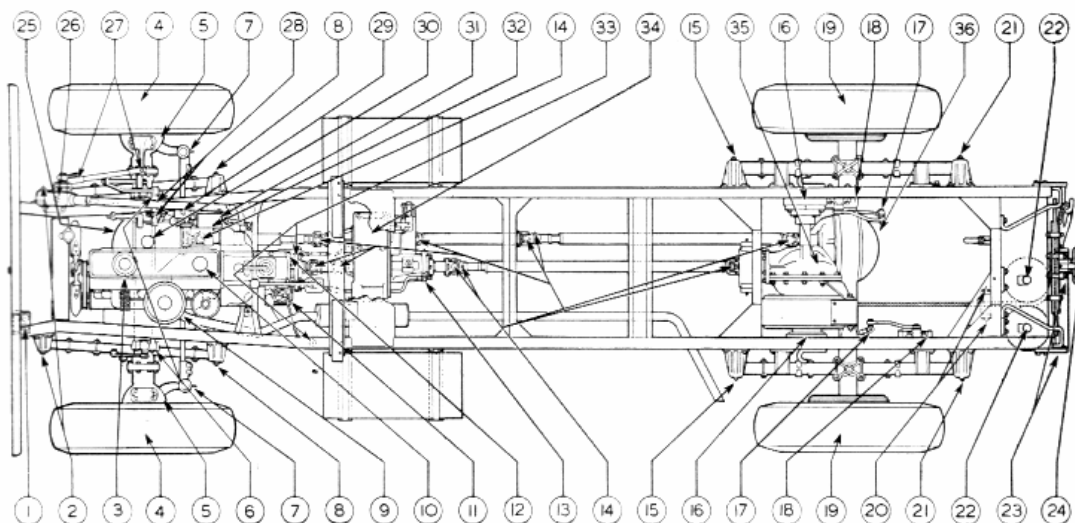


# LUBRICATION POINTS

(ALL 4 x 4 MODELS)



- |  |   |
|--|---|
| 1. Winch Cable Front Fairlead Rollers                    | 19. Rear Wheel Bearings   |
| 2. Front Spring Pins                                     | 20. Winch Cable Guide Roller  |
| 3. Crankcase Ventilator Air Cleaner                      | 21. Rear Spring Shackle Pins  |
| 4. Front Wheel Bearings                                  | 22. Winch Cable Sheaves   |
| 5. Front Axle Universal Joints                           | 23. Winch Cable Rear Fairlead Rollers                                   |
| 6. Front Shock Absorbers                                 | 24. Towing Attachment   |
| 7. Steering Tie Rod                                      | 25. Front Differential  |
| 8. Front Spring Shackle Pins                             | 26. Steering Gear   |
| 9. Carburetor Air Cleaner                                | 27. Steering Connecting Rod   |
| 10. Engine Oil Filler Cap                                | 28. Clutch and Brake Pedal Shaft  |
| 11. Tire Pump  | 29. Brake Master Cylinder   |
| 12. Transmission   | 30. Distributor   |
| 13. Power Take-Off Rear Linkage Fitting                  | 31. Brake Power Cylinder  |
| 14. Propeller Shaft Universal Joints and Sliding Splines | 32. Starter   |
| 15. Rear Spring Front Pins                               | 33. Front Axle Declutch Shaft and Winch Cable Intermediate Guide Roller |
| 16. Winch End Shaft Bearings                             | 34. Transfer Case   |
| * 17. Rear Shock Absorber Links                          | 35. Winch Housing   |
| 18. Rear Shock Absorbers                                 | 36. Rear Differential   |

\* No Lubrication Required.

