



LINCOLN MOTOR COMPANY... DETROIT
DIVISION OF *Ford Motor Company*

LINCOLN-ZEPHYR

REFERENCE BOOK



1940

LINCOLN MOTOR COMPANY

Division of FORD MOTOR CO.

DETROIT, MICH.

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FOREWORD

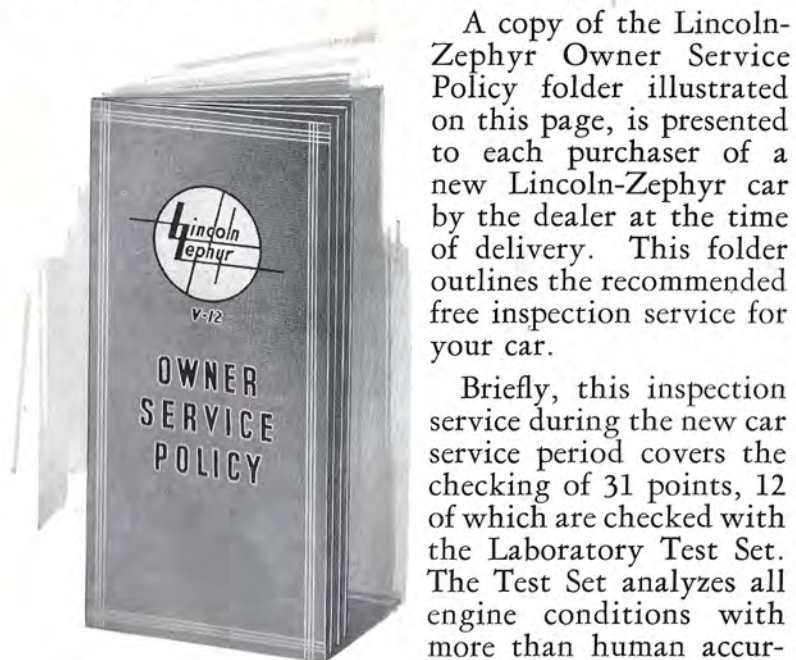
Knowing that you desire to give your car proper attention with the least effort and expense, Lincoln-Zephyr service engineers have prepared this reference book for your information and guidance. You will find it written in non-technical language and we believe after reading it, you will have an even deeper appreciation of Lincoln-Zephyr quality.

Pages four and five will be found to be of particular interest to you at the beginning of new car ownership.

For convenient reference, we suggest you keep this book in the glove compartment of your car.

NEW CAR INSPECTION SERVICE

Systematic inspection, with mechanical adjustments, when your car is new, will insure that excellence of performance which is a feature of the Lincoln-Zephyr. Proper lubrication during this period and regularly thereafter, is of vital importance if you are to obtain the long life which has been built into your car.



A copy of the Lincoln-Zephyr Owner Service Policy folder illustrated on this page, is presented to each purchaser of a new Lincoln-Zephyr car by the dealer at the time of delivery. This folder outlines the recommended free inspection service for your car.

Briefly, this inspection service during the new car service period covers the checking of 31 points, 12 of which are checked with the Laboratory Test Set. The Test Set analyzes all engine conditions with more than human accuracy.

Complete lubrication service is included at 300, 1000 and 2000 miles, without charge, except for engine oil.

As the owner of a Lincoln-Zephyr, you are entitled to have your car road tested, without charge, when necessary, by an authorized Lincoln-Zephyr dealer, providing no dismantling of parts is required.

LINCOLN-ZEPHYR SERVICE

One of the features of Lincoln-Zephyr service is the nation-wide organization of Lincoln-Zephyr, Mercury and Ford dealers.

Through this group, service is available throughout the country and in most parts of the world.

Lincoln-Zephyr dealers are equipped to render complete service. Your car will be serviced by men of mechanical ability, trained in appreciation of quality and precision manufacturing which qualifies them to render satisfactory service.

Ford and Mercury dealers throughout the country are in a position to assist Lincoln-Zephyr owners should emergency service become necessary.

Service Charges

In order that maintenance cost may be kept as reasonable as possible, Lincoln-Zephyr dealers are provided with a Suggested Time Schedule for service work. Most service operations for which a flat rate can possibly apply are in this manual. The labor charge is based on the shortest time for performing the particular operation consistent with good workmanship.

Repair Parts

Lincoln-Zephyr dealers carry genuine Lincoln-Zephyr repair parts. Genuine parts have the same quality and precision as those originally used in the car.

DATA

Engine

V-type. Included angle of cylinders .75 degrees
 Number of cylinders.....12
 Cylinder bore.....2.875 inches
 Stroke.....3.75 inches
 Piston displacement.....292 cubic inches
 Taxable horsepower rating.....39.6

Body Number

A plate giving the body number of the car is attached to the front of the dash.

Engine Number

The engine number is also the serial number and is located at rear of engine on the top of the clutch housing.

Key Number

Key numbers should be noted so that in case of loss, new keys may be obtained. Key numbers are indicated on metal tags attached to new car keys.

Wheelbase

125 inches.

Tires

7.00 x 16. Recommended tire pressure 28 pounds.

Capacities*

Engine oil pan.....5 quarts
 Transmission.....2.75 pints
 Rear Axle (Standard).....4 pints
 Rear Axle (Two-Speed).....5 pints
 Cooling system.....27 quarts
 Gasoline tank.....19.5 gallons

**All references to liquid measurements contained in this reference book are expressed in U. S. measure. One U. S. gallon is approximately 80% or $\frac{4}{5}$ of one British Imperial gallon.*

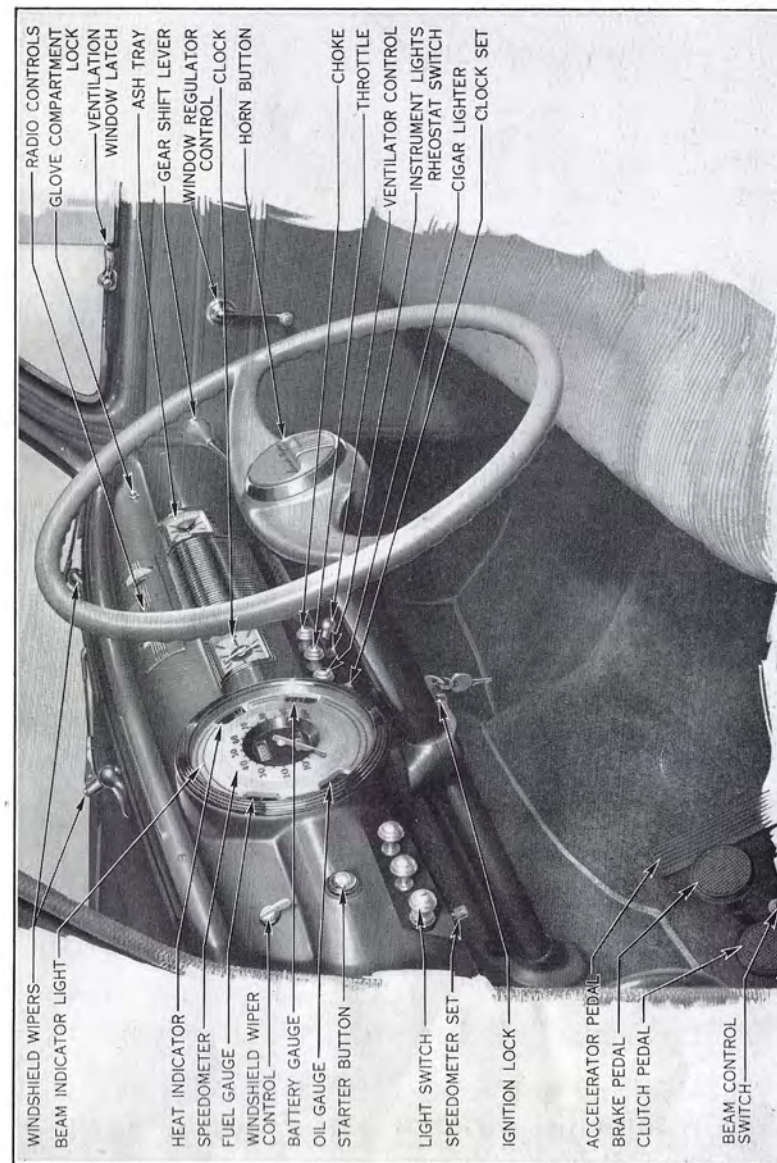


Fig. 1—Instruments and Controls

DRIVING NEW CAR

When you receive your car it will have a sufficient amount of oil in the engine, complete chassis lubrication, and cooling medium in the radiator.

The Lincoln-Zephyr needs no "breaking-in" because of the unusual accuracy in manufacture of moving parts, smoothness of bearing surfaces, and clearances which are correct. The car does not require a long "breaking-in" period to eliminate tightness and insure smooth running.

You can drive your car up to 60 miles per hour from the start. After the first 100 miles you may drive as you desire. This means you will enjoy your Lincoln-Zephyr from the beginning and is important, particularly, if you are planning on starting a long trip, or if you use your car for business.

Drain the engine oil after the first 300 miles of operation and replace with new oil of the correct viscosity (for oil change and lubrication see pages 34 and 36).

Locking the Car

The car is equipped with a coincidental lock built into the bracket which supports the steering column at the instrument panel. One operation locks both steering gear and ignition switch.

The car cannot be locked with ignition switch "ON."

The ignition and front doors lock with the same key. A separate key is provided for the glove compartment and rear deck door.

STARTING ENGINE

Be sure that the gear shift lever is in neutral position.

Depress accelerator pedal slightly.

Turn the ignition switch lever "ON." Press starter button at the left side of instrument panel and, if the engine does not instantly start, pull out the choke control located on the instrument panel. While the engine is cranking, push choke control in until it is about three quarters open.

The engine will usually start in a few seconds. Longer periods of cranking with choke button out should be avoided as the engine may be flooded, in which case it is necessary to pull the hand throttle button all the way out and crank engine with the switch still on. When the engine starts, release the starter button at once, push the hand throttle in and at the same time move the choke button to a point which gives the smoothest running condition. The choke button should be pushed all the way in as soon as the engine runs smoothly.

Cold Weather Starting

In extreme cold weather it is advisable to keep the clutch released until engine starts. By keeping the clutch released while engine is cranking, the starter motor is relieved of the extra load resulting from turning the transmission gears in the stiffened lubricant. Cold weather starting requires a judicious use of the choke button. When starting the engine in extreme cold weather, the choke button may be kept fully out until the engine starts as the auxiliary valve in the choke

butterfly will open and permit sufficient air to enter so that the engine will continue to run. However, as soon as the engine starts the choke should be pushed in to best running position. When the engine runs smooth it should be pushed all the way in.

COOLING SYSTEM

General Description and Operation

Two water pumps, one at the forward end of each bank of cylinders, are used to circulate the water in the cooling system.

A V-belt drives the pumps and generator from a pulley on the crankshaft.

The pumps differ from the conventional type as no adjustable packing gland is used. The water seal around the shaft is accomplished by an automatic feature inside the pump and should need no attention other than lubrication.

Pump Lubrication

Use engine oil in the oiler located at the top of each water pump. Lubricate each 1000 miles.

How to Adjust the Generator Belt

The adjustment is made by loosening the generator support bolt and moving the generator upward. The proper adjustment is $\frac{3}{4}$ " to 1" inward or outward movement of the belt at a point half way between the water pump and the generator pulley.

Radiator

The radiator is of the flat tube type. The hot water flows downward from the upper tank through the tubes to which are attached thin copper plates or fins. Air is drawn between these fins around the tubes by the fan and heat is carried away, thus cooling the water.

The radiator filler cap is located on top of the radiator under the hood and when removed is secured by a chain.

Draining the Radiator and Engine

A drain valve is provided at the bottom of the radiator on the left side.

