



# Installation Tips

TOYOTA

NISSAN

MITSUBISHI

ISUZU

HONDA

MAZDA

DAIHATSU

SUZUKI

SUBARU

HINO

FOREIGN VEHICLES

CROSS REFERENCE

Installation Tips

## COOLING SYSTEM AND BELTS MAINTENANCE

### A. COOLING SYSTEM

1. Be sure that the engine is cool before removing radiator cap for service. NEVER add cold coolant to an extremely hot engine as thermal shock can damage many internal engine components, including the water pump seal.

2. Flushing should always be done BEFORE replacing many cooling system components, especially the water pump, so that contaminants do not circulate and damage the new components.

### B. BELTS

1. Belt tension should be adjusted using a proper tension gauge during regular service intervals. This will limit play and possible belt slippage. Overtightening must be avoided as it reduces belt life and places excessive strain on the water pump bearing.

## NEW WATER PUMP INSTALLATION

The water pump is the heart of the cooling system. It provides constant circulation of the coolant through the internal engine passages and through the radiator. This helps provide even temperature throughout the engine, eliminating damaging hot spots. New water pump installation should follow the specific instructions provided with every NPW New Water Pump. Following is a general list of steps to be observed for proper installation and water pump life.

of any special bolt or fastener.  
6. Clean out any built sediment and scale from impeller cavity in engine block.  
7. Remove all gasket material from mounting surfaces on engine.

equipped), fan, fan belts, and re-connect all hoses. (Be sure the belts and pulleys are not offset.)

### A. BEFORE INSTALLING NEW WATER PUMP

1. If the old pump will still circulate coolant through the engine, clean cooling system with a chemical cleaner and reverse flush all sediment, rust and scale before removing old pump.
2. Drain coolant from radiator and engine block.
3. Disconnect all hoses from old water pump and fan belts riding on pulley connected to water pump.
4. Remove fan, fan clutch (if equipped) and pulley from old water pump.
5. Remove old water pump from engine block making note of location

### B. INSTALLING NEW WATER PUMP

1. If water pump equipped with a steel back plate covering the impeller, check all mounting bolts and tighten as required.
2. Coat both side of new gasket with tacky sealer and position on new water pump or engine block.  
NOTE: If using a self-curing, silicone type gasket sealer from a tube, do not apply excessive amount. Excess may be squeezed out into water pump and plug up cooling passages.
3. Install new water pump on engine block-DO NOT FORCE PUMP ON BY STRIKING END OF SHAFT.
4. Tighten mounting bolts gradually and evenly in a staggered sequence to vehicle manufacturer's torque specifications.
5. Turn pump shaft by hand to make sure it rotates freely.
6. Re-install pulley, fan clutch (if

7. Fill radiator with a correct mixture of fresh antifreeze and water and check for leaks.
8. Tighten fan belts to factory recommended tension. Tension can be checked with commercially available testers or by measuring fan belt deflection as specified in factory service manual.
9. Install radiator cap and run engine until normal operating temperature is reached and check for leaks.  
NOTE: A small, temporary seepage of coolant from the "weep hole" located on the lower side of the shaft housing may occur during initial run-in period. This should stop after the seal has been allowed to "lap in".
10. After operating temperature has been reached, shut off engine and allow to cool-NEVER REMOVE RADIATOR CAP WHILE ENGINE IS HOT.
11. Remove radiator cap (only after engine has cooled) and top off radiator with additional antifreeze and water mixture.

## FAN CLUTCH INSPECTION AND REPLACEMENT

A fan or fan clutch can be imbalanced by broken or missing components and quickly ruin a newly installed pump. Before installing a new water pump always take time for a careful inspection of the fan/fan clutch.

3. Remove the fan assembly from the fan clutch. Most fans are stamped "FRONT" to indicate position in relation to the front of the vehicle. However, to ensure proper re-installation, be sure to note fan position before removal.

new fan clutch using the new bolts provided. DO NOT REUSE OLD BOLTS. Tighten to 15-20 ft/lbs. torque.

### A. BEFORE INSTALLING NEW FAN CLUTCH

1. Loosen the tension of all belts riding on the water pump pulley.
2. Remove the four bolts or nuts attaching the fan clutch to the water pump pulley.

4. Carefully inspect the fan blades and replace if there are cracks, broken welds, loose rivets, or if blades are bent, broken or missing.

2. Mount the new fan clutch to the water pump reusing the original bolts and lockwashers. Tighten bolts to 20 - 25 ft/lbs torque.

### B. INSTALL NEW FAN CLUTCH

1. Install the fan assembly onto the

3. Tighten fan belts to factory recommended tension. Tension can be checked with commercially available testers or by measuring the fan belt deflection as specified in the factory service manual.



