



How To Use This Book

This book is written to help the Land Cruiser owner in performing maintenance, tune-ups and repairs on his vehicle. It will be helpful to both the amateur and experienced mechanic. Information on simple operations and more complex ones is given, allowing the user to try procedures he or she feels confident in doing and graduating to the more difficult tasks as more experience is gained.

In addition to this book a willingness to do your own work and the time to do it right, there are a few other items you will have to be aware of and that you will need. A basic but complete set of metric hand tools is a must. For many repair operations the factory recommends special tools be used. A conventional tool can be substituted for the special tool in a lot of cases. For those operations requiring a special tool for which no substitution can be made, this fact is called to your attention in the text. Remember that whenever the left-side of the vehicle is referred to, it is the driver's side of the vehicle and vice versa. Also, most screws and bolts

are removed by turning them counterclockwise and tightened by turning them clockwise. Left-handed threads (the opposite of above) will be brought to your attention in the text.

Before you start any project, read the entire section in the book which deals with the particular job you wish to perform. Many times a description of the system and its operation is given. This will enable you to understand the function of the system you will be working on and what must be done to fix it. Reading the procedures beforehand will help you to avoid problems and to learn about your Land Cruiser while you are working on it.

The more you work on your Cruiser and the more experienced you become, you will gain more confidence and appreciate this Repair and Tune-Up Guide.

History

In 1933, the Toyoda Automatic Loom Works started an automobile division. Several models, mostly experimental, were produced between 1935 and 1937.

Automobile production started on a large scale in 1937 when the Toyota Motor Co. Ltd. was founded. The name for the automobile company was changed from the family name, Toyoda to Toyota, because a numerologist suggested that this would be a more auspicious name to use for this endeavor. It must have been; by 1947, Toyota had produced 100,000 vehicles. Today Toyota is Japan's largest producer of motor vehicles and ranks third largest in world production.

It was not until the late 1950s, that Toyota began exporting cars to the United States. Public reception of the "Toyopet" was rather cool. The car was heavy and under-powered by U.S. standards. Several other models were exported, including the almost indestructible Land Cruiser.



Model FJ 55

longer wheelbase station wagon (FJ45 and FJ55). All of the vehicles are equipped with the F series 6 cylinder engine and a 3SM-2T (3-speed manual with a 2-speed transfer case) transmission until 1974, when a 4-speed transmission became available. The FJ55 was introduced in 1968.

Model Identification

The Land Cruiser has not changed appreciably since it was first imported to the U.S. Two types of Land Cruisers have been available; the short wheelbase standard version (FJ40) and the



Model FJ 40



Model FJ 45

Serial Number Identification

VEHICLE

All models have the vehicle identification number (VIN) stamped on a plate which is attached to the left-side of the instrument panel. This plate is visible through the windshield.

The VIN is also stamped on a plate in the engine compartment which is located on the firewall.

The serial number consists of a series identification number (see the chart below) followed by a six-digit production number.

Vehicle Identification Chart

Year	Model	Serial Number			
1966	FJ40	42101	to	46995	
	FJ45	25752	to	29201	
1967	FJ40	47196	to	53446	
	FJ45	29613	to	32983	
	FJ55	10186	to	10225	
1968	FJ40	54280	to	63799	
	FJ45	33339	to	37100	
	FJ55	10262	to	12049	

Vehicle Identification Chart (cont.)

Year	Model	Serial Number	
1969	FJ40	64779	to 76770
	FJ55	12354	to 15613
1970	FJ40	77994	to 93647
	FJ55	15891	to 19603
1971	FJ40	95342	to 117498
	FJ55	19966	to 25366
1972	FJ40	119431	to 140218
	FJ55	26025	to 31365
1973	FJ40	141656	to 152743
	FJ55	31865	to 35211
1974	FJ40	Starts with 160001	
	FJ55	Starts with 37001	

ENGINE

The engine serial number consists of an engine series identification number, followed by a 6 digit production number. The serial number on the Land Cruiser FA 6 cylinder engine is located on the front right-side of the engine.

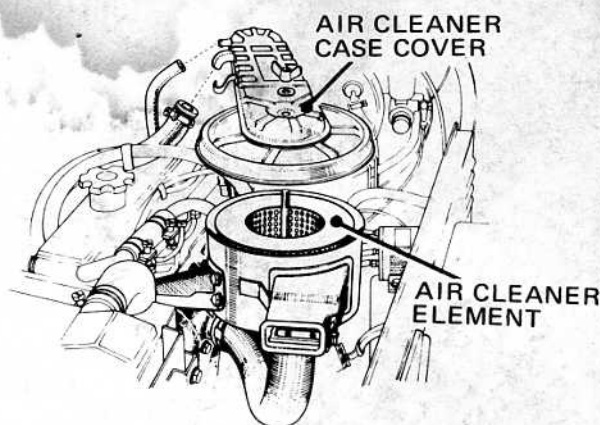
Routine Maintenance

AIR CLEANER

The standard air cleaner on the Land Cruiser F engine is a dry element, disposable type. An oil bath air cleaner is available as an option.

DRY ELEMENT TYPE

Clean the dry element type air cleaner every 3,000 miles or more often under dusty conditions, by using low pressure compressed air. Direct the air in the opposite direction of the normal flow (from the inside out). Be careful not to use high pressure air to clean the paper element as damage may result, requiring



Removal of the top of the air cleaner assembly in order to change the filter element

the replacement of the element. Replace the element every 20,000 miles or more often in dusty areas. Never wash a paper air filter or coat it with oil. If the element should become soiled in any way or get wet, replace it as soon as possible.

OIL BATH TYPE

Clean the element and replace the oil in the oil bath type air cleaner every 3,000 miles or sooner in dusty areas.

Remove the air cleaner assembly from the vehicle and disassemble the various parts. Remove any rubber or plastic hoses that are connected to the air cleaner. Remove the oil from the oil cup and scrape out all the dirt inside and the bottom. Wash the cup with a safe solvent, such as kerosene. Refill the oil cup to the level mark with the same weight (SAE) oil as is being used in the engine at that particular time. If it is cold and you are using a light viscosity oil in the engine, use a light viscosity oil in the air filter. If you are using a heavier oil in the crankcase for warm weather, use the same, heavier oil in the oil bath air cleaner. Soak the filter element in the same safe solvent as the oil cup. Agitate the element thoroughly in the cleaning solution to remove all dirt particles. Dry the element thoroughly with compressed air. Reassemble the air cleaner assembly and reinstall it on the engine in the reverse order of disassembly and removal.

PCV VALVE

The positive crankcase ventilation valve (PCV) should be replaced every 12 months or 12,000 miles on models made prior to 1972. On 1972 and later models,

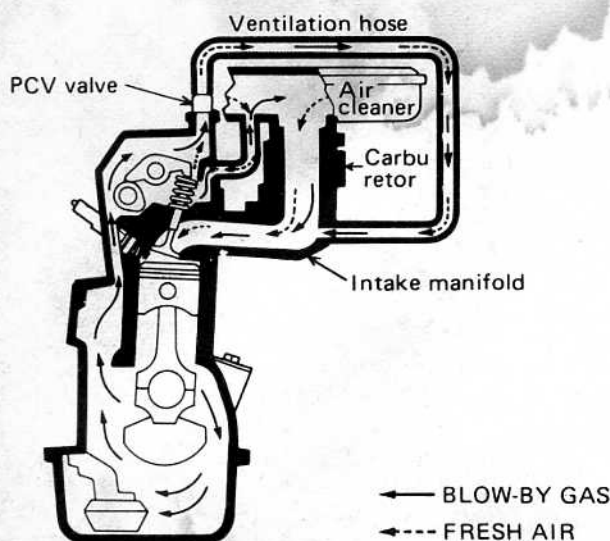


Diagram of the positive crankcase ventilation (PCV) system

check the valve every 12 months or 12,000 miles and replace it every 24 months or 24,000 miles, whichever comes first.

