IN ANY CLIMATE

Regardless of the type of weather you may expect this winter, whether it be the gentle sun of the South or the bitter blizzard of the North, your customers and service prospects should give their cars a seasonal service treatment at this time of year.

The mailing pieces illustrated above are to remind your customers of the need for seasonal service. The contents of this Service Bulletin are to remind your service personnel of what seasonal services should be performed. Certain services are *essential* and should be performed on every car at this time of year. Other services are desirable but, depending upon age

of the car and its recent service record, may not need to be performed at this time. We strongly recommend that you advise your customers of the importance of Safety Services from the standpoint of their protection and that of others -- this year's record school population means great concentrations of children on the streets, adding to the importance of safely operating brakes, lights, horns, wipers, and steering systems.

We recommend the article on Sludge to each of your mechanics and especially to apprentices and newcomers to your organization. For your convenience in preparing for good service on seasonal conditioning, we are also listing essential service equipment that should be checked over and readied to do heavy duty.

SLUDGE - ITS CAUSE, PREVENTION, AND CURE

Please record this article on Page 91 of 1947 Shop Manual and goldenrod page ENGINE of Truck Shop Manual.

From now until next spring many motorists will be following driving habits, either through choice or necessity, that contribute to the formation of sludge deposits in their crankcases. Most of these motorists will not know anything about sludge -- what it is, why it forms, or once formed, what to do to be rid of it. Those motorists who might be termed "Sludge conscious" will take every precaution they can to prevent its formation.

So that all our service men may discuss this problem intelligently with their customers and thus help the crusade to eliminate sludge formation, we are printing herewith some facts about sludge and some suggestions for preventing its formation. And for those whose cars already contain sludge, we are giving our recommendations for cleaning it out.

What Sludge Is

Sludge is an emulsion, or mixture, of oil and the water of condensation together with other minute impurities which collect in the oil pan. The emulsion takes three forms in engines, all of which are harmful, depending upon the relative quantities in the mixture of oil, water, soot, carbon, lead bromides, resins, iron, and other derivatives of the combustion chamber. These forms are lumpy, granular, or pasty.

It is easily understood by the service man that, no matter which form it takes, sludge so contaminates the engine oil that it is no longer suited to its purpose of freely flowing through the engine passages so as to lubricate and cool bearings in the crankshaft, connecting rods, pistons, cam shaft, etc. A lumpy substance, so long as it remains on the bottom of the pan, may not be too harmful but there is always the danger that it may be drawn into the oil circulation system and clog up the oil galleries; a granular substance may be carried along with the oil and result in badly scratched bearings; and a pasty "oil" may flow so sluggishly as to cause damage from insufficient lubrication.

So sludge is a convenient name for that mixture of materials coming from outside and inside the engine (even the finest air filters

cannot shut out every particle of solid matter) which changes perfectly good lubricating oil into a mass of lumps, or paste, or a granular conglomeration which, for the purpose of lubrication and heat dissipation in a finely made and precisely fitted engine, is not only useless but actually harmful.

Can Sludge Be Prevented?

One of the leading petroleum chemists believes that sludge is the number one source of engine operating difficulties and failures. Whether it is or not, most service men know that sludge is certainly a real problem and much more prevalent than motorists seem to realize.

It is important, therefore, to the interests of motorists and service men alike that sludge be prevented from forming. Under most conditions this is quite possible.

While many substances are found in sludge, the prime cause of its existence is water. Although clean oil and clean water will not mix, oil, water, and the salts, resins, and other chemicals left from the combustion chamber will mix. This mixture is sludge.

There is no mystery as to the source of this water. It is a fact -- probably not generally realized by the car owner -- that the weight of water formed in combustion is as great as the weight of gasoline burned. This water normally is in the form of steam and passes out of the exhaust with the other exhaust gases. If, however, the temperature of the jacket water is too low, some of this steam will condense on the cylinder walls and eventually reach the crankcase. Some water may also come as a result of condensation from the vapor in the air in the crankcase when the engine is stopped and allowed to cool off. To get rid of the water in the crankcase it must be vaporized and the rate of vaporization is increased by an increase in temperature or in the amount of ventilation. The rate of air circulation through the crankcase increases with increase in speed. Hence it is evident that low temperatures and low speeds add to the difficulty of getting rid of any water which may have been collected.