Drain valves, at the forward end of each bank of cylinders just below the water pumps, are provided for draining the water from the cylinder block. (See Fig. 2.)

Important—All three drain valves must be opened to completely drain the cooling system.

To control rusting, and corrosion of aluminum cylinder heads in the cooling system, a rust inhibitor is put in the radiator at the factory. In case of draining the water it is recommended the system be refilled with fresh water and rust inhibitor again added. This rust inhibitor can be obtained at Lincoln-Zephyr and Ford dealers.

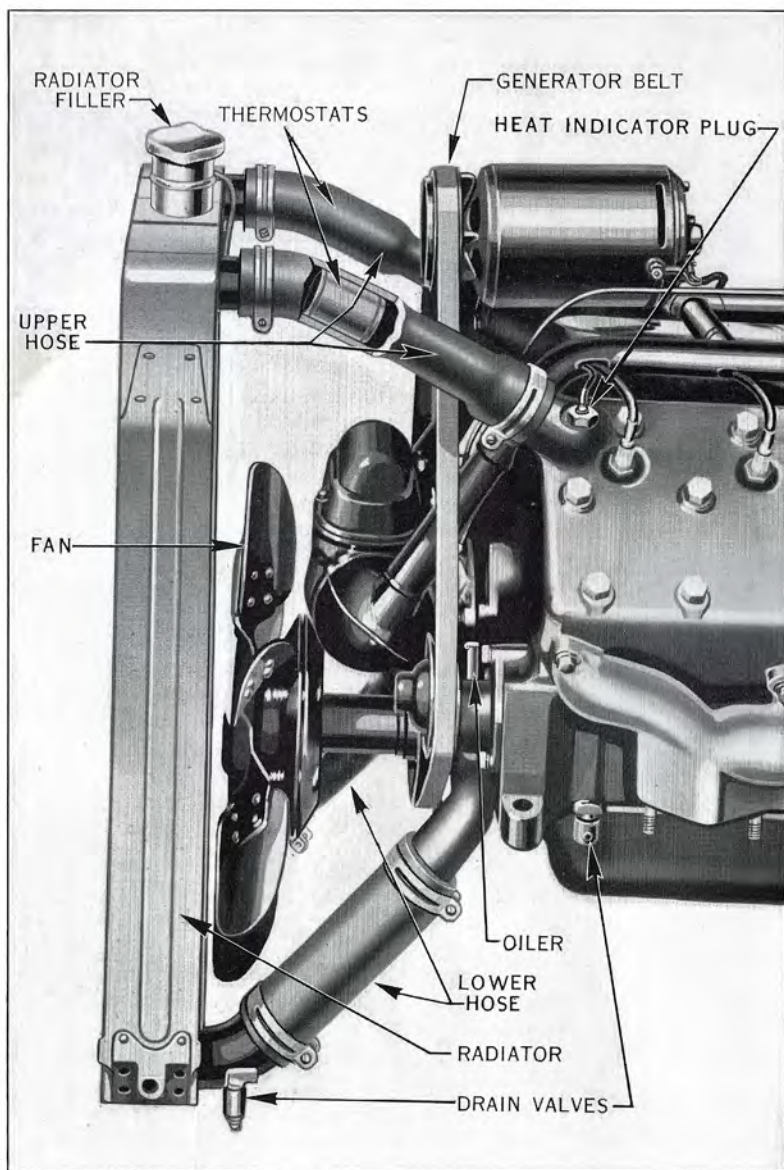


Fig. 2—Cooling System
[12]

Thermostats

Thermostatic valves are provided in each upper water hose between the engine cylinder heads and the top of the radiator.

These thermostats retard the circulation of water in the cooling system until the engine temperature has been raised to a point where maximum performance and economy are obtained. Thermostats are not adjustable and require no attention.

Heat Indicator

The heat indicator located in the instrument group is of the electric type and shows the water temperature in the engine. (Note—The gauge operates only when the ignition switch is "ON." The indicator hand parks at the "hot" end of the gauge when the ignition switch is "OFF.")

Anti-Freeze Solution

Genuine Ford Anti-freeze may be obtained from Lincoln-Zephyr and Ford dealers. Ethylene Glycol, radiator glycerine, or alcohols are also satisfactory anti-freeze solutions. These are organic liquids and like water will cause rusting in any system containing iron. This iron rusting, also corrosion of the aluminum cylinder heads, can be controlled by the use of a rust inhibitor which can be obtained at Lincoln-Zephyr and Ford dealers. Ethylene Glycol, some radiator glycerines and some brands of alcohol, as marketed, contain an effective inhibitor to control this corrosion.

Among the inorganic anti-freezes commonly offered to the public, calcium chloride solutions are probably the most destructive, particularly to aluminum. However, other solutions such as honey, glucose, sugar, also oils, are harmful and are not recommended.

FUEL SYSTEM

Fuel Tank

Fuel may be drained by removing the plug in the bottom of the tank.

The tank is provided with a trap to catch water or sediment. This trap is cleaned by removing the drain plug and allowing a small quantity of fuel to run out.

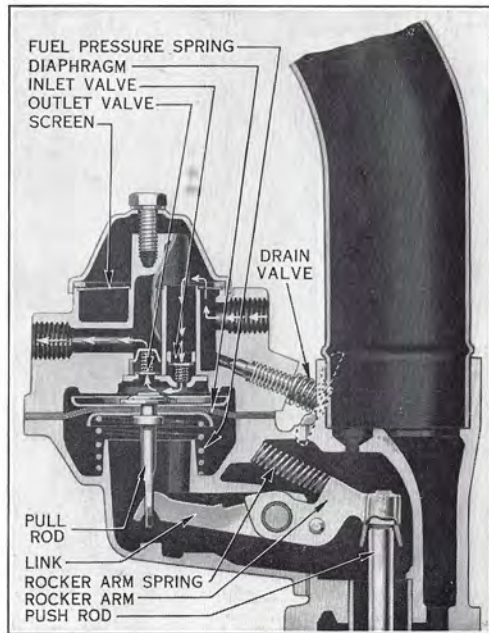


Fig. 3
Fuel Pump

Fuel Gauge

The fuel gauge located in the instrument group is of the electric type and is operated by a float in the gasoline tank. This gauge is automatic in its action and should require no attention.

NOTE—The ignition switch must be "ON" before the gauge will register.

Fuel Pump

The fuel pump is located on the top of the engine behind the carburetor and is driven by a push rod actuated by an eccentric on the camshaft. Being automatic in action, the pump requires little attention other than occasional draining to keep it free from dirt. (See Fig. 3).

The construction of the pump provides a trap for sediment or water which can be drained off by means of the valve in the side of the pump.

In case of running out of gasoline, it will require approximately 20 seconds of cranking the engine with the starter before the pump is primed and again supplies gasoline to the carburetor.

Carburetor

The carburetor is of the dual down draft, plain tube type with accelerating pump and auxiliary valve choke. The carburetor is entirely automatic in action. All orifices are fixed with the exception of the idling jets which are controlled by the idling adjusting screws. (See Fig. 4.)

Adjustment

The idle speed of the engine should be set by means of the throttle stop screw (See Fig. 4) to a speed equivalent to six miles per hour.

Idle mixture adjustment. Before making adjustment, the engine must be warmed up to normal operating temperature.

The idle adjustment shown in Figure 4 controls the quantity of the gasoline-air mixture for low speed operation.

Turning adjustment "out" gives a richer mixture. Turning "in" gives a leaner mixture. Adjust one side of the carburetor at a time. Turn the adjustment in slowly until the engine begins to lag or run irregular, then slowly turn out until the engine begins to "roll." Finally, turn in the adjustment again just enough so that the engine runs smoothly. This adjusts the mixture for one side of the engine; follow the same procedure for the opposite side. (Lincoln Zephyr dealers have special equipment for checking and adjusting carburetors.)

Accelerator Pump

During summer weather the accelerating pump stroke is shortened by connecting the accelerating pump link in No. 1 position. (See Fig. 4.)

For winter operation, the accelerating pump link should be connected in position No. 2. Connecting link in position No. 3 is advisable only in extremely cold weather. (See Fig. 4.)

Caution—NEVER attempt to operate the engine and make carburetor adjustments in a small, unventilated garage. Carbon monoxide gas, produced by all gasoline engines, is a deadly insidious poison when inhaled.

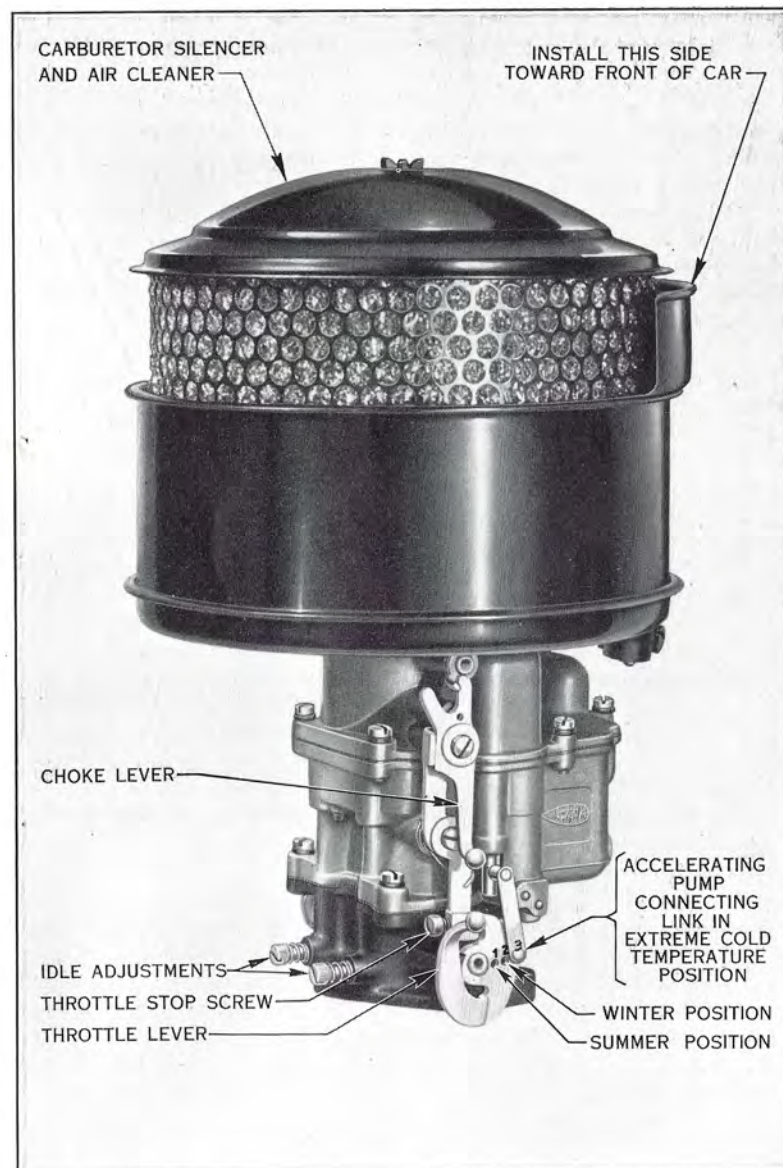


Fig. 4—Carburetor

Air Cleaner and Carburetor Silencer

The air cleaner and carburetor silencer (See Fig. 4) is attached to the carburetor air intake. This unit cleans the air going into the carburetor and quiets carburetor operating noises.

The air cleaner should be cleaned periodically, depending upon the condition of the roads over which the car is operated. To clean, remove top cover and filter unit. Wash filter unit in gasoline, after which dry thoroughly, then submerge in a good grade of engine oil and allow to drip dry before reinstalling. (Do not oil the felt in top cover.)

Cars which are operated in dusty territories, or over unpaved roads, should be equipped with an oil bath air cleaner. This type air cleaner can be obtained from Lincoln-Zephyr dealers.

