SERIES 10 TRACTOR REPAIR MANUAL SUPPLEMENT, SE 3870-S7

With the introduction of the Series 10 II range of tractors, a number of improvements were made, including a new safety cab, revised gear shift linkage and levers, and revised electrical, air conditioning and fuel systems.

Attached is Repair Manual Supplement SE 3870-S7 containing Repair Manual Chapters which provide an introduction, description and overhaul procedures for the improvements to update your copy of the Series 10 Repair Manual, SE 3870.

The supplement, SE 3870-S7 consists of the following Parts and Chapters:

- Part 2, FUEL SYSTEMS -- Chapter 9 to be inserted immediately following Chapter 8, and eight revised pages which supersede existing pages and should be directly substituted.
- Part 3, ELECTRICAL SYSTEMS -- Chapter 8, to be inserted immediately following Chapter 7, and a revised index page which supersedes the existing page and should be directly substituted.
- PART 5, TRANSMISSION SYSTEMS -- Chapters 11 and 12 to be inserted immediately following Chapter 10, and two revised index pages which supersede existing pages and should be directly substituted.
- PART 11, SAFETY CABS AND PLATFORMS -- Chapters 5 and 6 to be inserted immediately following Chapter 4, and six revised pages which supersede the existing pages and should be directly substituted.
- PART 13, ACCESSORIES AND GENERAL Chapters 5 and 6 to be inserted immediately following Chapter 4, and four revised pages which supersede the existing pages and should be directly substituted.

NASO SERVICE DEPARTMENT
FORD TRACTOR OPERATIONS

PART 2
FUEL SYSTEMS

In October 1985 changes were made to the fuel system. These included an in-line fuel injection pump fitted to the Ford 5610 in place of the rotary fuel injection pump and new style fuel tanks located on the side of the tractor beneath the cab for Ford 5610, 6610 and 7610 with De-Luxe Cab.

Chapter 9 details the changes in the system, Service repair procedures and specifications for the Ford 5610, 6610 and 7610 tractors with De-Luxe Cab.

Chapters 1 to 8 detail the system, Service repair procedures and specifications for all Series 10 tractors except Ford 5610, 6610 and 7610 tractors with De-Luxe Cab.

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PART 2
FUEL SYSTEMS

Chapter 2

FUEL SYSTEMS – DIESEL

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A. DESCRIPTION AND OPERATION

FUEL SYSTEM

The diesel fuel systems, Figures 1, 2 and 3 consist of a fuel tank, fuel filter(s), fuel injection pump, fuel injectors and interconnecting fuel lines. A pre-cleaner and filter remove dirt and contaminants from the intake air.

The fuel injection pump is either of the rotary or in-line type.

Tractors equipped with a rotary type fuel-injection pump have a gravity feed from the fuel tank to the filter(s).

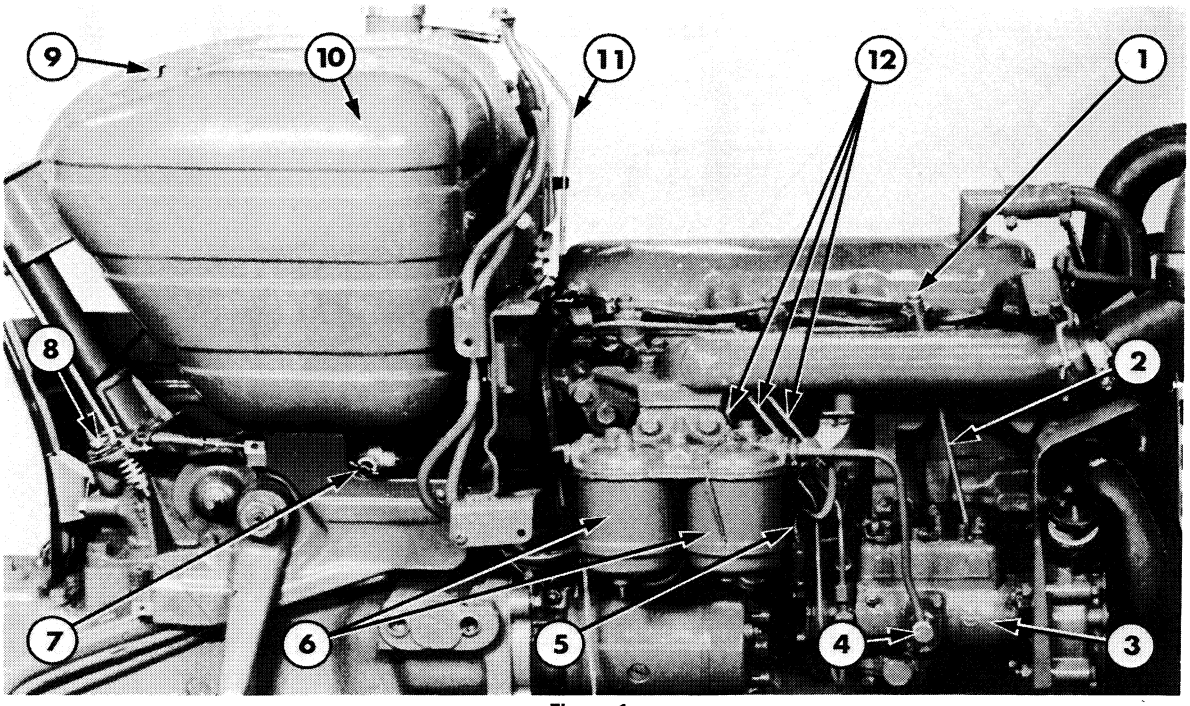

Figure 1
Fuel System – Rotary Type Fuel Injection Pump – Ford 3610

1. Fuel Injector
2. Fuel Injector Leak-Off Tube
3. Fuel Injection Pump
4. Fuel Return Line
5. Pump Inlet Line
6. Fuel Filters
7. Fuel Control Tap
8. Throttle Linkage
9. Fuel Tank Sender Unit
10. Fuel Tank
11. Fuel Injector Return-to-Tank Tube
12. Fuel Injection Tubes