The PCV valve is located in the hose connecting the crankcase breather with the intake manifold.

CHARCOAL CANISTER

Toyota used the charcoal canister fuel vapor storage system for the first time in 1972. Prior to this, Toyota used a "case" system which had no charcoal canister.

The charcoal canister vacuum lines, fittings, and connections should be checked every 6,000 miles for clogging, pinching, looseness, etc. Clean or replace the components as necessary. If the canister is clogged, it may be cleaned with *low pressure* compressed air. Seal off one of the two holes at the one end and allow the air to flow through the canister.

It is recommended that the canister be replaced every five years.

FLUID LEVEL CHECKS

Engine Oil

The engine oil level should be checked at regular intervals; for example, whenever the car is refueled. Check the oil level if the oil pressure gauge shows an abnormally low reading.

It is preferable to check the oil level when the engine is cold or after the car has been standing for a while. Checking the oil immediately after the engine has

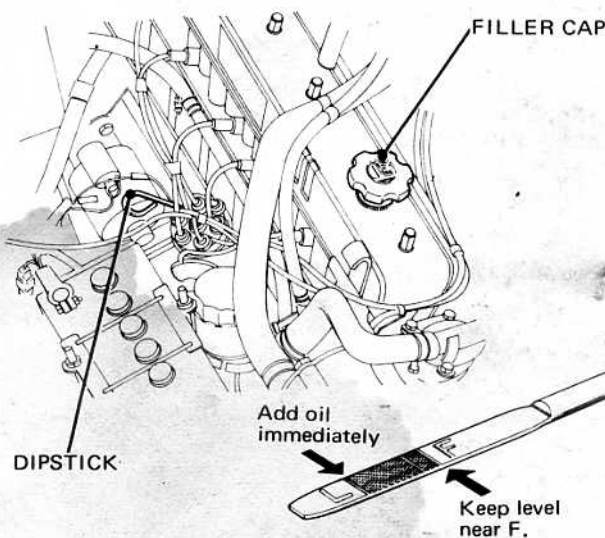
been running will result in a false reading. Be sure that the car is on a level surface before checking the oil level.

Remove the dipstick and wipe it with a clean rag. Insert it again (fully) and withdraw it. The oil level should be at the "F" mark (Full) or between the "F" and the "L" (Low) marks. Do not run the engine if the oil level is below the "L."

Add oil, as necessary. Use only oil which carries the API designation SD or SE (MS).

CAUTION: Do not use unlabeled oil or a lower grade of oil which does not meet SD or SE (MS) specifications.

See the chart in the lubrication section of this chapter for proper oil viscosities. Do not overfill; the oil level should never be above the "F" mark.



Engine oil level check

Transmission

It is recommended that the oil in the transmission be checked every 6,000 miles and replaced every 12 months or 12,000 miles.

With the vehicle resting on a level surface, remove the transmission filler plug. Hold in on the plug while unscrewing it. When you are sure that the threads of the plug are free of the transmission, ease the plug away from the hole very slightly. If lubricant begins to run out, replace the plug immediately to minimize lubricant loss. The lubricant level should be maintained to the bottom of the filler hole. If it is lower than this, add SAE 90 gear oil.

NOTE: Check the lubricant in the

transmission and transfer case as soon as possible after running the vehicle through deep water. If there is evidence of water in the lubricant, drain and refill the transmission and transfer case with the proper lubricant.

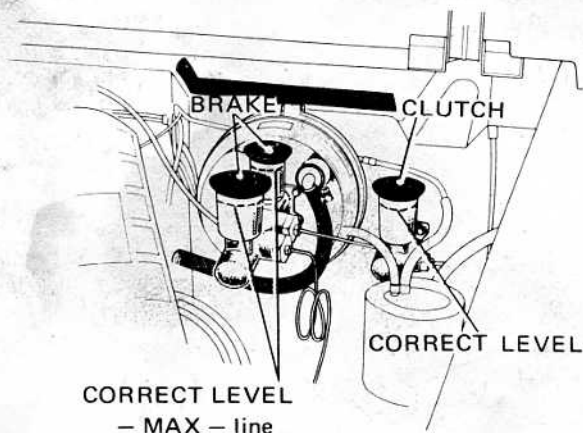
Brake and Clutch Master Cylinders

The brake and clutch master cylinder reservoirs are made of translucent plastic so that the fluid level can be checked without removing the cap. Check the fluid level frequently, every time the oil level is checked. It is recommended by the manufacturer that the fluid be drained and replaced every 12 months or 12,000 miles, whichever comes first.

NOTE: Models with tandem master cylinders have three fluid reservoirs. Fill all of the reservoirs separately. Neither of the brake reservoirs drain into the other.

If the fluid level is low, fill the reservoir with SAE 70R-3 (SAE J1703) brake fluid, pouring carefully so that no bubbles form in the reservoir. The level in all of the reservoirs must be maintained to at least $\frac{3}{4}$ full.

Do not use a lower grade of brake fluid than is recommended. Also, never mix different types of brake fluid.

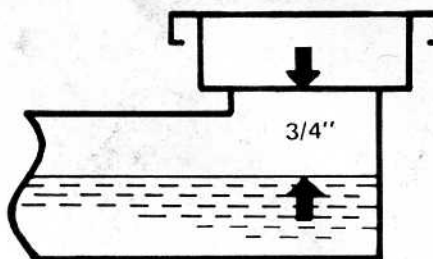


Brake and clutch master cylinder fluid level

Coolant

The coolant level should be checked at least once a week or when the temperature gauge registers "HOT". Because the cooling system is under pressure, check the coolant level with the engine cold to prevent possible injury from a high pressure stream of hot coolant.

Correct level
when engine is cold



Maintain the coolant level to within $\frac{3}{4}$ in. from the bottom of the filler neck on the radiator

The coolant level should be maintained at $\frac{3}{4}$ in. below the filler neck of the radiator when the engine is cold.

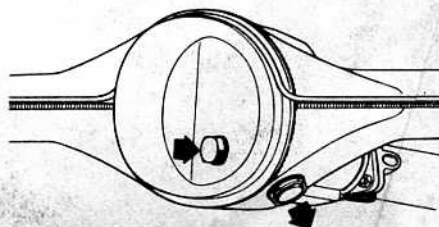
For best protection against freezing and overheating, maintain an approximate 50% water and 50% antifreeze mixture in the cooling system. Do not mix different brands of antifreeze to avoid possible chemical damage to the cooling system.

Avoid using water that is known to have a high alkaline content or is very hard, except in emergency situations. Drain and flush the cooling system as soon as possible after using such water.

CAUTION: Cover the radiator cap with a thick cloth before removing it from a radiator in a vehicle that is hot. Turn the cap counterclockwise slowly until pressure can be heard escaping. Allow all pressure to escape from the radiator before completely removing the radiator cap. It is best to allow the engine to cool if possible, before removing the radiator cap.

