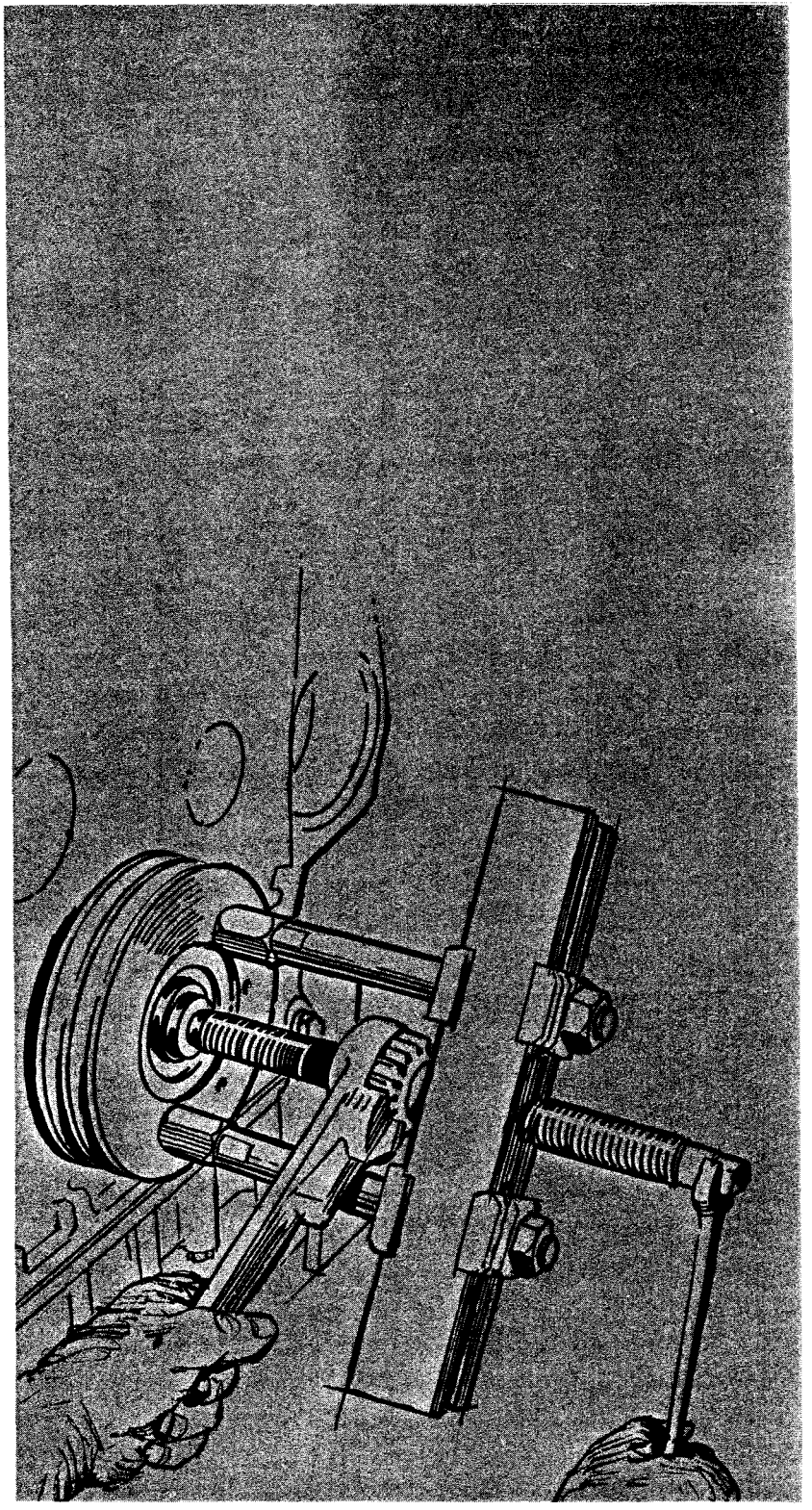

SERVICE MANUAL

# DISASSEMBLY AND ASSEMBLY
# SLEEVE METERING FUEL SYSTEM

FOUR AND SIX CYLINDER
4.75" BORE ENGINES

# INTRODUCTION

This publication has instructions and procedures for the subject on the front cover. The information, specifications, and illustrations in this publication are on the basis of information that was current at the time this issue was written.

The "Alphabetical Index" is a list of all components and service operations in this manual section. It gives page numbers and also the operations numbers as found in the "Service Index".

The "Service Index" is a list of all component operations found in this manual section. All operations in the column "Component Operation" are removal and installation instructions, unless other descriptions are given for the operation. The arrangement of the components in this list is by location on the machine or engine. The column "Other Needed Operations" gives the number of all other component operations that are necessary to do the respective job.

Correct operation, maintenance, test and repair procedures will give this product a long service life. Before starting a test, repair or rebuild job, the serviceman must read the respective sections of the Service Manual, and know all the components he will work on.

Your safety, and the safety of others, is at all times very important. When you see this symbol or this symbol in the manual, you must know that caution is needed for the procedure next to it. The symbols are warnings. To work safely, you must understand the job you do. Read all instructions to know what is safe and what is not safe.

It is very important to know the weight of parts. Do not lift heavy parts by hand. Use a hoist. Make sure heavy parts have a good stability on the ground. A sudden fall can cause an accident. When lifting part of a machine, make sure the machine has blocks at front and rear. Never let the machine hang on a hoist, put blocks or stands under the weight.

When using a hoist, follow the recommendation in the manual. Use correct lift tools as shown in illustrations to get the correct balance of the component you lift. This makes your work safer at all times.

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| Fuel Injection Pumps, Disassemble & Assemble | 28,29 | 12 |
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## SERVICE INDEX


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| 3 | Fuel Shutoff Solenoid, Disassemble & Assemble | 2 | 8,9 |
| 4 | Fuel Ratio Control | | 10,11 |
| 5 | Fuel Ratio Control, Disassemble & Assemble | 4 | 10,11 |
| 6 | Adapter Housings and Levers | 2,4,7 | 12,13 |
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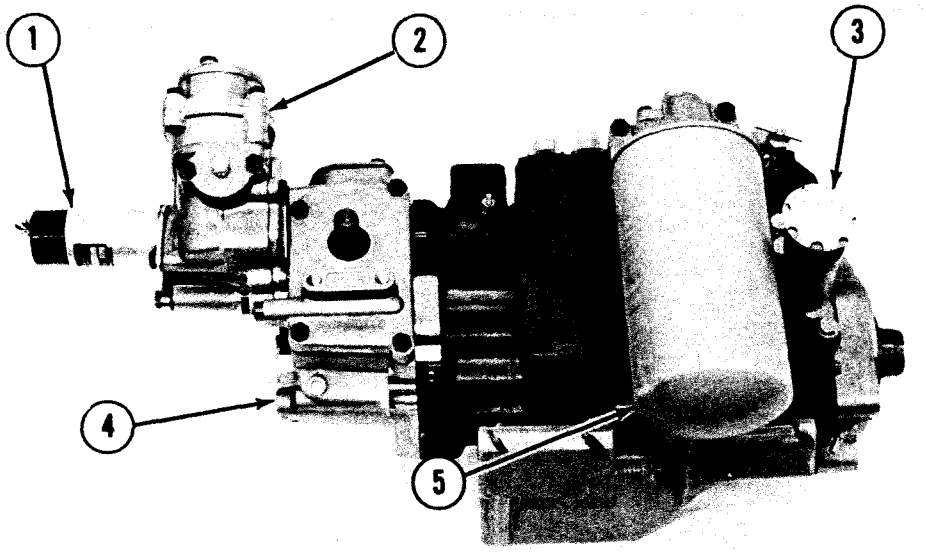
**DISCONNECT BATTERIES BEFORE PERFORMANCE OF ANY SERVICE WORK**

# GENERAL INFORMATION




A04121X1

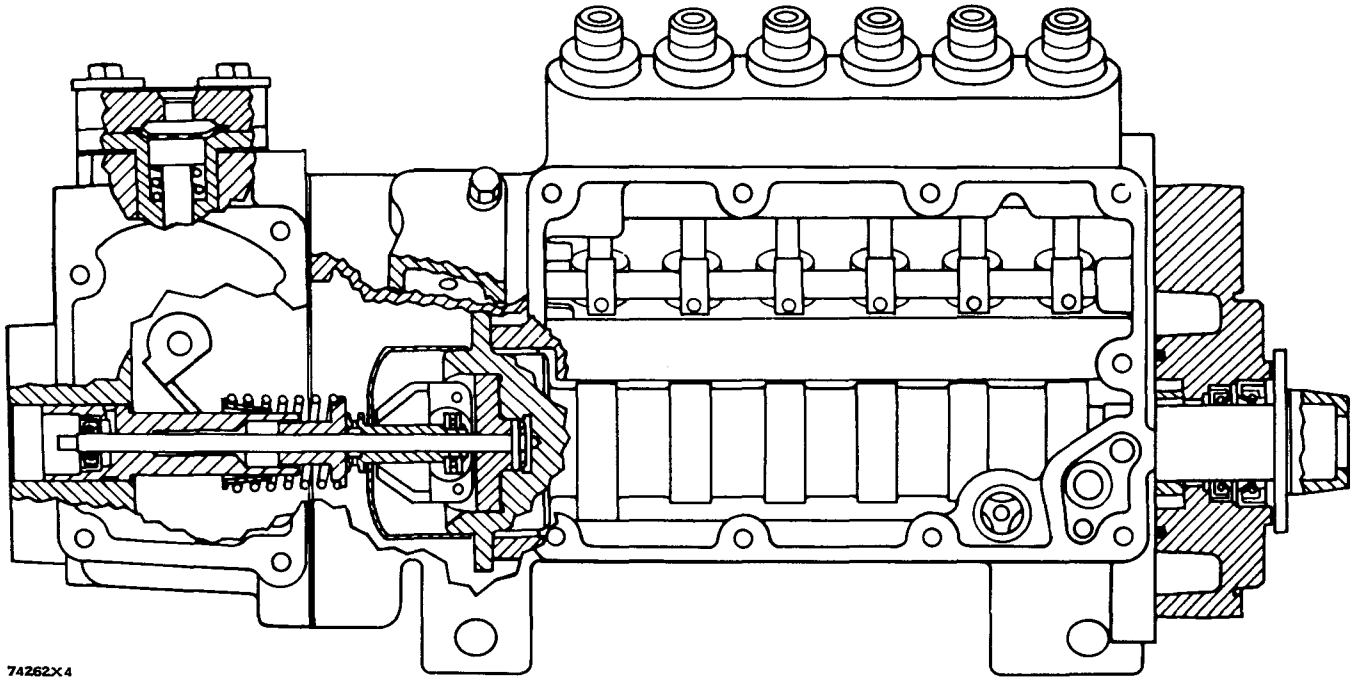
1. Fuel Shutoff Solenoid.
2. Fuel Ratio Control.
3. Fuel Priming Pump.
4. Adapter Housing.
5. Fuel Filter.

The Sleeve Metering Fuel System is adaptable to all four and six cylinder 4 3/4 bore engines with the correct arrangement of parts. The parts can be changed from one fuel system to another. The engine arrangement shows the correct parts needed on the fuel system for the engine.

Listed are some of the components that can be on the Sleeve Metering Fuel System and the different ways they can be installed.

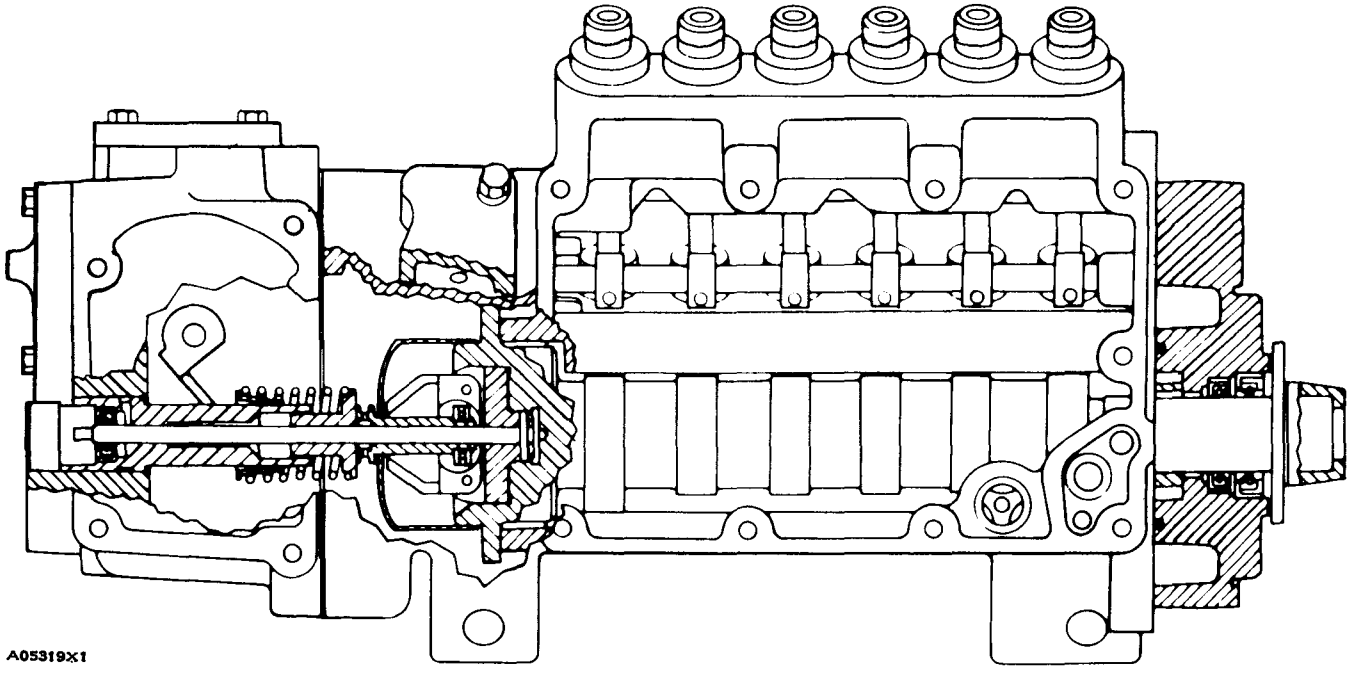
a) The fuel shutoff solenoid can be installed in two positions on the adapter housing.
b) There are two different adapter housings for the fuel system.
c) The fuel systems can be equipped with or without a fuel ratio control.
d) The fuel filter and priming pump can be installed on the cover or on the engine.
e) The governor spring is color coded for identification.
f) Torque control group has a screw or shim adjustment.