ENGINE AND IGNITION

The Lincoln-Zephyr engine is accurately made, carefully assembled, and thoroughly tested. Every precaution has been taken to provide trouble free operation, and with normal care, the occasion for making emergency repairs or adjustments on the road will be remote.

The instructions and illustrations under this heading are for general information and are not intended to be complete for making major repairs. It is recommended *all* repairs or adjustments be made by authorized Lincoln-Zephyr dealers.

Engine Operation

If the engine will not start it is probably due to one of the following causes:

- * 1. The cylinders have become flooded with gasoline, due to excessive use of the carburetor choke.

Remedy: Pull the throttle button all the way out. Without turning on the ignition switch, crank the engine with the starter for approximately thirty seconds to exhaust the rich gases; then proceed in starting the engine as outlined on page 9.

- 2. Insufficient gasoline reaching the carburetor may be caused by an empty gasoline tank, clogged gasoline line or faulty fuel pump.

Remedy: In case of running out of gasoline it will require approximately twenty seconds of cranking the engine with the starter before the pump is primed and will again supply gasoline to the carburetor. Clogged gasoline line can be cleaned by disconnecting the lines at each end and blowing out the obstruction. In case of a faulty fuel pump, remove and clean strainer and drain sediment trap (See Fig. 3). Make sure the inside of the pump is free from dirt, also check to see if all gas line connections are tight. In case replacement of pump parts becomes necessary it is advisable to consult a Lincoln-Zephyr dealer.

If sufficient gasoline is reaching the carburetor, a spray of gasoline will be produced at the high speed discharge nozzle in the carburetor every time the accelerator pedal is depressed. (It will be necessary to remove the air cleaner to observe this.)

3. Faulty ignition may be determined by holding a spark plug wire approximately $\frac{1}{4}$ inch away from the cylinder head as the engine is cranked with the starter. If a spark is not noted from each of the wires the cause is due to open ignition circuit, distributor points or coils. It is, of course, assumed the storage battery charge has not become exhausted.

Remedy: Check for loose connection or broken wire. If fault is located to be the distributor or coils, it is suggested you consult a Lincoln-Zephyr dealer.

Crankshaft Main Bearings

There are four crankshaft main bearings of the replaceable type. They do not require adjustment.

Connecting Rod Bearings

The connecting rod bearings are of the replaceable type and do not require adjustment.

Valves and Lifters

The clearance between the hydraulic valve lifters and valves is maintained at zero automatically. Valve lifters are self adjusting to compensate for expansion and contraction of the valve stems.

Oil is supplied by pressure into the valve lifter assemblies from auxiliary oil lines which are fed from the oil manifold (See Fig. 11).

During the interval when the valve is off its seat, a slight oil leakage occurs in the valve lifter which is necessary to compensate for any expansion of the valve stem.

When the valve closes, the valve lifter is replenished with oil thereby eliminating clearance between the lifter and valve stem. Valve quietness is thus maintained and there is no necessity to ever check valve clearance.

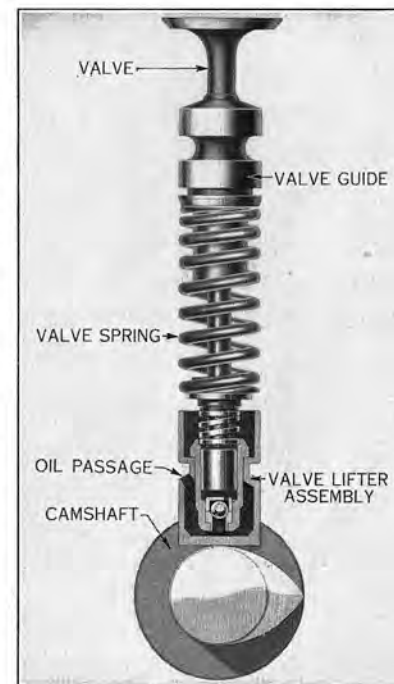


Fig. 5
Valve and Lifter Assembly

Camshaft Setting

The camshaft is driven by an aluminum alloy helical gear in mesh with a steel gear on the crankshaft. The camshaft gear and crankshaft gears are installed with the mark on the cam gear at the bottom corresponding with the mark on the crankshaft gear as indicated in Figure 6.

Ignition

The distributor is located at the front of the engine and is driven directly by the camshaft, thus eliminating many parts.

Spark timing is automatically advanced or retarded by centrifugal governor weights in the distributor. A vacuum brake automatically retards the spark timing in direct proportion to the load. (See Fig. 7).

Distributor Vacuum Brake

The vacuum brake consists of a plunger or piston which is held against the braking surface of the governor plate by a spring of adjustable tension. As the rapidity of combustion is dependent on the degree of compression, the need of a retarded spark for quick acceleration or power is not dependent entirely on engine speed.

To meet the requirements of the fuel used and the type of service in which the car is operated an adjustment is provided on the vacuum brake. (See Fig. 7.).

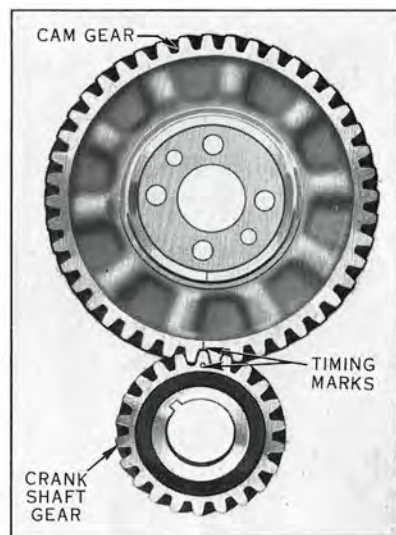


Fig. 6
Timing Gears

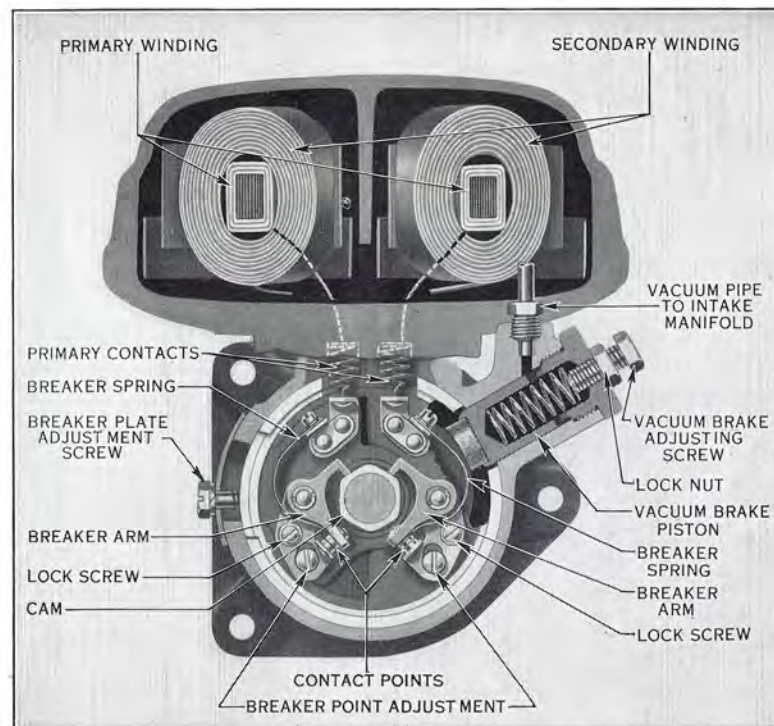


Fig. 7
Cross Section View of Distributor

Adjustment is obtained for a particular fuel as follows: Back off the adjustment on the vacuum brake (See Fig. 7) until the engine "pings" under load. Then turn the adjusting screw in just enough to remove the ping. Tighten the adjusting screw lock nut to preserve the adjustment.

Breaker Mechanism

The breaker mechanism includes a six lobe breaker cam, two sets of breaker points and two condensers (See

Fig. 7). The right hand breaker points are referred to as the fixed points. These points with the right hand coil fire the right hand cylinders. The left hand breaker points are called the adjustable points. These with the left hand coil, fire the left hand cylinders.

In the above reference to right hand and left hand, the engine and distributor should be viewed from the driver's seat and not as shown in Fig. 7.

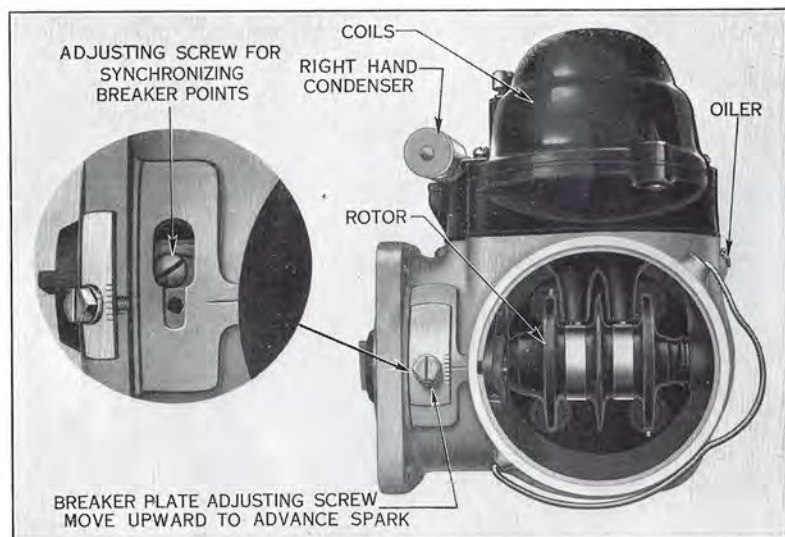


Fig. 8
Longitudinal Section of Distributor

The proper setting for the distributor point breaker gaps is .014 to .016 with breaker arm on the high point of the cam.

Rotor

The rotor distributes the high tension current to the spark plugs. (See Fig. 9.) The twelve high tension terminals which are placed around the distributor plates are numbered. The wires from each of the terminals are connected to the spark plug on the cylinder which is indicated by the corresponding number.

The forward contact on the rotor carries the current from the left hand coil for distribution to cylinders 1-3-5-7-9-11 in the left hand bank.

The rear contact on the rotor carries the current from the right hand coil for distribution to cylinders 2-4-6-8-10-12 in the right hand bank.

Spark Timing of Engine

It is advisable to have adjustments to the distributor made by an authorized Lincoln-Zephyr dealer as they are specially equipped for this service. Making adjustments such as adjusting and synchronizing points without special equipment would be guess work. No other one thing affects the operation of a car as vitally as incorrectly adjusted ignition which is reflected in poor performance, high fuel consumption and overheating of the engine.