Front and Rear Axle

The front and rear axle differentials each hold approximately 2.6 pints of either SAE 80 or SAE 90 gear oil. The heavier oil is recommended for use in climates with an average ambient temperature of above 10° F and the lighter oil for average temperatures of below 10° F. With the vehicle resting on

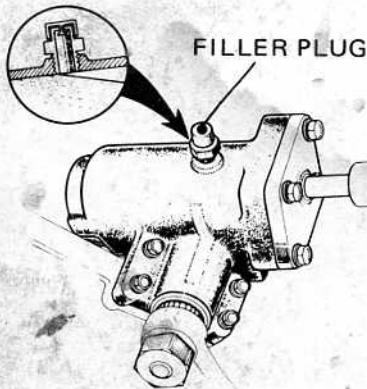


Filler and drain plugs in the front and rear axle

a level surface, check the level of the oil in the differential housings every 6,000 miles. The level should be up to the filler hole. When you remove the filler plug, the oil should start to run out. If it does not, replenish the supply until it does. The manufacturer recommends that the oil be drained and replaced with fresh lubricant every 12,000 miles or 24 months, whichever comes first.

Steering Gear

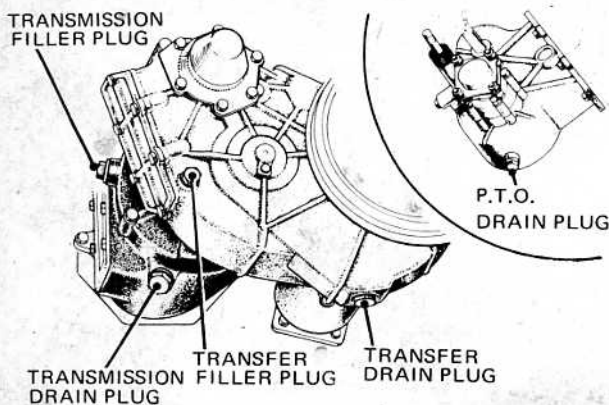
Check the steering gear oil level every 12,000 miles. The level should be up to the filler plug hole. Add API GL-4 gear oil SAE 90. When checking the oil level, always look for leaks.



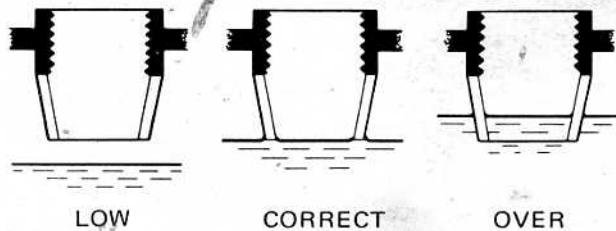
The filler plug in the steering gear housing

Transfer Case and Power Take-Off

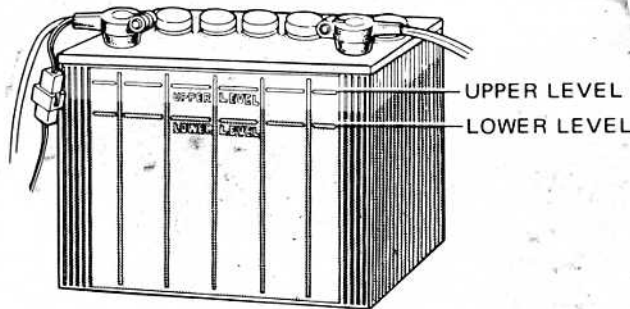
Check both the transfer case and the power take-off lubricant levels every 6,000 miles. The oil level should be up to the filler plug in each case. Replenish the supply with SAE 90 gear oil, as necessary.



Locations of the filler and drain plugs in the transmission, transfer case, and if applicable, the power take-off unit



Maintain the battery electrolyte level up to the bottom of the filler necks



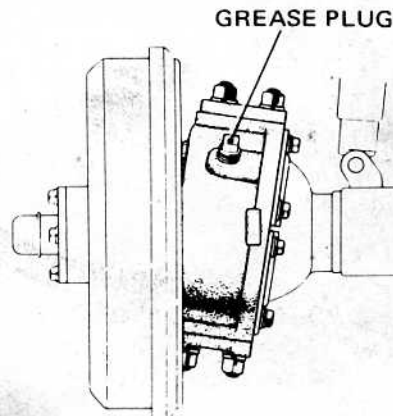
Keep the level of electrolyte between the two lines marked on the outside of a battery with a translucent case

Battery

Check the electrolyte level in the battery frequently, for example, whenever the vehicle is refueled. The electrolyte level should reach either between the upper and lower level lines marked on the battery case or just to the bottom of the filler well, depending upon battery type. Use distilled water when adding to the electrolyte.

Steering Knuckle

Check the amount and condition of the lubricant in the steering knuckle every 6 months or 12,000 miles, whichever comes first. The steering knuckle should be packed with multipurpose grease (NLGI No. 2).



The steering knuckle filler plug

Capacities

Year	Model	Engine Displacement Cu in. (cc)	Engine Crankcase (qts)		Transmission (pts)			Drive Axle (pts)		Cooling System System (qts)			
			With Filter	Without Filter	Manual	3-spd	4-spd	Transfer Case	Front	Rear	Gasoline Tank (gals)	With Heater	
												W/O Heater	W/O Heater
1966-'70	FJ40, FJ55	6-236.7 (3878)	8.46	6.56	1.8	—	1.8②	2.6	2.6	16.1	17.7		
1970-'74	FJ40, FJ55	6-236.7 (3878)	8.46	6.56	1.8	3.3	1.8②	2.6	2.6	16.1	17.7		

① 23.8 gals on FJ55

② 2.2 pts with power take-off

— Not applicable

TIRES AND WHEELS

Tire Rotation

Tires should be rotated every 6,000 miles. If no spare is used, follow the "rotating four tires" diagram. If you have a spare and are including it in your tire rotating sequence, follow the "rotating five tires" diagram.

If uneven tire wear occurs before 6,000 miles, rotate the tires sooner. If the tires show abnormal wear patterns, have the axle alignment checked. Inflation pressures should be adjusted whenever tires are rotated. Tires should also be balanced or rebalanced when they are rotated.

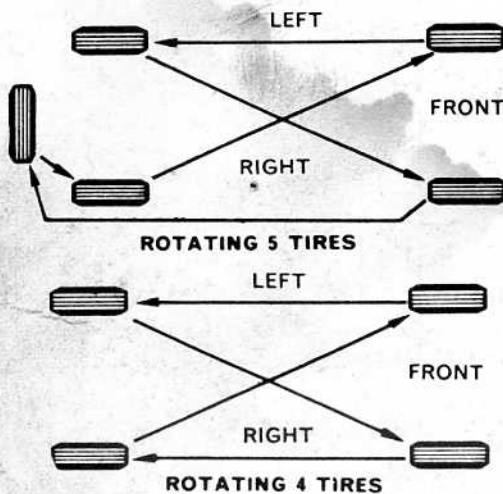


Diagram of tire rotation

Tire Life and Safety

Common sense and good driving habits will afford maximum tire life. Fast starts and stops, and hard cornering are hard on tires and will shorten their useful life span. If you start at normal speeds, allow yourself sufficient time to stop, and take corners at a reasonable speed, the life of your tires will increase greatly. Also make sure that you don't overload your vehicle or run with incorrect pressure in the tires. Both of these practices increase tread wear.

Inspect your tires frequently. Be especially careful to watch for bubbles in the tread or side wall, deep cuts, or underinflation. Remove any tires with bubbles. If the cuts are so deep they penetrate to the cords, discard the tire. Also look for uneven tread wear patterns that indicate that the front end is out of

alignment or that the tires are out of balance.

Wider Treads and Radial Ply Tires

The main thing to remember when you have decided to install a different type tire on your vehicle is that you have to install at least four. Your spare tire should be of the same size and tread design as the rest.

Radial tires must not be mixed with belted or conventional tires because of the unusual handling characteristics that will result. Radial tires are not designed for vehicles that carry a substantial load, once again, because of the unusual handling characteristics that will result. Make sure that the tires you select will provide adequate clearance between the fender wells, the fenders themselves, and all suspension and steering components. Also, oversize flotation type tires require wider rims than stock.