## SLEEVE METERING FUEL SYSTEM WITH SPEED LIMITER (EARLIER FUEL SYSTEM)



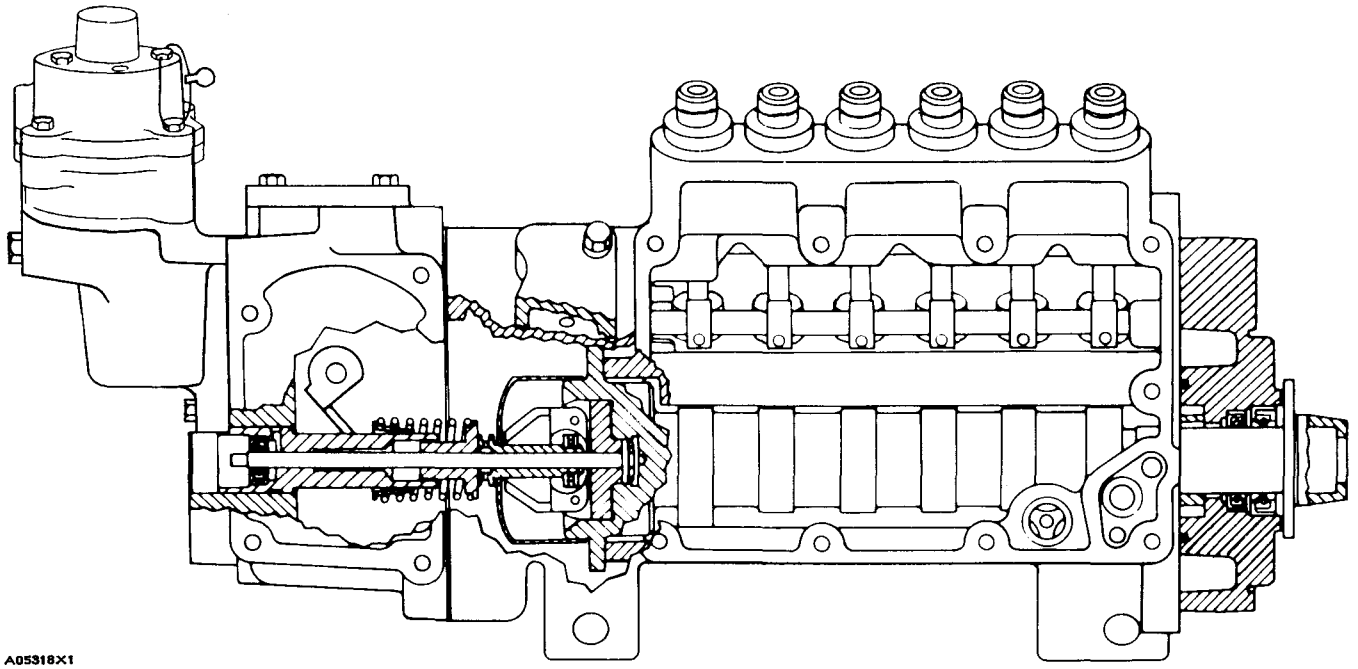
74262X4

## SLEEVE METERING FUEL SYSTEM WITHOUT SPEED LIMITER (LATER FUEL SYSTEM)



A05319X1

# SLEEVE METERING FUEL SYSTEM WITH FUEL RATIO CONTROL



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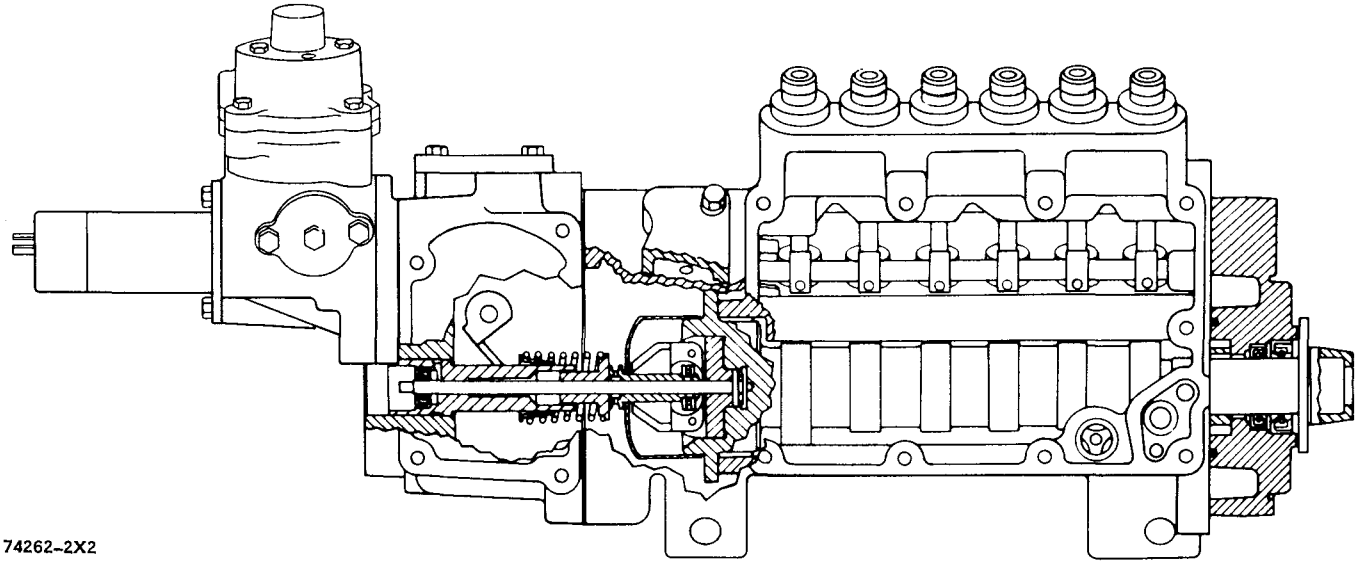
# SLEEVE METERING FUEL SYSTEM WITH FUEL RATIO CONTROL AND FUEL SHUTOFF SOLENOID

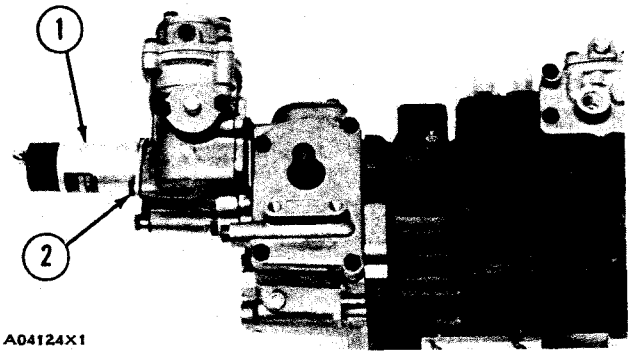


74262-2X2

# FUEL SHUTOFF SOLENOID

## REMOVE FUEL SHUTOFF SOLENOID 11–1259

1. Remove bolts (2) and remove the solenoid (1).

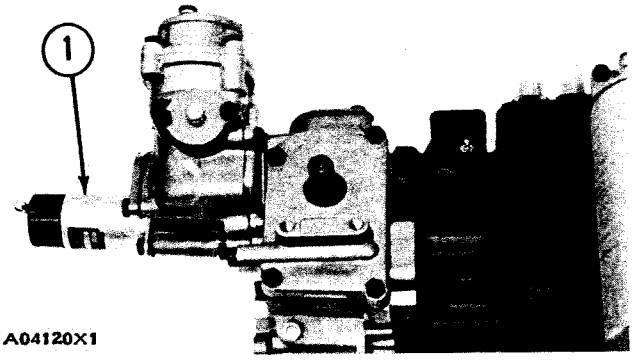


A04124X1

NOTE: The fuel shutoff solenoid can be installed in two positions on the housing. It can be activated to run or activated to stop.

## INSTALL FUEL SHUTOFF SOLENOID 12–1259

1. Put the fuel shutoff solenoid (1) in position on housing and install bolts.

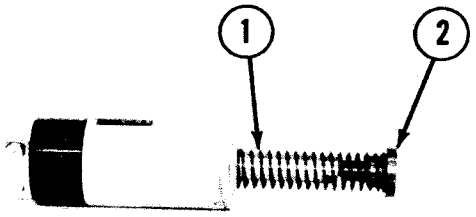


A04120X1

## DISASSEMBLE FUEL SHUTOFF SOLENOID 15–1259

start by:
a) remove fuel shutoff solenoid

1. Remove piston, shaft (2) and spring (1) from solenoid.



A04146X1

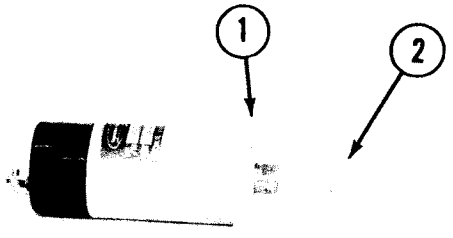
NOTE: The solenoid that is activated to run has a spring and the one that is activated to stop does not.

## ASSEMBLE FUEL SHUTOFF SOLENOID16–1259

1. Install spring, piston and shaft.

2. The solenoid with the spring must have the shaft installed tight against the piston.

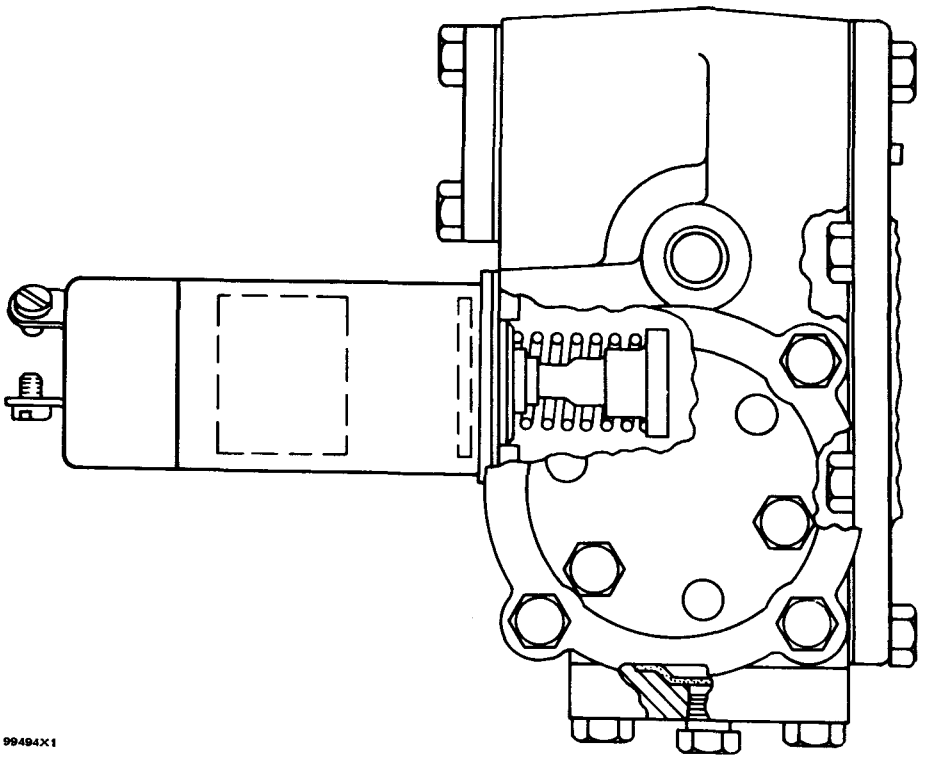
3. The solenoid without the spring must have 1.397 ± .010 in. (35.48 ± 0.25 mm) from face of plate (1) to inside edge of the end of shaft (2). Make sure the piston is pushed all the way in when checking the measurement.



A04151X1

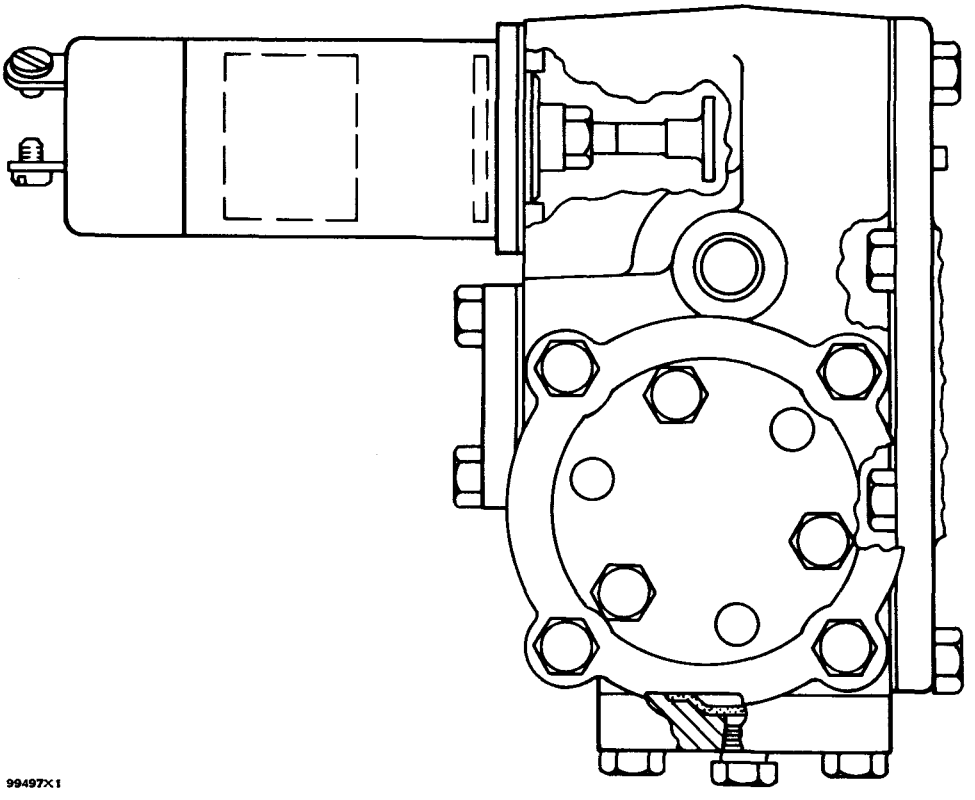
end by:
a) install fuel shutoff solenoid

## FUEL SHUTOFF SOLENOID ACTIVATED TO RUN



99494X1

## FUEL SHUTOFF SOLENOID ACTIVATED TO STOP



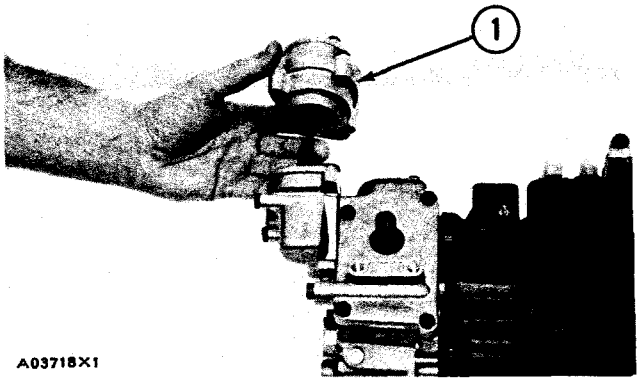
99497X1

# FUEL RATIO CONTROL

## REMOVE FUEL RATIO CONTROL 11–1278

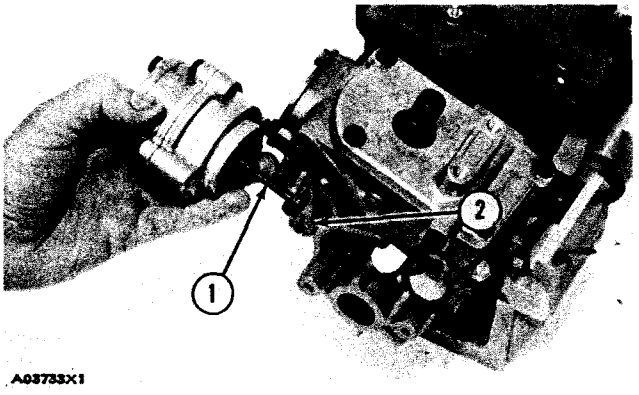
1. Remove two bolts from fuel ratio control.
2. Remove fuel ratio control (1) from adapter housing.