In a fully heated engine, such as on longer runs in winter or in warmer weather, this water is evaporated or quickly converted to vapor and expelled along with the other gases of combustion through the exhaust. That is why the sludge problem shows up after cold weather and reduced driving speeds have made its formation easy.

The elimination or prevention of sludge formation depends primarily upon the engine's operating at its fully heated temperature as soon as possible after starting. Tell customers who drive only a mile or two to work and home to take a little ride once or twice a week and get the engine really warmed up. Tell them, also, to watch their oil level gage frequently for signs of contamination, and, if it is found, to have the engine flushed out thoroughly with some such solvent as Kelite, Cisco, or the like, in combination with a power flusher which does not require the engine to be run during the flushing. This was discussed in our Service Bulletin 193, page 9.

A quick answer to the question, "How can I prevent sludge?" would be, "Make the engine run warmer." To do this, however, under conditions of two or three miles per day stop and go driving is not as easy as it sounds. Here are some measures to take:

1. Make certain that the thermostat is functioning properly. Engine operating temperatures between 160° and 200° F. are desirable.
2. With a winterfront or other restrictive material, reduce the air intake past the lower part of the radiator.
3. Check and clear the engine ventilating system frequently during cold weather. Check the oil filler pipe cap filter, the carbureter air cleaner, and the oil breather tube filter. Be sure these filters are kept clean and that all the ventilation passages are free from any type of obstruction.
4. Check the condition of the oil on oil level gage frequently so as to regulate oil changes to come before sludge forms. Check oil filter cartridge (if so equipped) for need of change. Keep oil filter cover (if so equipped) tight at all times.
5. Check ignition and carburetion to maintain good combustion. Avoid too rich a fuel-air mixture.

What About Sludge Already Present?

An oil change may reveal that sludge is already present in an engine. The only thing to do is to advise the owner of the condition and get his OK to have the sludge removed and the car checked over as outlined above and inform him of the preventive measures which may be taken so as to minimize possibility of its recurrence.

The owner's driving habits should be discussed. Explain to him how sludge forms, why it is more prevalent in cold running engines, and why he should take a drive once or twice a week long enough to get the engine and its oil heated to proper operating temperatures.

If sludge is found, the first thing to do is to clean the internal parts of the engine thoroughly. Use of a high pressure flushing unit and a strong solvent, such as Kelite, Stanapurge, or Cisco will do this job without running the engine. If such equipment is not available, it will be necessary to remove the oil pan and clean it carefully and thoroughly. Also clean the Floto and all other accessible internal parts of the engine.

After the engine is satisfactorily cleaned, points one through five above should be checked.

SAFETY SERVICES

Winter months with slippery driving conditions and more hours of darkness make it very important that the following checks and, where necessary, corrections be made.

Tires

Check tire pressure.

Inspect tires for cuts, breaks, and need of recapping or replacement.

Criss-cross tires to place those with most remaining miles where greatest wear occurs.

Steering

Balance front wheels (static and dynamic).

Lubricate and adjust front wheel bearings.

Check front and rear springs for free rebound and need of service.

Inspect steering gear connections for looseness.

Adjust steering gear to eliminate excessive backlash.

Check front wheel toe-in, caster, camber and king pin inclination.

Lights

Check all light circuit wires for loose connections or damaged insulation.

Check all lights for proper operation. Aim head lamps.

Brakes

Inspect brakes for indication of leaks at pipes, fittings, wheel cylinders, and master cylinder.

Check condition of brake lining and brakes for proper adjustment.

Check brake pedal for correct free travel.

Check fluid level in brake master cylinder.

Check parking brake adjustment.

Check hill holder for proper adjustment (if so equipped).

COLD CLIMATE**Winterization Services**

Drain and reverse flush cooling and car heating circulation system. Refill radiator with correct antifreeze solution. Be sure rust inhibitor is included in cooling system.

Check entire cooling and car heating system for leaks. Check Climatizer valve operation.

Drain and refill crankcase with good oil of correct grade. Change filter cartridge.