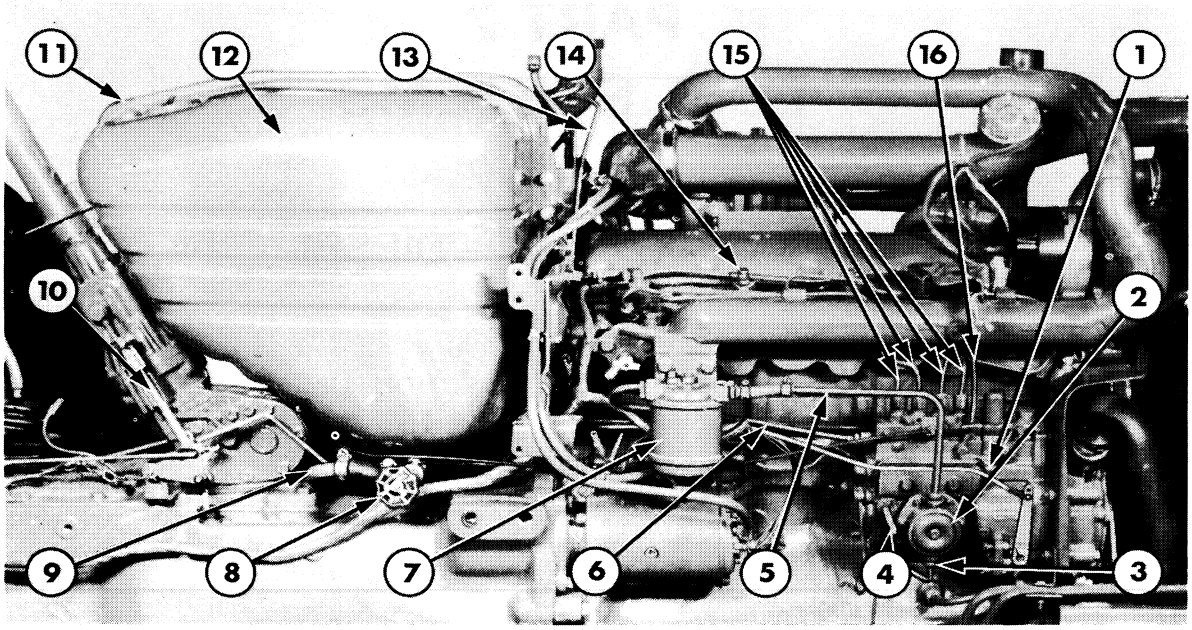

Figure 2
Fuel System – In-Line Type Fuel Injection Pump – Ford 7610 With Auxiliary Fuel Tank

1. In-Line Type Fuel Injection Pump
2. Fuel Lift Pump
3. Fuel Tank to Lift Pump Tube
4. Priming Lever
5. Lift Pump to Filter Tube
6. Filter to Injection Pump Tube
7. Fuel Filter
8. Fuel Control Tap
9. Main to Auxiliary Fuel Tank Tube
10. Throttle Linkage
11. Fuel Tank Sender Unit
12. Main Fuel Tank
13. Fuel Injector Return-to-Tank Tube
14. Fuel Injector
15. Fuel Injection Tubes
16. Injection Leak-Off Tube

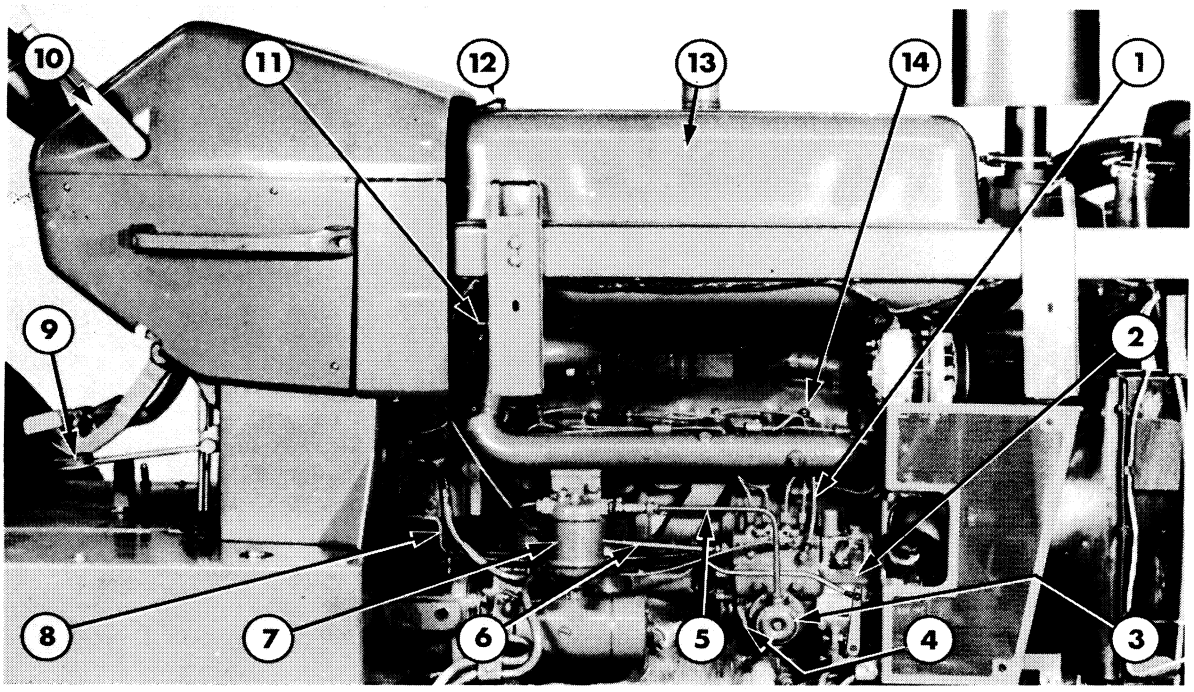

Figure 3
Fuel System – In-Line Type Fuel Injection Pump – Ford 7710 With Auxiliary Fuel Tank

1. Injection Leak-Off Tube
2. In-Line Type Fuel Injection Pump
3. Fuel Lift Pump
4. Priming Lever
5. Lift Pump to Filter Tube
6. Filter to Injection Pump Tube
7. Fuel Filter
8. Fuel Tank to Lift Pump Tube
9. Foot Throttle Pedal
10. Hand Throttle Lever
11. Main to Auxiliary Fuel Tank Hose
12. Fuel Tank Sender Unit
13. Main Fuel Tank
14. Fuel Injector

PART 2
FUEL SYSTEMS
Chapter 5
FUEL INJECTION PUMP – ROTARY TYPE

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A. DESCRIPTION AND OPERATION

The rotary type fuel injection pump is installed on all diesel engine Ford 2610, 3610, 4110, 4610 Tractors and Ford 5610 Tractors prior to October 1985.

The pump is mounted at the front right-hand side of the engine being driven by a gear timed to the camshaft drive gear, see "ENGINE SYSTEMS" — Part 1.

A cross-section of the rotary type fuel injection pump is shown in Figure 1.

The rotary type fuel injection pump consists of a pumping and distributing rotor driven directly from a pump drive shaft. The rotor revolves within the hydraulic head and has a vane type fuel transfer pump connected to the end.

Injection pumping is effected by either a single or double element, with opposed plungers, in the pumping half of the rotor. The plungers are operated by contact with cam lobes on an internal cam ring and the high pressure charges from the pumping elements are distributed to the injectors at the required timing intervals through ports in the rotor and hydraulic head.

Ford 2610, 3610, 4110 and 4610 models are fitted with a single element injection pump, the single element containing two opposed plungers.

Ford 5610 tractors are fitted with a double element injection pump, each element containing two opposed plungers, the four plungers operating simultaneously. All other components and pump operations are identical between the single and double element pumps.

Fuel entering the pump inlet port passes into the regulating valve, which is positioned in the pump end plate, then into the sliding vane type transfer pump. The transfer pump increases the pressure of the fuel. The fuel passes, at transfer pressure, to the metering valve which, actuated by the governor, regulates the amount of fuel delivered to the pumping plungers.