## LUBRICATION—C - 8 **LUBRICATION TABLE**

Lubrication Diagram Reference Number

C-15	All 4x4	Description	Lubricant	Application	Period
9	10	Crankcase	ENGINE	(a) Maintain level. (b) Change oil.	Daily 2000 miles
2	9	Air Cleaner		Clean and refill.	2000 miles
24	32	Starting Motor		2 or 3 drops	1000 miles
	11	Tire Pump		Maintain level.	1000 miles
7	3	Crankcase Ventilator Air Cleaner		Clean and refill.	2000 miles
	31	Brake Booster Cylinder		Add 2 ozs.	5000 miles
		Accelerator Linkage		Few drops.	1000 miles
		Control Linkage		Few drops.	1000 miles
		Brake Power Lever Joints		Few drops.	1000 miles
23	30	Distributor Wick		Few drops.	5000 miles
10	12	Transmission	GEAR	(a) Check and maintain level. (b) Flush and refill.	1000 miles 5000 miles
16	25, 36	Differentials		(a) Fill to level. (b) Drain and refill.	1000 miles 5000 miles
19	26	Steering Gear		Check and maintain level.	1000 miles
	34	Transfer Case		(a) Check and maintain level. (b) Drain and refill.	1000 miles 5000 miles
	35	Winch Housing	OIL	(a) Check and maintain level. (b) Drain and refill.	1000 miles 5000 miles
1, 4, 6, 8, 11, 13, 17, 18, 20, 21	1, 2, 7, 8, 13, 14, 15, 16, 20, 21, 22, 23, 24, 27, 28, 33	Chassis Fittings		CHASSIS LUBRICANT	Pressure gun.
5	4	Front Wheel Bearings	GREASE	Clean and repack.	5000 miles
15	19	Rear Wheel Bearings		Clean and repack. All 4x4. Repack only on overhaul C-15.	5000 miles
	5	Front Axle Universal Joints		Remove pipe plug and fill housing. Clean and repack	1000 miles 5000 miles
12		Hand Brake Cables		Pressure gun.	5000 miles
23	30	Distributor Cup		Fill cup and turn down 1 turn.	1000 miles
22	29	Brake Master Cylinder		BRAKE FLUID	Check and maintain level.
3	6	Front Shock Absorbers	SHOCK ABSORBER FLUID	Check and maintain level.	5000 miles
14	18	Rear Shock Absorbers		Check and maintain level.	5000 miles
23	30	Distributor Cam	PETROLEUM JELLY	Add trace.	1000 miles

## LUBRICANT SPECIFICATION GUIDE

The exact lubricant to use will be specified in Army instructions. The following table indicates the lubricants normally specified for vehicles operating under all conditions except extreme Tropical or Arctic, special instructions for which are given on page C-9.

General Type	Temperature Range	Specification		
		British W.D.	C.A.O.	D.N.D. (Canada)
Engine Oil	Above 32° F.	30 H.D.	30 H.D.	365
	32° F. to +10° F.	30 H.D. or 10 H.D.	30 H.D. or 10 H.D.	345
	Down to -10° F.	10 H.D.	10 H.D.	345
Chassis Lubricant	Above 32° F.	C-600	Grease No. 1	672
	32° F. to +10° F.	C-600	Grease No. 1	670
	Down to -10° F.	Grease No. 0	Grease No. 0	670
Gear Oil	Above 0° F.	Hypoid 90	Hypoid 90	390
	Down to -25° F.	Hypoid 80	Hypoid 80	360
Grease (Wheel bearings, etc.)	70° F. to -25° F.	Grease No. 2	Grease No. 2	672
Brake Fluid	Above 0° F.	Br. Fl. No. 3	Br. Fl. No. 3	510
	Below 0° F.	Br. Fl. "X"	Br. Fl. "X"	510
Shock Absorber Fluid (Light)	Above 0° F.	Br. Fl. No. 3	CS 1117A	38
	Below 0° F.	Br. Fl. "X"	CS 1117A	38

# Section C

## LUBRICATION

The Lubricants shown in this section are those specified by the manufacturer for use in the various units. The Lubricants specified by The Department of Munitions and Supply for use in the various units, are covered in the Lubrication Chart on Page C-7.

One of the most vital factors in the performance and durability of any machine is its lubrication. Therefore, it is urged that drivers and mechanics exercise care in the application of lubricants and engine oils for these vehicles.

The application of the right lubricant in the right place and at the right time will greatly reduce the possibility of failure of parts, especially at critical moments. Don't forget that your life may depend on proper lubricants. It is essential first, that the right lubricants be selected; secondly, that the lubricant be applied at regular intervals, and thirdly, that the lubricant be applied at the right place.

The lubricants used on these vehicles are specified in detail in the following paragraphs. No substitute lubricant should be used unless authorized by a reliable source.

Specifications shown are general specifications as to body and ingredients. No effort has been made to recommend or describe any particular brand of lubricant. High quality, well refined oils and properly compounded lubricants are essential.

### The Right Time

Intervals at which various points on the chassis should receive attention are indicated in the chart on Page C-7. Intervals are based upon actual experience and tests, as well as careful consideration of the design and purpose of the parts to be lubricated.

