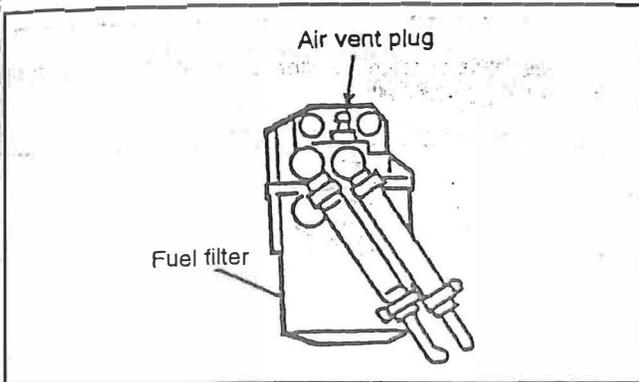


## BLEEDING AIR FROM THE FUEL SYSTEM

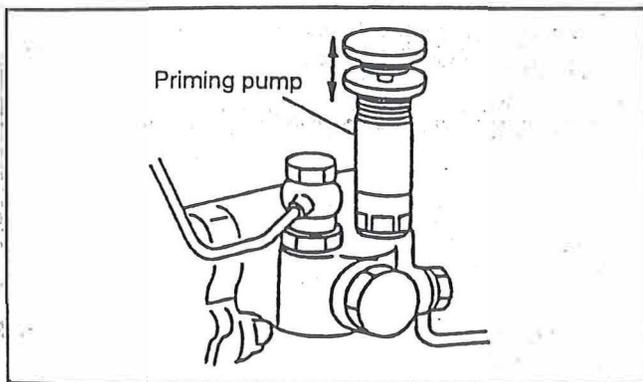
**NOTE:** For correct engine operation, always bleed the fuel system after the following procedures:

- a. When the fuel filter cartridge is replaced.
- b. When the fuel feed pump strainer is cleaned.
- c. When the fuel tank is emptied during truck operation. (Truck runs out of fuel)
- d. When the sedimentor (optional) is cleaned or drained.

1. Loosen the air vent plug on the top of the fuel filter body.

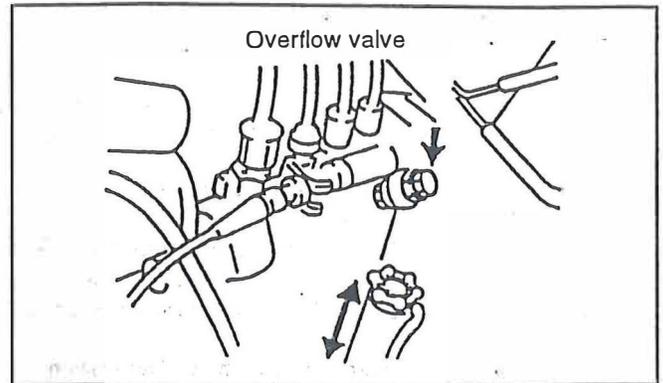


2. Loosen the top of the priming pump (unscrew the pump plunger). The priming pump is located on the side of the fuel injection pump.



3. Pump the priming pump plunger until fuel without air bubbles is discharged from the air vent plug on the fuel filter body. Close the air vent plug on the fuel filter body. Tightening torque: 0.6-0.9 kgm / (52-78 lbf in)

4. Next, loosen the injection pump's overflow valve, and pump the priming pump plunger until fuel without air bubbles is discharged from the overflow valve. Close the overflow valve. Tightening torque: 1.2-1.5 kgm / (104-130 lbf in)



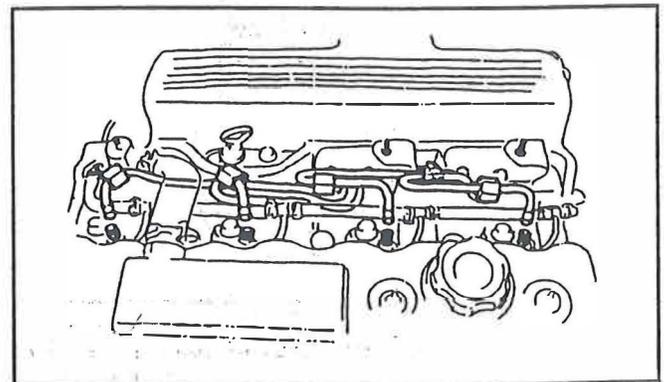
5. After bleeding the air out of the fuel filter and injection plug, press down the top of the priming pump plunger, and tighten it securely.



**CAUTION:** If you forget to tighten the priming pump plunger after completing the air bleeding process, fuel leaks can occur and/or the fuel injection pump can receive an insufficient fuel supply. A loose priming pump plunger can cause a hazardous situation (fuel leaks, fire hazard) or result in improper engine operation (low output, stalling, rough idling). Always push down the priming pump plunger and tighten it securely after completing the bleeding process.

6. After completing air bleeding, verify that no fuel is leaking from the air vent plug or the overflow valve.

7. Loosen the four flare nuts on the injection nozzle side of the injector fuel lines.



8. Crank the engine until fuel without air bubbles is discharged from the injector fuel lines.

**NOTE:** Do not crank the engine for extended periods without allowing the starter to cool.

9. Install the injection fuel lines. Tightening torque: 2.5-3.0 kgm / (217-260 lbf in)

10. Start the engine and verify that there are no fuel leaks.



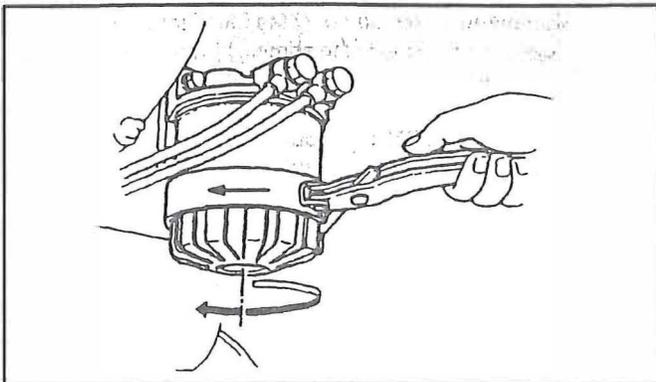
**WARNING:** Do not use your hand to check for high pressure leaks. High pressure fluid can penetrate the skin and may cause toxic symptoms if it enters the blood system. Use a piece of cardboard or paper next to high pressure lines and fittings to check for leaks.

