

Inspection and Care

Regular inspection, with adjustment or tightening when needed, goes far toward keeping the maintenance expense low and upholding the high standards of quietness, reliability and performance built into the vehicle at the factory.

Engine

The "new car instructions" posted on the windshield should be followed closely. A new car should not be driven faster than 30 miles per hour for the first 100 miles nor faster than 35 miles per hour for the next 400 miles. After 500 miles the maximum speed should not be increased more than 5 miles per hour for each additional 100 miles of driving.

The above speeds are permissible for high or third speed operation only. While driving in intermediate, the maximum speed should be half of that for high gear.

When negotiating hills or heavy roads requiring more than half throttle opening to attain the above specified speeds, the gears should be shifted to a lower speed and the throttle opening and the car speed reduced.

Oiling System

All outside oil line connections and gaskets should be inspected carefully and tightened if necessary. Lubricant is to be maintained at the high level point in the crankcase, transmission case, and rear axle housing.

Ignition System

It is a good plan to check over the wiring to see that all connections are tight. Dirt and dust should be wiped off the inside and outside of the distributor cap occasionally. While the distributor cap is off, the rotor contact should be cleaned. Cleaning and adjusting the spark plugs at intervals of about every two months will also aid in keeping the ignition system in good condition. (Page 41.)

When the engine is being used as a brake while coasting, the ignition switch should NOT be turned off. Failure to observe this precaution may cause excessive loading and shocking of the driving mechanism, muffler and exhaust valve damage, fouling of the combustion chambers and spark plugs, excessive reduction of the inlet manifold temperature, and dilution of the engine lubricating oil. While coasting down a long grade with the engine acting as a brake, the manifold heat control knob should be pulled "out" and the ignition switch left "on".

While the engine is not running, the ignition switch should be turned off to prevent discharging the battery and damaging the ignition coil.

Storage Battery

Water should be maintained at the proper level in the storage battery. (See Page 46.) If the nature of service is such that an excessive quantity of water is required by the battery, the generator charging rate should be reduced.

Cooling System

The hose connections and water pump packing nut should be inspected occasionally for leaks and the leaks, if any, stopped by tightening the hose clamp screws or the water pump packing nut, but care must be taken to not tighten the water pump packing nut so much as to bind the shaft, causing undue wear of the packing and possible slippage and wear of the fan belt. The radiator stud nuts and core to shell screws should also be kept tight.

Fuel System

Cleaning the strainer in the carburetor and the glass bowl of the fuel filter about once every five or six months is an added precaution against the flow of fuel becoming obstructed. Carburetor adjustments other than this should not be attempted by any but experienced carburetor mechanics. (Page 35.) The nuts holding the wire terminals to the tank unit and instrument panel unit of the gasoline gauge should be kept tight at all times.

Clutch

Abuse of the clutch should be avoided. Starting the car in second gear is permissible only for a gentle start on a hard, level road or down grade. The clutch pedal should have from $1\frac{1}{4}$ " to $1\frac{3}{8}$ " free movement before resistance can be felt. Less than 1" free movement of the pedal will cause damage to the clutch. (See Page 49, under "Adjustments".)

Pressure on the clutch pedal causes a certain amount of wear on the "throwout" mechanism and rapid wear of clutch disc due to slippage. (Page 51.) A driver should never rest his foot on the pedal except during the operation of shifting gears or stopping the car.

Transmission

The gears must be fully engaged after shifting to different speeds before relieving pressure on the clutch pedal. Lubricant should be maintained at the proper level in the transmission case. (Page 19.) This may be inspected by removing the plug from the filler hole in the side of the transmission case. This inspection should be made every 2,000 miles or at least every six months.

Brakes

The level of the liquid for the hydraulic brakes should never be above the three-quarter full point or below the half full point of the supply tank on the dash. The cap on this tank should always be turned down to a tight seat.

The brake shoes, at the wheels, should be adjusted so that the facing will just clear the drums at all points. (Page 69.)