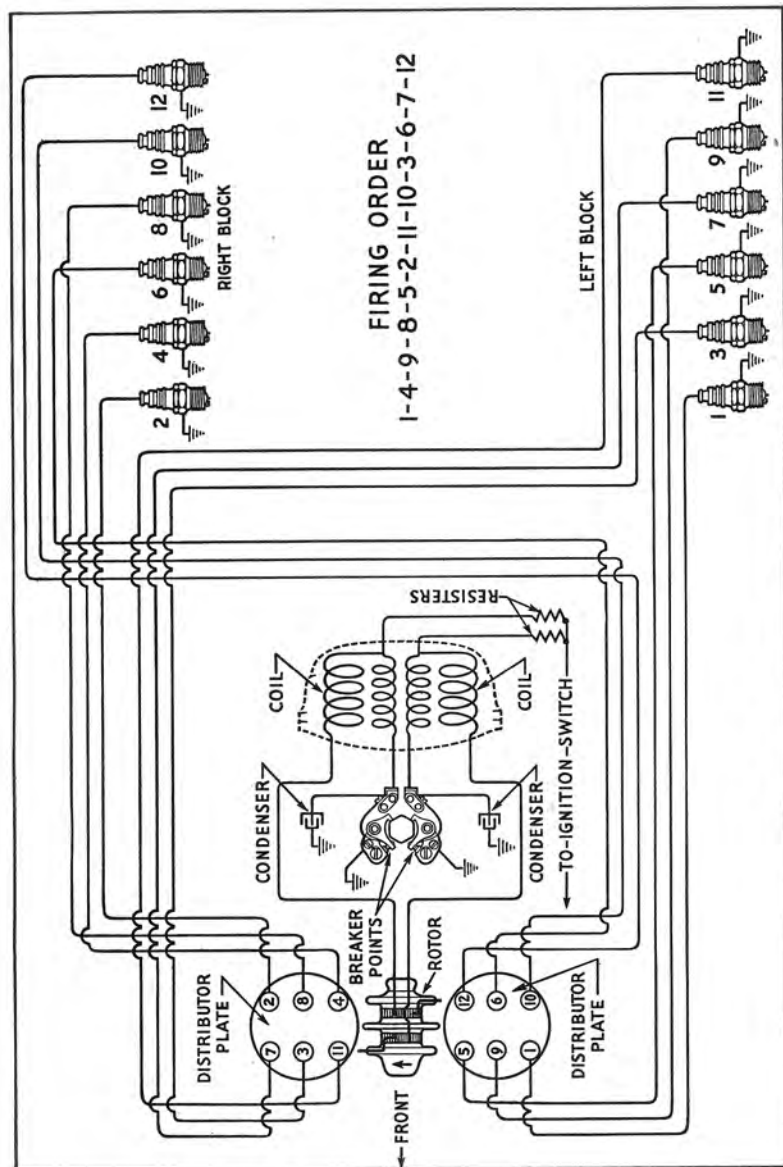


Fig. 9—Ignition Wiring Diagram

Spark Plugs

Spark plugs should be examined occasionally and cleaned. Care should be observed in correctly setting the points with gap of .028 to .030.

The particular spark plugs used as factory equipment are best adapted to the requirements of the Lincoln-Zephyr engine and should be used for replacement.

Lubrication of Distributor

An oil cup is provided on the distributor housing for oiling the forward bearing of the distributor shaft. This oiler is accessible from the left side of engine. Oil each 1000 miles, using light engine oil. The bearing at the rear end of the distributor receives oil from the interior of engine and requires no attention.

CLUTCH

The clutch is of the single plate type, composed of two major units—the pressure plate cover assembly and the clutch disc. (See Fig. 14.)

The pressure plate cover assembly contains the pressure springs, pressure plate and release levers.

The release levers are mounted on needle roll bearings and so designed that the centrifugal force from the rotation of the clutch increases the pressure on the driven member as the speed of the engine is increased. This feature permits a light pedal pressure when shifting gear at normal engine speeds and prevents clutch slippage at the higher speeds.

The steel clutch disc has friction facing rings riveted on each side. There are six segments formed in the disc which give the required amount of cushioning to insure smooth clutch engagement and long life of the friction facing.

A mechanical damper incorporated in the hub of the clutch disc serves to insure quiet operation of the transmission and absorbs the shock of sudden clutch engagement. This damper is adjusted correctly at the factory and should not require further attention.

No adjustment is required on the clutch other than to maintain the required amount of free travel in the clutch pedal. (See "Pedal Adjustment.")

Pedal Adjustment

The pedal should have approximately $1\frac{1}{2}$ to 2 inches free travel before it disengages the clutch, with engine idling or stopped. *This is important.*

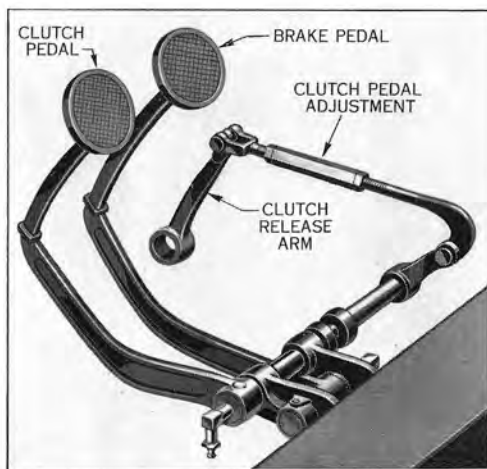


Fig. 10
Clutch Pedal Adjustment

The amount of movement can easily be determined by moving the clutch pedal down with a slight hand pressure. This free movement will become less as the mileage on the car increases. If movement less than $1\frac{1}{2}$ inches is noted, the clutch pedal adjusting rod should be shortened. (See Fig. 10.) Decreasing the length of the turnbuckle increases the amount of free pedal travel.

Caution—Don't "ride" the clutch pedal. Driving with the foot resting on the pedal will result in excessive wear of the clutch facings and clutch throw-out bearing. This will necessitate frequent adjustment of the clutch pedal and result in premature clutch replacement.

The pilot bearing located in the center of the flywheel for supporting the front end of the clutch shaft and the needle rolls in the clutch fingers, also the clutch throw-out bearing, are lubricated at time of assembly and no further lubrication is required.

GENERAL LUBRICATION

(See Figure 12)

Transmission

Summer lubricant for transmission should conform to S. A. E. specification No. 140.

Winter lubricant should conform to S. A. E. specification No. 90.

$2\frac{3}{4}$ pints are required to refill after draining and flushing.

Rear Axle

For both summer and winter use Hypoid type gear oil, S. A. E. 90 E. P., except for temperatures below -10°F . use hypoid type gear oil, S. A. E. 80 E. P.

The standard axle requires 4 pints to refill after draining and flushing. The two-speed axle requires 5 pints.

Water Pumps

An oiler is provided on the top of each pump for lubricating. Fill oilers every 1000 miles with engine oil.

Chassis

All moving parts of the chassis, king pins, spindle connecting rod ball joints, steering drag link ball joints, etc., are to be lubricated only with pressure gun lubricant. Suitable lubricator connections for pressure gun use are provided at these points.

Wheel Bearings

Use Ford fiber wheel bearing lubricant for packing front and rear wheel bearings every 5000 miles.

Universal Joint

Use universal joint lubricant (cylinder oil soda soap grease).

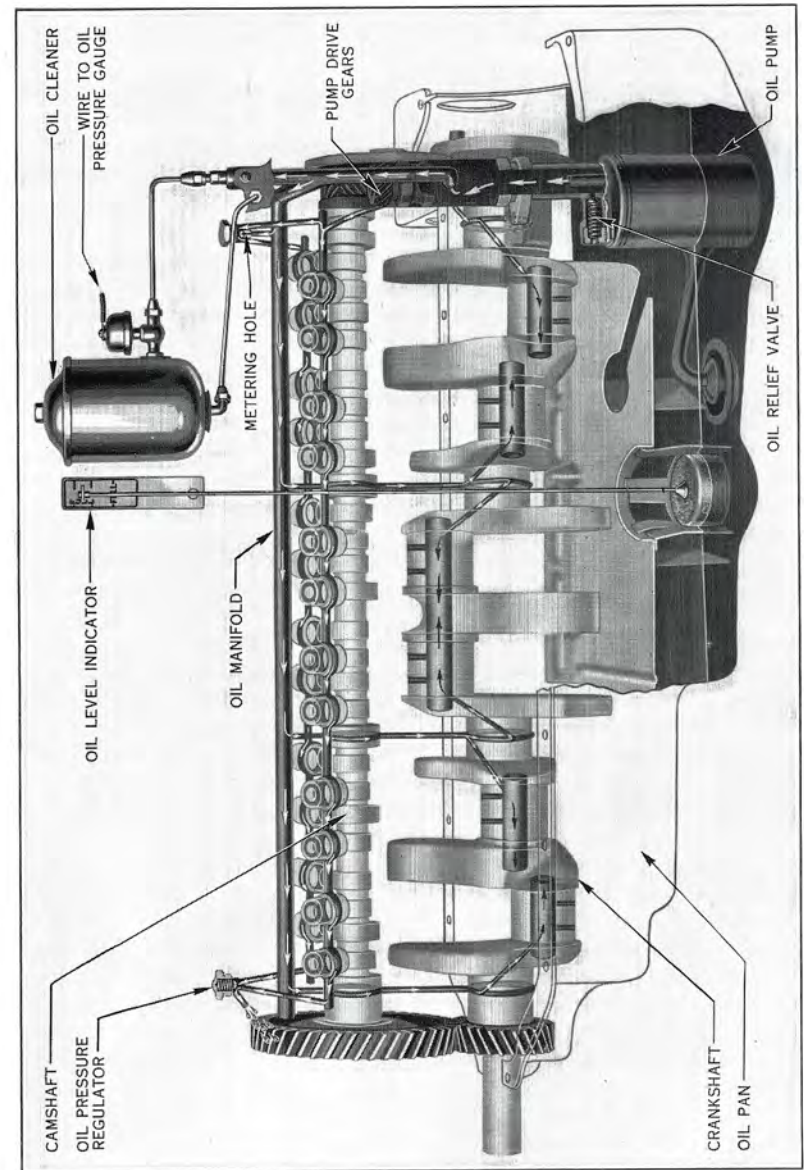


Fig. 11—Engine Oiling System



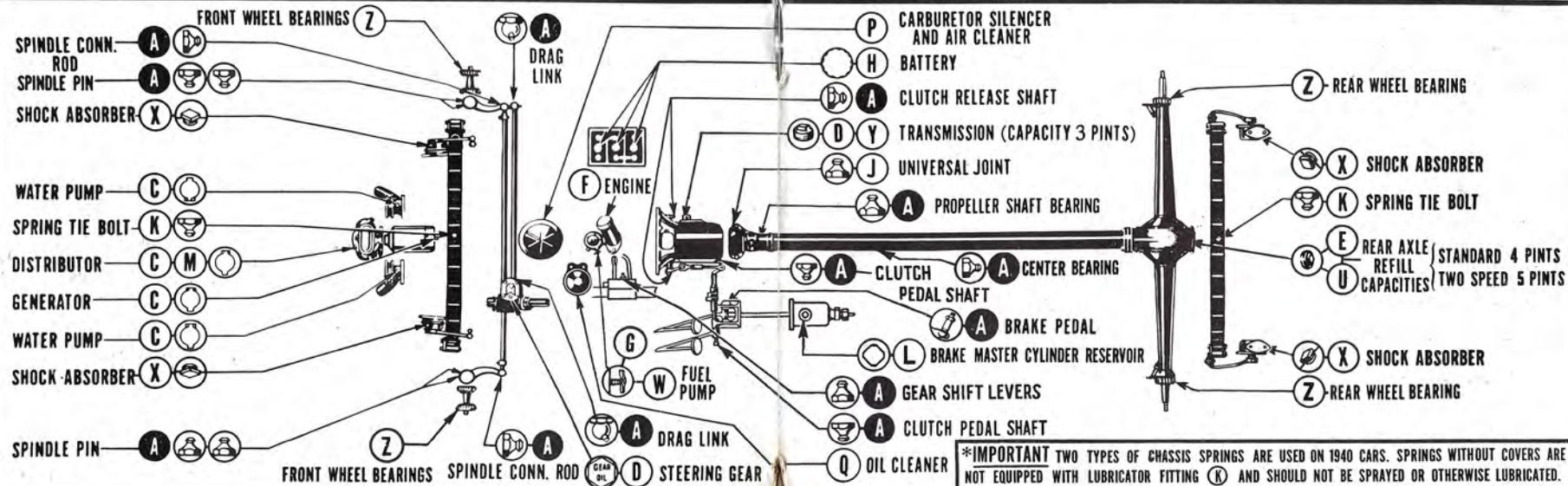
SERVICE CHART

LUBRICATION & MAINTENANCE - 1940 CARS



- A** PRESSURE GUN LUBRICANT
ENGINE OIL (DISTRIBUTOR
SHAFT, GENERATOR, BRAKE
CLEVIS PINS, WATER PUMPS
AND ACCELERATOR)
- C** ADD MILD E.P. GEAR OIL TO FILLER
PLUG: S.A.E. 90 ALL SEASONS
- E** ADD HYPOID TYPE GEAR OIL S. A. E. 90 E. P. FOR
SUMMER AND WINTER, EXCEPT FOR TEMPERATURES
BELOW -10° F. USE HYPOID TYPE GEAR OIL S. A. E. 80 E. P.
- F** DRAIN AND REFILL WITH 5 QUARTS ENGINE OIL EVERY 5000 MILES.
RECOMMENDED OIL
TEMPERATURE ABOVE 90° F. - S.A.E. 40; TEMPERATURE ABOVE 32° F. - S.A.E. 30;
TEMPERATURE ABOVE 10° F. - S.A.E. 20 OR 20W; TEMP. ABOVE -10° F. - 10W;
LOWER TEMPERATURES - 10W PLUS 10% KEROSENE
- G** DRAIN SEDIMENT
- H** ADD DISTILLED WATER
- J** UNIVERSAL JOINT GREASE
(CYLINDER OIL SODA SOAP GREASE)
- K** FORD SPRING LUBRICANT M-4628
*(NOTE BELOW)
- L** ADD M-3833 BRAKE FLUID TO FILL
MASTER CYLINDER RESERVOIR
- M** FORD DISTRIBUTOR LUBRICANT M-4601
ON CAM LOBES
- N** LUBRICANT IMPREGNATED WAX ON HOOD LACINGS,
DOOR STRIKER PLATES AND DOVETAILS
- O** PENETRATING DRY TYPE LUBRICANT FOR DOOR HINGES
- P** WASH SCREEN IN GASOLINE-WET WITH ENGINE OIL