Mud and snow tires should be operated at full inflation pressures and not at sustained speeds over 75 mph for one hour or more.

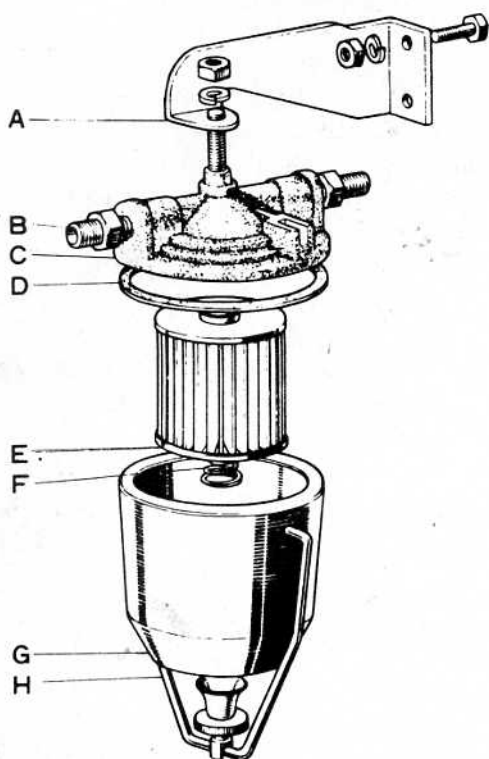
FUEL FILTER

The Land Cruiser uses a cartridge type fuel filter with a disposable element. The filter is located in the fuel line. It should not be necessary to remove it in order to change the disposable element. To replace the element, proceed as follows:

1. Loosen and remove the nut on the filter bowl bail.
2. Withdraw the bowl, element spring, element and the bowl gasket.
3. Wash all of the parts in solvent and examine them for damage.
4. Install a new filter element and bowl gasket.
5. Install the components in the reverse order of removal. Do not fully tighten the bail nut.
6. Seat the bowl by turning it slightly. Tighten the bail nut fully and check for leaks.

The above procedure should be performed if the clear glass bowl fills up with water or every 12,000 miles.

CAUTION: Do not have any open flame nearby while servicing the fuel



The fuel filter assembly

- A. Fuel filter bracket
- B. Fuel line fitting
- C. Mounting boss
- D. Filter bowl gasket
- E. Filter element
- F. Filter element positioning spring
- G. Fuel filter bowl
- H. Bowl retaining bail

filter because of the presence of flammable gasoline vapors.

BATTERY CARE

Maintain the battery electrolyte level, as outlined in the fluid level section, above.

If the terminals become corroded, clean them with a solution of baking soda mixed with water. Wash off the top of the battery with this solution and then rinse it off using clean, clear water.

CAUTION: *Be sure the filler caps are on tight or the electrolyte in the battery may become contaminated.*

Use petroleum jelly or silicone lubricant to protect the battery terminals. Check to be sure that the cables are fastened securely at both ends. Also, be sure that the battery hold-down bracket nuts are secure and free of corrosion.

When installing a new battery, be sure that its amp/hour capacity is at least as high as that of the battery which was removed. Its physical size should be the

same as that of the battery which it is replacing.

When hooking up the battery cables, be careful to observe proper polarity. The positive (hot) cable should be connected to the positive (+) terminal of the battery and the negative cable (ground) should be connected to the negative (-) terminal.

Lubrication

OIL AND FUEL RECOMMENDATIONS

The Land Cruiser F type engine is designed to operate on regular grade gasoline. If the vehicle is being used for heavy-duty service, do not use lead-free gas. If the Cruiser is being used in light-duty service, a tank of lead-free gasoline can be used without any problems. If your vehicle pings or knocks, use a higher octane fuel or retard the timing of the engine, but not more than 3° from the setting required for proper operation. This is only recommended for an emergency situation—until you can get some higher octane fuel. A little knocking at low speeds in an emergency is acceptable, but continued knock at high speeds is damaging to your engine.

Earlier models are equipped with an octane selector on the distributor. The octane selector turned toward the "A" mark for high octane fuel advances the ignition spark; toward the "R" mark for low octane fuel retards the ignition spark. Each graduation changes the ignition timing 2.6° of crankshaft rotation. The neutral position of the octane selector is when the centerline is aligned with the red dot on the distributor housing and the thick longitudinal line aligns with the end of the housing.

Many factors help to determine the proper oil for your Land Cruiser. The big question is what viscosity to use and when. The whole question of viscosity revolves around the lowest anticipated ambient temperatures to be encountered before your next oil change. The recommended viscosity ratings for temperatures ranging from below -10° F to

above 90° F are listed below. They are broken down into multiviscosities and single-viscosities. Multiviscosity oils are recommended because of their wider range of acceptable temperatures and driving conditions. Use a good quality motor oil of known brand, which carries the API classification SD or SE (MS).

<i>Ambient Temperature</i>	<i>Multiviscosity Engine Oil</i>
Below -10° F to +50° F	5W-20
-10° F to +90° F	10W-30
+10° F to Above +90° F	20W-40

	<i>Single-Viscosity Engine Oil</i>
Below -10° F	5W*
Between -10° F and +10° F	10W*
Between +10° F and +32° F	20W
Between +32° F and +50° F	20
Between +50° F and +90° F	30
Above +90° F	40

* A sustained speed of 60 mph or higher should not be maintained with SAE 5W or 10W oil in the engine because the engine will force oil past the piston rings and burn it in the combustion chamber. Oil consumption will be higher than normal.

OIL CHANGES

Engine

Change the engine oil at intervals specified in the level checks section. Change the oil and filter after the first 600 miles only.

Change the oil as follows:

1. Drive the vehicle for 15 minutes at expressway speeds or the equivalent of city driving to make sure that the oil is at its normal operating temperature. Hot oil will hold more impurities in suspension and will flow better, allowing it to remove more oil and dirt.

2. Park on a level surface.

3. Place a pan of adequate capacity under the oil pan drain.

4. Loosen the drain plug with the proper size wrench. Unscrew the plug with your fingers, using a rag to shield your fingers from the heat. Push in on the plug as you unscrew it so that you can feel when all of the screw threads are out of the hole. You can then remove the plug and gasket quickly with the minimum amount of oil running down

your arm and you will also have the plug in your hand and not in the bottom of a pan of hot oil. Be careful of the oil. If it is at operating temperature, it is hot enough to burn you or at least make you uncomfortable.

5. After the oil has drained fully, remove the container used to catch the oil and reinstall the drain plug and gasket and tighten it. Don't strip the threads by tightening the plug too much.

6. Add the proper amount of new oil through the oil filler on the top of the valve cover.

7. Check to make sure that the oil level registers Full on the oil dipstick and start the engine. Watch the oil gauge to make sure that the oil pressure comes up to the proper range. Check for leaks at the oil filter while the engine is running.

8. Stop the engine, check the oil level and adjust if necessary and replace the oil filler cap.

Transmission and Transfer Case

1. Park the car on a level surface and put on the parking brake.

2. Remove the oil filler (upper) plug.

3. Place a container, of a large enough capacity to catch all of the oil, under the drain (lower) plug. Use the proper size wrench to loosen the drain plug slowly, while maintaining a slight upward force to keep the oil from running out. Once the plug is removed, allow all of the oil to drain from the transmission.

4. Install the drain plug and its gasket, if so equipped.

5. Fill the transmission to capacity. (See the capacities chart above.) Use API grade SAE 90 gear oil. Be sure that the oil level reaches the bottom of the filler plug.