### FUEL FILTER ELEMENT REPLACEMENT

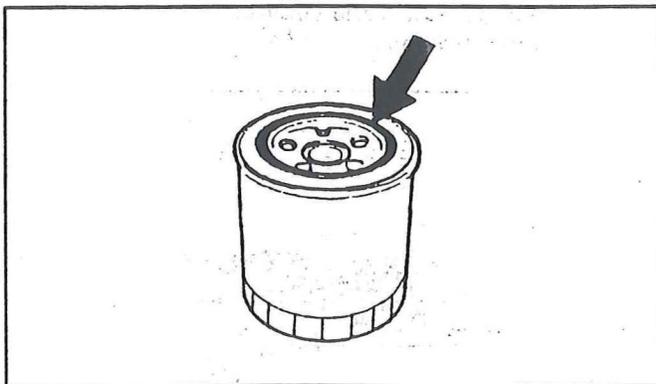


**WARNING:** Diesel fuel is flammable. Make certain there are no ignition sources (sparks, open flames, etc.) in the area during this procedure.

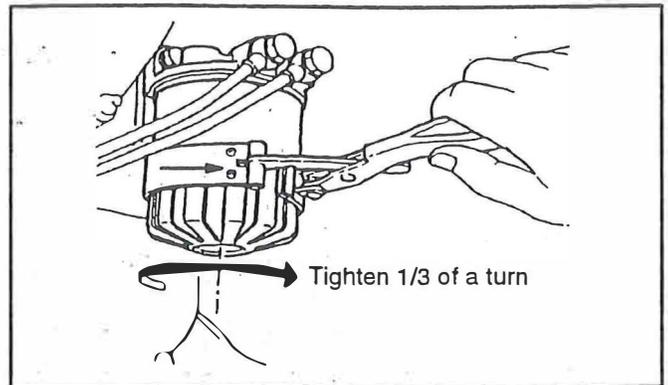
1. Remove the filter element with an oil filter wrench.



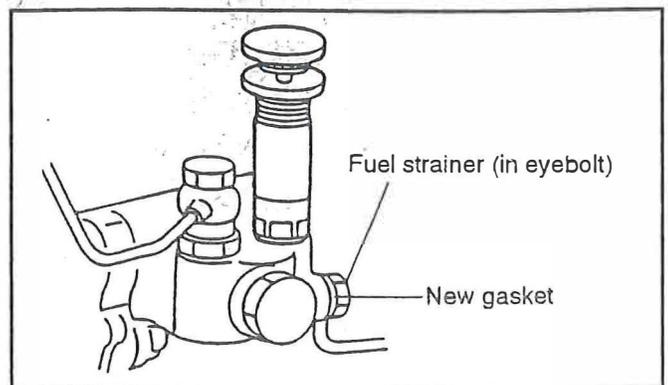
2. Apply a thin coat of light oil on the O-ring of the replacement filter.



3. Install the filter element on the filter body. Tighten it by hand until the O-ring contacts the filter body. Tighten the filter another 1/3 of a turn with the oil filter wrench.



4. Bleed the air from the filter. See: "**BLEEDING AIR FROM THE FUEL SYSTEM**".



### Replacement period:

Replace the element cartridge approximately once every six months or every 1200 hours.

### FUEL FEED PUMP STRAINER INSPECTION

1. Remove the strainer from the inlet of the fuel feed pump (located on the side of injection pump). Clean it with solvent and compressed air. Remove all traces of the cleaning solvent and dry completely before reinstallation.
2. Replace the two gaskets with new ones when reinstalling the strainer.  
Tightening torque: 2.0-2.5 kgm / (174-217 lbf in)
3. Bleed the air in the fuel after installing the strainer. See: "**BLEEDING AIR FROM THE FUEL SYSTEM**".
4. Start the engine, and verify that there are no fuel leaks.

### Fuel Feed Pump Strainer

Periodic cleaning and inspection: Once a month or every 200 hours.