**EACH 1000 MILES
(EXCEPT F)**



- Z** PACK WITH FORD WHEEL BEARING LUBRICANT
M-544 IF REQUIRED
- Y** DRAIN, FLUSH AND REFILL WITH GEAR OIL
WINTER S.A.E. 90 OR 110
SUMMER S.A.E. 140

- X** ADD FORD SHOCK ABSORBER FLUID
TO LEVEL OF FILLING PLUG

**EACH FALL AND SPRING
OR EVERY 5000 MILES (WHICHEVER OCCURS FIRST)**

- W** REMOVE AND CLEAN SCREEN
- Q** REPLACE FILTER CARTRIDGE
EVERY 10000 MILES

- U** DRAIN, FLUSH AND REFILL WITH HYPOID
TYPE GEAR OIL S. A. E. 90 E. P. FOR
SUMMER AND WINTER, EXCEPT FOR
TEMPERATURES BELOW -10° F. USE HYPOID
TYPE GEAR OIL S. A. E. 80 E. P.

Fig. 12—LUBRICATION AND MAINTENANCE CHART

Chassis Springs

To avoid clogging of oil grooves in spring leaves and insure proper lubrication, it is *important* to use the *recommended special lubricant*. See your Lincoln-Zephyr dealer about this.

Some body types are equipped with springs which do not require any lubricant. (See Fig. 12).

Engine Lubrication

The engine is lubricated by means of a gear type oil pump driven by the camshaft through spiral gears. (See Fig. 11.)

Oil under pressure is carried to the oil manifold and distributed to the bearings of the camshaft, crankshaft and the valve lifters.

The pressure to the crankshaft and camshaft is regulated by a relief valve located in the oil pump. The oil pressure regulator (See Fig. 11) regulates the pressure to the valve lifters and excess oil from this regulator lubricates the timing gears.

Oil Change

After running a new car 300 miles, the oil should be drained from the engine by removing the drain plug located at the left near the bottom on the right side of the oil pan. After the oil has drained, replace plug and refill with 5 quarts of oil of the proper viscosity (See page 36). Oil pan should be drained and fresh oil added every 5000 miles thereafter.

Oil must be added between oil changes as the individual engine requires (driving speed, temperature, etc., will effect oil consumption).

Oil Cleaner

The oil cleaner requires no other attention than replacing filter cartridge every 10000 miles. To assure

proper installation of the genuine cartridge it is recommended this service be obtained from an authorized Lincoln-Zephyr Dealer.

Oil Level Indicator

When the oil pan is full the oil level indicator will be just below the "full" mark. (See Fig. 13). Any excess oil which raises the indicator above this point will be quickly consumed and give the effect of excessive oil consumption.

To *avoid over-filling* it is important not to add oil while the engine is running, or immediately after the engine has been stopped. Approximately one quart of oil is suspended in the circulating system while the engine is operating and until this has had sufficient time to drain into the oil pan, the indicator will not accurately register the amount of oil in the engine.

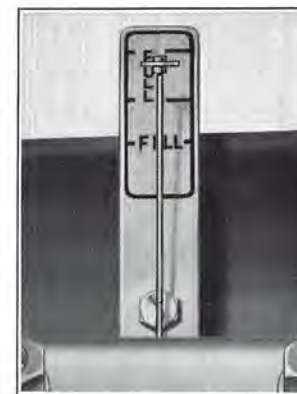


Fig. 13
Oil Gauge

Oil Pressure Gauge

The electric oil pressure gauge located in the instrument group indicates the pressure under which the oil is being supplied to all the engine bearings. The pressure should show from 30 to 45 pounds with the oil at normal engine operating temperature. The oil pressure will be higher with a cold engine.

Failure of oil gauge to show pressure generally indicates insufficient oil and the supply should be checked immediately.

Engine Oil Viscosity

Engine oils of the following viscosity numbers are recommended for use in the various temperature ranges indicated.

Temp. above 90° F.....	S.A.E. 40
Temp. above 32° F.....	S.A.E. 30
Temp. above 10° F.....	S.A.E. 20 or 20W
Temp. above -10° F. (below 0°)	10W
Lower temperatures.....	10W plus 10% Kerosene

Operating conditions will necessarily modify these recommendations inasmuch as the intermittent driver will find it necessary to use an oil one or two grades lighter than the continuous operator. The grades recommended above are for average conditions of operation.

Five quarts are required to refill the oil pan.

TRANSMISSION

The transmission is of the synchronized gear type, providing for three speeds forward and reverse. Helical silent gears are used throughout. Figure 14 shows the gears in neutral position.

The gear shift control on the steering column gives the same "H" type shift as the vertical lever used on previous models. Operation of the steering column gear shift lever, from the neutral position, is as follows: *reverse*, lift up on lever and move forward; *low*, lift up and move backward; *second*, push lever forward with slight downward pressure; *high*, pull backward with slight downward pressure.

Two units function in transmitting the power through the transmission; the transmission drive shaft and the

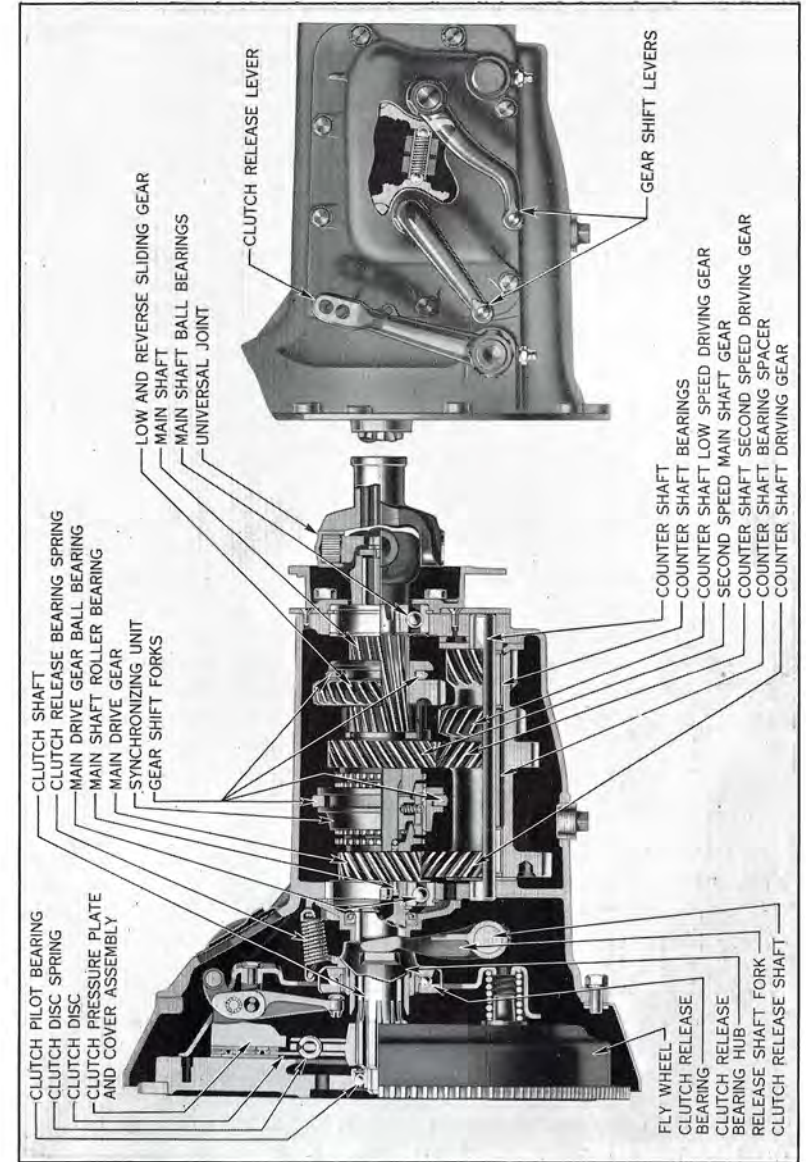


Fig. 14—Transmission

countershaft gears. The main shaft projects into, and transmits power to the transmission.

The transmission main shaft is splined and carries the low and reverse sliding gear, the second speed main shaft gear and also the synchronizing unit. This shaft and the clutch shaft form the direct or high speed power connection from the engine through the clutch to the propeller shaft which drives the rear axle. (See Fig. 14.)

The pilot bearing for front end of clutch shaft is mounted in the center of flywheel. This bearing is inoperative except when the clutch is released. It is lubricated when assembled into the car and does not require further lubrication.

The main drive gear, is integral with the clutch shaft and is constantly in mesh with the countershaft driving gear on the countershaft assembly.

When the car is at rest with the engine running, the clutch engaged, and the gear shift lever in neutral position, all gears are in motion except the gear synchronizing unit and the low and reverse sliding gear. No power can be transmitted to the propeller shaft and rear axle until either the gear synchronizing unit is meshed with the main drive or second speed main shaft gear, or the low and reverse sliding gear is meshed with the countershaft low speed driving gear or reverse idler gear. (See Fig. 14.)

Gear Synchronizing Unit

The "blocker type" gear synchronizing unit shown in Fig. 14 slides on the transmission main shaft. It is equipped with friction cones on either side and has an outer ring which is engaged by the shifter fork, controlled by the shifter lever. The ring is retained centrally on the unit by spring actuated plungers and is capable

of sliding either forward or backward to engage either the main drive gear or second speed main shaft gear at option. (See Fig. 14.)

When the shift is made either from first to second or second to high gear or from high gear to second, the friction cone in the gear synchronizing unit comes in contact with the mating cone on either the main drive gear or second speed main shaft gear. (See Fig. 14.) This causes the gears to turn at the same speed. Further movement of the lever causes the outer ring of the synchronizing unit to be pushed further forward or backward as the case may be, meshing the main drive gear or second speed main shaft gear. This operation is completed in practically one continuous deliberate movement of the shifting lever.

Lubrication

Summer lubricant for the transmission should conform to S. A. E. 140.

Winter lubricant should conform to S. A. E. 90.

Change each Fall and Spring or every 5,000 miles whichever occurs first.

2¾ pints of lubricant are required to fill to level of filler plug on right side of transmission. (See Fig. 14.)