Steering Connections

The steering gear connections and front axle tie rod should be inspected frequently, as well as the front wheel alignment. (Page 57.)

Springs

The nuts on the clips, holding the springs to the axles, should be kept very tight at all times. They should be inspected at least three times during the first month and about once every month for the succeeding six months. (Page 62.)

Shock Absorbers

The shock absorbers require no service attention and should not be lubricated.

Tires

Water and dirt will work into cuts in tires and loosen the rubber from the carcass unless the cuts are properly and promptly sealed. It is also important that the air pressure in the tires be properly maintained at all times. This should be checked about once each week. (Page 59.)

Wheels

The front wheel bearings require an occasional inspection for lubricant and adjustment. (Page 57.) The nuts holding the tire rims in place are apt to loosen slightly and should be tightened when necessary, as well as the nuts holding the rear hubs to the axle shafts.

Front Axle

All parts must be well lubricated and the front wheels jacked up and the bearing adjustment checked. (Page 57.)

Rear Axle

The lubricant in the rear axle should be at the proper level and of high quality. (Page 57.)

Windshield

Open car windshield anchor nuts (at bottom of windshield posts) should be examined and tightened, if necessary, with a wrench, but the windshield thumb nuts should be tightened only by hand.

Body Door Hinges and Locks

These require practically no attention. At times a tendency to bind may develop, but a few drops of oil applied to the movable parts will keep this equipment in good condition.

Washing the Car

It is possible in many instances to clean the lacquer finish of the body and hood by wiping with a dry cloth, but it is usually best to wash the finish with water and a sponge, especially if there is grit in the mud or dirt. At times the finish may appear to be turning gray or white, which only indicates that cleaning and polishing are required. If alcohol is spilled on the finish it should be wiped off immediately to avoid spotting.

Varnish should not be used for touching up scratches in the lacquer finish. Lacquer only should be used for such purposes.

The undersides of the fenders and the running gear should be flooded with water and, after most of the mud is soaked off, a warm soapsuds will take off the remainder. Then it should be thoroughly rinsed with running water. The same sponge should not be used on the body and running gear. After washing, the car should be thoroughly dried with a soft chamois skin.

After the car is clean, it should be polished with No. 7 Duco Polish or a comparable product.

The finish should be protected by an application of Simoniz Wax or Johnson's Liquid Wax. This is an important factor in the life of the finish.

The brightly finished metal parts are plated with chromium. To maintain the brilliancy of this finish it should be washed with a soft cloth dampened in warm water, and dried with a soft polishing cloth. The use of metal polish is not necessary and should be avoided.

Open Car Top

If it is desired to fold the top on an open car, care should be taken to avoid wrinkles in the top covering. Top rests and straps should be assembled to the body before the top is folded to furnish a support for the top bows when they are laid down. The "lift-the-dot" fastener on front of windshield should be unfastened. The side curtains should, of course, be removed from the top and placed in their compartment.

The forward ends of the rear curtains of Phaeton tops which are snapped to the sides of the rear bow of the top and the upper edge of the body should be unsnapped (on both sides of the car) and the loose ends of the curtain laid flat behind the rear stay straps. The top should then be released from the windshield and the top folded. When about two-thirds folded the side quarter pads should be pushed inside of the top and away from the bow sockets so that the top will lie flat. Care must be taken when folding the top to make certain that the top deck or covering is pulled loose and hangs down free from the bows so as to avoid creasing.

The top deck should then be rolled from the bottom up and laid between the top and bottom bows while the top boot is being slipped over the top. The boot should then be drawn taut and all the straps and fasteners clasped in place. The foregoing procedure applies to Phaeton and Roadster tops except that with the Roadster top the fasteners for the back curtain should be released all around and the top boot should be laid on the body deck before the hold-down straps are tightened.

While the top is damp it should never be folded or laid back. Dust or dirt on the outside of the top should be removed with a sponge and a mild soapsuds. A pure, high-grade, linseed oil soap should be used. Soapsuds should not be allowed to drip or spatter onto the finish of the car. If this does happen it should be rinsed off immediately with clear water. All lacquer and enamel work should be fairly wet before washing the top.