### The Right Place

Lubrication fittings or accessible lubrication points have been incorporated on all mechanical units of this vehicle.

### Oil Gauge

When starting a cold engine, it will be noted that the oil gauge on the instrument panel will register a high oil pressure. As the engine warms up, the pressure will drop until it reaches a point where changes to higher speeds will raise the pressure very little, if at all.

If the oil pressure registers abnormally high after the engine is thoroughly warmed up, an inspection should be made to ascertain if the oil lines and passages are "plugged."

### ENGINE OILS

Engine oils of the highest quality should be used. The oils available vary in lubricating qualities and in stability. A highly refined petroleum oil containing adequate amounts of suitable additives, such as oxidation inhibitors, is essential for satisfactory performance in heavy duty service.

In cold weather operation, if the vehicle is not stored in a heated garage, starting the engine may prove to be a serious problem when heavier oils other than indicated on the chart are used. The use of light oils, particularly at such times, will not only lessen cold weather starting difficulties; but will result in fuel economy and longer engine life.

Aside from the general requirements of high quality and suitability for the engine, the oil used should be highly resistant to formation of sludge varnish or any insoluble substance during operation and remain, during use, non-corrosive to the copper or bronze parts and to all other metals in the engine.

### Engine Oil Level

It is necessary that the quantity of oil in the system be kept within the specified limits; and since a certain amount of oil is used up in the proper operation of the engine, the supply must be replenished from time to time; (this requirement is in addition to periodic changing of the oil). The amount of oil used will depend greatly, among other things, on the speed at which the vehicle is driven.

For convenience in maintaining the proper level, a depth gauge is provided on the engine. Access to the depth gauge is obtained by raising the flaps of the engine hood on the right side. Readings of the gauge should be taken frequently—(a convenient time being when filling up with fuel)—and oil of the correct grade added as necessary to maintain the oil level within the safe driving range marks on the gauge. To take a reading, the engine should be stopped long enough to allow all oil to drain back into the oil pan. Remove the oil depth gauge, and wipe the oil from the gauge, then re-insert the gauge to its full depth and take the



Fig. 1—Oil Depth Gauge

reading. It is not necessary for the oil level to be always at the "high" or "full" mark, but it should never be allowed to go below the "low", or "danger" mark, Fig. 1.

Oil should be added while the engine is hot.

### Changing Engine Oil

For the first 500 miles, it is recommended that the oil placed in the crankcase by the Factory or Assembly Plant be used.

Oil should be changed at the first 500 miles and again at 1500 miles. After that the oil change mileage-periods depend largely upon the type of service in which the vehicle is employed. **It is necessary to change oil whenever it becomes contaminated with harmful foreign materials.** Under favourable driving conditions on paved highways, draining the crankcase and replacing with fresh oil every 2,000 miles is recommended. Under the adverse driving conditions described in the following paragraphs, it may become necessary to drain the crankcase oil more frequently.

It is always advisable to let the engine reach normal operating temperature before draining the crankcase. The benefit of draining is, to a large extent, lost if the crankcase is drained when the engine is cold as some of the suspended foreign material will cling to the sides of the oil pan and will not drain out readily with the slower moving oil.

When the engine oil is changed at the same time as the oil filter element is replaced, it is necessary to use five and one half (5½) quarts of oil for the crankcase oil refill in order to have the oil up to the "full" mark on the oil level gauge after the filter has become filled and the element saturated.

### Dust

Driving over dusty roads, cross country, or through dust storms introduces abrasive material into the engine. Air cleaners decrease the amount of dust that may enter the crankcase; however, if the oil becomes contaminated, it should be drained promptly to prevent harmful engine wear. The frequency of draining depends upon the severity of the dust conditions and no definite draining periods can be recommended.

### Condensation

Short runs in cold weather, do not permit the thorough warming up of the engine and water may accumulate in the crankcase from condensation of the moisture produced by the burning of the fuel. Water in the crankcase, may freeze and interfere with proper oil circulation. It also promotes rusting and may cause clogging of oil screens and passages. Under normal driving conditions this water is removed by the crankcase ventilating system but if water accumulates it should be removed by draining the crankcase as frequently as may be required.

### Dilution

Crankcase dilution may necessitate the changing of the crankcase oil. By crankcase dilution is meant a thinning of the oil as a result of certain

portions of the gasoline leaking by the pistons and mixing with the oil.