FRONT AXLE

The front axle is of the I-Beam type and is held in position by a radius rod, supported at the rear end by a pivot connection.

This method of mounting holds the axle in correct position with respect to steering connections, regardless of road conditions or speed of the car.

The steering tie rod is at the rear of the axle and is adjustable for aligning the wheels in respect to toe-in.

Alignment of Front Wheels

Alignment of the front wheels is an important factor in tire economy and ease of steering. When wheels are improperly aligned, the tires when rolling over the ground, are given a sidewise sliding motion which rapidly wears the tire treads.

The front wheels should have a toe-in of $\frac{1}{16}$ " to $\frac{1}{8}$ ". This measurement is taken between the wheel rims at the front and rear of the wheels at a height equal to the center of the wheel from the ground. The rear measurement should never be more than $\frac{1}{4}$ inch greater than the front measurement. If the difference between the two measurements is other than this, it is an indication the wheels are out of alignment and the car should be taken to a Lincoln-Zephyr dealer for adjustment. In case of emergency, however, the following instructions should be observed.

Loosen the clamp bolts at each end of the steering tie rod. One end of the tie rod carries right-hand threads and the other end left-hand threads, so by turning the tie rod one way or the other the distance between the rod ends is lengthened or shortened the amount necessary to give the wheels the proper toe-in.

Adjusting Front Wheel Bearings

If there is excessive play in the bearings they can be adjusted as follows:

Jack up front of car and remove outer and inner hub caps. Remove cotter pin from the bearing nut and tighten nut to a slight hand pressure with a suitable wrench until there ceases to be any looseness

in the bearing. Then turn the adjustment back approximately $\frac{1}{8}$ turn and replace cotter pin in the nut. (Always back off nut rather than tighten to replace cotter pin).

Lubrication of Front Wheels

Bearings should be cleaned and repacked with grease about every 5,000 miles under normal driving conditions.

Use Ford wheel bearing grease available at Lincoln-Zephyr and Ford dealers. (See Fig. 12).

REAR AXLE

General Description and Operation

The rear axle is of the three quarter floating type, the weight of the car being carried directly on the axle housing rather than on the axle shafts. (See Fig. 15). This allows the axle shafts to function only to rotate the wheels. The rear axle gears are of the hypoid type. Bearings are very carefully adjusted at the factory and need no further attention other than proper lubrication.

Lubrication

For both summer and winter, use *hypoid type gear oil* S. A. E. 90 E. P., except for temperatures below -10°F . use hypoid type gear oil, S. A. E. 80 E. P.

Change lubricant each Fall and Spring or every 5000 miles, whichever occurs first.

4 pints are required to refill the standard axle to level of filler plug after draining and flushing. 5 pints are required for the two-speed axle.

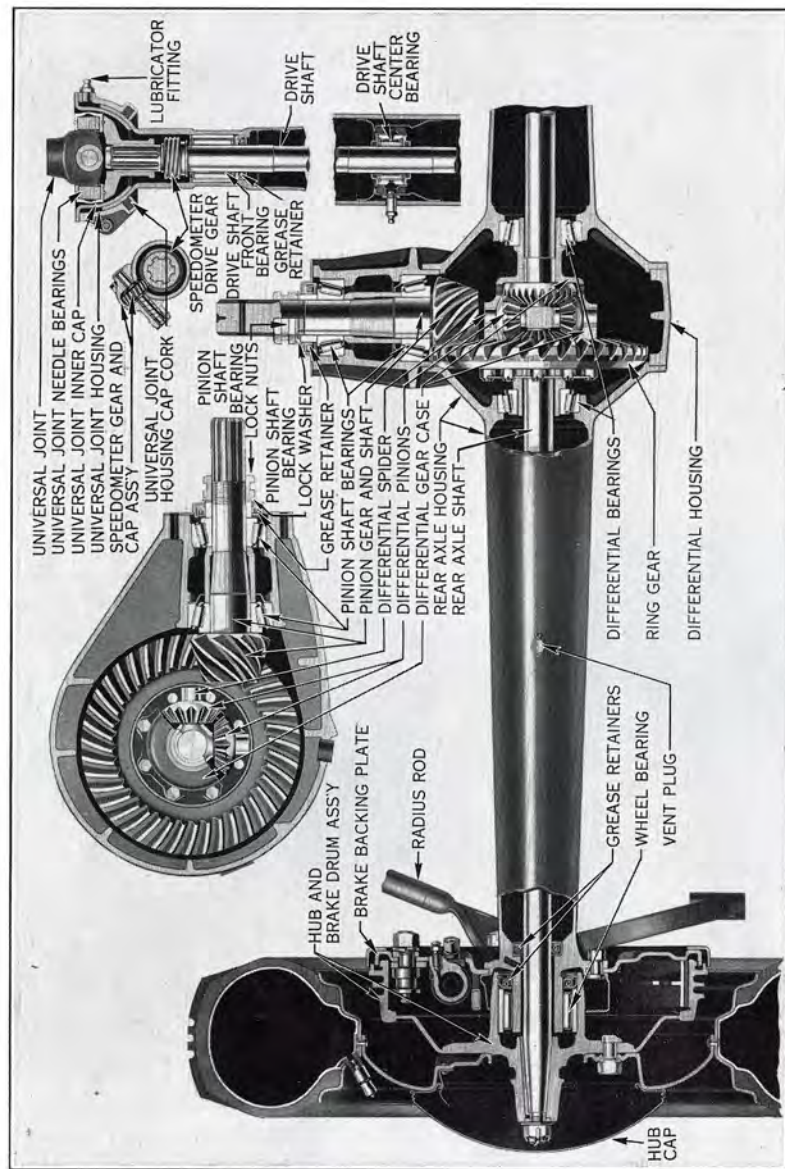


Fig. 15—Rear Axle

Torque Tube and Propeller Shaft

While the primary function of the torque tube is to counteract axle torque and take the driving thrust, it also encloses the propeller shaft and determines the position of the rear axle. This latter feature relieves the rear spring of any duties except carrying the load and absorbing road shocks.

Speedometer Drive Shafts

The speedometer drive shaft is driven by a spiral gear and pinion mounted at the front end of the torque tube. Lubrication is provided for these parts from the universal joint.

Propeller Shaft Bearings

A roller bearing is contained in the forward end of the torque tube in which the end of the propeller shaft rotates. Also a similar bearing is located at the center of the propeller shaft. These bearings receive lubrication through pressure gun fittings in the torque tube. (See Fig. 12.)

Lubrication of Rear Wheels

Rear wheel bearings should be removed, cleaned and repacked with Ford wheel bearing grease every 5000 miles. (See Fig. 12).

Universal Joint

Lubricate each 1000 miles. Use universal joint lubricant (cylinder oil soda soap grease). See Fig. 12 for location of fitting.

BRAKES

General Description and Operation

The braking system consists of hydraulic internal expanding Servo brakes on each of the four wheels. The hand brake lever provides for using the rear wheel

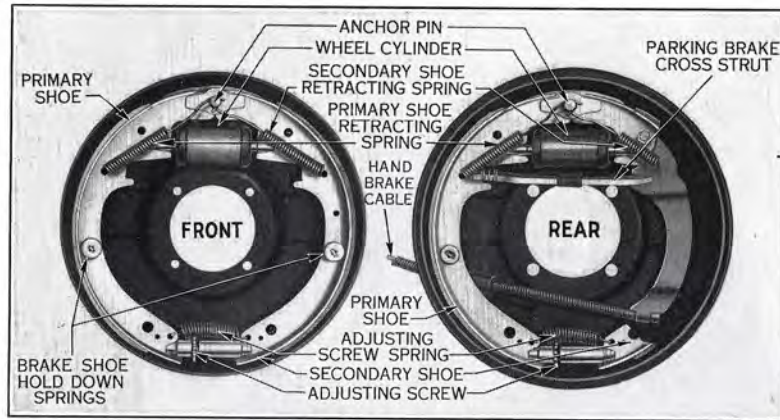


Fig. 16
Brake Shoe Assemblies

brakes as a parking brake. A moulded type lining is used on the primary brake shoes and woven on the secondary shoes.

Adjustment

To assure proper brake adjustment, it is recommended this important service be performed by an authorized Lincoln-Zephyr dealer.

For the purpose of making an emergency adjustment, should the occasion arise, proceed as follows:

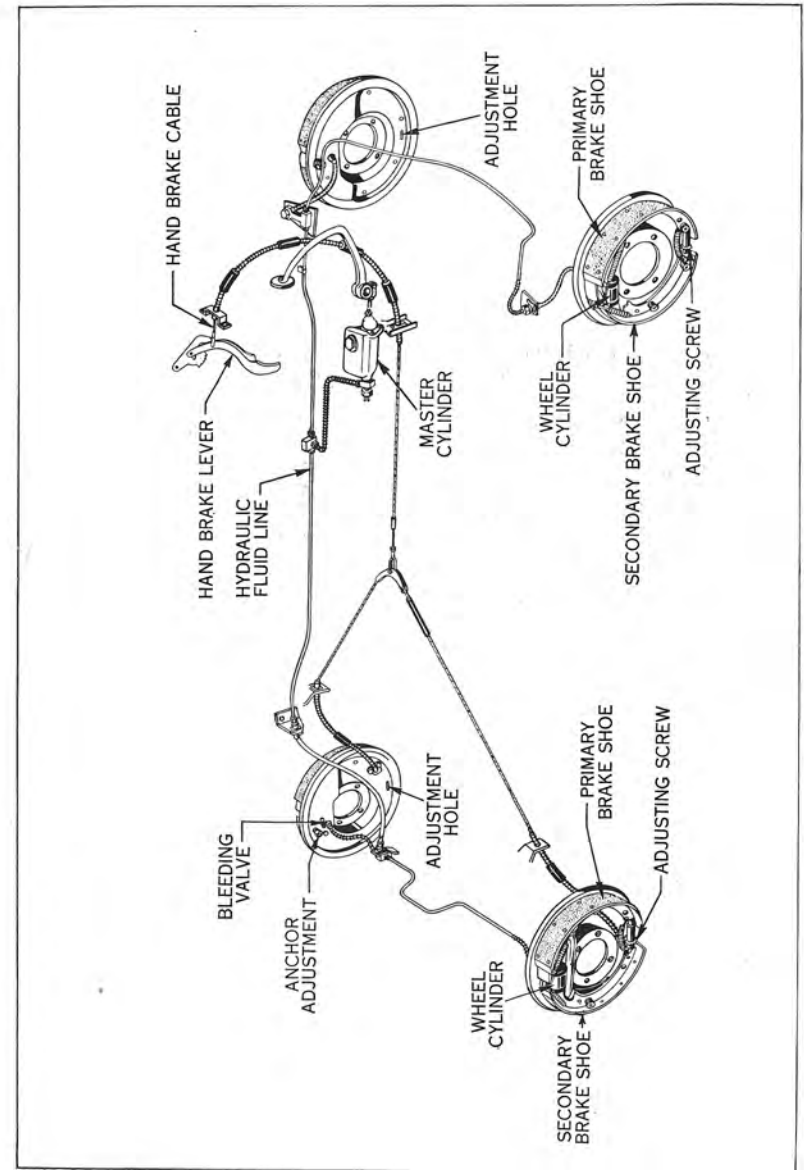


Fig. 17—Brake System

Make sure hand brake is in fully released position and then at *each wheel*. 1. Jack up until tire clears floor. 2. Remove cover from adjusting hole in brake backing plate (See Fig. 17). 3. Use a screw driver through adjusting hole to turn adjusting screw (See Fig. 16) downward until a brake drag is noted when the car wheel is turned by hand. 4. Back off adjusting wheel 14 notches. 5. Replace adjusting hole cover and lower wheel to floor.