The top should be well rinsed with clear water and wiped dry with a chamois skin. Gasoline cleaners and most of the so-called top polishes are detrimental to the top material and should never be used. The inside of the top, as well as upholstered interiors of closed cars, should be cleaned with a stiff brush.

Side Curtains

The side curtains should be carried in the large compartments provided and laid flat without folding. Curtains should be thoroughly dry before being put away, otherwise they will mold.

Precautions for Summer

The cooling system should be thoroughly flushed and all water leaks stopped (new hose installed, if necessary). Fresh lubricant should be used in the transmission and rear axle after the interiors of these cases have been thoroughly cleaned by flushing with kerosene, and oil leaks stopped. The air cleaner shutter in the crankcase ventilator should be closed in summer. (Page 36.) The carburetor choke should be adjusted, if necessary, for full opening. The battery terminals should be cleaned and coated with vaseline and water replenished in each cell when necessary. It is possible that the generator charging rate will need to be reduced to prevent excessive evaporation of the battery water. The car should have a general inspection and lubrication throughout, including the grinding of valves and relining of brakes, if necessary. The engine oil should be changed every 1500 miles during normal operation in warm weather, but when the car is driven extremely fast or worked hard on heavy pulling in hot weather the oil should be changed every 500 miles.

Precautions for Winter

A non-freezing solution should be used in the cooling system after the first indication of cold weather. (Page 33.) If an alcohol solution is used, the specific gravity should be checked about once a week to make sure of it being the desired strength because alcohol evaporates rapidly and raises the freezing point of the solution. The lower half of the radiator should be covered.

The carburetor should be drained to remove any water which may have collected there.

The engine oil pan should be removed and thoroughly cleaned, as well as the oil strainer, the parts then reinstalled and the pan filled with fresh oil. The air cleaner shutter in the crankcase ventilator should be open in winter. (Page 36.) When refilling at temperatures approaching zero, an oil having a zero or below zero cold or pour test should be used which has a body or viscosity meeting S. A. E. viscosity numbers as described on Page 16. The engine oil should be changed every 1000 miles during normal operation in cold weather, but if the car stands in the cold and is used principally for short runs the oil should be changed every 500 miles.

The lubricant in the transmission and rear axle should be drained off and filled to the proper level with the lubricant specified on Page 19. A slightly thinner lubricant is recommended for winter than for summer.

Tire chains should be adjusted loosely enough to allow them to creep around the tires.

Storage of Tires

If the car is not to be used for several months it should be jacked up until the tires clear the floor. The tires should be inflated only sufficiently to hold their normal shape. If convenient it is well for the tires to be removed from the rims and placed in a room with subdued light and a temperature of about 60 degrees Fahrenheit. Tires in storage or not being used frequently should be protected from strong sunlight.

Storing the Car

The car should be thoroughly washed and dried, also the curtains and top brushed before being stored. The wheels should be jacked up sufficiently for the tires to clear the floor. Unpainted metal parts should be coated with heavy oil to prevent rust and corrosion. The storage place should be dry and have as even a temperature as possible. Sudden changes of temperature and close proximity of steam pipes or other heating apparatus should be avoided. A subdued light evenly distributed will best preserve the finish. A car should never be stored in the same building with horses or other animals. The water should be drained from the radiator. The spark plugs should be removed and cleaned and a small quantity of engine oil poured into each cylinder through the spark plug holes. Then the spark plugs should be reinstalled and the engine cranked several times by hand. This operation should be repeated every sixty days while the car is in storage.

Partly disengaging the clutch and blocking the pedal in this position will prevent corrosion developing on the faces of the clutch plate. The hand brake should be released and the storage battery stored at a battery service station for proper attention during the storage period. (Page 46.)