NOTE: There are two different adapter housings. The removal and installation of the fuel ratio control is the same for each.




## INSTALL FUEL RATIO CONTROL 12–1278

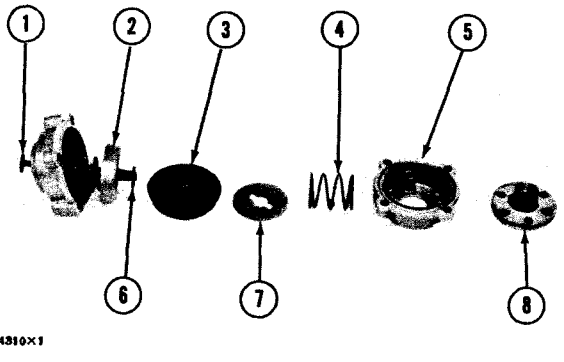
1. Put the fuel ratio control in position on adapter housing with the bolt (1) engaged in arm (2) as shown.
2. Make adjustment to the fuel ratio control. See TESTING AND ADJUSTING.




## DISASSEMBLE FUEL RATIO CONTROL 15–1278

start by:
a) remove fuel ratio control

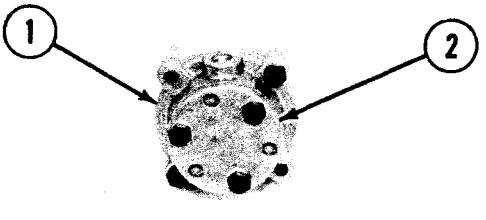
1. Remove bolts and remove cover (8).
2. Remove cover (5), spring (4), washer (7) and diaphragm (3) from housing.
3. Remove pin (6) from bolt (1).
4. Remove bolt from retainer (2) and housing.



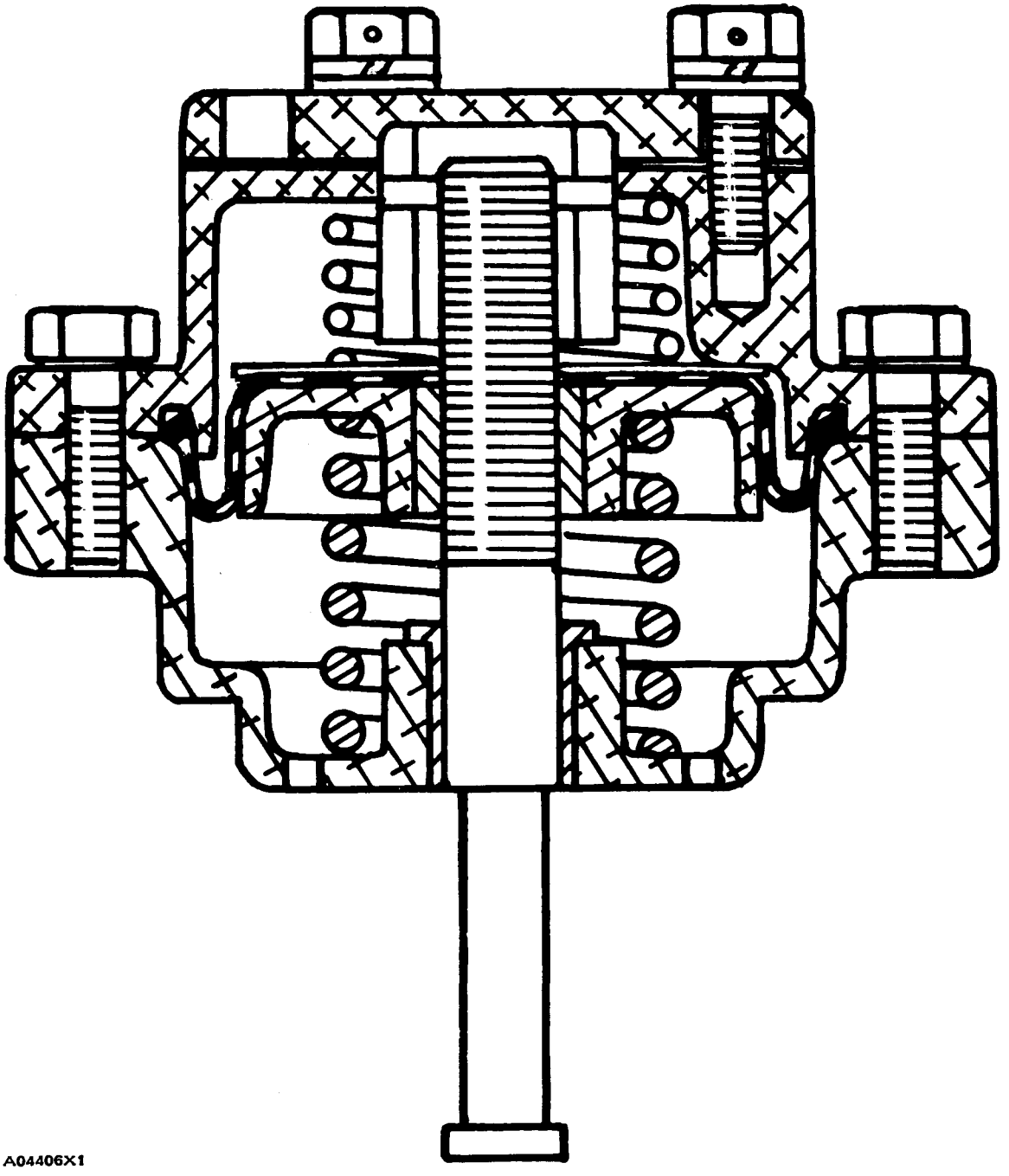

## ASSEMBLE FUEL RATIO CONTROL 16–1278

1. Install bolt in housing and retainer.
2. Install pin in the bolt.
3. Install diahpragm, washer, spring and cover (1) on housing.
4. Install top cover (2).

end by:
a) install fuel ratio control



# FUEL RATIO CONTROL



A04406X1

# ADAPTER HOUSINGS AND LEVERS

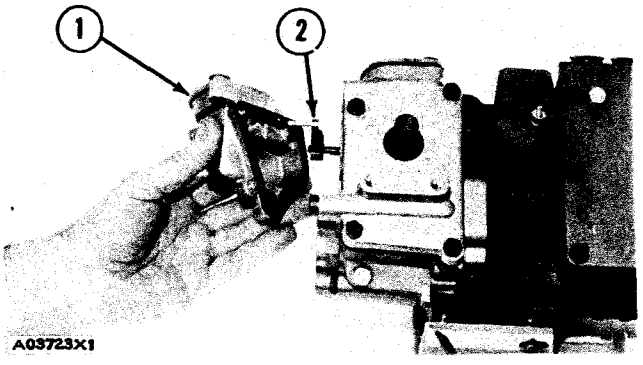
## REMOVE ADAPTER HOUSINGS AND LEVERS (IF SO EQUIPPED)

start by:

a) remove fuel ratio control

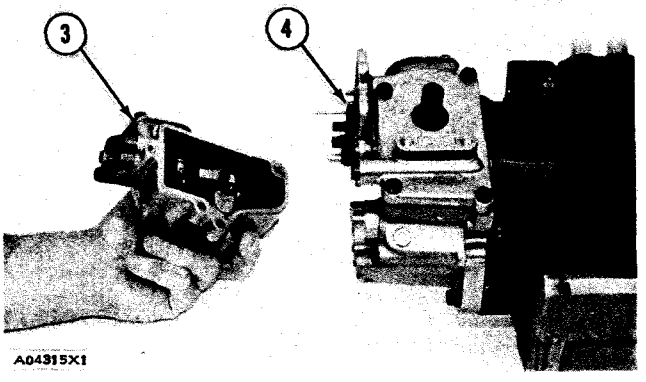
b) remove fuel shutoff solenoid

1. Remove adapater housing (1) from governor housing.



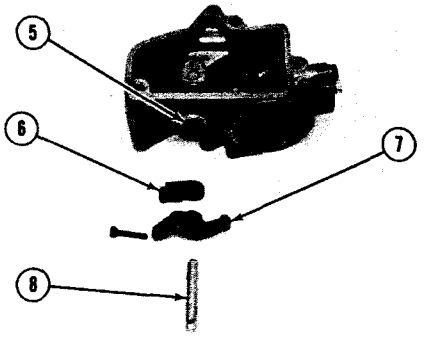

NOTE: There are two different adapter housings used with the fuel system. Adapter housing (1) is used when only a fuel ratio control is needed. Adapter housing (3) is used when a combination of fuel ratio control, fuel shutoff solenoid and oil pressure safety shutoff is needed.

2. Remove control lever (2) or (4) from shaft.



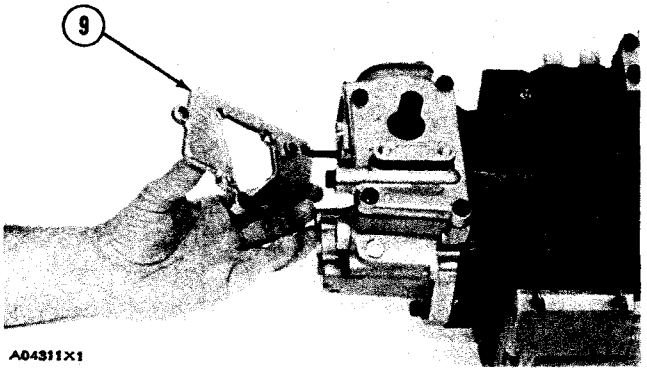

NOTE: There is a different control lever for each adapter housing. On a truck fuel system, there is a spring between the lever and governor housing.

3. Remove shaft (8), lever assembly (7) and lever (6) from adapter housing.




4. Remove seal (5) from adapter housing.

5. Remove base (9) from governor housing.

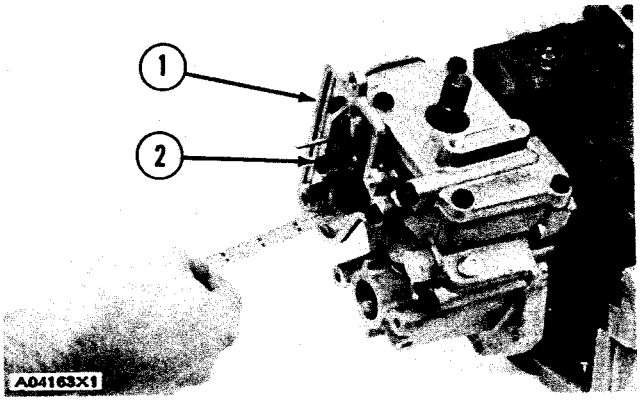


# ADAPTER HOUSINGS AND LEVERS

## INSTALL ADAPTER HOUSINGS AND LEVERS (IF SO EQUIPPED)

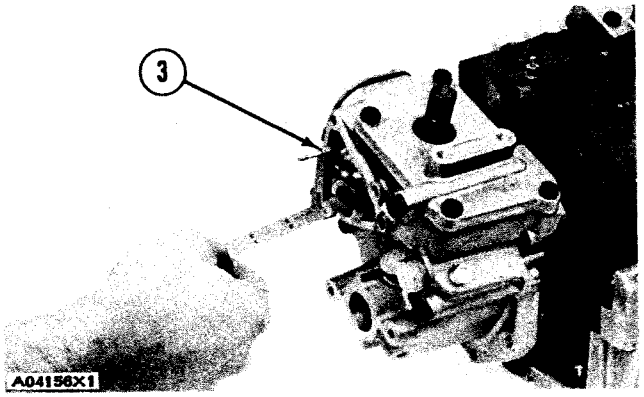
1. Install base (1) on governor housing.

2. Install control lever (2) on shaft which is for adapter housing (5).



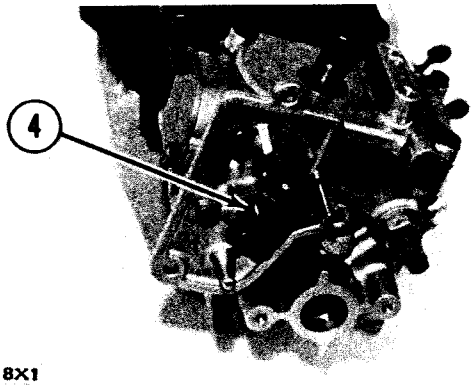

3. Check the distance between the governor housing and inside of lever (2). This distance must be .438 ± .010 in. (11.13 ± 0.25 mm) with the shaft pulled out tight against the governor housing.

4. Install control lever (3) which is for the adapter housing that has fuel ratio control only.




5. Check the distance between the inside of lever (3) and governor housing. This distance must be .590 ± .010 in. (14.99 ± 0.25 mm) with the shaft pulled out tight against the inside of the governor housing.

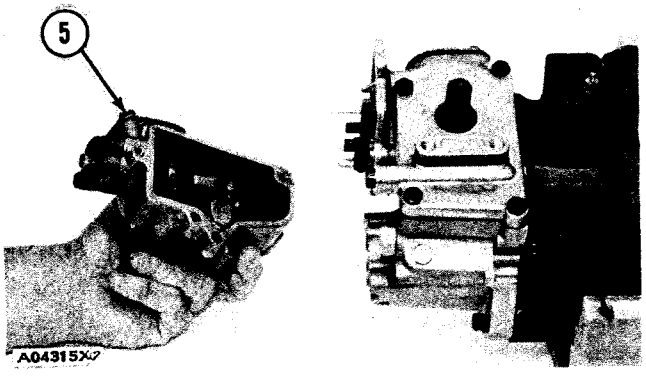
NOTE: On a truck fuel system, there is a spring (4) between the lever and governor housing. This spring must be turned (wound) 1 1/4 turns clockwise to get a preload when installed.