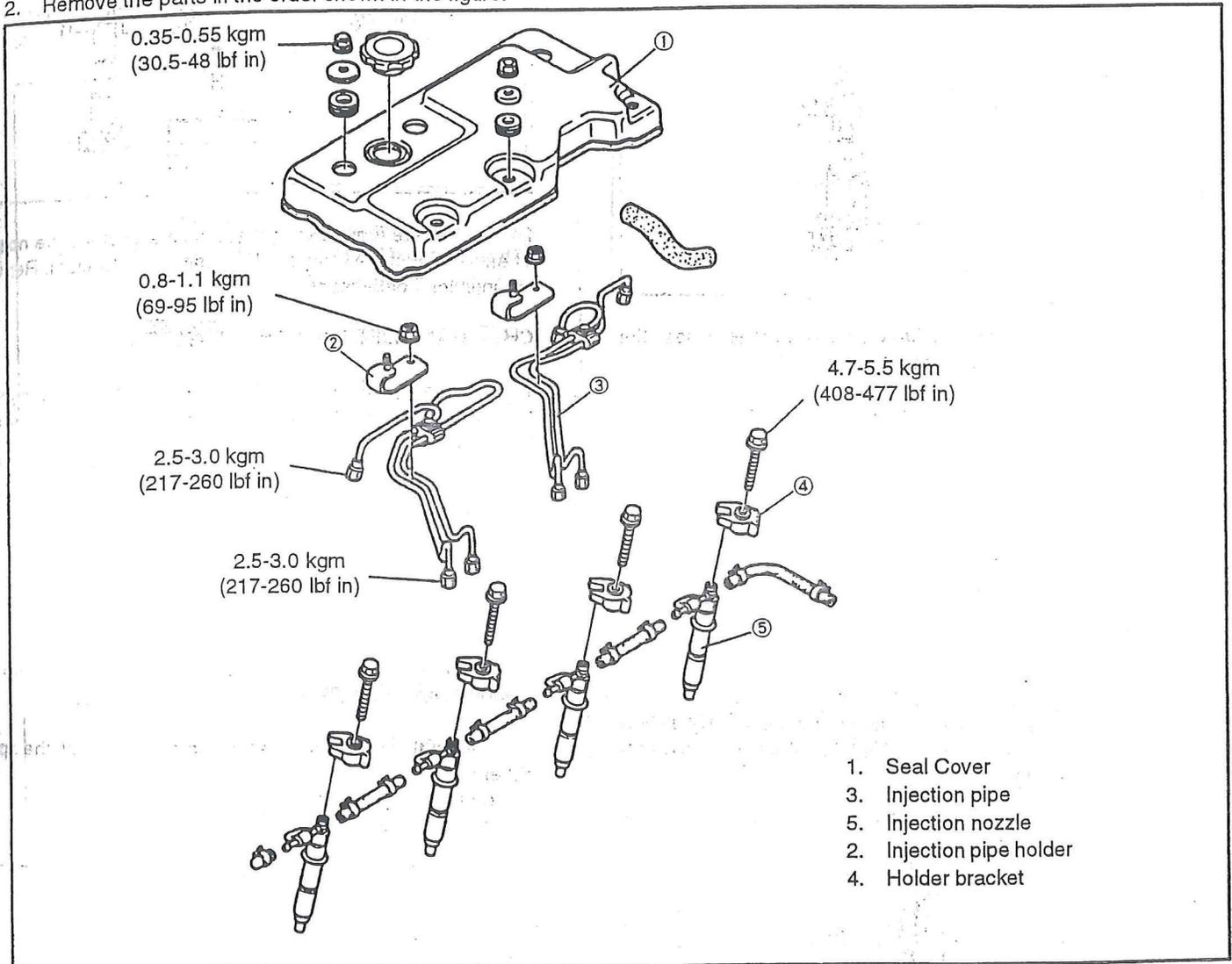
## INJECTORS-FUEL

### INJECTOR REMOVAL

1. Remove the negative (-) battery cable.
2. Remove the parts in the order shown in the figure.



**WARNING:** Diesel fuel is flammable. Make certain there are no ignition sources (sparks, open flames, etc.) in the area during this procedure.



### INSPECTION OF THE INJECTORS



**WARNING:** Do not touch the mist ejected from the injector nozzle when using the nozzle tester. The high pressure fluid exiting the nozzle can penetrate the skin and may cause toxic symptoms if it enters the blood system.



**WARNING:** Wear eye protection when testing the fuel injector nozzle.

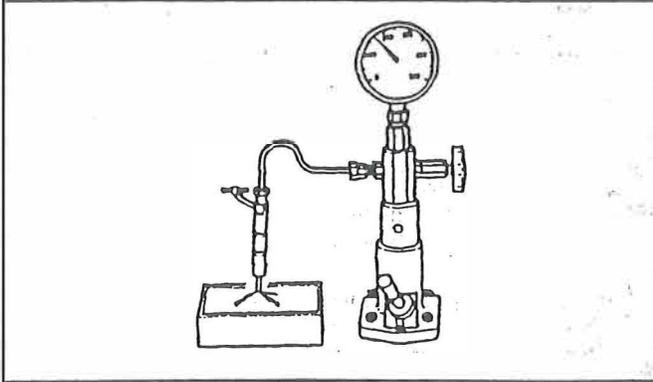
**NOTE:** Use clean Number 2-D Diesel Fuel – SAE J313a at 20°C / (68°F) for the nozzle tester. Replace the testing fuel when it gets dirty. Clean or replace the filter in the nozzle tester at the same time. Perform all testing in a clean location to prevent contamination of the testing equipment or nozzles.

Mazda TM Engine Parts contact:  
[EngineParts@HeavyEquipmentRestorationParts.com](mailto:EngineParts@HeavyEquipmentRestorationParts.com)

Phone: 2696731638

## CHECKING INJECTOR STARTING PRESSURE

1. Install the nozzle on the nozzle tester.



2. Pump the nozzle tester's handle several times to bleed the air from the injector and the tester.
3. Gradually lower the nozzle tester handle and verify that the injector opens at the proper pressure.