# Installation Tips

## WATER PUMP/FAN CLUTCH FAILURE AND THEIR CAUSES

### A. FAILURE SYMPTOM: Seal Leakage - Dirty System



Fig. 1. Evidence of seal leakage from weep hole.

This pump had been in service only a short time before rusty-looking coolant began to leak out of the weep hole leaving behind large deposits of rust and calcium. Fig. 2 shows a buildup of rust particles with a mud-like consistency within the pump.

### CAUSES OF FAILURE: Cooling System Contamination

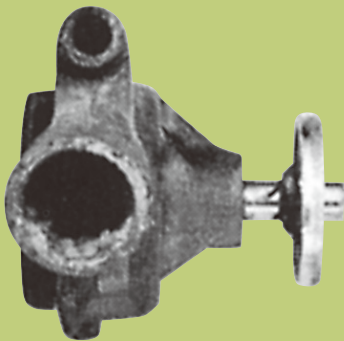


Fig. 2. Built-up contaminants quickly wear seal.

The abrasiveness of the particles found in a badly contaminated system will prematurely wear the water pump seal. Harmful contamination is common in systems that are not properly maintained. A system that is not properly pressurized will allow air to enter and promote the buildup of rust. If water with a high mineral content is added to the system and is heated, it will begin to form deposits that will accumulate and cause passage restrictions and may damage the seal.

### B. FAILURE SYMPTOM: Shaft Breakage

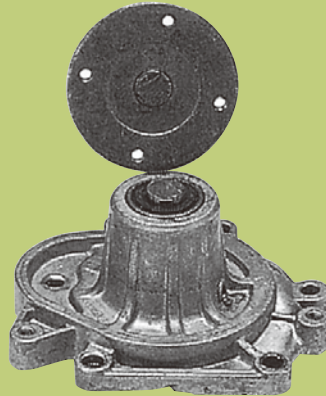


Fig.3. Clean break indicates an "instantaneous" fracture caused by sudden overload or imbalance.

### CAUSE OF FAILURE: Bearing Overload

This bearing failed as the result of a sudden overload caused by vibration or imbalance.

### C. FAILURE SYMPTOM: Casting Breakage

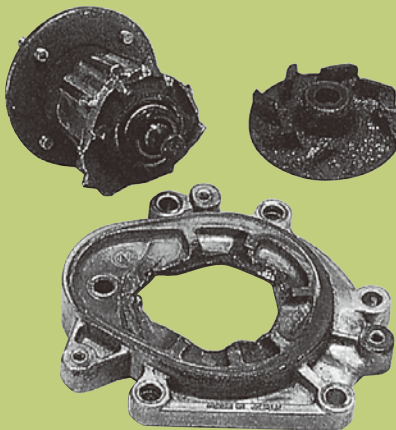


Fig. 4. Excessive vibration shattered this casting.

### CAUSE OF FAILURE: Excessive Vibration

Casting failure is normally associated with heavy vibration or imbalance which can be caused by a loose fan or pulley assembly, or by worn fan clutch.

### D. FAILURE SYMPTOM: Seal Leakage-Clean System

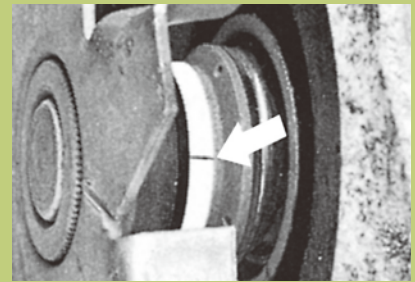


Fig. 5. Adding cold coolant to a hot system can crack a ceramic seat.

Leakage was observed from this pump which had just recently been installed in a fairly clean coolant system.

### CAUSE OF FAILURE: Thermal Shock

The seal damage had come from thermal shock, typically caused by adding cold coolant to an overheated engine.

NOTE: Allow an overheated engine to sit and cool before adding coolant.

### E. FAILURE SYMPTOM: Dirty Fan Clutch



Fig. 6. A worn fan clutch rob power by remaining fully engaged.

When the silicon fluid leaks from the fan clutch it will appear as streaks which often collect dirt across the face of the unit. Driver may notice either loss of horsepower and fuel economy, or hotter running, overheating engine.

### CAUSE OF FAILURE: Component Wear

Service life of the OE fan clutch is usually shorter than the vehicle's service life. After three or four years failure or wear may be expected. NOTE: Inspect frequently and replace as required.

TOYOTA

NISSAN

MITSUBISHI

ISUZU

HONDA

MAZDA

DAIHATSU

SUZUKI

SUBARU

HINO

FOREIGN VEHICLES

CROSS REFERENCE

Installation Tips