6. Remember to install the filler plug when finished.

7. Repeat Steps 1-6 in order to change the oil in the transfer case.

Front and Rear Axle

1. With the vehicle resting on a level surface, and a drain pan large enough to hold all of the differential oil placed under the drain hole, remove the drain plug.

2. Allow the lubricant to drain completely.

3. Install the drain plug. Tighten it so that it will not leak, but do not over-tighten.

4. Refill the axle housings with the lubricant to the proper level.

5. Install the filler plug.

OIL FILTER CHANGES

The oil filter on the newer models is a spin-on cartridge type and is changed simply by unscrewing the old filter with an oil filter wrench, smearing some motor oil on the gasket of the new filter and screwing on the new filter, turning only $\frac{3}{4}$ of a turn after the rubber gasket contacts the mounting boss. Remember to have a container placed under the oil filter before unscrewing it in order to catch the oil. Replace the filter every time you change the oil.

The oil filter on the earlier models is a replaceable element type of oil filter. Change this type of filter along with the oil in the crankcase as follows:

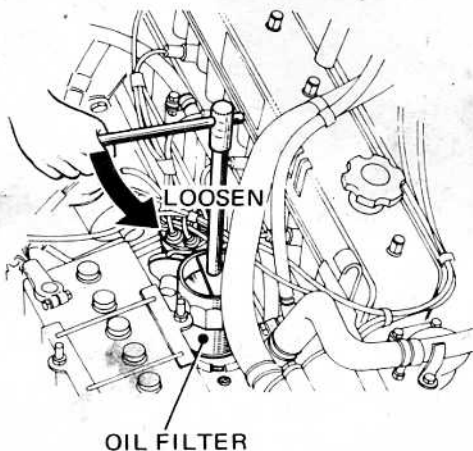
1. Drain the oil as outlined previously.

2. Place the drain pan under the drain plug on the filter case and remove the plug. Allow all of the oil to drain from the oil filter case.

3. Remove the two oil lines from the filter case.

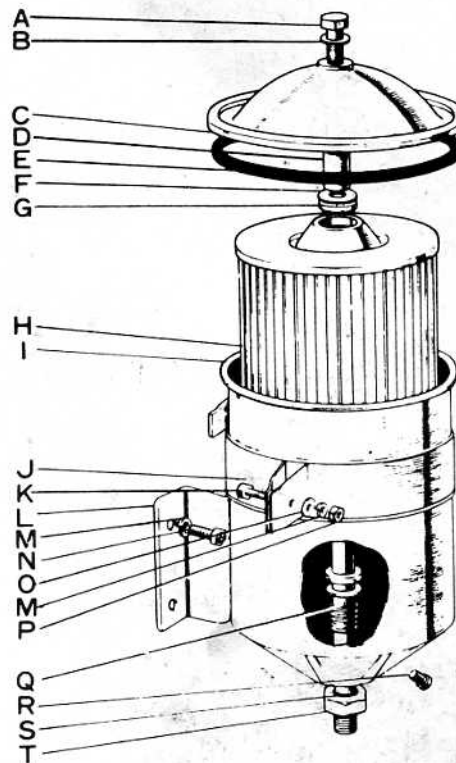
4. Unfasten the mounting bolts which attach the filter bracket to the intake manifold. Remove the entire filter assembly.

5. Unscrew the securing bolt from the cap. Remove the large cap gasket, collar, small gasket and the filter element.



OIL FILTER

Removing a spin-on type oil filter with a filter wrench



The replaceable element type oil filter

- | | |
|--------------------------------|--------------------------------|
| A. Cap retaining bolt | K. Clamp bolt |
| B. Gasket | L. Mounting bracket |
| C. Cap | M. Mounting bolt |
| D. Upper spacer | N. Washer |
| E. Cap gasket | O. Nut |
| F. Upper spacer washer | P. Nut |
| G. Washer | Q. Filter element support ring |
| H. Filter element | R. Drain plug |
| I. Filter case | S. Gasket |
| J. Filter case retaining clamp | T. Filter element guide |

6. Remove the gasket, element support spring, and washer from the element guide. Remove the guide.

7. Clean the sludge out of the bottom of the case with solvent. Allow the case to dry completely.

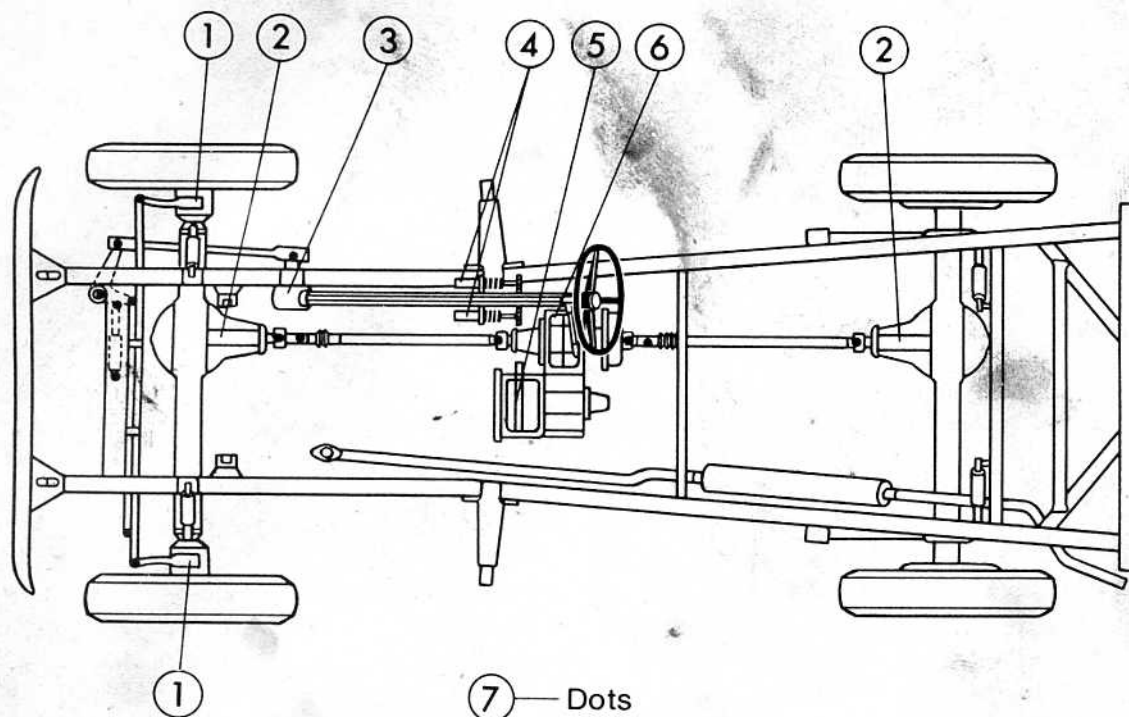
8. Replace the element and all of the gaskets with new ones.

9. Assemble the filter assembly and install it in the reverse order of removal.

10. Make sure that the crankcase drain plug is installed and fill the crankcase with the proper amount and type of oil.

CHASSIS GREASING

The following chart indicates where the grease fittings are located on the Land Cruiser. It is recommended that the vehicle be greased every 2,000 miles, more often if the vehicle is operated under dusty conditions or under heavy-



Land Cruiser lubrication points

- | | | |
|---|--------------------------------------|-------------------------------------|
| 1. Front wheel bearings and steering knuckles | 4. Brake and clutch fluid reservoirs | 6. Transfer case and power take-off |
| 2. Differentials | 5. Transmission | 7. Chassis grease fittings (15) |
| 3. Steering gear | | |

duty conditions. If the Cruiser is driven through deep water, it should be greased as soon as possible afterward. Use NGLI No. 1 multipurpose grease or an equivalent.