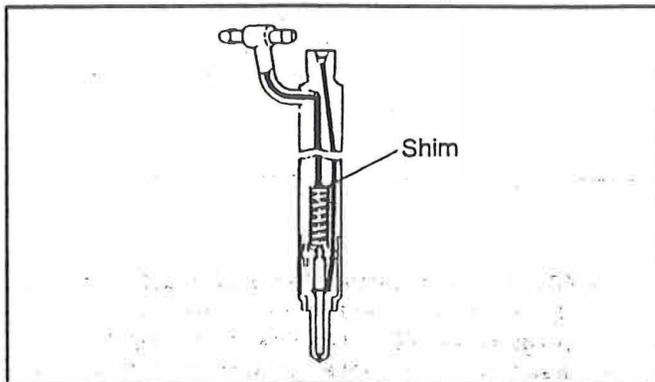
Injection starting pressure:

New injector: 210 kg/cm<sup>2</sup> / (2987 psi)

Used injector: 200 kg/cm<sup>2</sup> / (2845 psi)

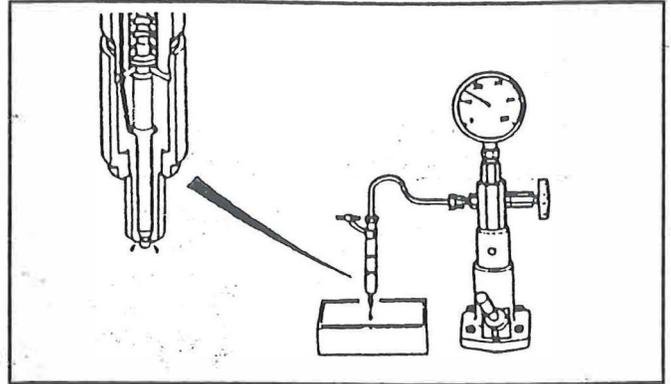
4. If the injector starting pressure is not the specified value, adjust the pressure by shimming, and then retest the injector as previously described.

**NOTE:** 21 sizes of shims from 0.5 to 1.5 mm / (.0197 to .0591 in) are available in 0.05 / (.00197 in) increments. The injection pressure will change approximately 5 kg/cm<sup>2</sup> / (71.1 psi) with each 0.05 mm / (.00197 in) size change.



## CHECKING VALVE SEAT INTEGRITY

1. While applying a pressure 20 kg/cm<sup>2</sup> / (284 psi) lower than the specified fuel injection pressure, make sure that no fuel leaks from the nozzle injection port.



2. If there are fuel leaks, disassemble and clean the nozzle. Then, reinspect the valve seat integrity (oil tightness). Replace the injector if necessary.

## CHECKING INJECTOR SPRAY PATTERN

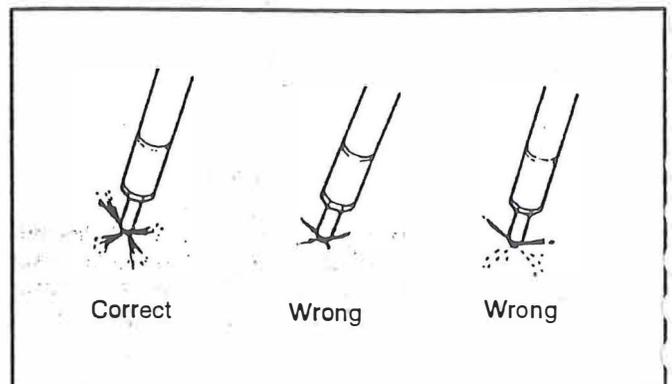
1. Remove or disable the pressure gauge on the injector tester. (The procedure varies between nozzle testers.) Install the nozzle on the nozzle tester.

**NOTE:** The pressure gauge must be disabled or removed from the nozzle tester for this test to be accurate. If the gauge is removed, be sure to install a plug in its place.

2. Pump the handle on the nozzle tester several times to bleed the air from the injector and the tester.
3. Rapidly pump the handle on the nozzle tester. (Pump the handle quickly so that a whistle like sound is heard.)
4. Repeat this procedure several times and check the spray pattern.

\* Is the mist equally vaporized?

\* Is the mist sprayed in the proper direction?

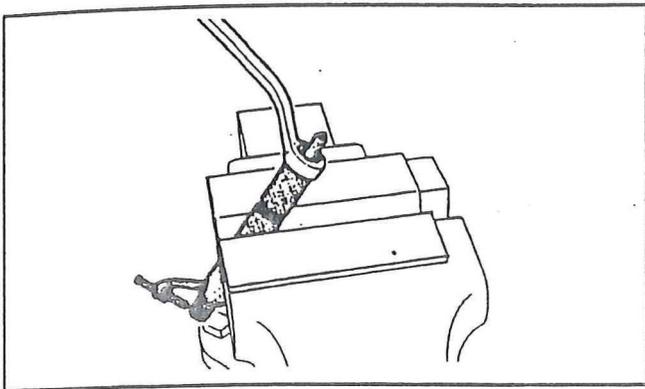


5. If the spray pattern is improper, disassemble and clean the nozzle. Reinspect the spray pattern after cleaning. Replace the injector if necessary.

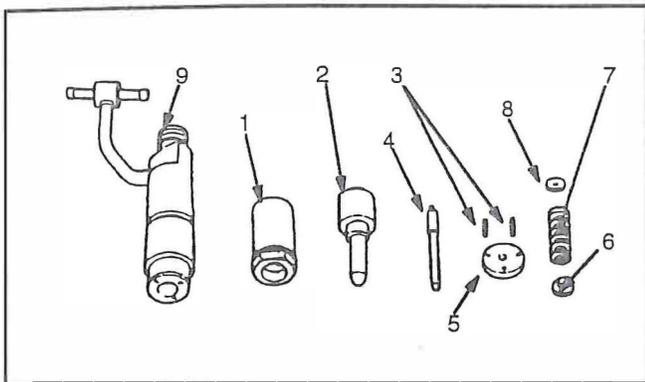
## DISASSEMBLY OF THE INJECTOR

1. Clamp the nozzle holder in the vice as shown in the illustration, and remove the retaining nut.

**NOTE:** Always use a protector over the jaws of the vice as shown in the illustration.



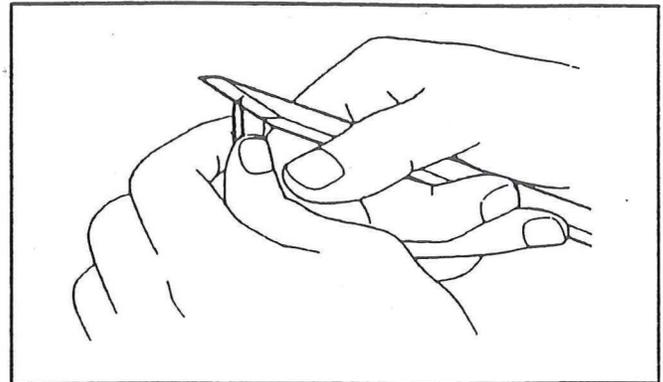
2. Disassemble as shown in the illustration.