Lubrication

Proper lubrication is of vital importance. Lubricating with the best materials and with the utmost care will be repaid many times by long wear and good service. The use of re-refined oil should be avoided. The process of re-refining engine oil requires considerable care and even the best re-refined oil is not suitable for use in any Dodge Brothers Six engine. This is a matter of vital importance and considerable care should be taken when selecting engine oil to make certain that it is of the highest quality.

Engine Lubrication

Oil is put into the engine through the oil filler located on the left side of the crankcase. The oil level gauge is just toward the rear of the engine from the filler. When a reading of this gauge is being taken, the engine should be stopped, the indicator removed and the oil wiped off the indicator rod. The indicator should then be inserted again and removed for a true reading. The engine should never be operated when the oil is below the lower mark of the indicator rod.

For correct engine lubrication a high-grade, well-refined oil is essential. As a guide to the proper viscosity or body of oil for summer and winter conditions, which vary for different territories, the lubrication charts of the

reputable oil companies should be consulted. In general an oil having the body of S. A. E. viscosity number 30 is recommended for summer use except for continued high-speed driving when the body of S. A. E. viscosity number 40 should be used. For winter use at temperatures below freezing and above zero an oil having the body of S. A. E. viscosity number 20 with a low cold test is recommended. At temperatures below zero an oil having the body of S. A. E. viscosity number 10 with a low cold test, or S. A. E. viscosity number 20 low cold test, diluted with 5% ($\frac{1}{2}$ pint for full oil pan) kerosene, is to be used.

The gear type oil pump draws the oil through a strainer and forces it through passages drilled in the cylinder block to the main bearings and camshaft bearings, and from the main bearings through passages in the crankshaft to the connecting rod bearings. The spray off the bearings lubricates all other reciprocating and rotating parts of the engine. A lead from the front camshaft bearing delivers oil direct to the timing chain and sprockets. The overflow from the rear main bearing is conducted through a trap back into the oil pan.

An oil filter is mounted on the engine which passes the oil through a treated fabric, removing carbon and dirt too small to be caught by the strainer.

Oil Pressures

The oil pressure gauge, on the instrument panel, at normal driving speeds with warm engine and oil will show approximately 25 to 30 lbs. pressure. Pressure over 40 lbs. compresses a spring in the oil pressure relief valve, allowing excess oil to pass back into the engine oil pump sump.

The oil gauge should be watched at all times, particularly in winter. If at any time it should indicate no pressure, the engine should be stopped immediately. If there is plenty of oil in the pan, the oiling system should be carefully checked by a competent mechanic before starting.

The oil pressure relief valve may be adjusted to increase or decrease pressure on the gauge, but it should not be touched until the oiling system has been carefully checked by an experienced mechanic. If the gauge shows inadequate or too great pressure, it indicates trouble in the oiling system. Changing the position of relief valve to correct gauge reading removes the effect of the trouble, but does not remove the cause. If it becomes necessary to adjust the oil pressure relief valve, the cap nut adjacent to the oil filler should be removed and the locking wire withdrawn. The slotted plug should be turned clockwise to increase the pressure or anti-clockwise to decrease the pressure.

There are several conditions which may cause a reduction in the pressure registered on the gauge. They should always be carefully checked before any change is made in the adjustment of the pressure relief valve. Some of them are as follows:

Use of an oil with too heavy a body or with too high a cold or pour test at zero temperature or below. Oil excessively thinned out by unvaporized and unburned fuel. Loose bearings; the looseness may be due to wear and should be investigated. A leaky or broken oil tube. Clogged oil screen. Broken oil gauge.

Oil Filter

The engine oil filter separates foreign substances from the engine oil, but it is not intended to separate fuel and acids which form in the engine oil due to natural service and improper use of the carburetor choke. Instructions regarding proper use of the choke (Page 35) as well as draining the crankcase (see below) should be followed carefully. When the engine is running fast enough to register about 10 lbs. pressure on the oil pressure gauge, the bottom connection on the oil filter should be removed, if it is desired to determine whether or not the oil is passing through the filter. A steady flow of clean oil should then be observed passing through the bottom of the filter. If a steady flow of oil cannot be observed at this point, the filter may have become clogged with foreign matter. In this case the filtering cartridge should be replaced. However, under normal conditions it should not be necessary to replace this filtering unit more frequently than 8000 to 10,000 miles of car travel.