The transfer pump pressure is related to the engine speed and this relationship is controlled by the regulating valve.

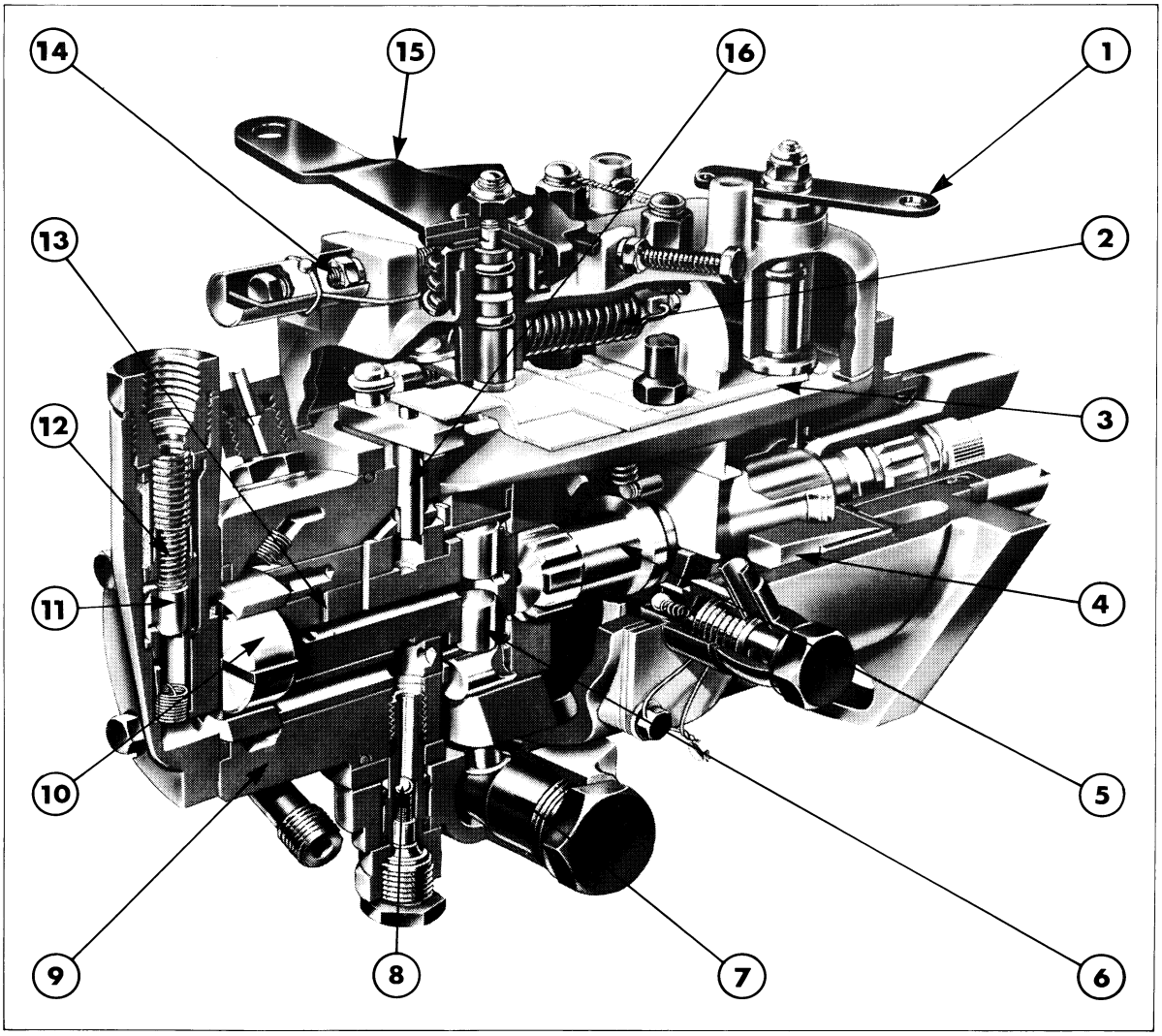

Figure 1
Sectional View of Rotary Type Fuel Injection Pump

1. Fuel Shut-Off Lever
2. Governor Spring
3. Fuel Shut-Off Bar
4. Governor Weight Assembly
5. Drive Shaft
6. Pumping Plunger
7. Advance Device Piston
8. Advance Device Non-Return Valve
9. Hydraulic Head
10. Transfer Pump Rotor
11. Regulating Valve Piston
12. Regulating Valve Spring
13. Distributing Rotor
14. Maximum Speed Adjustment Screw
15. Throttle Lever
16. Metering Valve

Regulating Valve Operation

With reference to Figure 2.

As transfer pressure increases with rising engine speed, fuel at transfer pressure acts on the underside of the regulating piston and tends to force the piston upwards against the regulating spring.

As the piston is forced upwards and the regulating spring is compressed, the piston uncovers the regulating port which allows excess fuel pressure to return to the inlet side of the pump so maintaining a pre-determined pressure.

PART 2
FUEL SYSTEMS

Chapter 6

FUEL INJECTION PUMP – IN-LINE TYPE

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A. DESCRIPTION AND OPERATION

The in-line type fuel injection pump is installed on all Ford 6610, 6710, 7610 and 7710 Tractors and Ford 5610 Tractors post October 1985.

The fuel injection pump is of the constant stroke, in-line type, driven at half engine speed by the timing gears. There is one pumping element per cylinder actuated through tappet rollers by a fully enclosed camshaft.

The pump is mounted at the front right-hand side of the engine being driven by a gear timed to the camshaft drive gear, see "ENGINE SYSTEMS" — Part 1.

PUMPING ELEMENTS

The pumping elements accurately meter and deliver the fuel to the injectors.

An exploded view of the in-line type fuel injection pump is shown in Figure 1.

Each of the pumping elements consists of a barrel and plunger lapped together to give an accurate fit, Figure 2. Two diametrically opposed drillings in the barrel form fuel inlets and the barrel is splined, with a master spline, for correct location within the pump body.