WHEEL BEARINGS

The front wheel bearings should be repacked every 12,000 miles, or once a year, whichever comes first.

Before handling the bearings there are a few things that you should remember:

Remember to DO the following:

1. Remove all outside dirt from the housing before exposing the bearing.
2. Treat a used bearing as gently as you would a new one.
3. Work with clean tools in clean surroundings.
4. Use clean, dry canvas gloves, or at least clean, dry hands.
5. Clean solvents and flushing fluids are a must.
6. Use clean paper when laying out the bearings to dry.
7. Protect disassembled bearings from rust and dirt. Cover them up.
8. Use clean rags to wipe bearings.
9. Keep the bearings in oil-proof

paper when they are to be stored or are not in use.

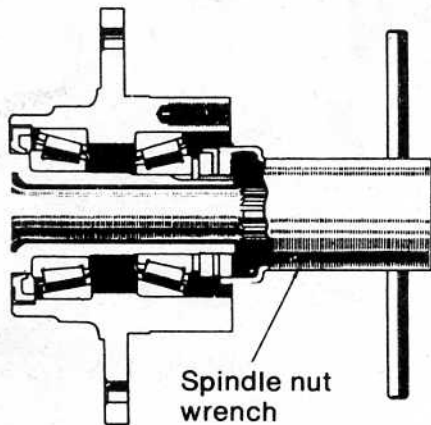
10. Clean the inside of the housing before replacing the bearings.

Do NOT do the following:

1. Don't work in dirty surroundings.
2. Don't use dirty, chipped, or damaged tools.
3. Try not to work on wooden work benches or use wooden mallets.
4. Don't handle bearings with dirty or moist hands.
5. Do not use gasoline for cleaning; use a safe solvent.
6. Do not spin-dry bearings with compressed air. They will be damaged.
7. Do not spin unclean bearings.
8. Avoid using cotton waste or dirty cloths to wipe bearings.
9. Try not to scratch or nick bearing surfaces.
10. Do not allow the bearing to come in contact with dirt or rust at any time.

Removal

1. Remove the hub cap and loosen the lug nuts.
2. Raise the front of the Cruiser and support it with jackstands.



Removing the spindle locknut and/or the bearing adjusting nut with a spindle nut wrench

3. Remove the lug nuts and the wheel.

4. Remove the cap from the axle shaft outer flange. Remove the snap-ring from the shaft.

5. Remove the bolts which secure the axle shaft outer flange to the hub.

6. Install two service bolts into the holes provided in the flange. Tighten the bolts evenly in order to loosen the flange. Withdraw the flange and the sealing gasket.

NOTE: The flange should never be removed by prying it off; damage to the sealing surface could result in oil leaks.

7. Remove the set screws and remove the brake drum.

8. Straighten out the lockwasher and remove the adjusting nut, using a spindle nut wrench.

NOTE: Removing the adjusting nut with a hammer and chisel will result in damage to the nut and the spindle threads.

9. Remove the hub assembly, complete with the claw washer, bearings and oil seal.

10. Remove the bearings from the hub.

Cleaning, Inspection, and Packing

Place all of the bearings, nuts, washers, and dust caps in a container of solvent. Cleanliness is basic to wheel bearing maintenance. Use a soft brush to thoroughly clean each part. Make sure that every bit of dirt and grease is rinsed off, then place each cleaned part on an absorbent cloth and let them dry completely.

Inspect the bearings for pitting, flat spots, rust, and rough areas. Check the races on the hub and the spindle for the same defects and rub them clean with a rag that has been soaked in solvent. If the races show hairline cracks or worn, shiny areas, they must be replaced with new parts. Replacement seals, bearings, and other required parts can be bought at an auto parts store. The old parts that are to be replaced should be taken along to be compared with the replacement part to ensure a perfect match.

Pack the wheel bearings with grease. There are special devices made for the specific purpose of greasing bearings, but, if one is not available, pack the wheel bearings by hand. Put a large dab of grease in the palm of your hand and push the bearing through it with a sliding motion. The grease must be forced through the side of the bearing and in between each roller. Continue until the grease begins to ooze out the other side and through the gaps between the rollers; the bearing must be completely packed with grease.

Installation

1. Install the inner bearing cone and the oil seal.

2. Pack the hub with grease, and install the outer bearing cup.

3. Assemble the brake drum to the hub.

4. Install the hub and drum assembly over the spindle and then install the outer bearing.

5. Install the claw washer and adjusting nut with the spindle nut wrench.

6. Adjust the bearing preload in the following manner:

a. After tightening the adjusting nut with the spindle nut wrench, rotate the wheel back-and-forth in order to seat the bearing.

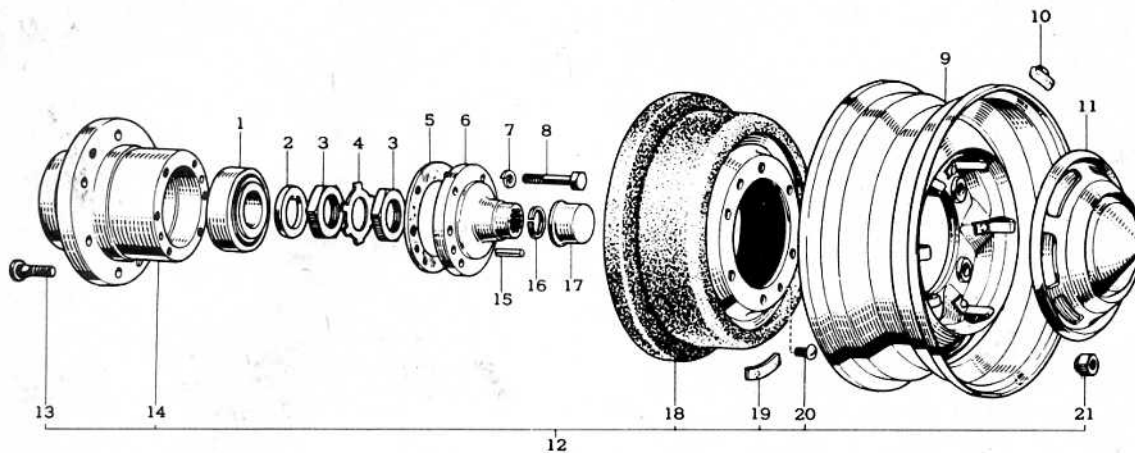
b. Loosen the adjusting nut $\frac{1}{8}$ to $\frac{1}{6}$ of a turn.

c. Check the brake drum for free rotation.

d. Install the lockwasher and the locknut. Use the spindle nut wrench to tighten the locknut.

e. Bend up the tabs on the lockwasher.

7. Install the axle shaft flange and



The front wheel, brake drum, and hub assembly

- | | |
|--|--|
| 1. Outer bearing | 11. Hub cap |
| 2. Claw washer | 12. Front axle hub and brake drum assembly |
| 3. Wheel bearing adjusting nut (inner) and locknut (outer) | 13. Lug bolt |
| 4. Lockwasher | 14. Hub |
| 5. Drive flange gasket | 15. Locating pin |
| 6. Drive flange | 16. Axle shaft snap-ring |
| 7. Lockwasher | 17. Outer axle shaft flange cap |
| 8. Drive flange-to-hub attaching bolt | 18. Brake drum |
| 9. Wheel | 19. Balance weight |
| 10. Balance weight | 20. Brake drum set screw |
| | 21. Lug nut |

gasket. Tighten the retaining bolts to 11-16 ft lbs.