6. Install seal in adapter housing.

7. Install lever, lever assembly and shaft.

8. Install adapter housing (5) on base.

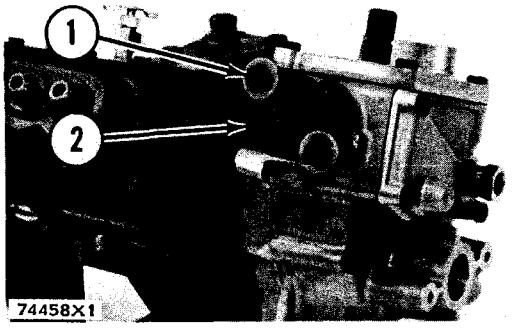



end by:
a) install fuel shutoff solenoid
b) install fuel ratio control

# SPEED LIMITER

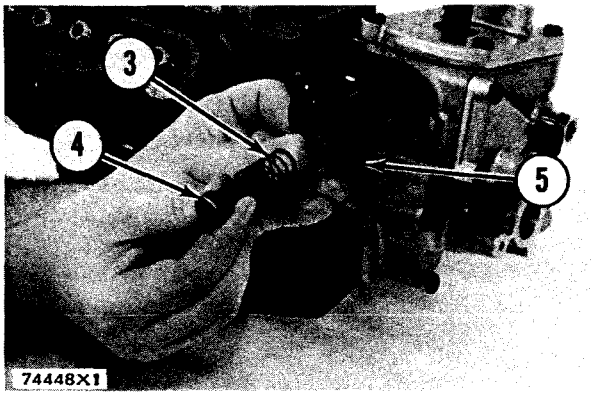
## REMOVE SPEED LIMITER (Earlier Fuel Systems) 11–1268

1. Remove the bolts (1) and washers that hold the cover (2) to governor housing. Remove the cover (2).




2. Remove the diaphragm from governor housing.

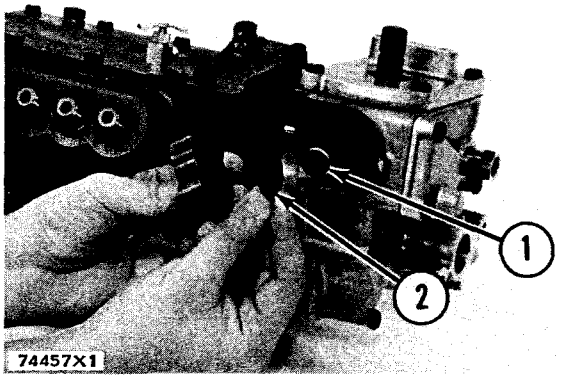
3. Remove the plunger (4) and spring (3) from governor housing.




4. Remove the body (5) from the governor housing.

## INSTALL SPEED LIMITER (Earlier Fuel Systems) 12–1268

1. Install the body, spring, and plunger (1).

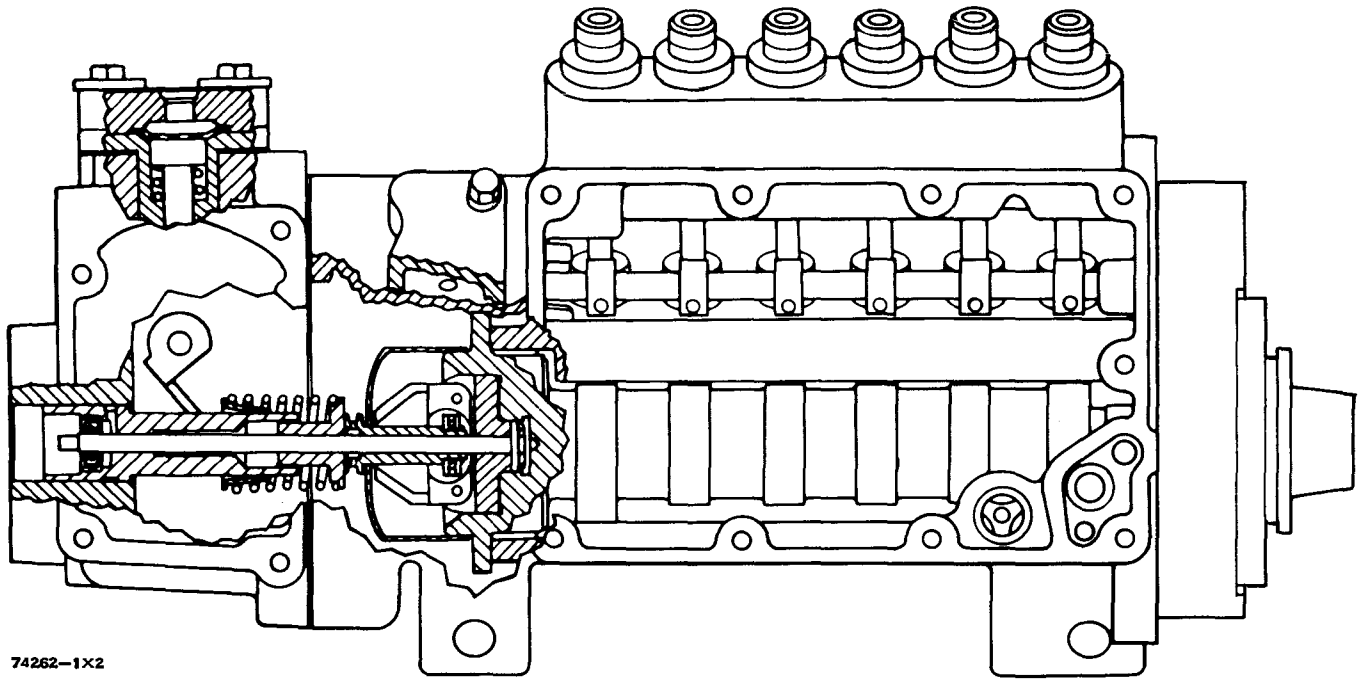



2. Install the diaphragm (2) and cover.

3. Install the bolts (3) and washers.

4. See ADJUSTMENT of SPEED LIMITER in TESTING AND ADJUSTING.

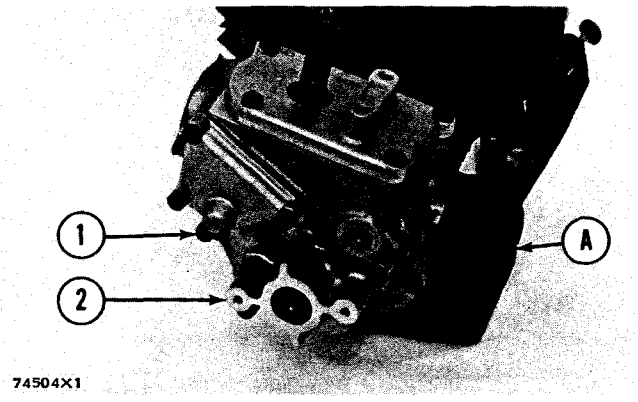
# SLEEVE METERING FUEL SYSTEM WITH SPEED LIMITER (EARLIER FUEL SYSTEMS)



# FUEL INJECTION PUMP HOUSING AND GOVERNOR

## SEPARATION OF GOVERNOR FROM FUEL INJECTION PUMP HOUSING

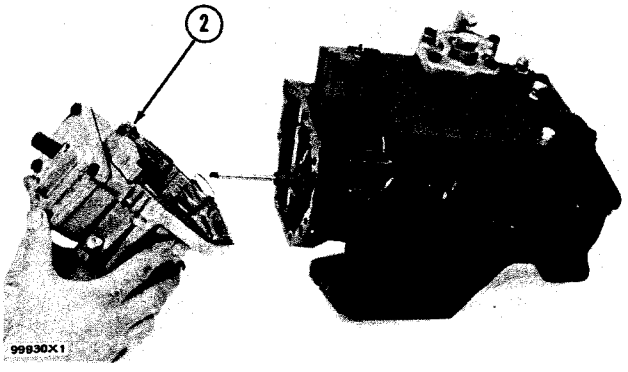
| Tools Needed | | A | B |
|---|---|---|---|
| 2P8315 | Bracket Assembly | 1 | |
| 5P302 | Bar | | 1 |



74504X1

1. Put the fuel injection pump housing on tool (A).

2. Remove bolts (1) that hold the governor housing (2) to the fuel injection pump housing.



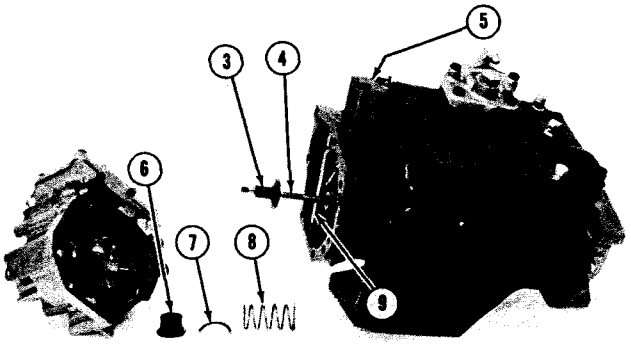
99830X1

3. Remove governor housing (2) from pump housing.

4. Remove cover (5) over the torque spring.

5. Remove spring (8), (wave) washer (7) and guide (6) from governor housing.

6. Remove seat (3) and over fueling spring (4).

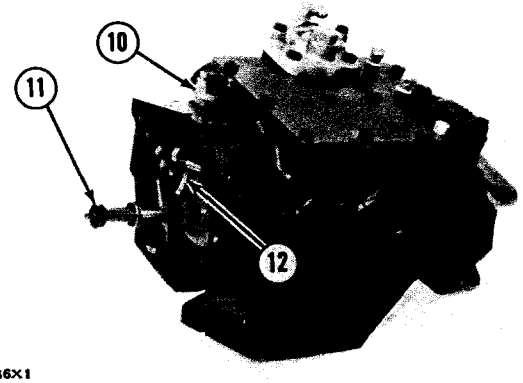


99741X1

7. Pull shaft (9) up and remove shaft and lever from the housing.

8. Remove torque spring assembly (10) and pin.

NOTE: Some fuel systems do not have a torque spring. They have only a stop.



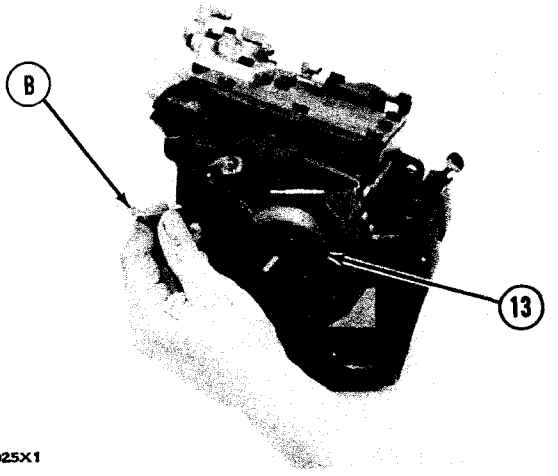
99946X1

9. Remove riser (follower) (11) from the shaft.

10. Remove ring and lever (12) from the dowel.

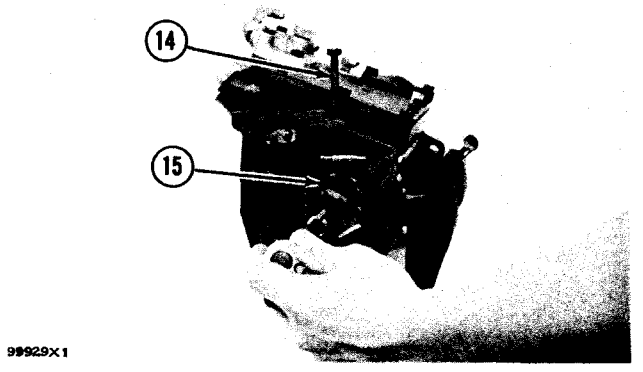
# FUEL INJECTION PUMP HOUSING AND GOVERNOR

11. Remove cover (13) for the flyweights with tool (B).



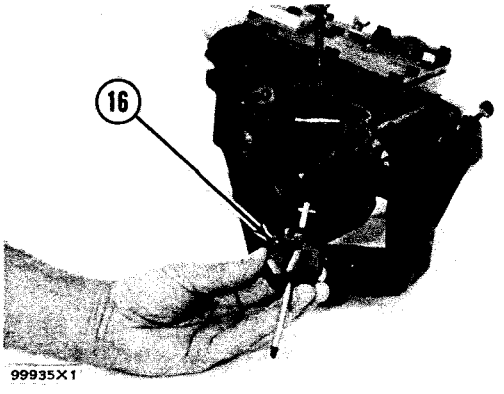

NOTE: Tool (B) can cause damage to the cover. Always inspect cover and install a new cover if needed.

12. Install timing pin (14) to hold the camshaft from turning.




13. Remove bolts (15) that hold flyweight assembly to camshaft.

14. Remove the flyweight assembly (16) from the fuel injection pump housing.




15. Remove the timing pin from the housing.

# FUEL INJECTION PUMP HOUSING AND GOVERNOR

## CONNECTION OF GOVERNOR TO FUEL INJECTION PUMP HOUSING

| Tools Needed | | A | B |
|---|---|---|---|
| 2P8315 | Bracket Assembly | 1 | |
| 5P301 | Driver | | 1 |

1. Put the fuel injection pump housing on tool (A).

2. Install timing pin (1) to keep the camshaft from turning.

3. Put flyweight assembly (2) in position on the camshaft.

CAUTION: Be sure pin (3) that holds shaft is in the correct position on back of the flyweight assembly.

4. Install new bolts for the flyweight assembly.

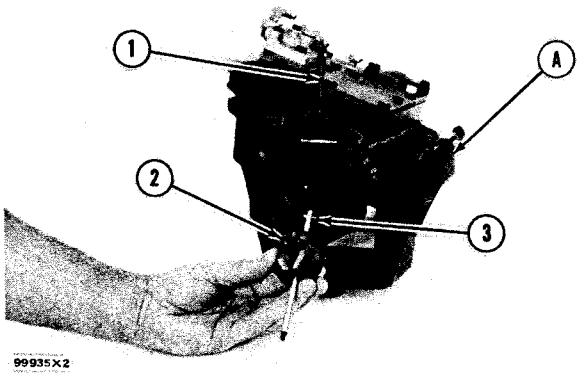
NOTE: The bolts for the flyweight assembly have a locking material on the threads and must not be used more than one time.

5. Install cover over the flyweight assembly with tool (B).

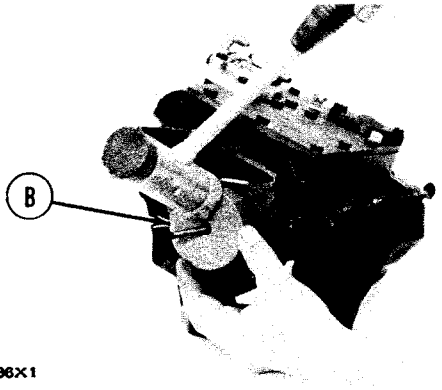
6. Grind a taper on the bottom edge of a 1/8" screwdriver (4). Install the screwdriver through the bolt hole in the governor housing. The screwdriver must fit evenly against the flyweight assembly cover. Make a mark (stake) in four places around the cover in line with the groove in the camshaft.

CAUTION: Never install a used flyweight cover that is bent.

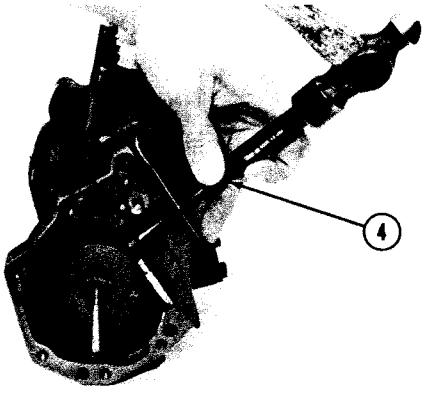
7. Install lever (5) on the dowel. Install ring (6) that holds lever on dowel.