Important—The master cylinder reservoir must be kept filled to within one quarter inch of the top with genuine Ford hydraulic brake fluid (See L in Fig. 12). Insufficient fluid in the reservoir will result in air getting into the system. This will cause the brakes to become “spongy” and ineffective, necessitating a “bleeding” operation by a Lincoln-Zephyr dealer.

STEERING GEAR

The steering gear is of the “hour glass” worm and roller type. Ratio is 18.4 to 1.

Adjustment for Wear

Adjustment is provided to take up end play in the main roller shaft. See Figure 18 for location of the adjustment screw, indicated above roller shaft needle bearings. Loosen lock nut and turn adjusting screw clockwise until the end play is compensated for, then tighten lock nut.

End play in the steering worm and the clearance between the worm and roller is controlled by shims. Adjustment at these points should not be required for many thousands of miles. It is recommended when they require adjustment, you consult a Lincoln-Zephyr dealer.

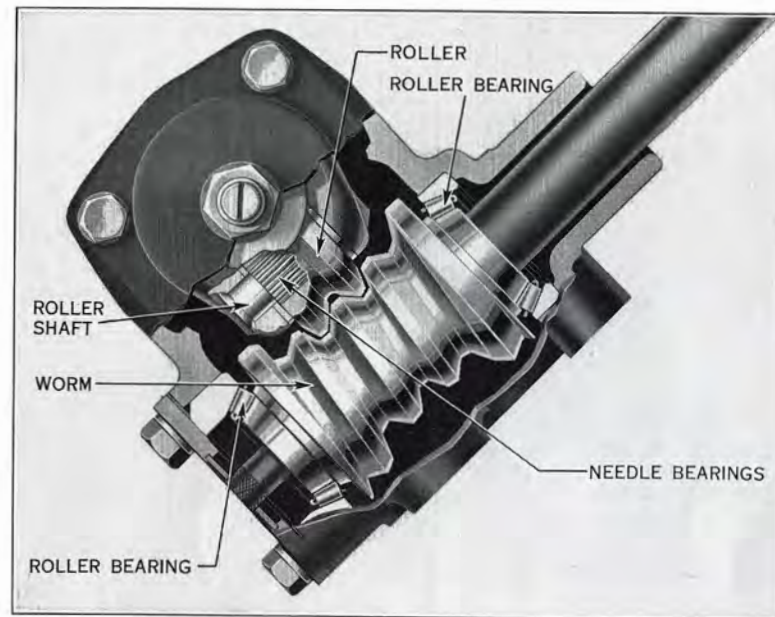


Fig. 18
Steering Gear Assembly

Lubrication

Add gear lubricant to level of filler plug every 1000 miles. See Fig. 18 for location of filler plug. Use gear oil, S. A. E. 90 in Winter. S. A. E. 140 in Summer.

ELECTRICAL EQUIPMENT

Battery

The battery is located on the forward side of the dash in the engine compartment. It is of the 6 volt type, using 17 plates and has a capacity of 120 ampere hours.

Every two weeks check the battery solution (electrolyte) to see that the level is maintained above the top of the plates. Add distilled water only and fill each cell to the top of the filler neck. When the filler caps are screwed in place the correct level of the solution will automatically take place—a feature of the Lincoln Zephyr battery.

During cold weather a battery loses some of its efficiency and the demands upon a battery becomes greater due to more energy required to crank the engine in cold weather.

The charge in the battery can be conserved by being cautious in the use of electrical equipment and special electrically operated accessories all of which draw on the battery.

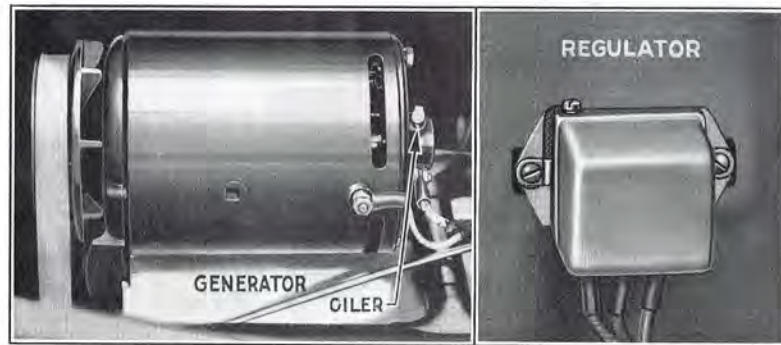


Fig. 19
Generator and Regulator

Generator

The generator delivers electrical energy for charging the storage battery which serves for operating the lights, ignition, horns, etc. A two brush type generator is used and output is automatically controlled by a regulator.

Cutout and Regulator

This unit (See Fig. 19) is mounted on the engine side of the dash. The cutout section is an automatic switch which closes the charging circuit between the generator and battery as soon as the generator supplies sufficient current to charge the battery and immediately opens this circuit when the generator is not charging so as to prevent the battery discharging back through the generator.

The regulator section of the unit is also automatic in its action and requires no attention. Output of the generator is controlled by the regulator to vary with the load, and condition of the battery.

Battery Gauge

The Battery gauge, located in the instrument group (See Fig. 1) is used in place of the conventional ammeter. This instrument shows the condition of the battery and generator circuit in the battery at all times. "L" on the dial indicates a "low" condition, "N" normal and "H" high.

With the ignition switch "ON" and the engine not operating, the indicator hand will reach a position close to the line just below the green sector if the battery is in good condition. The hand will slowly rise to the green sector as soon as the engine is started, which indicates the generator is charging.

The gauge hand will be in the green sector under normal operating conditions. If the hand falls below the green sector during normal engine operation, this indicates the battery is not fully charged. If the hand

goes above the green sector the cause will probably be traceable to improper operation of the regulator. If gauge readings are not normal, it is advisable to consult a Lincoln-Zephyr dealer.

Starting Motor

The starting motor is mounted to the flywheel housing and its power is transmitted to the engine through an automatic drive.

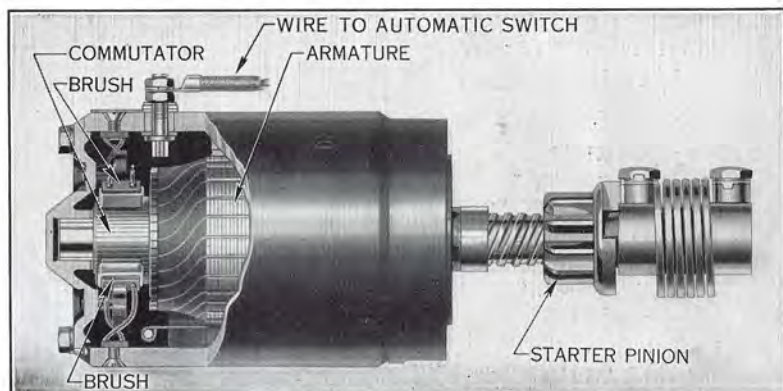


Fig. 20
Starting Motor

A magnetic type switch is located on the engine side of the dash. This switch closes the electrical circuit of the starting motor when the starter button on the instrument board is pressed.

Rotation of the starter motor shaft causes the pinion of the automatic drive to advance and mesh with the flywheel. After the engine starts, and the flywheel speed

exceeds that of the starting motor, the pinion releases from the flywheel automatically.

The starting motor bearings do not require lubrication.

Light Switch

The light switch control is located below the starter button on the instrument panel and the beam control switch is just below the brake and clutch pedals (See Fig. 21.)

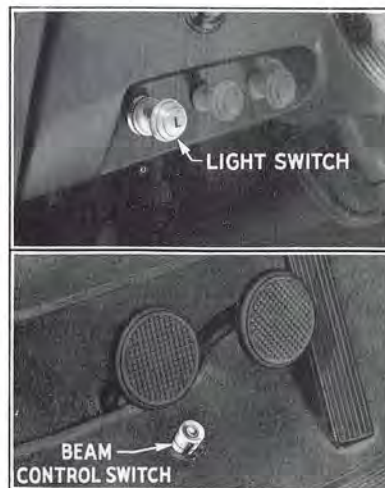


Fig. 21
Light Switch and Beam Control Switch

With the light control pushed all the way in, lights are disconnected. Pulling the control out to its first position connects the parking, tail lights, instrument lights and ignition lock light. Pulling the control all the way out to its definite stop connects the headlamps through the beam control switch on the toe-board and disconnects the parking lights. Pressing the beam control switch alternately lowers the headlamp beam for "traffic" driving, and raises the beam for "country" driving. A small red light appears at the top of the speedometer dial when beam is in the high position for "Country" driving. (See Fig. 1.)

A rheostat switch located under the instrument panel, controls the instrument lights independent of the other lights. (See Fig. 1.) Turning the knob of this switch permits the operator to dim or brighten the instrument lights as desired.

Circuit Breaker

The lighting system is protected by a circuit breaker located on the dash under the cowl.

The normal demand for current does not affect the circuit breaker, but in the event of an abnormally heavy demand for current, such as would be caused by an accidental short circuit or defect in any of the lighting circuits, the unit is affected causing the contacts to vibrate and intermittently cut off or interrupt the flow of current. This interruption will continue until the cause is removed or the light switch is turned off. The circuit breaker thus protects the switch and wiring from destruction, also the storage battery from being rapidly discharged. As soon as circuit overload is removed, the breaker automatically restores the normal circuit.

Headlamps

Headlamps are of the "Sealed Beam" type, in which the lamp, reflector and lens are one sealed unit. Because of the air tight feature of the sealed beam unit, the efficiency of the light remains practically unimpaired for its entire life. When the filament finally burns out, an entire new unit is used for replacement.

There are two filaments in each headlamp unit, one to provide a "country" or high beam for illuminating

the highway when no other vehicles are approaching, the other filament gives a "traffic" or low beam for use in cities or whenever vehicles are approaching. This "traffic" or low beam should always be used when meeting other cars to avoid the danger of dazzling light shining into the eyes of approaching drivers.

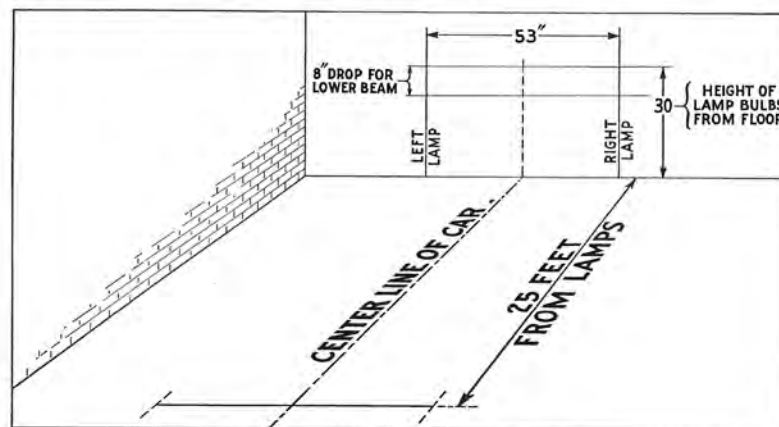


Fig. 22
Diagram for Headlamp Adjustment

Headlamp Renewal and Adjustment

To replace a headlamp unit, first remove outer rim by taking out screw at the bottom of the rim and lifting rim from top clip (See Fig. 23). Second, loosen the three retainer ring screws and turn ring to the left to release. Third, remove and replace headlamp unit, making sure plug connection is made to the new lamp before installing retainer ring in place.