The causes of dilution in most cases can be traced directly to the excessive use of manually operated chokes and sometimes to the fuel characteristics. Practically all motor fuels contain portions which are slow burning and hard to ignite. The thinning of the motor oil is due to unburned fuel vapor which, in coming in contact with the cool walls in the crankcase, condenses and is mixed with the oil, thus reducing the "body" of the oil.

Modern crankcase ventilating systems have greatly reduced the danger of excessive dilution. Under certain unfavorable conditions, however, such as short runs in cold weather, some dilution may occur and it is, therefore, recommended that under such conditions oil be changed more frequently, especially during the colder months.

### Thickening of Oil

During the winter months light or low viscosity oils are required to obtain easy starting. Therefore, at the beginning of the winter season the crankcase should be drained and refilled with oil of the proper viscosity for Winter use. With continuous high engine speeds, these light oils may thicken and cause starting trouble. More frequent oil changes may, therefore, be required during the Winter months, and a drainage period of 2,000 miles for vehicles subjected to high speed driving conditions may be desirable, but under very severe conditions more frequent draining may be required to prevent starting troubles due to thickened oil.

### Corrosion

Practically all present-day engine fuel contains a small amount of sulphur which, in the state in which it is found, is harmless; but this sulphur on burning, forms certain gases, a small portion of which is likely to leak past the pistons and rings and reacting with water, when present in the crankcase, form very corrosive acids. The more sulphur in the fuel, the greater the danger from this type of corrosion. This is a condition which we cannot wholly avoid, but it may be reduced to a minimum by proper care of the engine.

As long as the gases and the internal walls of the crankcase are hot enough to keep water vapor from condensing, no harm will result; but when an engine is run in low temperatures, moisture will collect and unite with the gases formed by combustion; thus, acid will be formed and is likely to cause serious etching or pitting. This etching, pitting or corrosion, when using fuel containing considerable sulphur, manifests itself in excessively rapid wear on piston pins, camshaft bearings and other moving parts of the engine.

### Temperature Range

During the colder months of the year, an oil that will permit easy starting, at the lowest atmospheric temperature which is likely to be encountered, should be used.

When the crankcase is drained and re-filled, the oil should be selected, not on the basis of the existing atmospheric temperature at the time of

change, but on the anticipated minimum temperature for the period during which the oil is to be used. Unless the crankcase oil is selected on the basis of the viscosity or fluidity at the anticipated minimum temperature, difficulty in starting will be experienced with each sudden drop in temperature.

The viscosity grade of crankcase oil will, therefore, depend upon the climatic conditions under which the vehicle will be operated. The grades best suited for use at the various temperatures, are shown in the following table:

If you anticipate that the minimum atmospheric temperature will be:	Use the grade indicated below:
As low as +10° F. ....	S.A.E. 20 or 20-W (Satisfactory for year round use in England.)
As low as -10° F. ....	S.A.E. 10 or 10-W
Below -10° F. ....	10-W plus 10% Kerosene

S.A.E. 30 may be used where temperatures run consistently above 90° F. or for consistent high speed operations where oil economy may otherwise be affected.

### TRANSMISSION LUBRICATION

Keep the transmission case filled to the level of the filler plug hole.

Do not fail to change from Summer grade of lubricant to the Winter grade when cold weather approaches. Failure to change the lubricant may result in hard shifting and abnormal wear.

Transmission lubricants thicken considerably after use, due to oxidation and chemical reaction resulting from normal service conditions. This thickening seriously impairs their lubricating qualities and if neglected will finally result in semi-solids which will adhere to the sides of the case and afford no lubrication whatever. It is essential, therefore, that in addition to checking the level of the lubricant, its condition also should be considered and if there is evidence of thickening, the transmission should be drained, thoroughly flushed and refilled with fresh lubricant.

When the lubricant changes are made, wash out the transmission with a light oil to remove foreign substances, such as grit or dirt. To do this, remove the drain plug at the bottom of the transmission case, and allow the oil to drain off, after which flush out the case thoroughly and refill with extreme pressure gear oil as recommended. When the lubricant is drained, the transmission should be warm so that its contents will drain freely.

It may be found necessary and desirable to drain the transmission in vehicles subject to severe service more frequently than seasonally.

In addition to seasonal changes, drain, flush and re-fill the transmission at least every 5,000 miles or sooner if inspection indicates necessity.