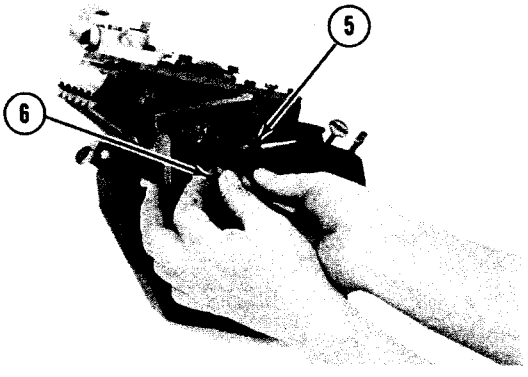
99935X2



99936X1



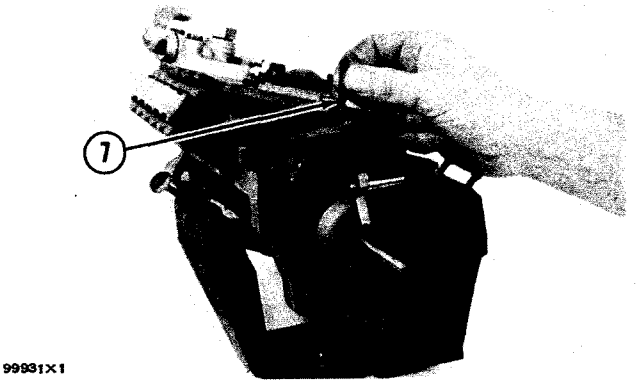
A02791X1



99932X1

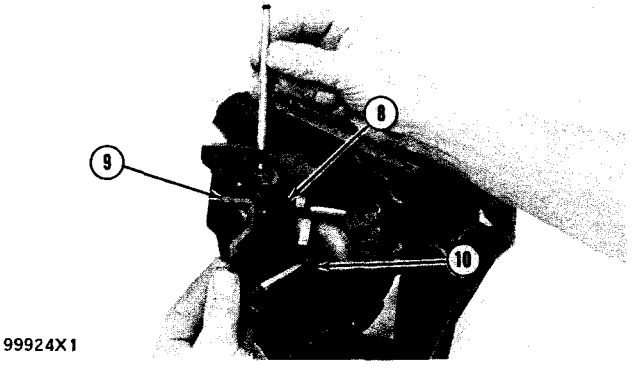
# FUEL INJECTION PUMP HOUSING AND GOVERNOR

8. Install pin (7) in the housing with the round end down.




9. Put riser (follower) (10) in position between the flyweights. Lift the flyweight up with a piece of wire and push riser (follower) forward.

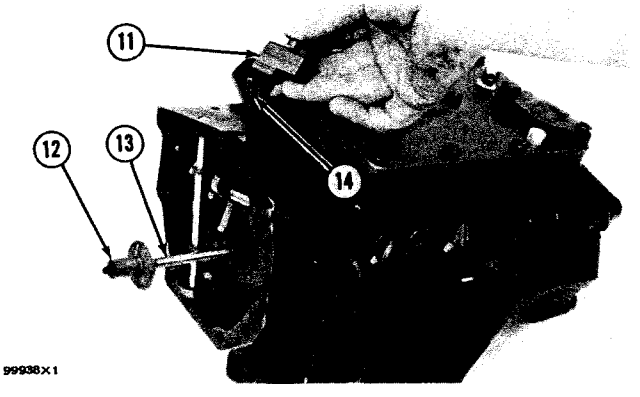
10. Put lever (9) into position in groove of riser (follower) (10) and ball end engaged in the sleeve shaft lever (8). Install shaft to hold lever in place.




CAUTION: If lever (9) is not installed correctly, the governor cannot operate and can cause the engine to over speed.

11. Install over fueling spring (13) and seat (12) on shaft.

12. Install stud (14) and torque spring or stop bar (11) on the housing.

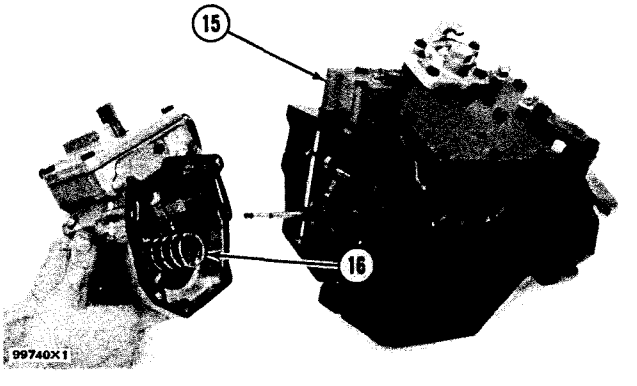



CAUTION: The screw that holds the torque spring must not go beyond the inner surface of the governor housing.

13. Install cover (15) over torque spring after adjustment has been made.

14. Install guide, (wave) washer and spring (16) in the governor housing.

15. Put the governor housing on the fuel injection pump housing and install the bolts.




end by:

a) make adjustment of fuel system setting (See Fuel System Setting in Testing and Adjusting)

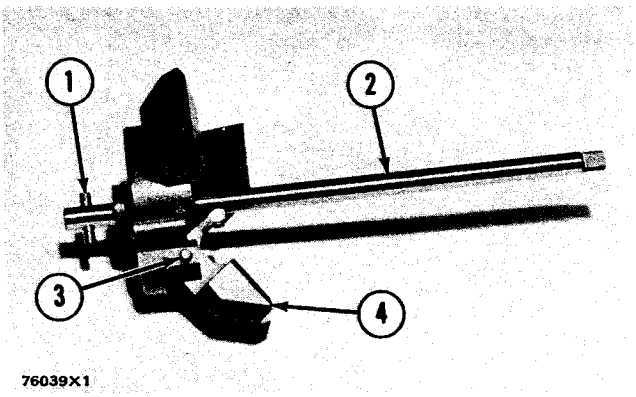
# GOVERNOR

## DISASSEMBLE GOVERNOR 15–1264

start by:
a) separation of governor from fuel injection pump housing

1. Remove shaft (2). Remove pin (1) from shaft.

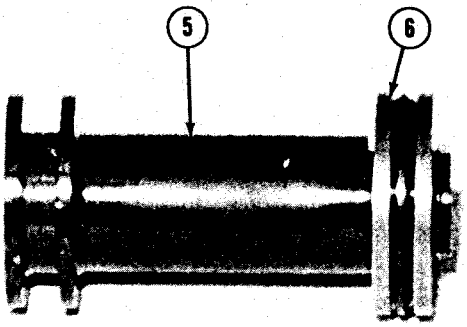
2. Remove pins (3) from the flyweights. Remove flyweights (4).



76039X1

3. Remove ring, races (6) and bearing from the riser (follower) (5).

4. Remove cover (7) and spring (8) from governor housing.



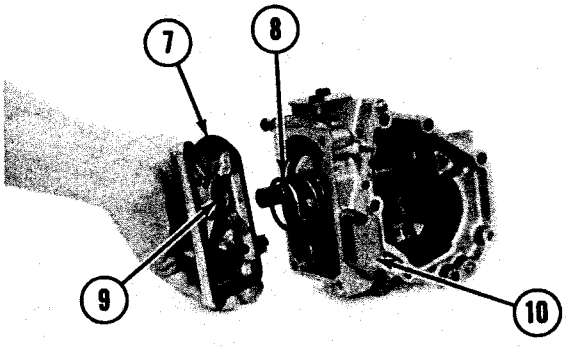
76047X1

NOTE: There is force on the cover from the spring.

5. Remove seal (9) from cover.

6. Remove cover (10) for the low and high idle adjustment.

7. Remove locknut and screw (13) for the high idle adjustment.



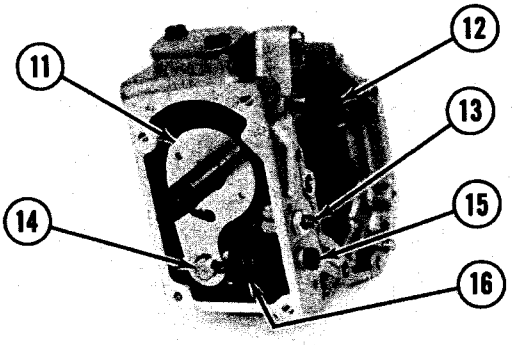
99927X1

8. Remove bolt (15) and washers for the low idle adjustment.

9. Remove spring (16) and guide.

10. Remove pin (14) and plate (11).

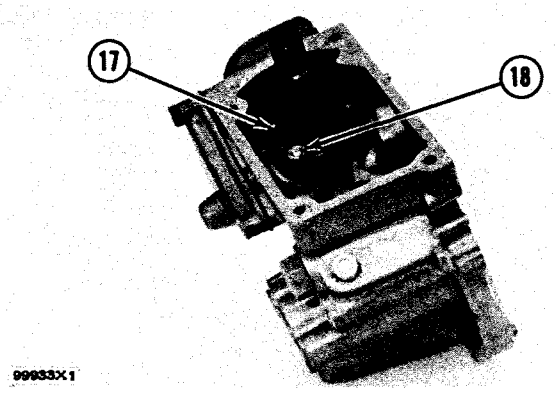
11. Remove shaft (12) from the housing.



A00180X1

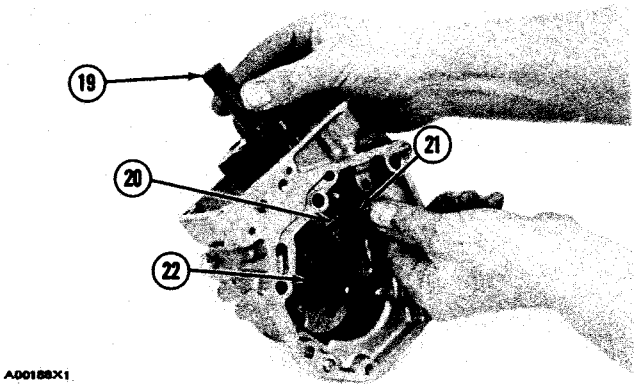
# GOVERNOR

12. Remove pin (18) and two spacers (17) from shaft.

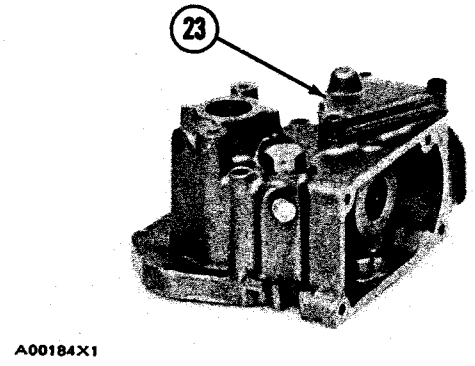



NOTE: Earlier fuel systems have a ball in place of spacers (17) and pin (18).

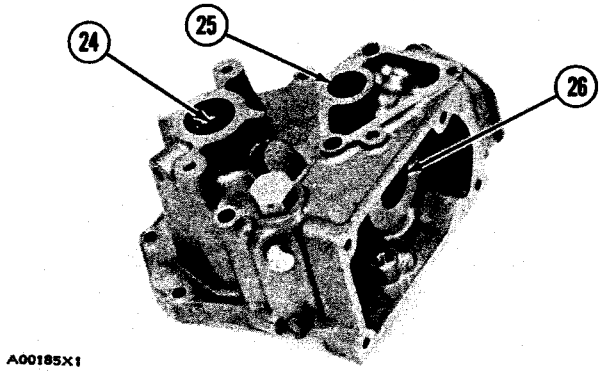
13. Remove shaft (19) from the governor housing.




14. Remove washer(20) and levers (21) and (22) from governor housing.




15. Remove cover (23) from governor housing.




16. Remove seal (25) and bearing.

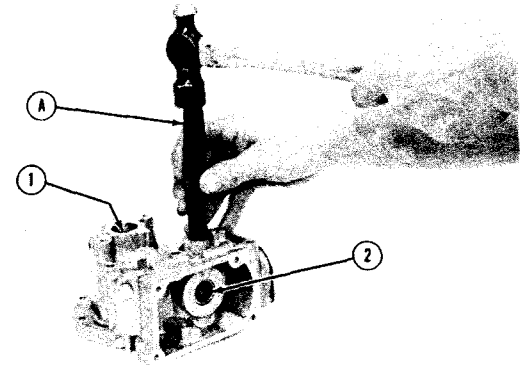
17. Remove seals (24) and (26) from governor housing.

# GOVERNOR

## ASSEMBLE GOVERNOR 16–1264

| Tools Needed | | A | B |
|---|---|---|---|
| 1P529 | Handle | 1 | 1 |
| 1P457 | Drive Plate | | 1 |
| 1P471 | Drive Plate | | 1 |

1. Install bearing and seal in the housing with tool (A). The lip of the seal must be toward the bearing.

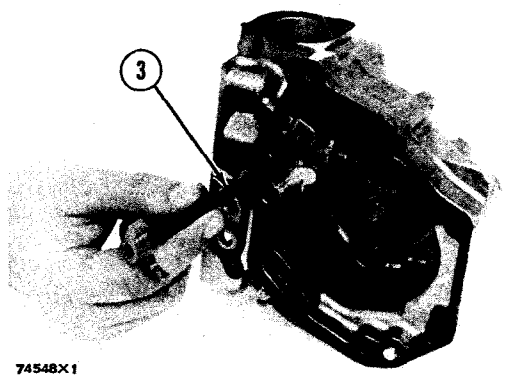


A00186X1

2. Install seal (1) in housing with tool (A). The lip of seal must be toward inside of housing.

3. Install seal (2) in housing with tooling (B). The lip of seal must be toward the inside of housing.

4. Install shaft (3) in the housing.

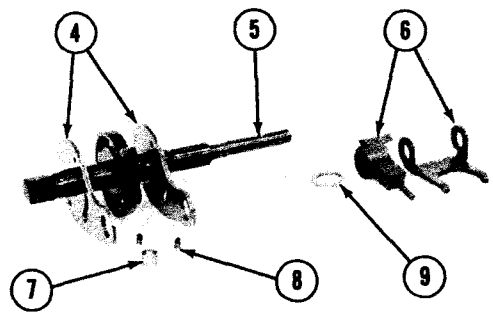


74548X1

5. Install plates (4), spacers (8) and pin (7) on shaft.

6. Install shaft (5) in housing and through washer (9) and levers (6).

7. Install pin (11) in holes of the plates.

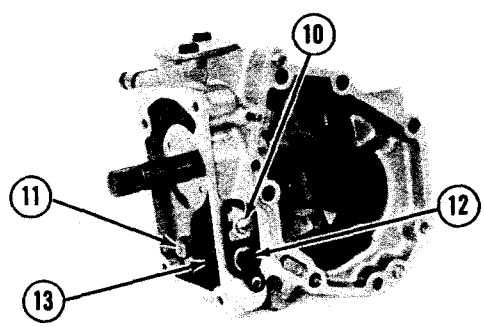


A00179X1

8. Install screw (10) and locknut for high idle adjustment.

9. Install spring (13) and guide.

10. Install bolts (12) and washer for low idle adjustment.



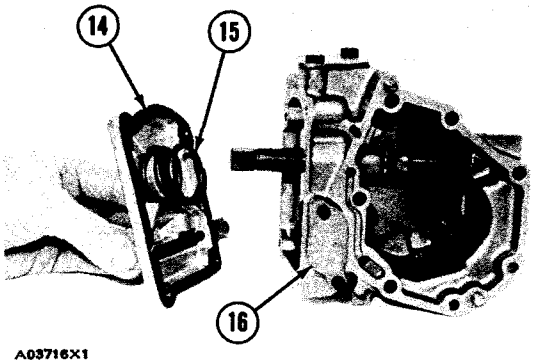
99928X1

# GOVERNOR

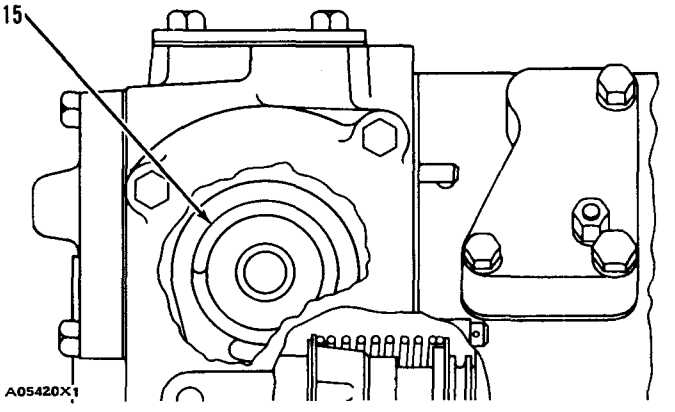
11. Push plate and pin (11) over toward the bolt (12) and tighten the bolt.