Vertical and horizontal adjustment of the headlamps is controlled by adjustment screws shown in Fig. 23. These two adjustment screws allow the headlamp unit to be tilted up or down or to either side to conform with

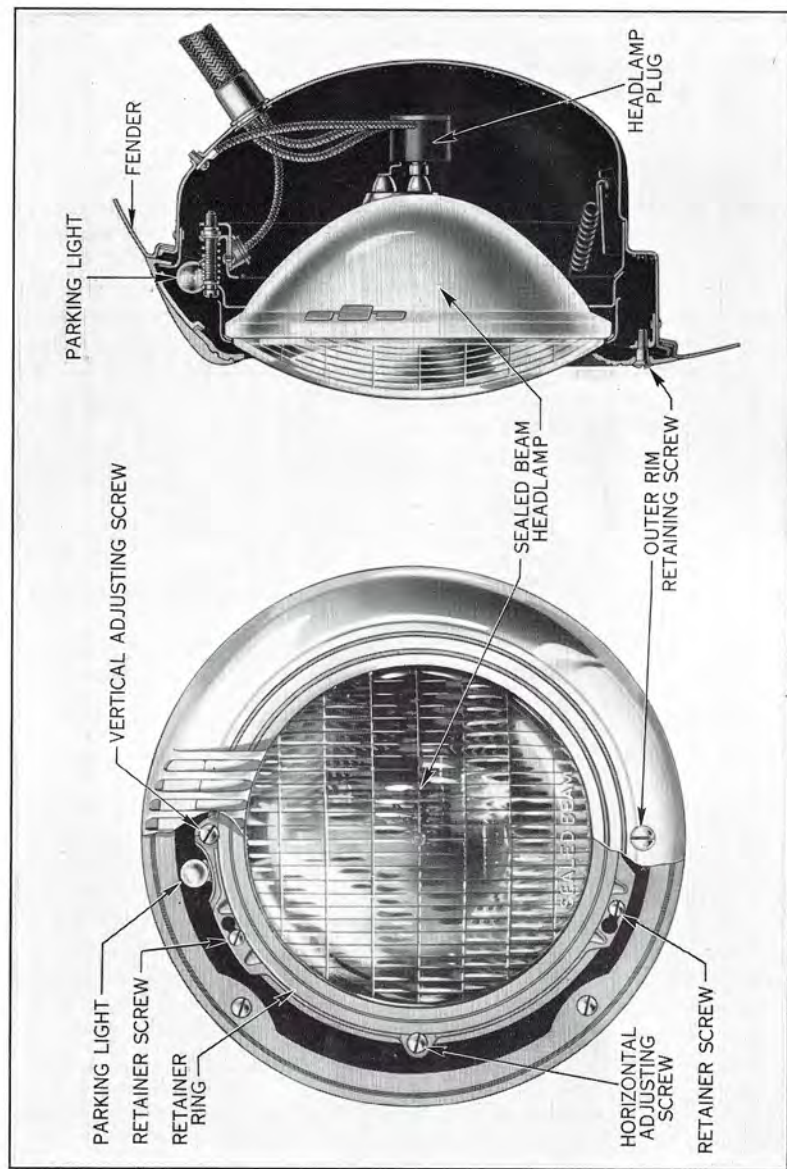
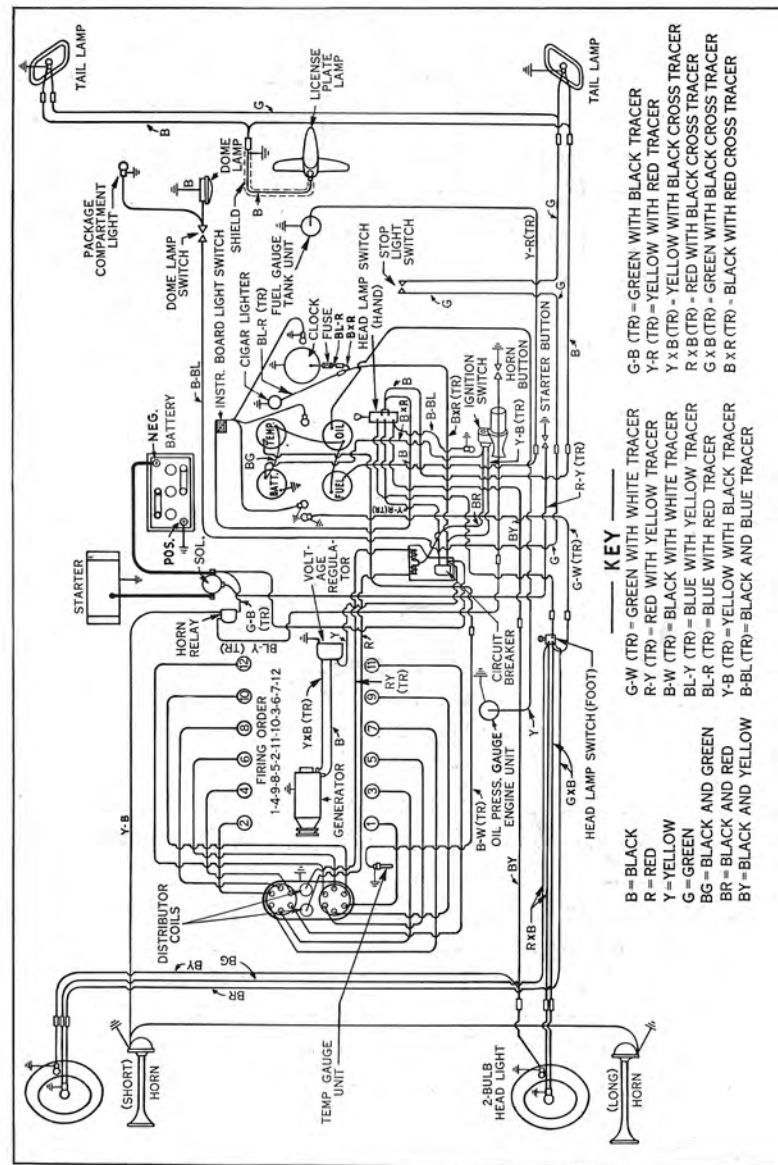


Fig. 23—Headlamps and Adjustments



the recommended setting as indicated in Fig. 22. As the adjustment screws are under the outer rim of the headlamp it is necessary to remove these rims to make the adjustment (See Fig. 23.)

BODY

Washing and Polishing.

To keep the baked enamel finish of your car in good condition, wash with plain water, using a sponge. Dry with a damp chamois.

When a "scum" develops on the finish which is not readily removed with plain water, use Zephyr or Lincoln cleaner and polish which are available from Lincoln-Zephyr and Ford dealers.

Automatic Top (Convertible Bodies)

The automatic top is operated by two vacuum cylinders, one in each side of the body. Vacuum from the engine to these cylinders is controlled by a valve located on the left side of the instrument panel. The following should be observed in the operation and care of the automatic top:

1. Do not raise or lower top when car is in motion.
2. Best operation will be obtained with engine running at slightly above idle speed.
3. When car is operated with top in lowered position for any length of time it is important that padded portion of top material be pulled out from between bows and slat irons to prevent pinching and chafing of the material.
4. If the top is lowered without installing the top boot, be sure the boot is not stored under the top as this may prevent the top from lowering to the locked position.

EQUIPMENT

Speedometer

A knob, located at the left side of instrument group under instrument panel, is for setting the trip mileage.

Clock

A knob for setting clock is located at the right side of the instrument group under the instrument panel. (See Fig. 1.) When the battery is disconnected for any reason, the clock becomes inoperative during the period of disconnection and should be correctly set after the battery is again connected.

A 3 ampere fuse, located in a housing in the wire leading to the clock, is provided for electrical protection.

Cigar Lighters

An "ejector type" cigar lighter is located on the instrument panel just below the clock. (See Fig. 1.)

The sedan, club coupe and convertible cabriolet also have similar lighters in the rear compartment.

Shock Absorbers

Shock absorbers are of the double acting hydraulic type and are adjustable for resistance. Every 5000 miles all instruments should be checked for sufficient fluid. The addition of this *special fluid*, and seasonal adjustment should be performed by a Lincoln-Zephyr dealer.

TIRES

Inflation

Improperly inflated tires will effect the riding qualities of your car and increase fuel consumption, also cause excessive tire wear.

The pressure recommended by the tire manufacturer is 28 pounds for both front and rear.

CHANGING TIRES

1. To Remove Top Bead

Deflate tube completely. Loosen both beads from rim ledges, using tire iron if necessary.



Fig. 25—Removing Top Bead

Stand on tire with feet about 15" apart opposite valve and force bead off bead seat into drop center part of rim. (See Fig. 25).

Caution—Care should be taken that the soft rubber tip on the inner edge of the tire bead is not damaged by tire iron, as such damage will have a tendency to

chafe the inner tube. It is advisable to coat the inside and outside of the tire beads with soft soap, which will assist in removing the bead over the edge of the rim and also protects the inner edge of the bead.

Insert the two tire irons about 8" apart between bead and rim flange near valve, and pry short length of bead over flange. (See Fig. 25.)

Leaving one tire iron in position, follow around rim with other iron to remove remainder of bead. Remove tube.

2. To Remove Bottom Bead

Stand wheel in upright position with bead in drop center part of the rim at bottom. Insert tire iron between bead and rim flange at top side of wheel, and pry wheel out of tire as shown in Fig. 26.



Fig. 26—Removing Bottom Bead

3. To Mount Tire with Wheel on Floor

Inflate tube until barely rounded out and insert in casing. See that balancing mark on casing is opposite valve stem. Before mounting tire casing use soft soap on tire beads. Place tire on rim, guiding valve through valve hole.

4. To Apply Bottom Bead

Push bottom bead down into drop center part of the rim at valve and force remaining portion of bead over rim flange.



Fig. 27—Applying Bottom Bead

A tire iron may be needed to pry the last portion of bead over the flange. (See Fig. 27).



Fig. 28—Applying Top Bead

5. To Apply Top Bead

At point on opposite side of wheel from valve insert tire iron between top bead and rim flange, prying bead over rim flange. Holding this iron in position continue prying with other iron, working around rim until bead is in place. (See Fig. 28).

Inflate slowly and see that tire is centered on rim on both sides. This "centering" may be done by bouncing tire after approximately 15 pounds of air pressure has been added. Finish inflating.

Caution: When mounting either of the front wheels on the car, it is advisable to have another individual apply the foot brake so the brake drum will be held in position. This will permit easier mounting

over the studs in the drum. One of the studs is longer than the others and has a tapered end. This stud should be at the top of the drum when mounting the wheel so it can be used to guide the wheel over the other studs.

Car Jack

Figure 29 shows the locations, front and rear, for placing the car jack when raising a wheel, also position of the handle in the jack for raising and lowering. When lowering car press jack handle down GENTLY. The amount of pressure exerted controls the speed of lowering.

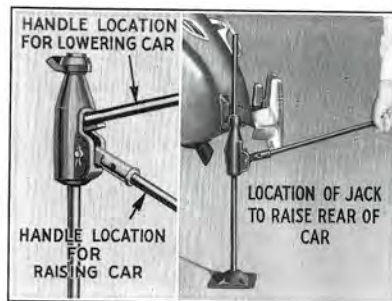
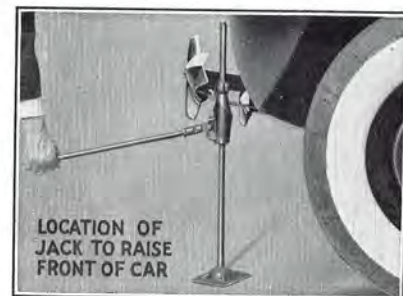


Fig. 29—Car Jack

Rear Fender Shield

To remove rear fender shield turn latch nut one quarter turn in direction of arrow. (See Fig. 30).

The wheel nut wrench provided in the tool kit is adaptable for operating the fender shield latch nut.

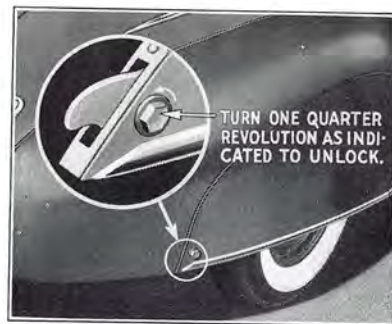


Fig. 30—Rear Fender Shield

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