The recommended grades of transmission lubricants are as follows:—

#### Summer and Mild Winter

(Down to 0° F.).....	Use S.A.E. 90* E.P. (Satisfactory for year round use in England.) (G.M. Spec. 4645M)
Winter (down to -20° F.).....	Use S.A.E. 80 E.P. (G.M. Spec. 27855R)

\*The grade to be used depends largely on the service to which the transmission is subjected. Under high heat, where temperature is consistently above 90° F., and heavy loads, S.A.E. 140 should be used, but it should be changed to a lighter grade when the temperature falls below +32° F.

### TRANSFER CASE LUBRICATION

The general remarks made under the heading of "Transmission Lubrication" are equally applicable to the transfer case.

The transfer case used on this vehicle has one filler plug and should be filled with lubricant to the level of the filler plug hole. Refer to general data section "U" at the rear of this manual for transfer case capacities.

When the transfer case or power take-off has been removed or overhauled, it is IMPORTANT to pour half a pint of oil through the power take-off pipe plug hole before initial running in of the transfer case to insure lubrication of the pinion bearings.

Due to the high operating temperature of the transfer case, the lubricant required is a highly refined (Bright Stock) Petroleum oil

For Summer use (down to +32° F.).....	S.A.E. 140 (G.M. Spec. 27817R)
For Winter use (down to 0° F.).....	S.A.E. 90 (G.M. Spec. 27818R)
For temperatures below 0° F. add	10% Kerosene.

### DIFFERENTIAL LUBRICATION

#### Front and Rear Axles

The lubricant should be checked periodically and kept to the level of the filler plug hole. If at such inspection periods the lubricant shows any evidence of thickening, it should be drained off and the axle flushed out with light oil and re-filled with the correct type and grade of lubricant.

Do not use water, steam, gasoline or alcohol to flush out the differential. Drain the axle while warm so that the lubricant will flow readily and the drainage will be complete.

It is recommended that the housing be drained and refilled every 5,000 miles. Also the grade of lubricant should be changed in accordance with the table on page C-7.

An important point to observe in lubricating differentials is that the lubricant which is added is the same kind as that already in the unit. If the same kind of lubricant is not available, the axle should be drained and flushed out with light oil to remove any traces of the lubricant previously used.

The recommended grades of differential lubricants are as follows:

Summer and mild Winter—	
(Down to 0° F.) use.....	S.A.E. 90* (G.M. Spec. 4655M)
(Satisfactory for year round use in England.)	
Winter (down to -20° F.) use.....	S.A.E. 80 (G.M. Spec. 4654M)
Below -20° F. ....	Add 10% Kerosene

\*The grade to be used depends largely on the service to which the vehicle is subjected. Under

high heat, where temperature is considerably above 90° F., and heavy loads, S.A.E. 140 should be used, but it should be changed to a lighter grade when the temperature falls below +32° F.)

#### WINCH LUBRICATION

On vehicles equipped with Winch, keep unit filled to level of the filler plug. Use the same lubricant and make the same seasonal changes as specified for Rear Axles. Capacity 6 pints.

#### FRONT AXLE UNIVERSAL JOINTS

(All 4 x 4 Vehicles)

The front axle universal joints should be filled with front axle universal joint lubricant E.P., G.M. specification G.M. 27967R. The filler plug is under the universal joint housing.

This is an all weather E.P. lubricant and does not require seasonal changing.

#### FRONT WHEEL BEARING LUBRICATION

It is necessary to remove the wheels and hubs to lubricate the bearings on the front wheels at the periods specified on the lubrication chart. See page C-7.

In mounting the wheels, great care must be taken to properly adjust the bearings. It is an operation that requires mechanical skill and is described in section F under the title "Wheel Bearing Adjustment."

The bearing assemblies should be cleaned and packed with the correct lubricant.

Use front axle universal joint lubricant E.P., G.M. specification G.M. 27967R.

This lubricant does not require to be changed seasonally.

Do not pack the hub between the inner and outer bearing assemblies with grease as this excessive lubrication would result in the grease working out into the brake drums and on to the linings.

The cleaning of the inner bearing of the front hub necessitates disassembly of the steering end assembly. It is, therefore, recommended that a supply of lubricant be placed in the housing as close to the bearing as possible so that the installation of the hub will force the lubricant into the bearing. The outer bearing may be readily removed for cleaning.