Draining Crankcase Oil

Due to natural conditions, the engine oil, in use, is constantly being impregnated with fuel, water, and acid, depreciating the value of the oil as a lubricant. For this reason the oil should be replaced at regular intervals. (See Lubrication Chart—Center Insert.) Running the engine with the choke closed or partially closed increases the amount of fuel drawn into the cylinders. To reduce the amount of fuel which will work into the engine oil, the engine should be run with choke button pushed in as far as possible. The rapidity of accumulation of these damaging elements can be governed to a great extent by the driver of the car.

Fuel accumulates in the engine oil because of a certain excess of fuel in the combustion chambers not burning and working down the cylinder walls into the crankcase. Only certain percentages of vaporized fuel and air when mixed will ignite and explode in the combustion chamber. If the mixture contains too much fuel the excess will not burn, but a certain amount of it will remain on the cylinder walls and work down into the crankcase by the action of the pistons.

Water vapor is a product of combustion. There is approximately as much water vapor formed by weight as fuel consumed. This accounts for the white vapors and water coming from the exhaust which is most noticeable in cold weather. A certain amount of this vapor condenses on the cylinder walls and is carried into the crankcase by action of the pistons. This water accumulates in the crankcase and under certain conditions forms an oil sludge. An excess of sludge or water may interfere with lubrication.

Acid forms in the combustion chamber also due to natural causes. Fuel contains varying percentages of sulphur which, when burned, changes to sulphur dioxide. The sulphur dioxide unites with water in the combustion chamber, making sulphurous acid.

The accumulation of these non-lubricating elements in the engine oil has very damaging effects on the wearing surfaces. Fuel thins the oil, reducing its lubricating ability. Water is a non-lubricant and is likely

to freeze, causing stoppage of the oil circulation. The sulphurous acid attacks bearing surfaces and causes excessive wear. The rapidity of accumulation of these elements increases as the temperature decreases. The crankcase ventilator (Page 36) greatly reduces the formation of these elements which, in turn, reduces dilution of the crankcase oil. These elements can only be removed by draining the crankcase and the following instructions should be observed carefully:

To drain the oil, the drain plug at the bottom of the oil pan on the right side should be removed. The best time to drain is after a run when the engine is heated. The oil is thinner when it is hot and is also thoroughly mixed. It will, therefore, carry off sediment more completely.

Kerosene should never be used for flushing out the oil pan and lubricating system. A certain amount will remain in the system, collecting in pockets from which it cannot readily be drained and will dilute the oil.

Cleaning Oil Pan and Screen

At least once a year, preferably in the fall, the oil pan should be removed from the engine and thoroughly washed. The oil strainer should be removed and washed at this time.

Distributor

The grease cup on the distributor housing should be kept full of a high-grade medium cup grease and should be given one turn about once each month, or every 2000 miles.

Care should be taken to keep grease off breaker points and governor weights.

Generator

The oiler at each end of the generator body should be filled with light engine oil every 2000 miles. The bearing at the rear end of the armature shaft is of the plain bronze type and it is important that it be well lubricated at all times. Oil should never be used on the commutator.

Starting Motor

The commutator should be inspected and cleaned periodically to prevent gumming. (Page 39.) No other service is required.

Lubricant Gun

The lubrication system for the chassis consists of an easily operated high-pressure gun and a set of nipples. The gun is filled by unscrewing the end cover and filling the barrel with lubricant as specified for various points.

One pumping action is generally sufficient, but two or more pumping actions should be given if necessary. The return motion of the plunger automatically fills the inner chamber of the gun with a fresh charge of lubricant.

Water Pump

The water pump shaft is mounted on two porous bronze bearings which should be lubricated with engine oil every 2000 miles. The oil holes carry the oil to the outside of the bushings and it then seeps through to the shaft. This prevents any possibility of dirt which might lodge in the oil holes reaching the wearing surfaces of the bushings, and also prevents water leaking out the oil holes.