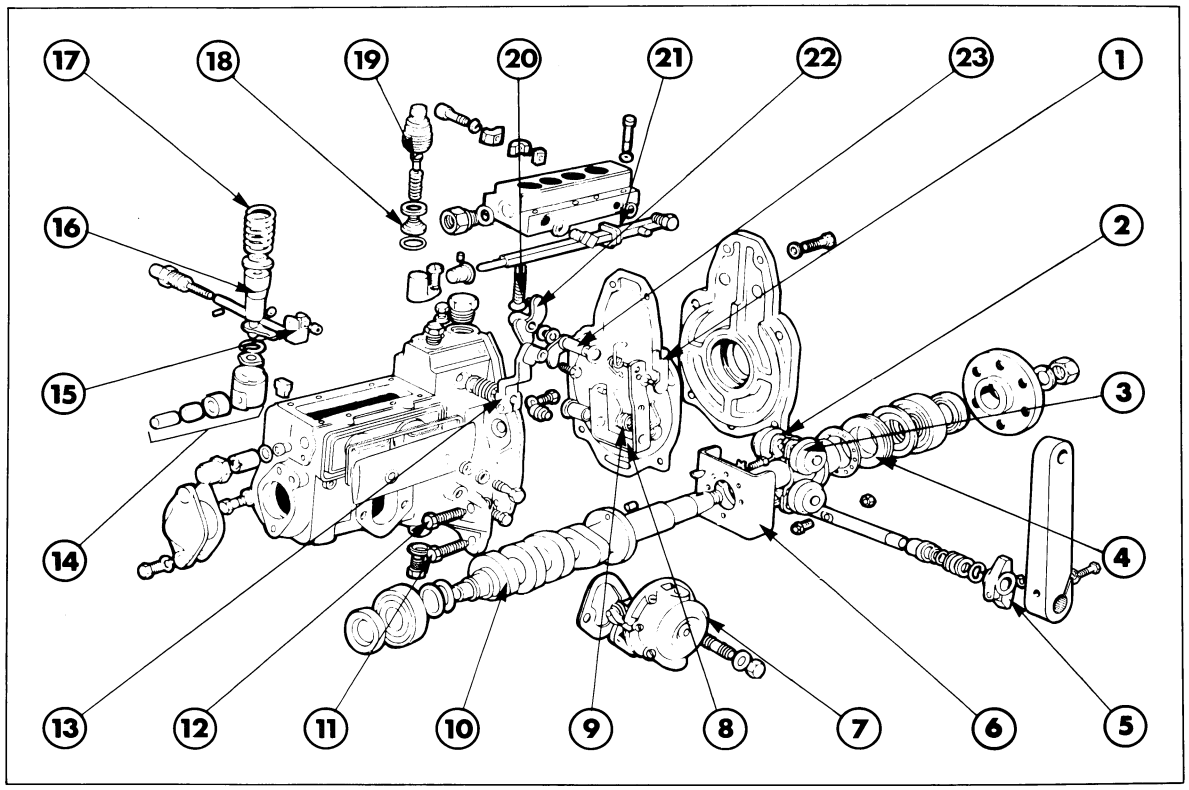

Figure 1
Sectional View of In-Line Type Fuel Injection Pump

1. Link Plate
2. Weight Carrier
3. Governor Weight Assembly
4. Thrust Pad
5. Stop Quadrant
6. Backplate
7. Fuel Lift Pump
8. Rocking Lever
9. Governor Main Control Spring
10. Camshaft
11. Idle Speed Ajusting Screw
12. Maximum Speed Adjusting Screw
13. Stop Control Lever
14. Tappet Assembly
15. Control Fork
16. Pumping Element
17. Return Spring
18. Delivery Valve
19. Volume Reducer
20. Maximum Fuel Stop Screw
21. Control Rod
22. Maximum Fuel Stop Lever
23. Stop Control Shaft

An annular groove is machined around the plunger into which fuel leaking between the barrel and plunger may accumulate. This leakage provides lubrication of the barrel and plunger surfaces.

The plunger also has a fuel port which terminates in a helical groove machined in the periphery of the plunger. The purpose of the groove is to control the effective pumping stroke of the plunger.

E. LIFT PUMP OVERHAUL

IMPORTANT: *Whenever diagnosing a fuel injection problem first ensure that the fuel pump to engine timing is correct and that the fuel lift pump is functioning correctly by carrying out the following checks using test kit No. FT.9103 or 2843.*

FUEL LIFT PUMP

INTERNAL CONTAMINATION CHECK

1. Turn the fuel tank shut-off valve to the "Off" position.

2. Withdraw the centre bolt and remove the pump cover plate from the fuel lift pump, Figure 32.

3. Check the area inside the lift pump chamber for any accumulation of dirt or foreign matter. Wash the inside of the chamber with clean fuel oil if dirt is present.

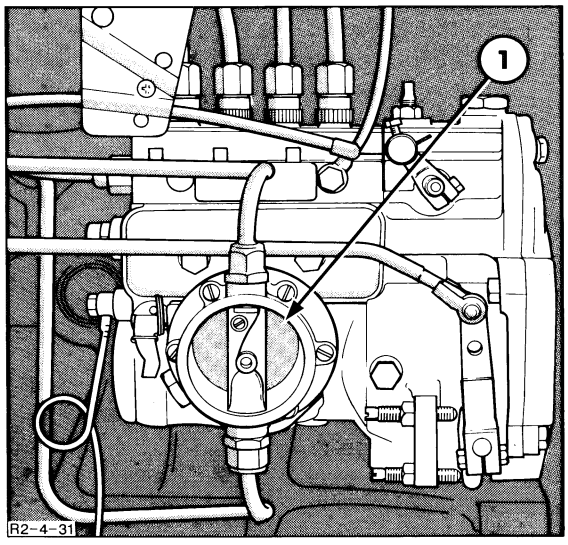

Figure 32
Internal Contamination Check

1. Lift Pump

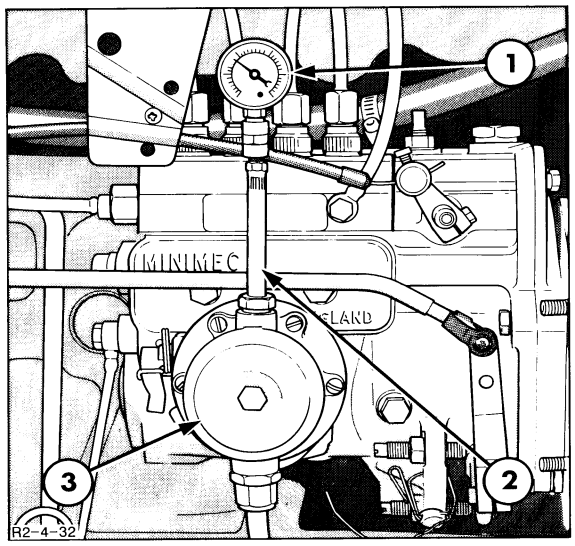

Figure 33
Lift Pump Pressure Check

1. Pressure Gauge
2. Pressure Gauge Tube
3. Lift Pump

4. Install the pump cover plate and tighten to the correct torque, see "Specifications", Chapter 8.

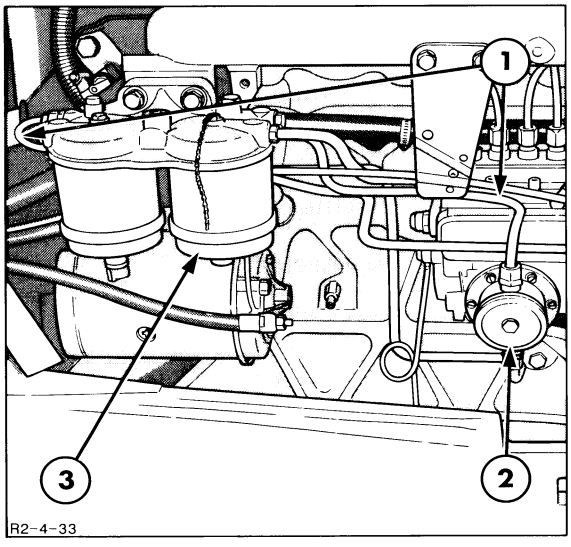

Figure 34
Air Leakage Check

1. Plastic Tube
2. Lift Pump
3. Fuel Filter

LIFT PUMP PRESSURE CHECK

1. Disconnect the fuel pressure line at the top side of the fuel lift pump and install the Pressure Gauge and Tube Assembly, Figure 33.