#### REAR WHEEL BEARING LUBRICATION

Pack with wheel bearing grease, G.M. 379888, at intervals specified on lubrication chart. The correct procedure is the same as that required for front wheels.

This lubricant does not need to be changed seasonally.

#### STEERING GEAR LUBRICATION

Keep the lubricant up to the level of the filler plug hole.

Over-lubrication of this unit might result in forcing lubricant up the steering gear tube to the horn button and steering wheel.

Use petroleum gear oil G.M. 4567-M of the same grade seasonally.

#### CARBURETOR LUBRICATION

The countershaft that operates the accelerating pump should be lubricated at least every 5,000 miles. To do so, remove the screw attaching the dust cover and fill the threaded hole with graphite grease.

#### GENERATOR LUBRICATION

Lubricate periodically with 4 or 6 drops only of engine oil in oil cups.

#### STARTING MOTOR LUBRICATION

Lubricate periodically with 2 or 3 drops only of engine oil in oil cup.

#### DISTRIBUTOR LUBRICATION

Fill the grease cup with a soft, smooth cup grease and turn down periodically. At every 5,000 miles apply a **very small** amount of Petroleum Jelly to the cam. Be careful not to over-lubricate as otherwise the contact points may be affected.

#### AIR CLEANER SERVICING

Servicing of the air cleaner is an important operation and must be performed at regular intervals, depending on the type of cleaner and the conditions under which the vehicle is operating.

The periods at which servicing should be carried out can only be learned from experience. For very extreme conditions, such as continuous operation on gravel roads in heavy traffic, etc., once a day is often necessary—never longer than twice a week. For other conditions, experience will govern the proper cleaning periods, but a check should be made regularly when operating under ordinary transport conditions. For complete service operation see section Q, Page 11.

When servicing, use oil as recommended S.A.E. 50 (G.M. 4506M) when the temperature is above 32° F., and 20-W (G.M. 27980-R) when the temperature is below 32° F.

#### "OIL WETTED" TYPE AIR CLEANER

The "Oil Wetted" type of cleaner or breather in the valve rocker arm cover on vehicles equipped with crankcase ventilation system requires frequent cleaning. For operation on dirt roads, where dust conditions are extremely severe, service the "oil wetted" type breather daily. Under moderate dust conditions, service the breather every other day, according to the instructions given on Page K-4.

#### SHOCK ABSORBER LINKAGE LUBRICATION

The rear shock absorber linkage is equipped with pressure fittings. The linkage should be lubricated at regular intervals with chassis lubricant.

#### HYDRAULIC BRAKE FLUID

Check the level of the fluid in the master cylinder every 1,000 miles.

Great care must be taken to see that only the correct fluid is used. Otherwise the rubber parts may be affected with resultant brake failure. If brake fluid is obtained elsewhere than from Ordnance Stores, be sure to use only G.M. Brake Fluid, Lockheed No. 21, or Delco Super No. 9.

It is not necessary to change any of the above brake fluids seasonally.

Pay great attention to cleanliness when filling the brake system as a minute particle of foreign material may cause inoperative brakes.

#### **DRIVE SHAFT UNIVERSAL JOINT LUBRICATION**

These vehicles are provided with universal joints at both ends of the propellor shafts. Both are lubricated by pressure gun fittings.

Use the same lubricant as that specified for the transmission.

#### **CAB LUBRICATION**

All hinges, operating levers, door locks and door lock striker plates should be given a few drops of light engine oil at intervals of 1,000 miles. Work the levers, hinges or locks at the same time as the lubricant is applied to make certain that the lubricant reaches the moving parts. Lubricate the seat track with cup grease.

### **PERMANENT LUBRICATED PARTS**

#### **WATER PUMP LUBRICATION**

The water pump bearing is of the sealed type and is packed with a high temperature lubricant which makes further lubrication unnecessary.

#### **CLUTCH THROWOUT BEARING**

The clutch throwout bearing is packed with lubricant at the time of assembly and requires no further attention. Upon removal for clutch overhaul, however, the recess in the throwout bearing collar should be cleaned and repacked with a high-melting-point lubricant.

#### **CLUTCH PILOT BEARING**

No lubrication of the clutch pilot bearing is necessary unless the clutch is being overhauled, at which time it should be removed from the crankshaft, cleaned, inspected and repacked with a small amount of high-melting point lubricant.