Drain and flush transmission, differential, and steering gear. Refill with recommended lubricant.

Check generator for proper output.

Test battery for specific gravity and for need of recharge or replacement. Add water if necessary, clean and tighten terminals and coat with petroleum jelly.

Check cylinder head gasket for leaks and tighten head bolts in correct sequence (use tension wrench).

Other Essential Operations

Examine all tires for cuts, breaks, or need of replacement, and criss-cross wheels and tires.

Lubricate and adjust front wheel bearings.

Check front and rear springs for free rebound or need of service.

Check front wheels for correct toe-in, caster, camber, and king pin inclination. Inspect all steering connections for wear.

Inspect and adjust brakes, if required.

Check condition of all lights and aim head lamps.

Waterproof ignition wires, coil, distributor cap, battery cables, and terminals. We recommend PiB.

Lubricate chassis.

Clear body drain holes.

HIGHLY DESIRABLE

Inspect and test car for additional services required to improve performance and appearance.

WARM CLIMATE**Seasonal Services**

Drain and reverse flush cooling and car heating circulation systems. Refill radiator with ethylene glycol base antifreeze. Because alcohol base antifreeze evaporates quickly in warm climates, a permanent type of antifreeze is preferable. Be sure rust inhibitor is included.

Check entire cooling and car heating system for leaks. Check Climatizer valve operation.

Drain and refill crankcase with good oil of correct grade. Change filter cartridge.

Drain and flush transmission, differential,

and steering gear. Refill with recommended lubricant.

Check generator for proper output.

Test battery for specific gravity and for need of recharge or replacement. Add water if necessary. Clean and tighten terminals and coat with petroleum jelly.

Check cylinder head gasket for leaks and tighten head bolts in correct sequence (use tension wrench).

Clean fuel pump bowl and reset carburetor adjustment, if necessary.

Other Essential Operations

Examine all tires for cuts, breaks, or need of replacement, and criss-cross wheels and tires.

Lubricate and adjust front wheel bearings.

Check front and rear springs for free rebound or need of service.

Check front wheels for correct toe-in, caster, camber, and king pin inclination. Inspect all steering connections for wear.

Inspect and adjust brakes, if required.

Check condition of all lights and aim head lamps.

Waterproof ignition wires, coils, distributor caps, battery cables, and terminals. We recommend PiB.

Lubricate chassis.

Clear body drain holes.

HIGHLY DESIRABLE

Inspect and test car for additional services required to improve performance and appearance.

ADDITIONAL MECHANICAL AND APPEARANCE SERVICES FOR ALL CLIMATES

These are the complete services that should be offered the customer providing the results of the car test and inspection prove that their need exists.

Cooling System Checks

It is very important that the cooling system be clean and free from corrosion and that no leaks exist. For quick warm-up and economical operation the thermostat should be operating properly. To have cold weather comfort, the Climatizer or heater must be in good operating condition. Don't forget to clean the Climatizer filter, if so equipped.

Check condition of water pump seal or packing.

Check thermostat operation for opening and closing at the proper temperature.

Check Climatizer or heater for proper operation.

Check condition and adjustment of fan belt.

Engine Performance

Valves

Check for uneven or low compression. Remove carbon, if required. Reface valves and valve seats, if required. Check valve tappet adjustment. Tighten manifold to cylinder block studs and check for leaks.

Ignition

Clean and test spark plugs and set to proper electrode gap. Inspect high tension cables for leaks and deterioration. Inspect condition of distributor points and adjust. Check spark modifier operation and ignition timing. Test coil and condenser. Waterproof ignition wires, coil, and distributor cap. We recommend PiB.

Fuel System

Disassemble, clean, rebuild, and adjust carburetor. Replace all gaskets. Clean and service carburetor air filter. Check choke for free operation and proper adjustment. Clean fuel pump sediment bowl and screen. Check fuel pump pressure. Inspect heat riser valve for free operation. Set carburetor low speed adjustment. Check and set engine idle speed.

Electrical Checks

With more battery drain due to greater use of lights and harder starting in the months ahead, the electrical system should be in the best possible condition.