Clutch

The clutch is of the single dry plate type, requiring no lubrication, except the release bearing which is lubricated by grease cup which should be given one turn every 500 miles.

Transmission

The transmission case should be kept full to the level of the filler plug, on the left side, with a high-grade fluid gear lubricant. Fresh lubricant should be used every 5000 miles, or at least each spring and fall, after flushing the inside of the housing with kerosene. In winter, where the atmospheric temperature may be below 0° Fahrenheit, the lubricant should be diluted with one-quarter pint of colorless kerosene.

Universal Joints

The universal joints should be lubricated every 2000 miles with special universal joint or fibre grease, supplying about 1 ounce or 2 tablespoonfuls each time. Do not overlubricate. Never use cup grease in the universal joint.

Rear Axle

The rear axle housing should be filled to the level of the filler plug in the cover with a high-grade fluid gear lubricant. In winter, in climates where the atmospheric temperature may be below 0° Fahrenheit, the lubricant should be diluted with one-half pint of colorless kerosene. Fresh lubricant should be used every 5000 miles, or at least each spring and fall, after flushing the inside of the housing with kerosene.

Note: Grease or non-fluid oil should never be used in the transmission case or rear axle housing.

Front Axle

The front axle pivot pins should be lubricated by means of the high-pressure lubricant gun through the nipples provided in the upper and lower forks of the spindle yokes. Fluid gear lubricant should be used at intervals of every 500 miles.

The ball and socket joints on the ends of the tie rod and drag link should be lubricated at intervals of every 500 miles with fluid gear lubricant.

The front wheel bearings should be packed at intervals of every 5000 miles, using medium cup grease that will not harden at low temperatures. Before new lubricant is packed into the bearings it is advisable to clean the bearings and the insides of the hubs with kerosene.

Springs

The bolts through the front and rear ends of the chassis springs, as well as the bolts through the rear shackles of the front and rear springs, are provided with lubricant gun nipples. A high-grade fluid gear lubricant of heavy body should be forced through the nipples at these points at intervals of every 500 miles.

Lubricant should never be used between the leaves of these springs. If it is ever necessary to remove dust from between the leaves, a light penetrating oil (containing no graphite) may be used because it will evaporate readily and leave the surfaces of the leaves clean and free from substances which are liable to cause improper spring action and improper steering action at high speed.

Brakes

The transmission hand brake rod connections should be oiled every 2000 miles with a few drops of engine oil.

Steering Gear

Frequent lubrication of the entire steering mechanism provides easy steering. The steering gear housing should be filled every 5000 miles with special heavy steering gear lubricant. This lubricant should be diluted with engine oil, in extremely low temperatures, if necessary. Never use cup grease or any oil or grease containing graphite in the steering gear.

General Description and Repair Operations

Engine

The power plant of the Dodge Brothers Six is of the unit type, having a six-cylinder engine, of the L-head, four-cycle, poppet valve construction. The cylinder head and oil pan are removable.

Lubrication is accomplished by a full force feed system to all crankshaft, connecting rod, and camshaft bearings as well as to the chain which drives the camshaft. The cylinder walls, piston pins and the entire valve mechanism are lubricated by spray thrown from the ends of the connecting rod bearings. An oil filter passes the oil through treated fabric which removes dirt and sediment and returns the oil, cooled and cleansed, to the oil pan.

The water pump, in the front of the cylinder block, draws cool water from the bottom of the radiator and, through a system of graduated outlets and large passages, forces circulation around each cylinder and valve seat.

The camshaft is driven by the crankshaft through a silent chain. The ignition distributor, which has single breaker points and semi-automatic spark advance, is accessibly mounted above the cylinder block and driven by a spiral gear on the camshaft.

Pistons and Rings

Each piston is light in weight, of special slotted skirt design. The rings are all above the piston pin which floats free in the connecting rod with