8. Install the bolt on the end of the outer shaft. Pull out on the shaft while installing the snap-ring.

9. Install the flange cap.

10. Install the wheel and the hub cap. Lower the vehicle.

Bearing Diagnosis

This section will help in the diagnosis of bearing failure. Such a diagnosis can be helpful in determining the cause of axle failure. The illustrations will help to take some of the guesswork out of deciding when to use an old bearing and when to replace it with a new one.

When disassembling an axle, the general condition of all bearings should be noted and classified where possible. Proper recognition of the cause will help in correcting the problem and avoiding a repetition of the failure.

Some of the common causes of bearing failure are:

a. Abuse during assembly or disassembly;

- b. Improper assembly methods;
- c. Improper or inadequate lubrication;
- d. Bearing contact with dirt or water;
- e. Wear caused by dirt or metal chips;
- f. Corrosion or rust;
- g. Seizing due to overloading;
- h. Overheating;
- i. Fretting of the bearing seats;
- j. Brinelling from impact or shock loading;
- k. Manufacturing defects;
- l. Pitting due to fatigue.

To avoid damage to the bearing from improper handling, it is best to treat a used bearing the same as a new bearing. Always work in a clean area with clean tools. Remove all outside dirt from the housing before exposing a bearing and clean all bearing seats before installing a bearing.

CAUTION: *Never spin a bearing, either by hand or with compressed air. This will lead to almost certain bearing failure.*

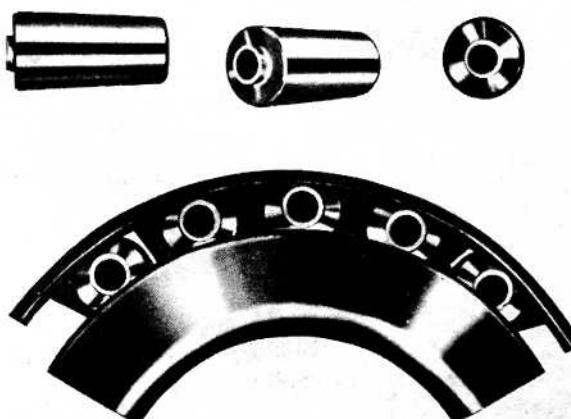
Bearing Failure Chart

General Wear

<i>Cause</i>	<i>Serviceability</i>
Wear on races and rollers caused by fine abrasives	Clean all parts and check seals. Install new bearing if old one is rough or noisy.



Normal wear pattern (© Chevrolet Div. G.M. Corp.)



Step wear (© Chevrolet Div. G.M. Corp.)

Step Wear

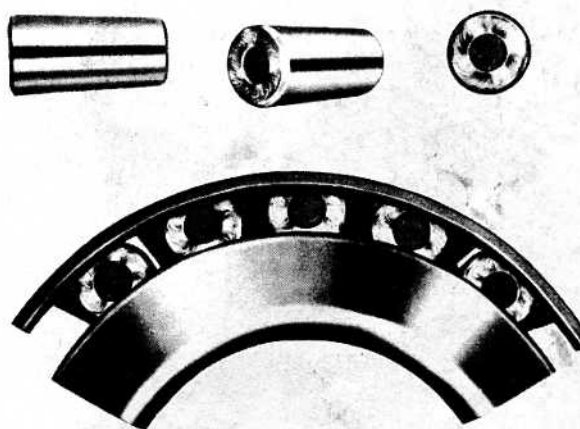
<i>Cause</i>	<i>Serviceability</i>
Wear pattern on roller ends caused by fine abrasives	Clean all parts and check seals. Install new bearings if old one is rough or noisy.

Indentations

<i>Cause</i>	<i>Serviceability</i>
Surface depressions on races and rollers caused by hard foreign particles	Clean all parts and check seals. Install new bearing if old one is rough or noisy.



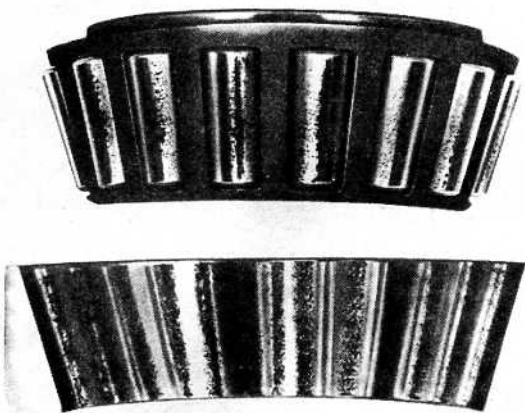
Indentations (© Chevrolet Div. G.M. Corp.)



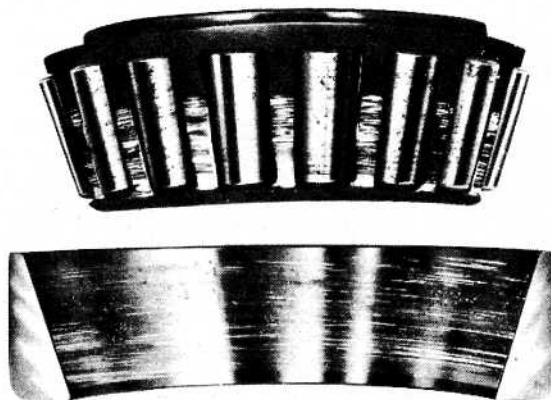
Galling (© Chevrolet Div. G.M. Corp.)

Galling

Cause	Serviceability
Metal smears on roller ends due to overheating from improper lubricant or overloading	Install a new bearing. Check seals and use proper lubricant.



Etching (© Chevrolet Div. G.M. Corp.)



Cage wear (© Chevrolet Div. G.M. Corp.)

Etching

Cause	Serviceability
Bearing surfaces appear gray or gray-black with related etching	Install new bearing and check seals. Use proper lubricant.

Cage Wear

Cause	Serviceability
Wear around outside diameter of cage and rollers caused by foreign material and poor lubrication	Clean all parts, check seals, and install new bearing.

Fatigue Spalling

Cause	Serviceability
Flaking of surface metal due to fatigue	Clean all parts and install new bearing.



Fatigue spalling (© Chevrolet Div. G.M. Corp.)



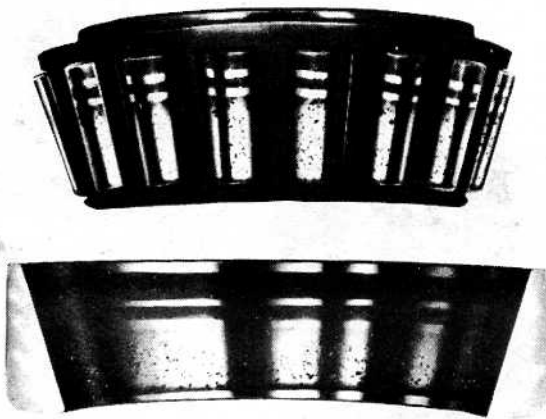
Heat discoloration (© Chevrolet Div. G.M. Corp.)

Heat Discoloration

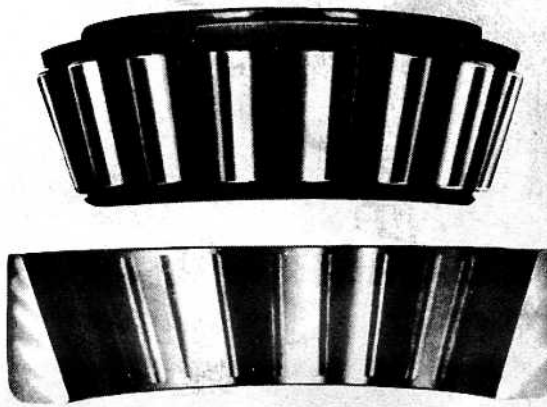
<i>Cause</i>	<i>Serviceability</i>
Discoloration from faint yellow to dark blue due to overload or lubricant breakdown. Softening of races or rollers also	Check for softening of parts by drawing a file over suspected area. The file will glide easily over hard metal, but will cut soft metal. If overheating is evident, install new bearings. Check seals and other parts.