2. Turn the fuel tank shut-off valve to the "ON" position.

3. Using the fuel lift pump priming lever, 'pump up' the lift pump until the pointer on the gauge rises to its maximum obtainable level.

NOTE: *If no resistance is felt when pumping the priming lever and no gauge pressure is recorded, it is possible that the injection pump camshaft is positioned so that the lift pump rocker lever is in neutral position. Momentarily turn the engine over and repeat Step No. 3 above.*

4. Observe the pressure reading on the gauge. The pressure should be a minimum of 2.5 lbf/in^2 (0.17 bar) (0.18 kgf/cm^2) and should hold for a minimum of five minutes. If the pressure does not hold for a minimum of five minutes, install a new fuel lift pump.

5. Turn the fuel tank shut-off valve to the "Off" position.

6. Remove the pressure gauge and tube assembly.

AIR LEAKAGE CHECK

1. Ensure that the fuel tank shut-off valve is turned to the "Off" position.

2. Completely remove the line connecting the pressure side of the lift pump and the fuel filter.

3. Install the 24 in (60.9 cm) clear plastic tube, as shown in Figure 34. Tighten the fitting at the lift pump securely. Tighten the fitting at the filter finger tight.

4. Turn the fuel tank shut-off valve to the "On" position and when all air is expelled from the line, tighten the fitting at the filter securely.

5. Start the engine and while the engine is running at low idle, observe the clear plastic tube for any signs of air bubbles. If signs of air bubbles are present, check all fuel line fittings for tightness or stripped threads.

NOTE: *Small quantities of tiny air bubbles flowing in the fuel is permissible. Large air bubbles flowing in the fuel is a sign of air leakage in the fuel system.*

6. If all fuel line fittings are securely tightened, check the threads in the inlet and outlet ports of the fuel lift pump. If the threads are damaged in any way, install a new fuel lift pump.

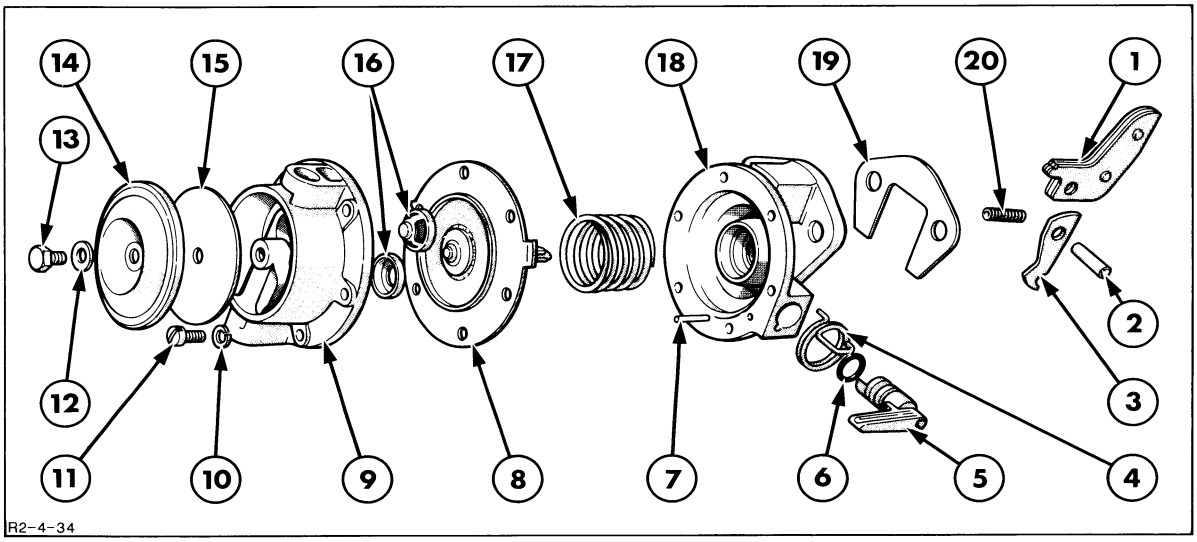

Figure 35
Fuel Lift Pump

1. Rocker Arm
2. Pivot Pin
3. Rocker Arm Lever
4. Spring
5. Priming Lever
6. Seal
7. Retaining Pin
8. Diaphragm and Pull Rod Assembly
9. Outer Body Assembly
10. Washer
11. Screw
12. Washer
13. Screw
14. Pump Cover Plate
15. Pulsator Cover Plate
16. Valves
17. Return Spring
18. Inner Body
19. Reinforcing Plate
20. Rocker Arm Spring

FUEL LIFT PUMP

REMOVAL

1. Disconnect the battery.

2. Turn the fuel shut-off valve to the "Off" position and disconnect the fuel inlet and outlet lines from the fuel lift pump.

3. Withdraw the two nuts securing the pump to the injection pump cam box and remove the pump and gasket.

DISASSEMBLY

With reference to Figure 35.

1. Remove the screw and washer which secure the pump cover plate and lift off the cover and rubber pulsator diaphragm.

2. Mark the positions of the two body halves of the pump and the position of the diaphragm and pull rod assembly so that they can be re-assembled in the same relative positions.

3. Remove the six screws and washers securing the two body halves of the pump together. If necessary, punch back the staking and remove the valves from the outer half.

4. Push down the diaphragm and disengage the pull rod, then lift out the diaphragm and pull rod assembly and the return spring.

5. Drive out the retaining pin holding the priming lever and withdraw the lever, seal and lever spring.

6. Tap out the pivot pin and withdraw the rocker arm and lever. Do not lose the small spring fitted between the rocker arm and the housing.

RE-ASSEMBLY

1. Insert the rocker arm and lever and small spring. Install the pivot pin and stake it into place. Stake the pin in three places, 120° apart.

2. Install a new seal on the priming lever. Position the lever spring on the lever, and insert the assembly into the priming lever bore. Hold the lever in position and drive in the retaining pin.

NOTE: *Be sure the retaining pin is installed below the machined surface of the inner body or damage to the diaphragm may result.*

3. Install the diaphragm return spring on the diaphragm and pull rod assembly. Insert the assembly into the inner body. Hold the rocker arm lever inward and hook the slotted end of the pull rod over the end of the rocker arm lever. Test the operation of the rocker arm and diaphragm by moving the rocker arm toward the body with the diaphragm moved inward. With the diaphragm held fully inward, the rocker arm should be free to move without transmitting motion to the diaphragm.

4. If the valves have been removed from their locations in the outer body, install and stake them in position. The valves should be examined to be sure they are seating correctly.