12. Install seal in cover with tooling (B). The lip of seal must be toward the inside.

13. Install spring (15) in the cover. Install cover (14) on housing.



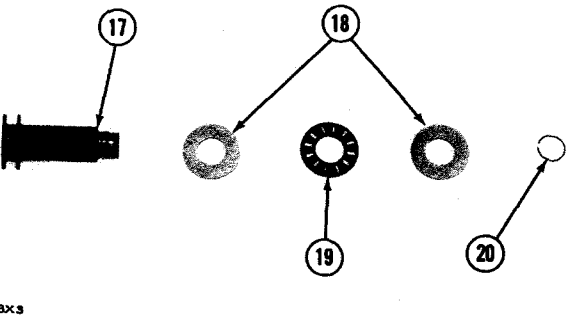

CAUTION: The spring (15) must be installed with the end of spring as shown.




14. Install cover (16) for the idle adjustment screws.

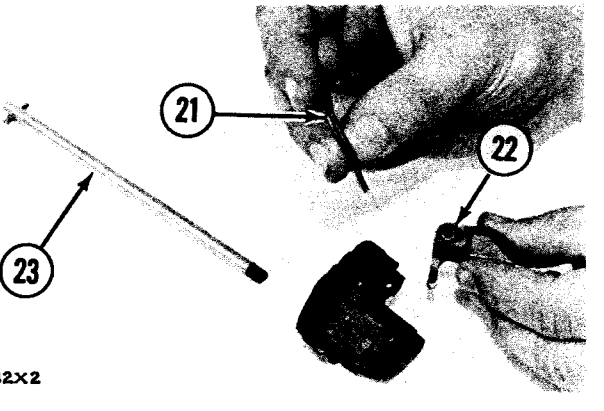
15. Install bearing (19) between the races (18) on riser (follower) (17). Install ring (20) that holds the washers on the riser (follower).

16. Install pin in shaft (23).




17. Install flyweights (22) and pin (21).

18. Install shaft (23) in the flyweight assembly.




end by:

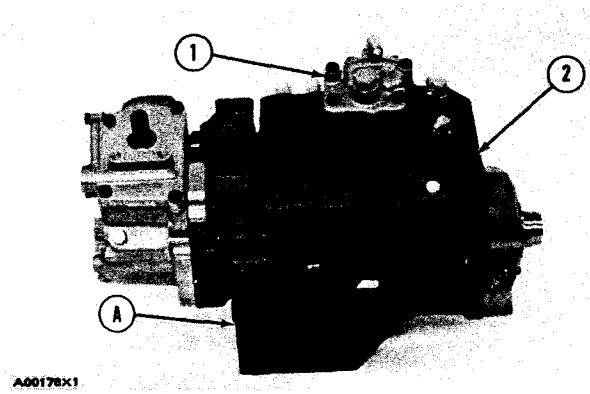
a) connection of governor to fuel injection pump housing

# FUEL CHECK VALVE AND BYPASS VALVE

## REMOVE FUEL CHECK VALVE AND BYPASS VALVE

| Tools Needed | | A |
|---|---|---|
| 2P8315 | Bracket Assembly | 1 |

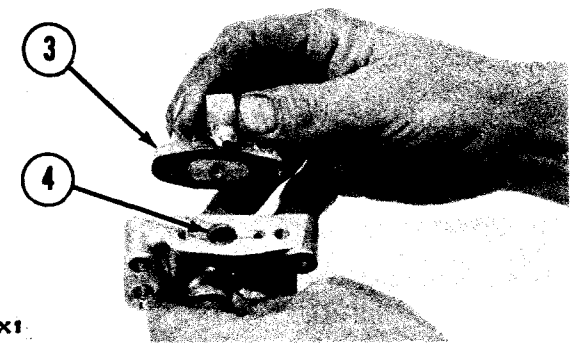
1. Remove fuel from the pump housing and install on tool (A).




2. Remove cover (2) from top cover.

3. Remove fuel inlet and return housing (1) from top cover.

4. Remove elbow (3) and disc (4) from fuel inlet and return housing.

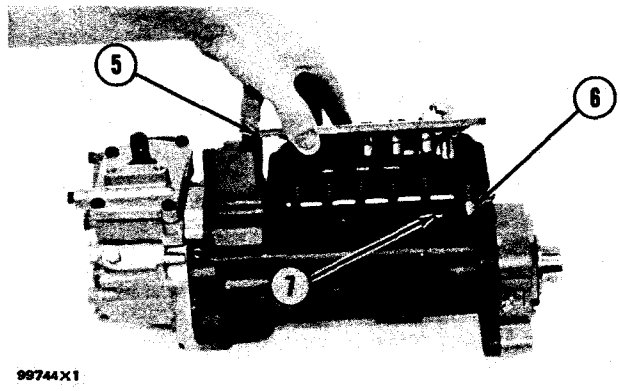



NOTE: The function of the disc (4) is to keep the fuel in the pump housing from returning to the tank when the engine is not in operation. If the fuel tank is higher than the fuel pump housing, disc and housing is not needed.

5. Remove cover (5) and fuel channel from pump housing.

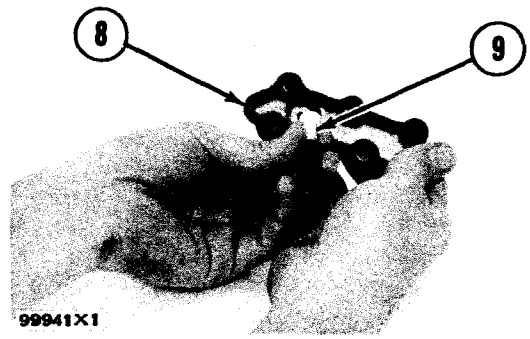
6. Remove spring and bypass valve (6) from housing.

7. Remove check valve (7).




8. Remove fuel channel (8) and check valve from cover.

9. Remove check valve (9) and spring from fuel channel.



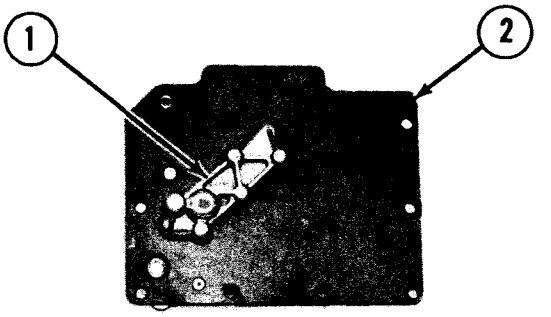

NOTE: Earlier fuel systems have two check valves (7) and (9). Check valve (9) is not needed. Remove check valve (9) and fill the hole in fuel channel with weld or replace channel.

# FUEL CHECK VALVE AND BYPASS VALVE

## INSTALL FUEL CHECK VALVE AND BYPASS VALVE

| Tools Needed | | A |
|---|---|---|
| 2P8315 | Bracket Assembly | 1 |

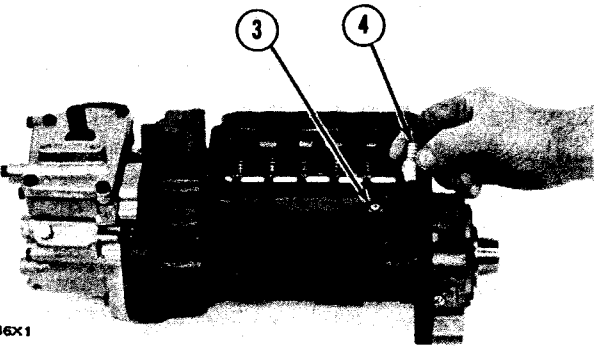
1. Install fuel channel (1) on cover (2).



A04157X1

2. Install spring and bypass valve (4) in housing with the rounded end up.

3. Install check valve (3) evenly in pump housing.

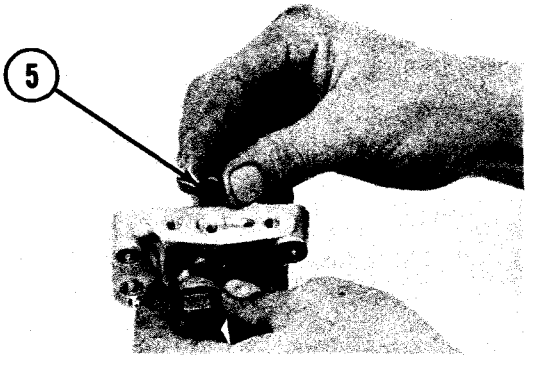


99746X1

NOTE: Do not install a check valve that is bent.

4. Install cover on pump housing. Be sure the bypass valve spring is in the groove in the cover.

5. Install disc (5) and elbow on fuel inlet and return housing.

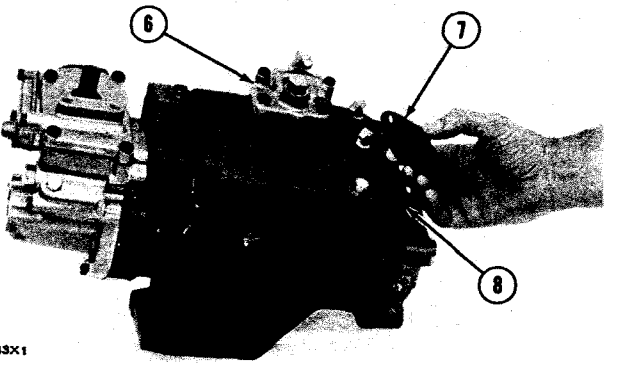


99940X1

6. Install fuel inlet and return housing (6) on cover (8).

7. Install cover (7) on cover (8).

8. Remove fuel injection pump housing and governor from tool (A).



99943X1

# FUEL INJECTION PUMPS

## REMOVE FUEL INJECTION PUMPS 11–1251

| Tools Needed | | A |
|---|---|---|
| 8S2243 | Wrench | 1 |

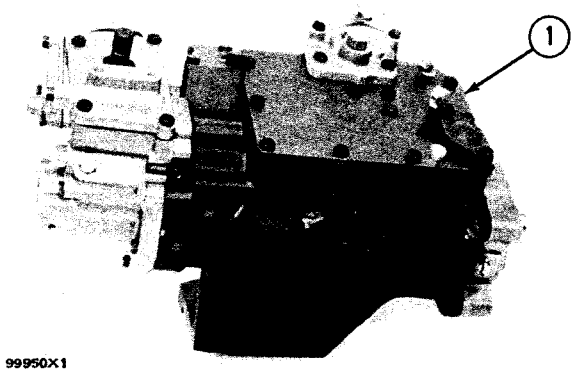
CAUTION: Before any service work is to be done on the fuel system the outer surface of injection pump housing must be clean.

1. Remove the cover assembly (1) from the pump housing. Remove spring for the by-pass valve.

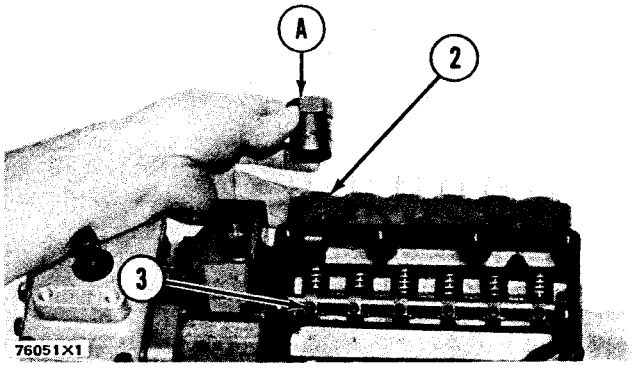
2. Loosen the bushing (2) from the pump housing with tool (A).

NOTE: Do not loosen the screws (3) that hold levers to shaft when removing or installing pumps. If levers are moved, fuel pump adjustment will be changed.

3. Remove the fuel injection pump from the pump housing. The sleeve on the plunger will slide off the lever as the pump is removed.



99950X1



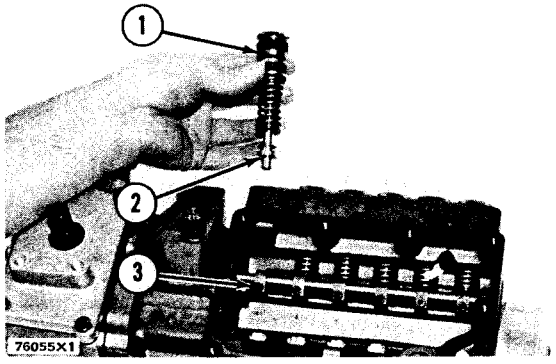
76051X1

## INSTALL FUEL INJECTION PUMPS 12–1251

| Tools Needed | | A |
|---|---|---|
| 8S2243 | Wrench | 1 |

1. Put the fuel injection pump (1) in the bore of pump housing.

2. The sleeve (2) will be engaged with lever when installed correctly.

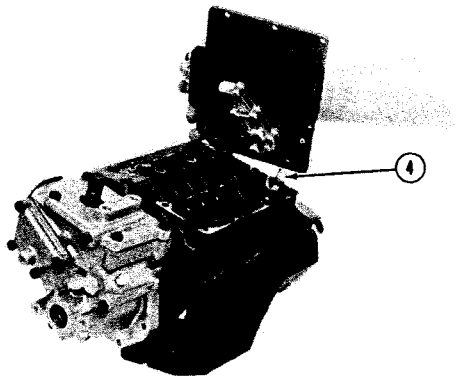


76055X1

CAUTION: If levers have been moved on the shaft, fuel pump adjustment must be made. (See TESTING AND ADJUSTING).