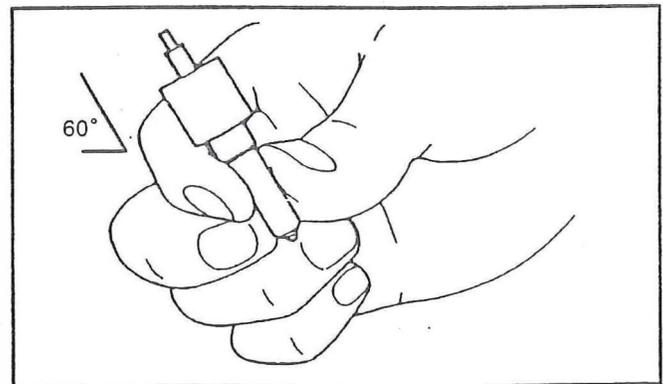
1. Retaining nut
2. Nozzle body (seat)
3. Guide pin
4. Needle valve
5. Spacer
6. Spring seat
7. Pressure spring
8. Shim
9. Nozzle holder

## CLEANING OF THE INJECTOR

1. Clean the parts with fresh diesel fuel. Start with the nozzle.
2. Clean any carbon off the nozzle with carburetor cleaner. Use a piece of hardwood to polish the nozzle if necessary.

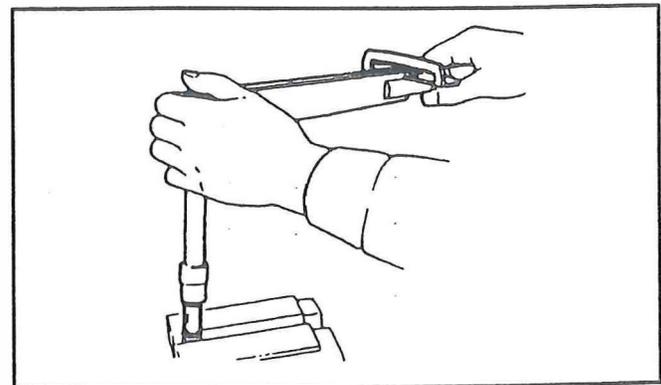


3. Inspect all parts for wear and damage.
4. Carefully inspect the nozzle body valve seat and the needle valve for damage. Place the needle valve in the nozzle body, tilt the body up 60° and check for binding (verify that the weight of the needle valve will cause it to slide to the seat).