5. Reassemble the two pump halves and install the six screws and lockwashers. Fully depress the rocker arm to stretch the diaphragm, then tighten the six screws securing the two halves of the body to the correct torque, see "Specifications", Chapter 8.

6. Install the rubber pulsator diaphragm and pump cover plate with the screw and washer. Tighten the screw to the correct torque, see "Specifiations", Chapter 8.

INSTALLATION

1. Use a new gasket and install the pump on the injection pump cam box with the two nuts and lockwashers.

2. Connect the fuel inlet and outlet lines.

3. Ensure the pump retaining nuts and fuel line connections are tightened to the correct torque, see "Specifications", Chapter 8.

4. Turn the fuel shut off valve to the "On" position and bleed the fuel system.

GASOLINE ENGINES (CONT.)

	Ford 2610	Ford 3610	Ford 4610
Fuel Pump Pressure	5.6 U.S. Gal. (4.5 Imp. Gal.) (21.1 Litres) per hour at 1200 engine rev/min at 1.8 lbf/in^2 (0.126 bar) (0.126 Kgf/cm^2) at fuel pump outlet		
Maximum No-Load Speed (rev/min)	2250–2350	2250–2350	2450–2550
Idle Speed (rev/min)	600–650		

DIESEL ENGINES

	Ford 2610		Ford 3610		Ford 4110		Ford 4610		Ford 5610*	
	Less Cab	With Cab	Less Cab	With Cab	Less Cab	With Cab	Less Cab	With Cab	Less Cab	With Cab
Fuel Tank Capacity Less Auxiliary Fuel Tank:										
U.S. Gallons	13.0	15.0	13.0	15.0	13.0	15.0	16.0	15.0	21.0	21.0
Imperial Gallons	10.8	12.5	10.8	12.5	10.8	12.5	13.3	12.5	17.4	17.4
Litres	49.3	57.0	49.3	57.0	49.3	57.0	60.5	57.0	79.5	79.5
Fuel Tank Capacity With Auxiliary Fuel Tank:										
U.S. Gallons	—	—	—	—	—	—	—	—	34.5	34.5
Imperial Gallons	—	—	—	—	—	—	—	—	28.6	28.6
Litres	—	—	—	—	—	—	—	—	130.6	130.6
Injection Pump Type	Distributor									
Fuel Injector Nozzle Opening Pressure	3053–3275 lbf/in^2 (210–226 bar) (215–230 kgf/cm^2)		2666–2887 lbf/in^2 (184–199 bar) (187–203 kg/cm^2)							
Pump Timing	272°		272°		271°		272°		258°	
Maximum No-Load Engine Speed (rev/min) For Belgium, France, Germany, Italy, Netherlands and Sweden	2180–2200		2180–2200		2355–2375		2350–2370		2245–2265	
Maximum No-Load Engine Speed (rev/min) For All Countries Except Belgium, France, Germany, Italy, Netherlands and Sweden	2225–2275		2225–2275		2425–2475		2350–2400		2250–2300	
Idle Speed (rev/min)	600–850									

*Tractors built prior to October 1985.

DIESEL ENGINES

Tractors built prior to October 1985. For tractors built October 1985 onwards see Chapter 9, Section C.

	Ford 6610		Ford 6710		Ford 7610		Ford 7710	
	Less Cab	With Cab	Less Cab	With Cab	Less Cab	With Cab	Less Cab	With Cab
Fuel Tank Capacity Less Auxiliary Fuel Tank:								
U.S. Gallons	21.0	21.0	28.0	28.0	21.0	21.0	28.0	28.0
Imperial Gallons	17.4	17.4	23.3	23.3	17.4	17.4	23.3	23.3
Litres	79.5	79.5	106	106	79.5	79.5	106	106
Fuel Tank Capacity With Auxiliary Fuel Tank:								
U.S. Gallons	34.5	34.5	47.0	47.0	34.5	34.5	47.0	47.0
Imperial Gallons	28.6	28.6	39.1	39.1	28.6	28.6	39.1	39.1
Litres	130.6	130.6	178	178	130.6	130.6	178	178
Injection Pump Type	In-Line							
In Line Type Fuel Injection Pump Lubricating Oil Capacity	0.88 U.S. pt. (0.73 Imp. pt.) (414 cc)							
Fuel Injector Nozzle Opening Pressure	2666–2887 lbf/in^2 (184–199 bar) (187–203 kgf/cm^2)				3053–3275 lbf/in^2 (210–226 bar) (215–230 kgf/cm^2)			
Pump Timing	27°B.T.D.C.		27°B.T.D.C.		25°B.T.D.C.		25°B.T.D.C.	
Maximum No-Load Engine Speed (rev/min) For Belgium, France, Germany, Italy, Netherlands and Sweden	2240–2270		2240–2270		2240–2270		2240–2270	
Maximum No-Load Engine Speed (rev/min) For All Countries except Belgium, France, Germany, Italy Netherlands and Sweden	2325–2375		2325–2375		2325–2375		2325–2375	
Idle Speed (rev/min)	600–850				700–800			

SPECIAL TOOLS (CONT.)
FUEL INJECTION PUMP – ROTARY TYPE

DESCRIPTION	LESLIE HARTRIDGE TOOLS
Protection Cap for Shut-Off Spindle	7144–458B
Protection Cap for Shut-Off Shaft/Throttle Shaft	7144–459A
Drive Plate Screw Torque Adaptor	7144–482
Drive Plate Spanner	7144–744
Drive Shaft Screw Tool	7144–773
Protection Cap for Mechanical Drive Shaft	7144–773
Maximum Fuel Adjusting Probe	7144–875
Universal Flange Marking Gauge	7244–26
Auto Advance Gauge	7244–59
Torque Spanner Socket	7244–125B
Base	7244–200

FUEL INJECTION PUMP–IN-LINE TYPE
(Prior Tool Numbers, where applicable, shown in brackets)

DESCRIPTION	V L CHURCHILL TOOLS	NUDAY TOOLS
Adjustable Bridge Puller	518	5939 (518)
Shaft Protectors	625A	9212 (625A)
Pulling Attachment	952	9526 (952)
Camshaft End Float Gauge	CT9017	8053
Delivery Valve Guide Remover	CT9022	8055
Pump Spill Pipe	CT9023	8056
Pump Bearing Remover	CT9050	8057
Spill Cut-off Checking Adaptor	CT9076B	8061
Delivery Valve Holder Adaptor	FT9100	4460
Lift Pump Test Kit	FT9103	2843
Camshaft End Float Gauge Adaptor	CT9017	8054
Step Plate Tool	6305	9210

FUEL INJECTORS
(Prior Tool Numbers, where applicable, shown in brackets)

DESCRIPTION	V L CHURCHILL TOOLS	NUDAY TOOLS
Injector Nozzle Nut Socket	CT9009	8126
Nozzle Reverse Flush Adaptor	CT9024	8124
Injector Cleaning Kit*	FT9101 (SW20)	1720
Tallow	OBTAIN LOCALLY	
Polishing Sticks	OBTAIN LOCALLY	