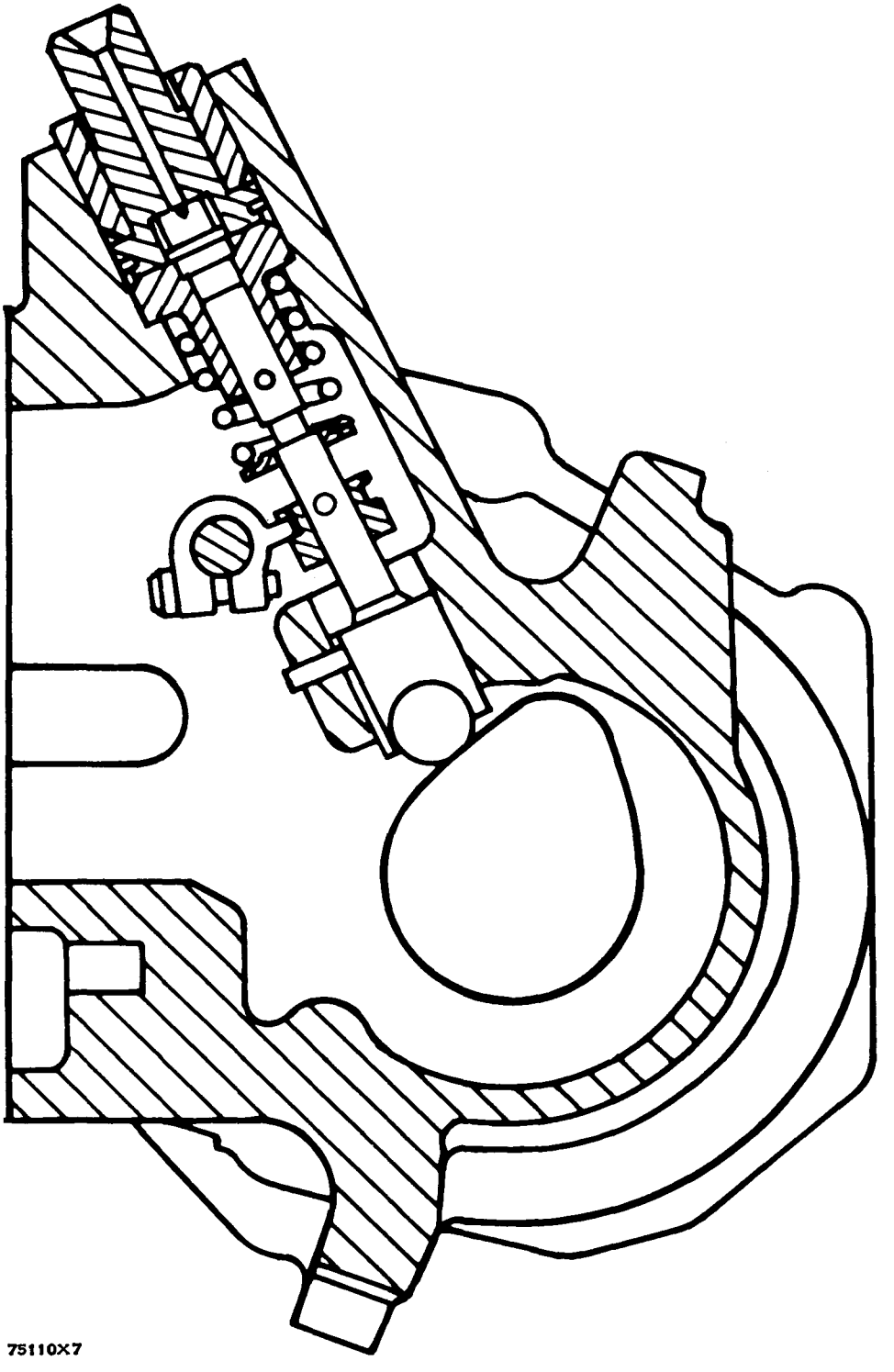
3. Tighten the bushing with wrench (A) to a torque of 70 ± 5 lb.ft. (9.7 ± 0.7 mkg).

4. Put the spring on the bypass valve. Install the cover assembly on the pump housing. Be sure the spring (4) is in position in the cover.



A01851X1

# FUEL INJECTION PUMP AND HOUSING



75110X7

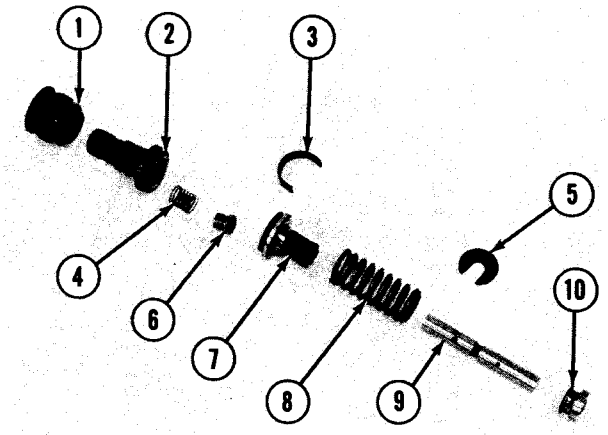
# FUEL INJECTION PUMPS

## DISASSEMBLE FUEL INJECTION PUMPS 15–1251

start by:
a) remove fuel injection pumps

1. Remove the bushing (1) from the bonnet (2).
2. Remove the ring (3) from the bonnet and barrel (7). Remove the check valve (6) and spring (4) from the bonnet.
3. Remove the spring (8) and washer (5). Remove the plunger (9) and sleeve (10).

NOTE: Keep the plunger and sleeve with their respective barrel for installation. Do not use plungers, sleeves, and barrels with other plungers, sleeves, and barrels.



73792X1

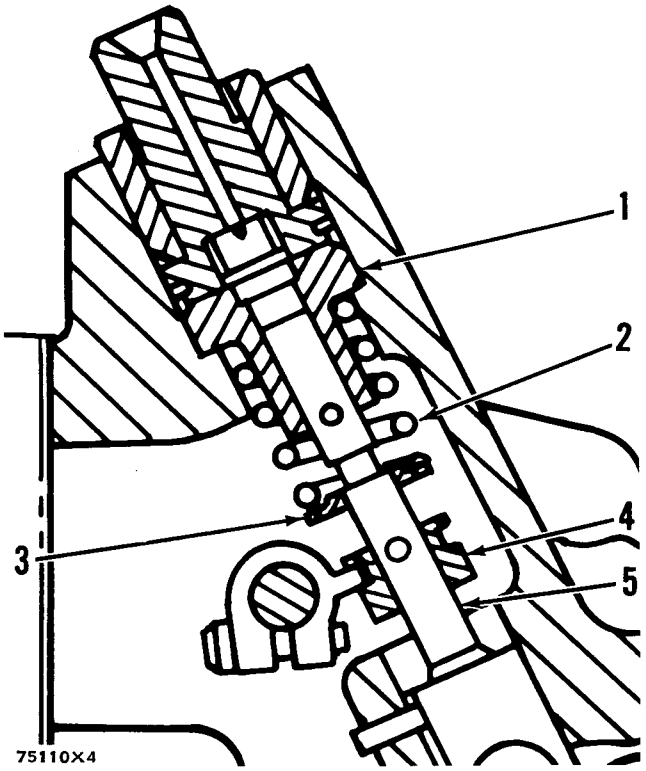
## ASSEMBLE FUEL INJECTION PUMPS 16–1251

1. Install the sleeve (4), plunger (5), spring (2), and washer (3) on the barrel (1).

NOTE: Be sure sleeve and plunger are installed in original barrel, and large hole in plunger is up.

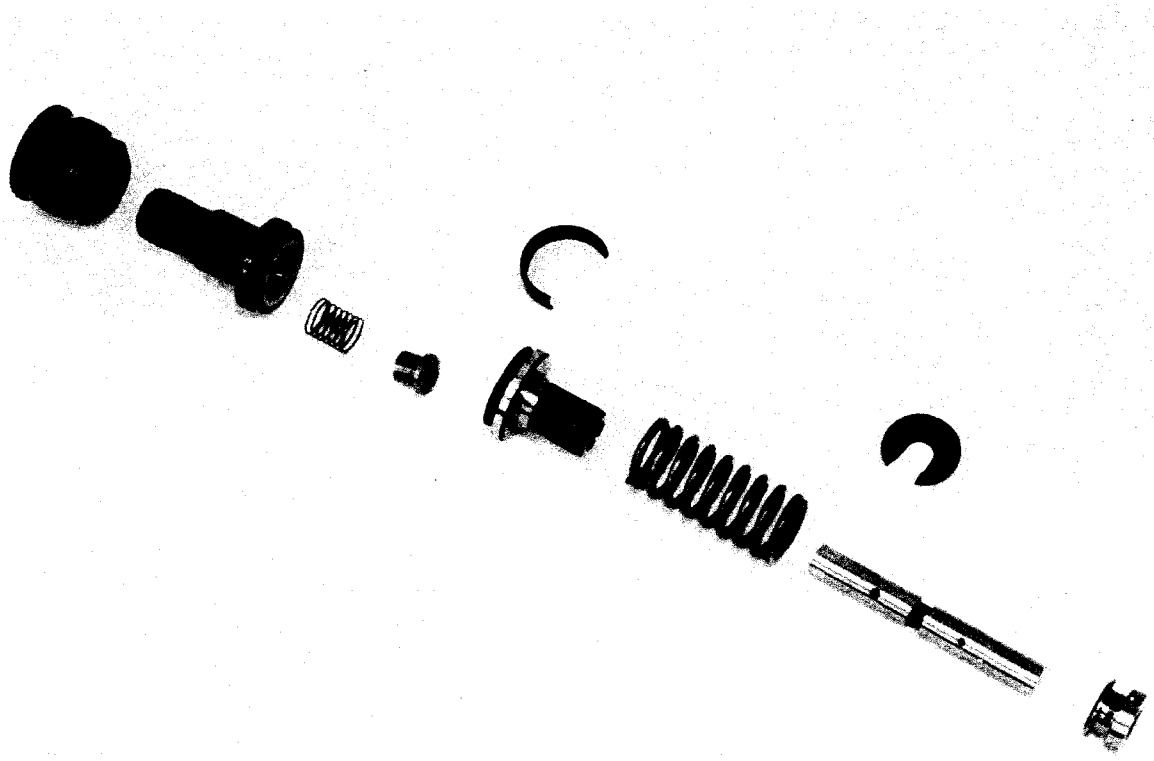
2. Install check valve and spring in bonnet. Connect the barrel and bonnet and install the ring. Install the bushing on the bonnet.

end by:
a) install fuel injection pumps



75110X4

# FUEL INJECTION PUMPS



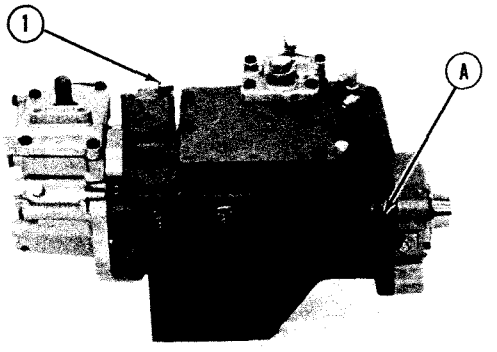
73792X2

# FUEL TRANSFER PUMP

## REMOVE FUEL TRANSFER PUMP 11–1256

| Tools Needed | | A | B |
|---|---|---|---|
| 2P8315 | Bracket Assembly | 1 | |
| 2H3740 | Bolt | | 1 |

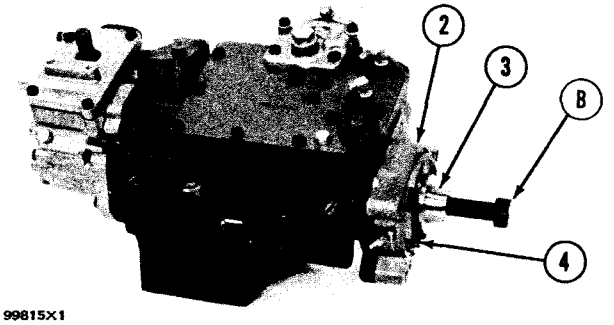
1. Install the fuel injection pump housing on tool (A).



A00176X1

2. Install timing pin (1) to keep the injection pump camshaft from turning during disassembly and assembly.

3. Install bolt (B) in the threads of sleeve (3). Tighten the bolt until sleeve can be removed.

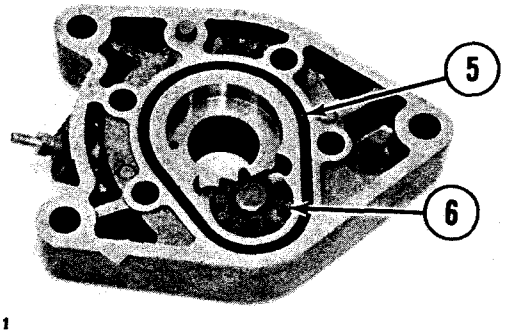


99815X1

CAUTION: Do not hit on bolt or sleeve. This will cause damage to the unit.

4. Remove bolts (4) that hold body to the housing.

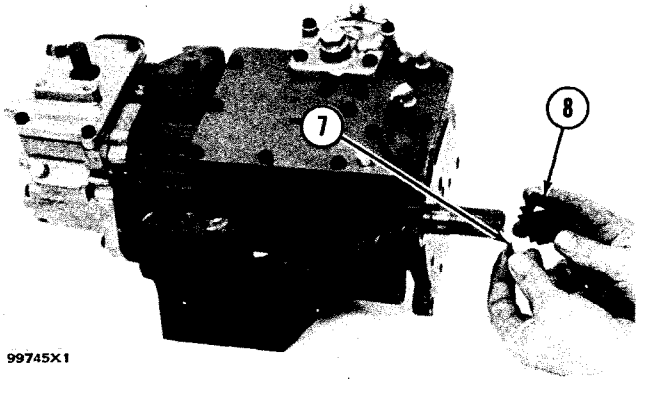
5. Remove body (2) from the housing.