Stain Discoloration

<i>Cause</i>	<i>Serviceability</i>
Stain discoloration ranging from light brown to black, caused by lubricant breakdown or moisture	Reuse bearings if stains can be removed by light polishing and no overheating exists. Check seals.



Stain discoloration (© Chevrolet Div. G.M. Corp.)



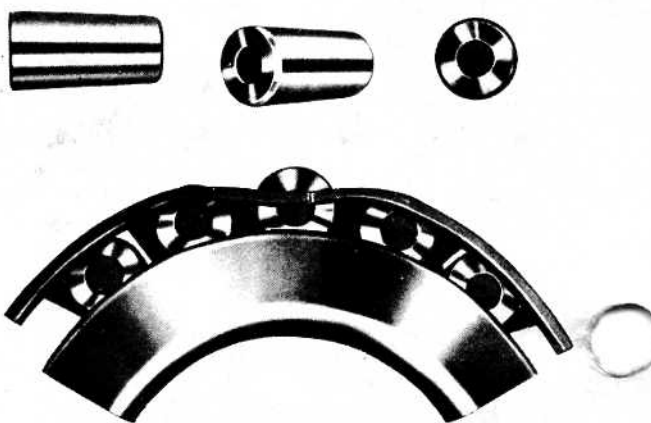
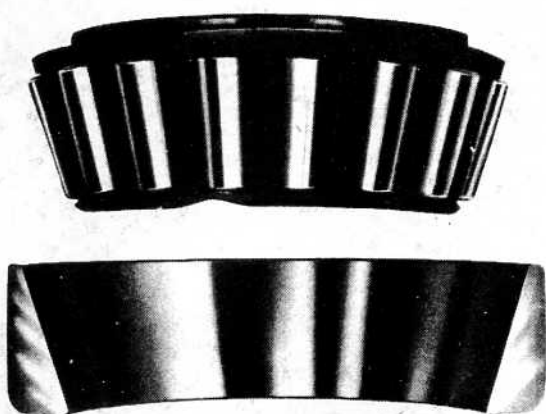
Brinelling (© Chevrolet Div. G.M. Corp.)

Brinelling

<i>Cause</i>	<i>Serviceability</i>
Surface indentations in race caused by rollers under impact load or vibration while the bearing is not rotating	If the old bearing is rough or noisy, install a new bearing.

Bent Cage

<i>Cause</i>	<i>Serviceability</i>
Improper handling	Install a new bearing.



Bent cage (© Chevrolet Div. G.M. Corp.)

Misalignment

Cause

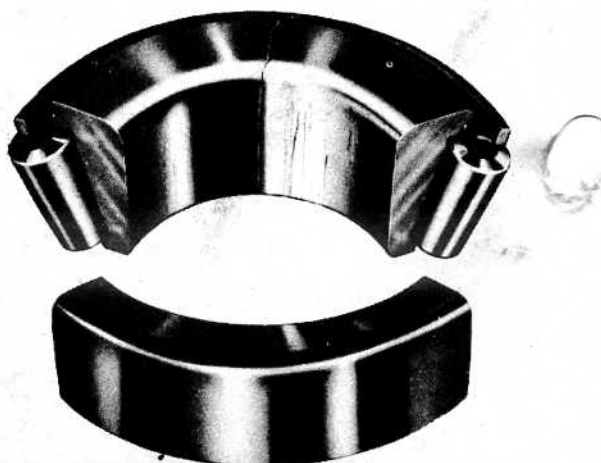
Serviceability

Outer race misaligned as shown

Install a new bearing and be sure races and bearing are properly seated.



Misalignment (© Chevrolet Div. G.M. Corp.)



Cracked inner race (© Chevrolet Div. G.M. Corp.)

Cracked Inner Race

Cause

Serviceability

Crack due to improper fit, cocked bearing, or poor bearing seats

Install a new bearing and be sure it is seated properly.

Fretting

Cause

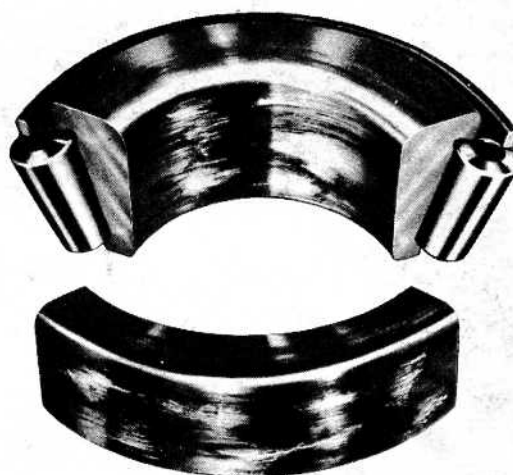
Serviceability

Corrosion due to small movement of parts with no lubrication

Clean parts and check seals. Install a new bearing and be sure there is proper lubrication.



Fretting (© Chevrolet Div. G.M. Corp.)



Smears (© Chevrolet Div. G.M. Corp.)

Smears

Cause

Metal smears due to slippage caused by poor fit, improper lubrication, overloading, or handling damage

Serviceability

Clean parts, install new bearing, and check for proper fit and lubrication.

Pushing, Towing and Jump Starting

To push-start your vehicle, follow the procedures below. Check to make sure that the bumpers of both vehicles are aligned so neither will be damaged. Be sure that all electrical system components are turned off (headlights, heater, blower, etc.). Turn on the ignition switch. Place the shift lever in Third or Fourth and push in the clutch pedal. At about 15 mph, signal the driver of the pushing vehicle to fall back, depress the accelerator pedal, and release the clutch pedal slowly. The engine should start.

When you are doing the pushing or pulling, make sure that the two bumpers match so you won't damage the vehicle you are to push. Another good idea is to put an old tire in between the two vehicles. If the bumpers don't match, perhaps you should tow the other vehicle. Decide whether or not you are going to use 4WD or low range. Do the road surface conditions warrant its use? If the other vehicle is just stuck, use first gear to slowly push it out. Tell the driver of

the other vehicle to go slowly too. Try to keep your Land Cruiser right up against the other vehicle while you are pushing. If the two vehicles do separate, stop and start over again instead of trying to catch up and ramming the other vehicle. Also try, as much as possible, to avoid riding or slipping the clutch. Low range makes this easy. When the other vehicle gains enough traction, it should pull away from your vehicle.

If you have to tow the other vehicle, make sure that the tow chain or rope is sufficiently long and strong, and that it is attached securely to both vehicles at a strong place. Attach the chain at a point on the frame or as close to it as possible. Once again, go slowly and tell the other driver to do the same. Warn the other driver not allow too much slack in the line when he gains traction and can move under his own power. Otherwise he may run over the tow line and damage both vehicles. If your Land Cruiser has to be towed by a tow truck, it can be towed forward for any distance just as long as it is done fairly slowly. If your Land Cruiser has to be towed backward, remove the front axle drive flanges to prevent the front differential from rotating. If the drive flanges are removed,

improvise a cover to keep out dust and dirt.

Jacking and Hoisting

The Land Cruiser can be jacked at any point from under the axles or the frame.

Do not jack directly on any of the springs, spring hangers, or shock absorber mountings.

Use jackstands to support the vehicle while working underneath. Use heavy-duty jackstands, preferably not of stamped steel construction.

Always jack the vehicle on as level and firm a surface as possible.