*Kit consists of: Nozzle Cleaning Wires
Pressure Chamber Drills
Pressure Chamber Scraper
Valve Seat Scraper
Brass Wire Brush
Pin Vice

F. TEST PLANS

IMPORTANT: *Ensure check valves are in situ on injector lines prior to calibration being checked.*

NOTE: *Due to the method of timing engines with in-line fuel injection pumps, the effect of backlash in the timing gears is eliminated.*

FUEL INJECTION PUMP – ROTARY TYPE TEST PLANS – FORD 2610 – 5610

BASIC PUMP SPECIFICATION

Mechanical governor
Automatic speed advance device
Rotation (looking at drive end) – Clockwise
Hydraulic head and transfer pump liner modified to provide for self-venting
Cambox pressurising valve(2610–4610 only)

Governor link length as follows:

Ford 2610 to 4610	Ford 5610
53.00–54.00 mm (2.087–2.126 in)	53.5–55.5 mm (2.126–2.185 in)

Governor control spring positions:
2610 and 3610 – No. 3 hole on control arm and No. 2 hole on throttle lever.
4110 and 4610 – No. 3 hole on control arm and No. 1 hole on throttle lever.
5610 – No. 2 hole on control arm and No. 2 hole on throttle lever.

Roller to roller dimension as follows:

Ford 2610	Ford 3610	Ford 4110	Ford 4610	Ford 5610
50.0mm (1.968in)	50.15mm (1.974in)	50.24mm (1.977in)	50.43mm (1.985in)	49.95mm (1.966in)

Plunger diameter 9.5 mm (0.374 in.) – 2 plunger pump, 7.0 mm (0.275 in.) – 4 plunger pump.

Test Procedure

Install Auto-advance measuring device and set scale to zero before commencing test.

Install pressure gauge to measure Cambox pressure using special bleed-off connection.

Ensure the pump injector valve assemblies are installed.

Where marked*, use 30 secs. glass draining time and allow fuel to settle for 15 secs. before taking a reading.

Shimming of Automatic Speed Advance Device:
Ford 2610, 3610 & 4610

A 1.0mm shim is fitted to the piston spring cap on assembly. If necessary, 0.5mm shim may be removed in order to satisfy test (4). No additional shimming is required.

Ford 4110

1.5mm. shim is fitted to the piston spring cap on assembly. If necessary, 0.5mm. shim may be removed in order to satisfy test (4).

Ford 5610

A 2.5mm. shim is fitted to the advance piston spring cap on assembly. A 0.2mm shim may be added for rectification.

PART 2
FUEL SYSTEMS

Chapter 9

FUEL SYSTEMS – DIESEL POST OCT. 1985
FORD 5610, 6610 and 7610 WITH DE-LUXE CAB

Section		Page
A.	DESCRIPTION AND OPERATION	1
B.	FUEL TANKS – OVERHAUL	2
C.	SPECIFICATIONS AND TEST PLANS	7

A. DESCRIPTION AND OPERATION

FUEL SYSTEM

The fuel system for Ford 5610, 6610 and 7610 Tractors equipped with De-Luxe Cab consists of an in-line fuel injection pump, fuel injectors, fuel filters, fuel tank(s) and inter-connecting fuel lines. A pre-cleaner and filter remove dirt and contaminants from the intake air.

The in-line fuel injection pump utilizes a fuel feed from the fuel tank directly to the fuel lift pump which is attached to the fuel injection pump.

The lift pump supplies fuel at low pressure to the fuel filters. From the filters fuel passes to the fuel injection pump to supply the fuel injectors at high pressure. The excess fuel that leaks past the needle valve of the injectors is directed back into the fuel tank at the sender unit by means of the injector leak-off line.

MAIN FUEL TANK

The fuel tank for Ford 5610, 6610 and 7610 tractors with De-Luxe Cab is located on the left-hand side of the transmission housing beneath the cab and is retained in position by brackets which are bolted to the side of the tractor.

The tank is vented by a breather hose connected to a tube fixed to the underside of the cab frame and directed upwards to vent beneath the left-hand fender. The fuel tank outlet line and injector leak-off line are an integral part of the fuel tank sender unit secured to the top front end of the fuel tank.

ADDITIONAL FUEL TANK

To increase the quantity of fuel which may be carried by the tractor, an additional fuel tank is available as an option for Ford 5610 and 6610 and is standard for 7610 models.

The additional fuel tank is located on the right-hand side of the transmission housing beneath the cab and is retained in position by brackets which are bolted to the side of the tractor.

The additional fuel tank is connected in series to the main fuel tank by two pipes which pass beneath the transmission housing. The additional fuel tank is filled via the main fuel tank and fuel is automatically transferred to and from the additional tank via the two pipes. The additional tank is vented, via a hose across the top of the transmission housing to connect with the main tank.

B. FUEL TANKS – OVERHAUL

MAIN FUEL TANK

REMOVAL

With reference to Figure 1.

1. Position the tractor on flat ground with the wheels chocked and the battery disconnected.

2. Release the securing clamp and remove the rubber cap at the rear of the fuel tank and drain the fuel oil into a suitable receptacle. Replace and secure the cap.

NOTE: *Ensure the receptacle is capable of holding the quantity of fuel oil held in the fuel tank(s). A tractor with dual fuel tanks is capable of holding 33.4 Imp. Galls (40.0 U.S. Galls) (152 litres).*

3. Jack up the tractor and remove the left-hand rear wheel. Position a suitable stand under the axle housing and lower the tractor from the jack.

4. Withdraw the retaining bolts and remove the left-hand cab step.

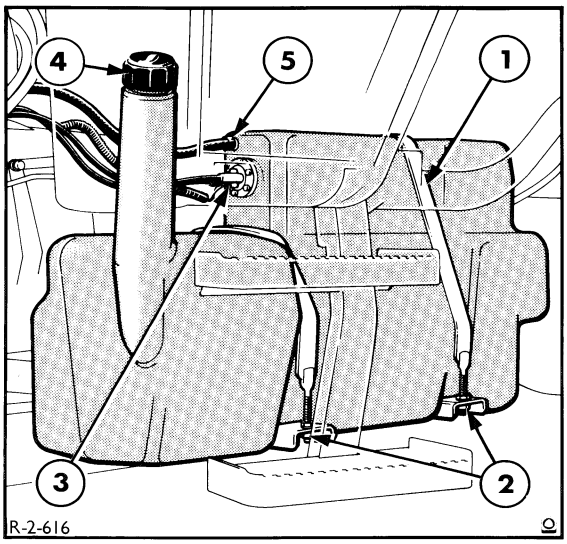

Figure 1
Main Fuel Tank Assembly

1. Fuel Tank Retaining Strap
2. Retaining Strap to Support Securing Nuts
3. Fuel Tank Sender Unit
4. Fuel Tank Filler Cap
5. Auxiliary Tank to Main Tank Breather Hose

5. Release the securing clamp and remove the breather hose from the tube on the underside of the cab.

6. Disconnect the electrical wires from the fuel tank sender unit.

7. Disconnect and withdraw the fuel return tubes and the additional fuel tank breather hose (where fitted) from the main fuel tank. Cap or plug the exposed hose ends and connections.