74609X1

6. Remove idler gear (6) from body.

7. Remove O-ring seal (5) and the two lip-type seals from body.

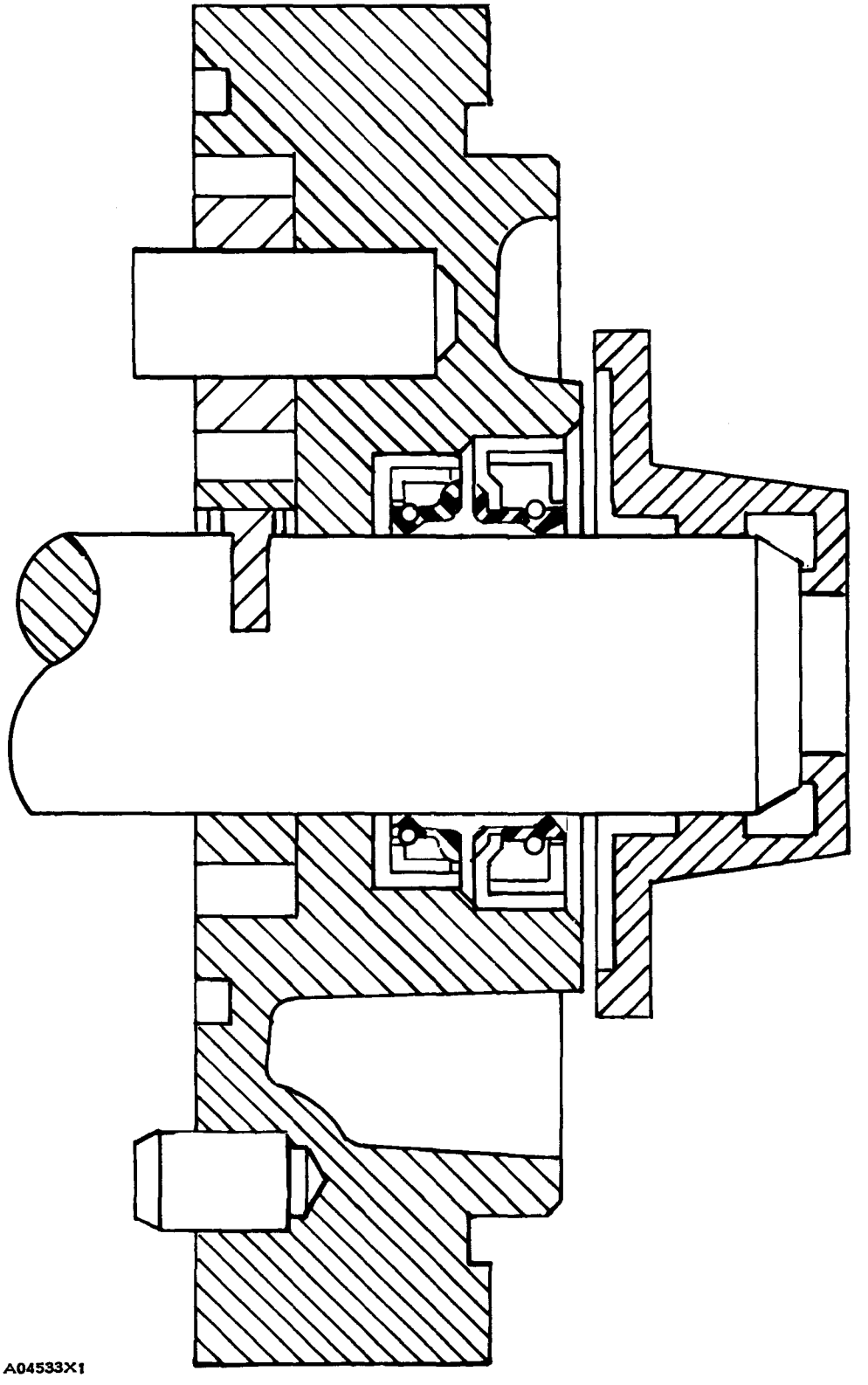


99745X1

8. Remove drive gear (8) from shaft.

9. Remove key (7) from the shaft.

# FUEL TRANSFER PUMP

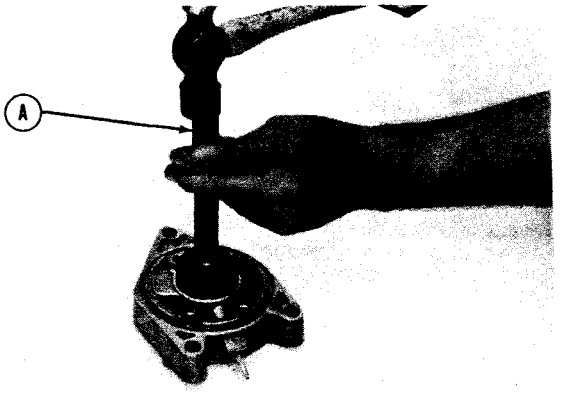


A04533X1

# FUEL TRANSFER PUMP

## INSTALL FUEL TRANSFER PUMP 12–1256

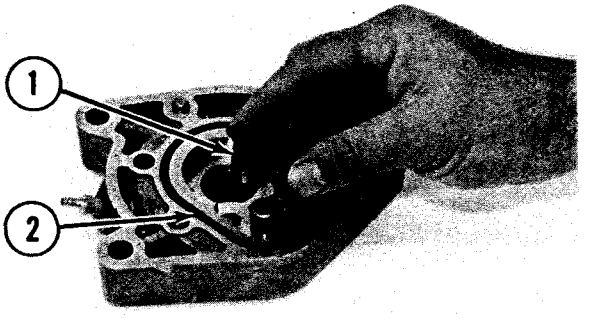
| Tools Needed | | A | B | C |
|---|---|---|---|---|
| 1P529 | Handle | 1 | | |
| 1P463 | Drive Plate | 1 | | |
| 5P318 | Drive Plate | 1 | | |
| 5P319 | Drive Plate | | 1 | |
| S1603 | Bolt | | | 1 |
| 4B4280 | Washer | | | 1 |
| 4N3371 | Washer | | | 1 |



74524X1

1. Install the inner seal in the body with tooling (A). The lip of seal must be toward the pump gears.

2. Install the outer seal in the body with tooling (B). The lip of seal must be toward the outside.

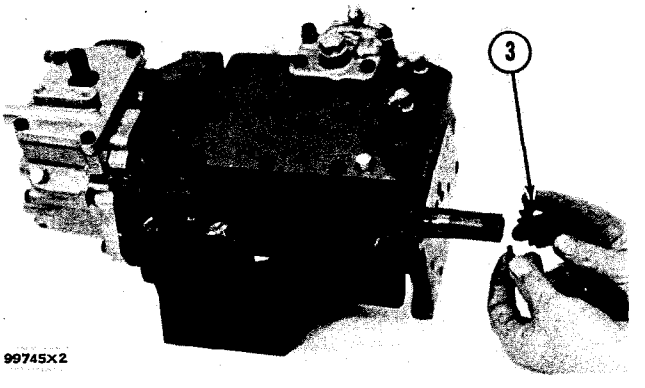


74610X1

CAUTION: Always be careful not to scratch or cause damage to the machined surface of the pump body.

3. Install the O-ring seal (2) and idler gear (1) on the body.

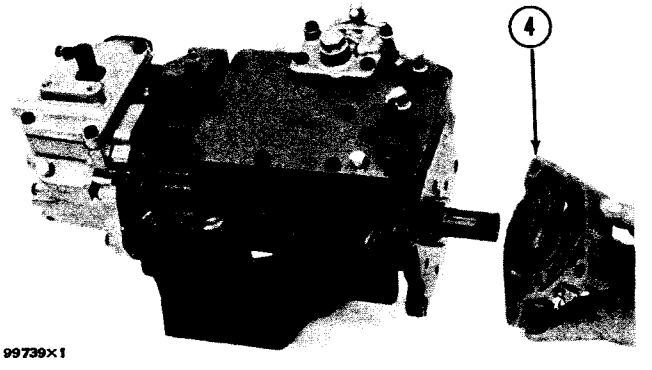
4. Install the key and drive gear (3) on the shaft.



99745X2

5. Install the body (4) on the housing.

6. Install the bolts that hold the body to the housing.

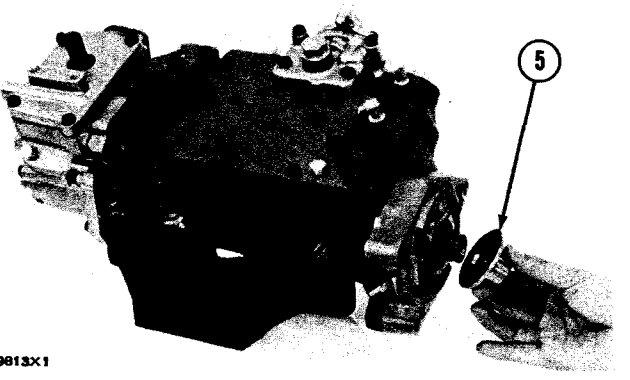


99739X1

NOTE: The pump body for the truck engine fuel system has an oil passage through the pump body. Other pump bodies do not have the oil passage.

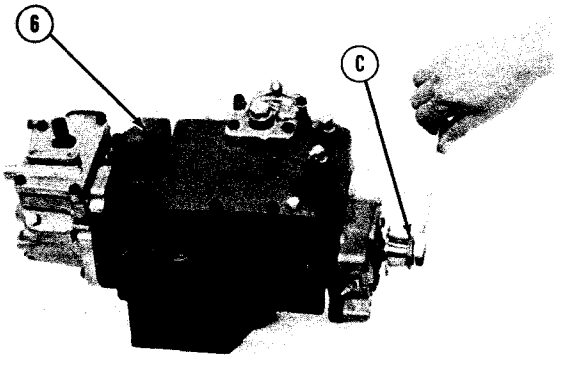
# FUEL TRANSFER PUMP

7. Put sleeve (5) in position on camshaft.



99813X1

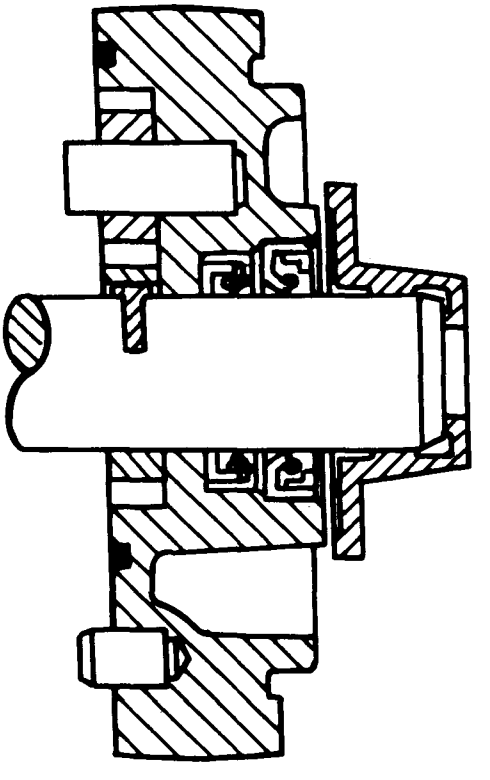
NOTE: The timing pin (6) must be in position as shown to keep the camshaft from turning during assembly.



99747X1

8. Install sleeve on camshaft with tooling (C).

CAUTION: Do not hit the sleeve with a hammer to install it. This will put end force on the camshaft and cause damage to the other components in the pump housing.


75111X2

9. The end clearance of the camshaft must be 0.58 ± 0.46 mm (.023 ± .018 in.) after sleeve (5) is installed.

end by:

a) install fuel injection pump housing and governor

# FUEL INJECTION PUMP HOUSING

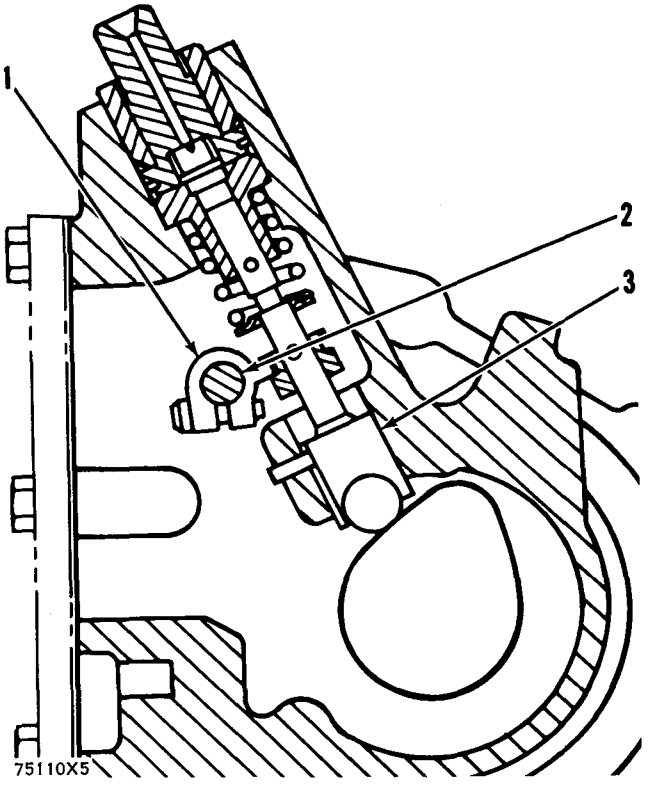
## DISASSEMBLE FUEL INJECTION PUMP HOUSING 15–1253

start by:
a) remove fuel injection pumps
b) separation of governor from fuel injection pump housing
c) remove fuel transfer pump

1. Remove dowel from housing for torque spring lever.
2. Loosen screws that hold levers (1) to the sleeve control shaft (2).
3. Remove the sleeve control shaft (2) from housing.
4. Remove lifters and roller assemblies (3) from the housing.

NOTE: Make identification of lifters and rollers for identification in their respective bore in housing.

5. Remove camshaft from housing.

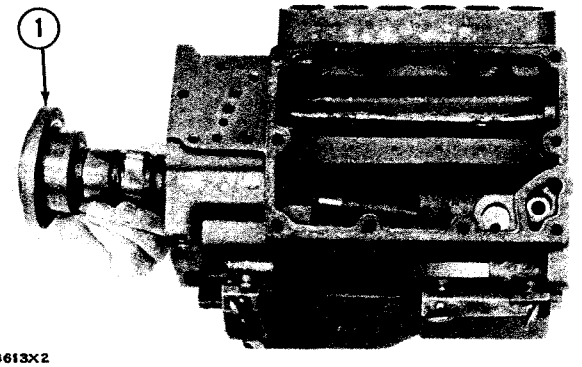


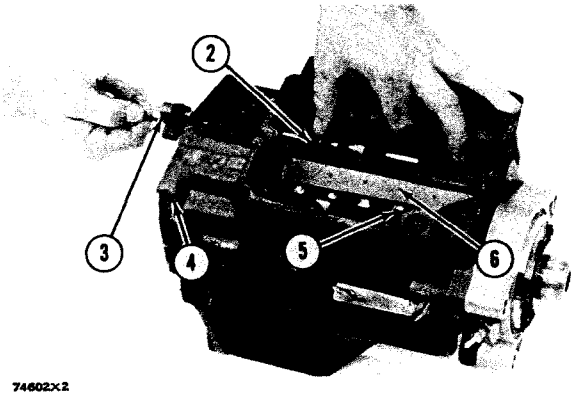

## ASSEMBLE FUEL INJECTION PUMP HOUSING 16–1253

1. Install camshaft (1) in housing.
2. Install lifters and roller assemblies (5) in their respective bores in housing.

NOTE: Install the lifters with grooves of lifters in alignment with pins (6) in housing.

3. Put the sleeve control shaft (3) in housing. Slide levers (2) on shaft. Push the shaft into position in housing.
4. Install dowel (4) in housing.
end by:
a) make adjustment to the sleeve control shaft (See TESTING AND ADJUSTING FOR CORRECT PROCEDURE)
b) install fuel transfer pump
c) install fuel injection pumps
d) connection of governor to fuel injection pump housing



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