## REASSEMBLY OF THE INJECTOR

1. Assemble the parts in reverse order of disassembly. Tightening torque: 3.0-4.0 kgm / (260-347.lbf in)

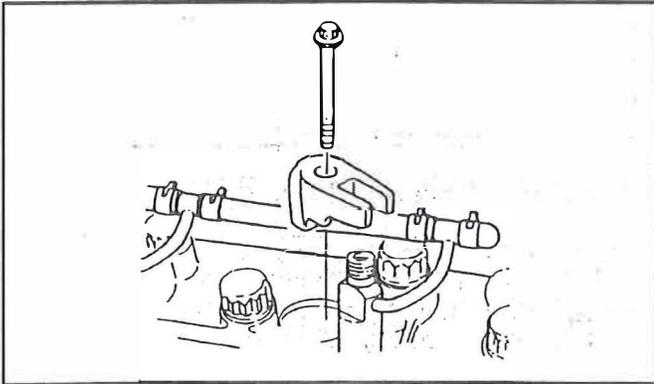


2. Always check the starting injection pressure, valve seat integrity (oil tightness) and spray pattern after assembly.

## INSTALLATION OF THE INJECTOR

**NOTE:** Always replace the gaskets and O-rings with new parts when reassembling the injector.

1. Install the parts using the removal procedure in reverse.  
Tightening torque: 4.7-5.5 kgm / (34-40 lbf ft)



2. Start the engine and check for compression and fuel leaks.

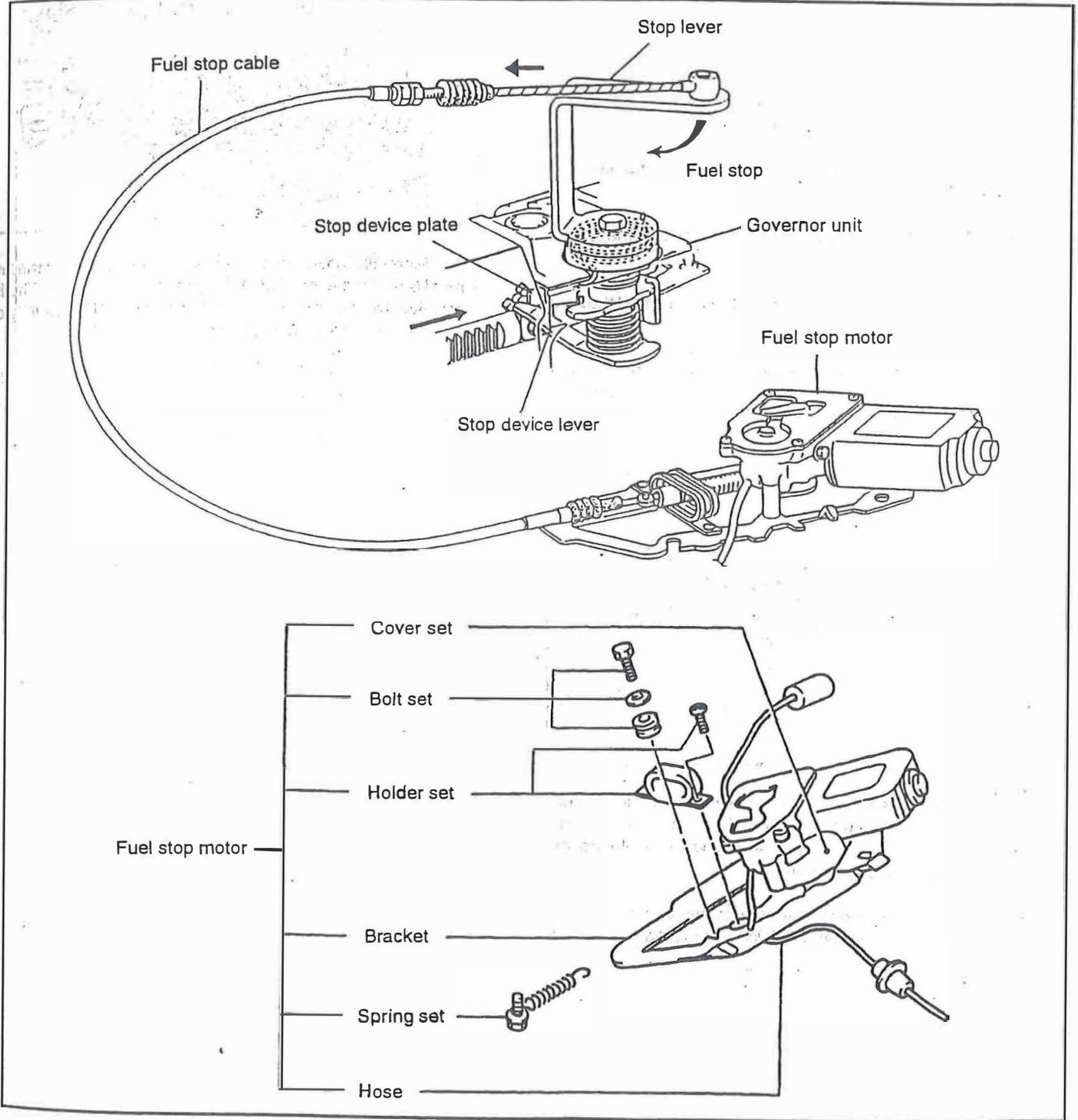


**WARNING:** Do not use your hand to check for high pressure leaks. High pressure fluid can penetrate the skin and may cause toxic symptoms if it enters the blood system. Use a piece of cardboard or paper next to high pressure lines and fittings to check for leaks.

## FUEL STOP MECHANISM

An electric fuel stop mechanism is used for the in-line injection pump on the TM engine.

When the ignition switch is turned from "ON" to "OFF", the fuel stop motor operates. The fuel stop lever on the injection pump is moved, and the fuel supply is stopped.



## FUEL STOP CABLE INSPECTION AND ADJUSTMENT

1. Check that the fuel stop cable is not rusted, frayed, kinked or damaged in any way. Check that the fuel stop cable moves freely inside the cable housing. Replace the fuel stop cable assembly if any binding or defects are found.

2. Check the fuel stop cable's tension. See: Step (3).

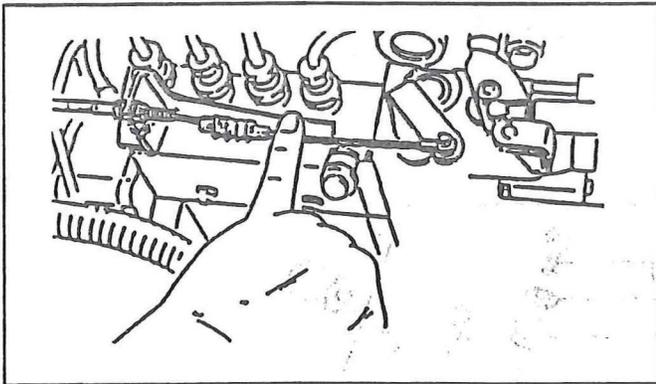
**NOTE:** Inspect the tension with the ignition switch "ON".  
(Fuel stop lever in the "FUEL ON" position)

3. Use the following procedure to replace or adjust the fuel stop cable.

(1) Install the cable at the fuel stop motor and turn the ignition switch "ON".

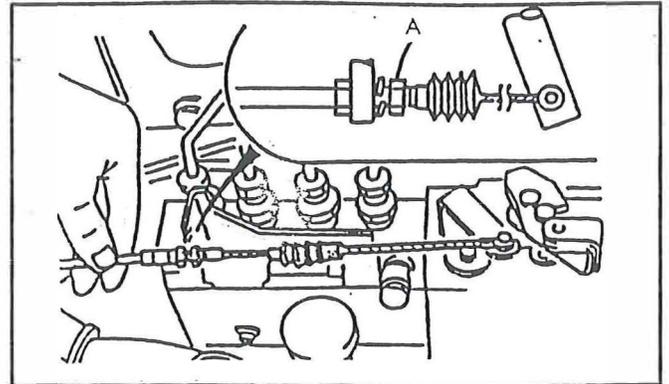
(2) Install the cable end on the fuel stop lever. Install the snap pin (retaining clip).

**NOTE:** It may be necessary to manually extend the fuel stop cable in order to attach the end of the cable to the fuel stop lever on the injection pump. The ignition switch must be "ON" in order to extend the fuel stop cable.