Battery

Test battery specific gravity and need for recharge or replacement. Add water as required. Clean and tighten terminals and coat with petroleum jelly. Waterproof cables and terminals. We recommend PiB.

Generator

Check generator output. Inspect generator brushes. Inspect armature, if required. Check field coils, if required. Check voltage regulator for proper operation.

Starter

Check starter switch and cables. Inspect starter brushes. Inspect starter armature and bearings, if required. Check starter field coils, if required. Check Bendix drive.

VEHICLE LIFE

Clutch

Check clutch operation for slippage, chatter, or grab. Check clutch pedal adjustment for correct free travel.

Transmission

Check transmission for proper operation in all forward and reverse speeds. Check overdrive operation. Check transmission shift rods for proper adjustment. Check overdrive control for proper adjustment. Inspect transmission for leaks. Drain, flush, and refill transmission with oil of proper quality and grade for seasonal temperatures expected.

Rear Axle

Inspect for leaks at wheels, pinion shaft, and rear axle housing. Check rear axle shaft bearing adjustment. Drain, flush, and refill differential with hypoid lubricant of the proper quality and grade for seasonal temperatures expected.

Springs

Check spring shackles for excessive wear. Tighten spring U-bolts. Repack springs with recommended lubricant, if necessary.

Shock Absorbers

Fill shock absorbers with recommended fluid. Check shock absorber operation. Check shock absorber adjustment. Check shock absorber links. Tighten shock absorber to frame bolts.

Exhaust System

Inspect exhaust pipe, muffler, and muffler outlet pipe for leaks. Tighten exhaust pipe to manifold bolts and exhaust system hangers and brackets. See that manifold heater valve operates freely.

Lubrication

Lubricate chassis according to manufacturer's recommendations -- including doors, hinges, locks, etc. Refer to lubrication chart. Check universal joints and lubricate. Lubricate rear axle shaft outer bearings, if required. Drain and refill engine crankcase with good oil of correct grade. Change filter cartridge.

Body

Adjust door striker plates. Eliminate window rattles. Tighten body bolts, bumper bolts, and wheel bolts. Check windshield wiper for proper operation. Check operation of hood lock. Check operation of door, package compartment, and luggage compartment locks.

APPEARANCE CONDITIONING

Everyone likes to drive a clean, good looking automobile. Sell the customer these appearance services and keep him proud of his car. Plastel, the long duration, color-matched protective polish material is highly recommended.

Sheet Metal

Remove all dings from fenders and body panels. Refinish as required.

Plated Parts

Clean all chrome or silver-plated parts and coat with clear enamel.

Finish

Wash, clean, and polish entire car.

Upholstery

Inspect cushion springs, upholstery, and floor mats for need of repair.

Clean upholstery and floor mats.



ESSENTIAL SERVICE EQUIPMENT

Proper equipment is essential for satisfactory customer service.

This equipment should be in good operating condition and, particularly if exposed to customer view, clean and attractively painted.

Cooling System Flushing Equipment

Trouble-free performance depends largely on having a clean, rust-free cooling system. Sediment and scale, resulting from oxidation, require reverse flushing for effective removal.

Steering Alignment Equipment

Long life of tires, ease of handling, and safety of customer and his passengers depend on efficient and balanced steering apparatus. Alignment equipment is essential in satisfactorily aligning entire front end and steering.

Headlight Service Equipment

Greater customer satisfaction and safety will result from correct use of essential headlight service equipment.

Brake Service Equipment

Correctly adjusted and smoothly operating brakes, resulting from correct use of proper

equipment, add considerably to customer safety and enjoyment.

Engine Tune-Up Equipment

Greater economy and peak performance will result from the use of modern tune-up equipment.

Electrical Service Equipment

For longer battery life and better operation of electrical units, checks should be made with proper testing equipment.

Engine Reconditioning Equipment

For effective operation, proper reconditioning of engine with adequate equipment is essential.

Gear Flushing Equipment

Gear cases should be thoroughly flushed with proper equipment as Hypoid lubricants must not be mixed.

Lubrication Equipment

Proper lubrication equipment is essential for a thorough lubrication job, which will result in longer vehicle life.

Body Shop Equipment

For a good appearance reconditioning job in the minimum of time, proper equipment is essential.