(3) Install the cable housing in the stationary bracket. Adjust the cable to allow approximately 3 mm / (.12 in) deflection with light pressure applied to the cable as shown in the illustration. Tighten the cable adjustment nut "A".

**NOTE:** Do not over tighten the stop cable. 3 mm / (.12 in) deflection with the ignition switch "ON" is necessary for proper operation.

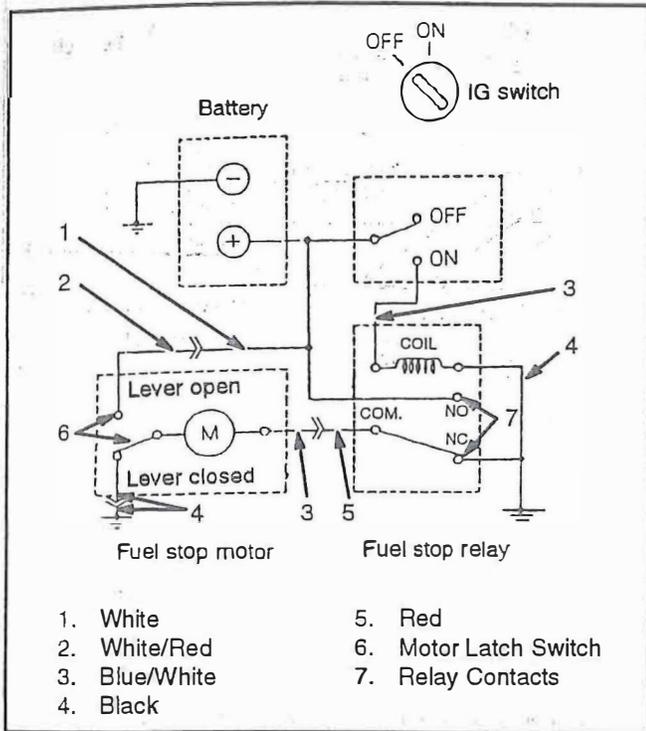


(4) Manually move the fuel stop lever and verify that the lever travel is not limited or restricted by the fuel stop cable. The fuel stop lever must be allowed to return fully to the "FUEL ON" position with the cable extended (ignition key "ON").

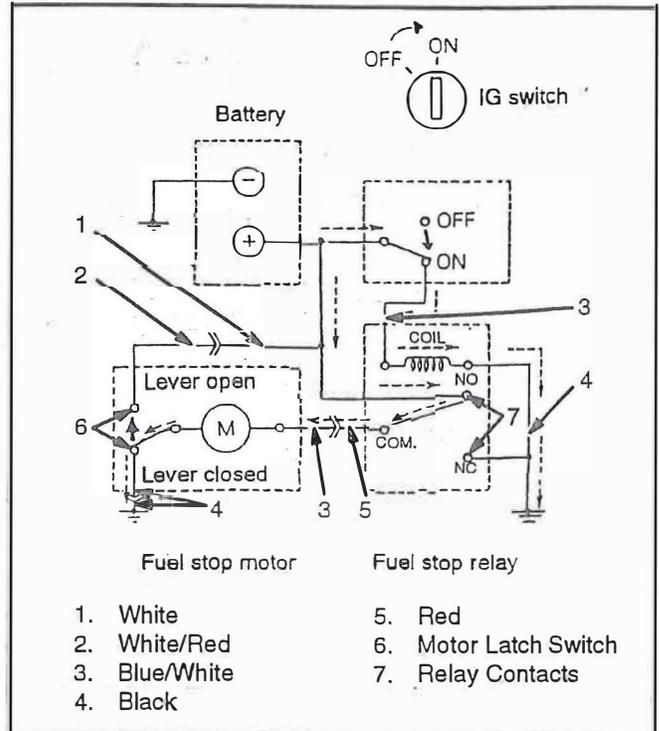
(5) Check that the fuel stop cable moves smoothly by cycling the ignition switch "ON" and "OFF". Recheck that the fuel stop arm is allowed to return completely to the "FUEL ON" position with the ignition switch ON. Check that the fuel stop arm is moved to the "FUEL OFF" position and that the engine stops when the ignition switch is moved to the "OFF" position.

## OPERATION OF THE FUEL STOP CONTROL

ENGINE OFF  
 IGNITION SWITCH OFF  
 FUEL STOP RELAY COIL DEENERGIZED  
 FUEL STOP MOTOR OFF  
 FUEL STOP LEVER CLOSED  
 FUEL OFF



ENGINE OFF  
 IGNITION SWITCH TURNED FROM OFF TO ON  
 FUEL STOP RELAY COIL ENERGIZED  
 FUEL STOP MOTOR OPERATING  
 FUEL STOP LEVER CLOSED, MOVING TO OPEN  
 FUEL BEING TURNED ON



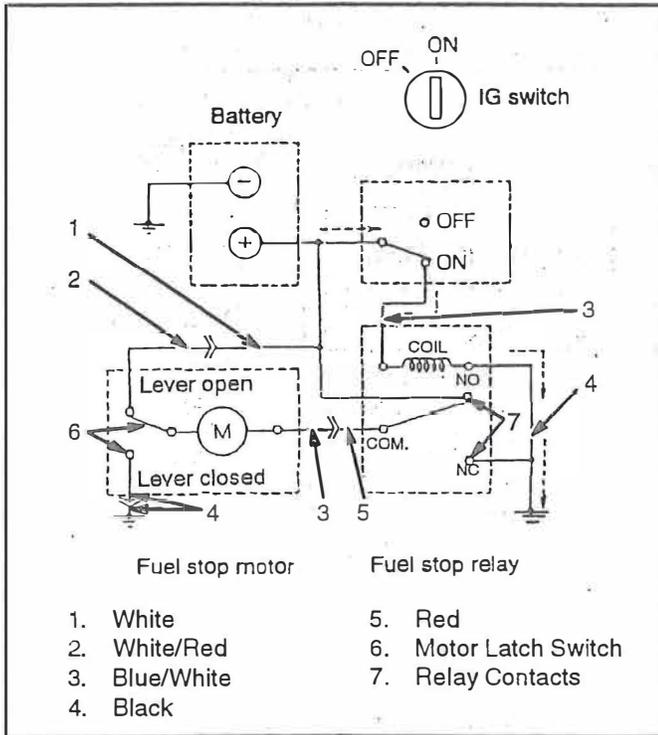
### When the ignition switch is OFF:

1. The fuel stop lever is stationary in the closed position (FUEL OFF).
2. The fuel stop cable is stationary and fully retracted. (FUEL OFF position.)
3. The fuel stop relay coil is deenergized.
4. The fuel stop motor is not operating (stationary).
5. The fuel stop motor is now connected to the "A" terminal (battery -) and the "B" terminal (battery -). The "D" terminal is not connected to the fuel stop motor circuit.

### When the ignition switch is turned from OFF to ON:

1. The fuel stop lever is initially in the closed position (FUEL OFF) (IGNITION SWITCH OFF).
2. The ignition switch is turned on and the fuel stop relay coil is energized.
3. The relay's normally open contacts switch from open to closed and supply battery (+) to the fuel stop motor "A" terminal.
4. The fuel stop motor is now connected to the "A" terminal (battery +) and the "B" terminal (battery -). The "D" terminal is not connected. The circuit is complete and the fuel stop motor operates to extend the fuel stop cable.
5. The fuel stop lever begins moving from the closed (FUEL OFF) to the open (FUEL ON) position.
6. The fuel stop cable extends completely. The latch switch in the fuel stop motor moves and changes the motor connection points.
7. Battery (+) is now supplied to both sides of the fuel stop motor and it stops operating. The fuel stop motor circuit is now connected to the "A" terminal (battery +) and the "D" terminal (battery +). The "B" terminal is no longer connected to the fuel stop motor circuit.

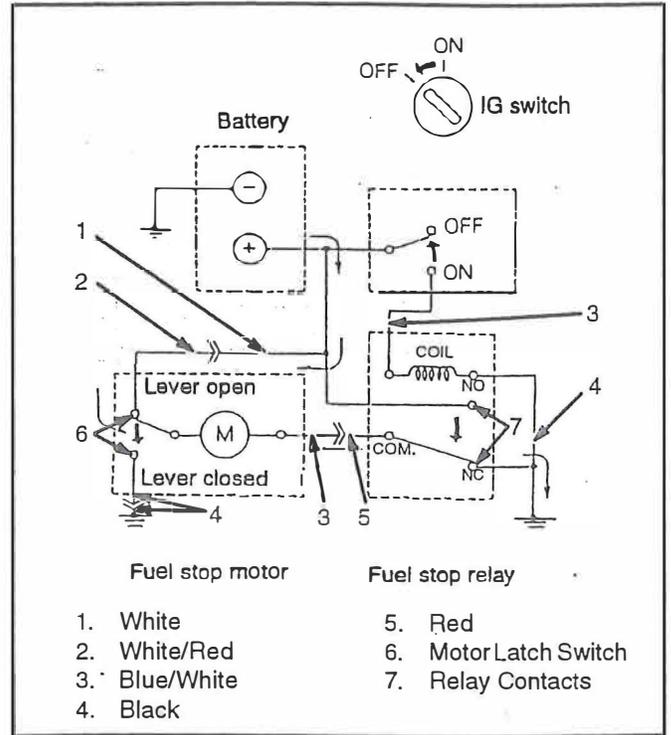
ENGINE ON  
IGNITION SWITCH ON  
FUEL STOP RELAY COIL ENERGIZED  
FUEL STOP MOTOR OFF  
FUEL STOP LEVER OPEN  
FUEL ON



When the ignition switch is ON:

1. The fuel stop lever is stationary in the open position (FUEL ON).
2. The fuel stop cable is stationary and fully extended. (FUEL ON position.)
3. The fuel stop relay coil is energized.
4. The fuel stop motor is not operating (stationary).
5. The fuel stop motor is now connected to the "A" terminal (battery +) and the "D" terminal (battery +). The "B" terminal is not connected to the fuel stop motor circuit.

ENGINE ON  
IGNITION SWITCHED TURNED FROM ON TO OFF  
FUEL STOP RELAY COIL DEENERGIZED  
FUEL STOP MOTOR OPERATING  
FUEL STOP LEVER OPEN, MOVING TO CLOSED  
FUEL BEING TURNED OFF



When ignition switch is turned from ON to OFF:

1. The fuel stop lever is initially in the open position (FUEL ON) (IGNITION SWITCH ON).
2. The ignition switch is turned off and the fuel stop relay coil is deenergized.
3. The relay's normally open contacts switch from closed to open and supply battery (-) to the fuel stop motor "A" terminal.
4. The fuel stop motor is now connected to the "A" terminal (battery -) and the "D" terminal (battery +). The "B" terminal is not connected. The circuit is complete and the fuel stop motor operates to retract the fuel stop cable.
5. The fuel stop lever begins moving from the open (FUEL ON) to the closed (FUEL OFF) position.
6. The fuel stop cable retracts completely. The latch switch in the fuel stop motor moves and changes the motor connection points.
7. Battery (-) is now supplied to both sides of the fuel stop motor and it stops operating. The fuel stop motor circuit is now connected to the "A" terminal (battery -) and the "B" terminal (battery -). The "D" terminal is no longer connected to the fuel stop motor circuit.