8. Withdraw the retaining nuts then release the retaining straps from the base of the fuel tank mounting brackets.

9. Withdraw the retaining bolts then remove the baffle and insulator assembly (where fitted) from the fuel tank mounting brackets.

10. Units with additional fuel tank:

- Withdraw the retaining bolts and remove the guard(s) from the fuel tank cross-over pipes that pass beneath the transmission housing.

- Remove the plastic straps and pull back the insulators (where fitted) to reveal the cross-over pipe retaining clamps.

- Release the cross-over pipe retaining clamps at the fuel tank connection.

NOTE: *Place a suitable receptacle below the cross-over pipes to collect any fuel oil which may be left in the fuel tanks or hoses.*

11. Pull the fuel tank away from the transmission housing to gain access to the rear support bracket retaining bolts. Take care when pulling the fuel tank out as the fuel tank cross-over hoses (where fitted) will be released from the fuel tank and any fuel oil left in the tanks or hoses will drain out. Plug or cap the exposed hose ends and fuel tank connections.

12. Support the fuel tank assembly at the rear then withdraw the rear support retaining bolts and remove the support and retaining strap assembly from the tractor.

NOTE: *The lower retaining bolt has a left-hand thread and high torque value, see "Specifications", Section C.*

13. Remove the fuel tank assembly from the tractor, it may be necessary to slide the fuel tank rearwards and downwards to clear the underside of the cab frame.

INSTALLATION

The installation of the fuel tank follows the removal procedure in reverse. On installation, observe the following requirements:-

- Tighten all bolts to the correct torque, see "Specifications", Section C.
- Tighten all clamps to the correct torque see, "Specifications", Section C.
- Bleed the fuel system as described in Chapter 2, Section C.
- Check all hose connections for leaks.

ADDITIONAL FUEL TANK

REMOVAL

With reference to Figure 2.

1. Position the tractor on flat ground with the wheels chocked and the battery disconnected.
2. Release the securing clamp and remove the rubber cap at the rear of the main fuel tank and drain the fuel oil into a suitable receptacle. Replace and secure the cap.

NOTE: *Ensure the receptacle is capable of holding the quantity of fuel oil held in the fuel tank. A tractor with dual fuel tanks is capable of holding 33.4 Imp. Galls. (40.0 U.S. Galls) (152 litres).*

3. Withdraw the retaining bolts and remove the right-hand cab step.
4. Disconnect the fuel tank breather hose located at the front end of the fuel tank. Plug or cap the exposed hose and connection.
5. Withdraw the retaining nuts then release the retaining straps from the base of the fuel tank mounting brackets.

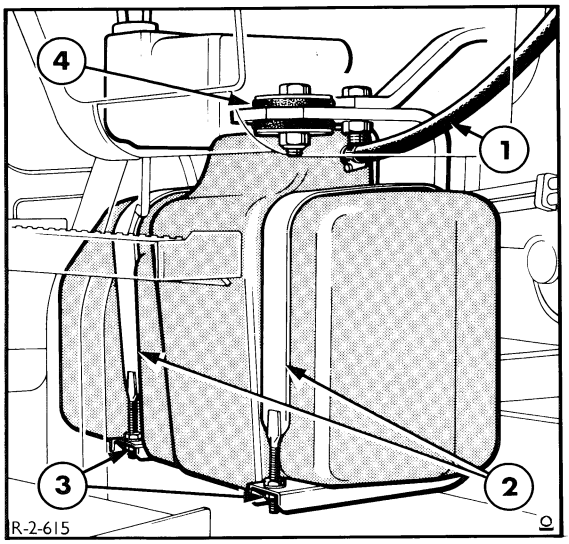

Figure 2
Auxiliary Fuel Tank Assembly

1. Auxiliary Tank Breather Hose
2. Fuel Tank Retaining Straps
3. Retaining Strap to Support Securing Nuts
4. Cab Front Mount Assembly

6. Withdraw the retaining bolts then remove the baffle and insulator assembly (where fitted) from the fuel tank mounting brackets.

7. Withdraw the retaining bolts and remove the guard(s) from the fuel tank cross-over pipes that run below the transmission and rear axle.

8. Remove the plastic straps and pull back the insulators (where fitted) to reveal the cross-over pipe securing clamps.

NOTE: *Place a suitable receptacle below the cross-over pipes, where fitted, to collect any fuel oil which may be left in the fuel tanks or hoses.*

9. Release the cross-over pipe retaining clamps at the fuel tank connection.

10. To remove the fuel tank assembly, pull the fuel tank out from the transmission housing and tilt the top section inwards to clear the underside of the cab frame. Take care when pulling the fuel tank out as the fuel tank cross-over hoses will be released from the fuel tank and any fuel oil left in the tanks or hoses will drain out. Plug or cap the exposed hose ends and fuel tank connections.

INSTALLATION

The installation of the additional fuel tank follows the removal procedure in reverse. On installation, observe the following requirements:-

- Tighten all bolts to the correct torque, see "Specifications", Section C.
- Tighten all clamps to the correct torque, see "Specifications", Section C.
- Bleed the fuel system as described in Chapter 2, Section C.
- Check all hose connections for leaks.

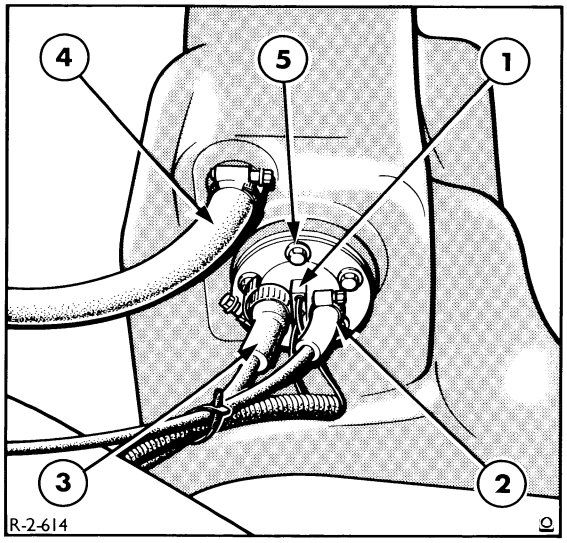

Figure 3
Fuel Tank Sender Unit

1. Electrical Harness Connection
2. Fuel Outlet Tube
3. Fuel Return Tube
4. Additional Fuel Tank Breather Hose
5. Sender Unit Retaining Bolt

FUEL TANK SENDER UNIT

REMOVAL

With reference to Figure 3.

1. Remove the main fuel tank as previously described.

2. Release and remove the sender unit securing screws.

3. Remove the flange ring then withdraw the float assembly from the fuel tank.

4. Remove and discard the sealing gasket.

INSTALLATION

The installation of the fuel tank sender unit follows the removal procedure in reverse. On installation observe the following requirements:-

- Install a new sealing gasket.

- Lightly tighten the retaining screws then continue to tighten alternate screws until the torque stabilises at 2.5 Nm (21.5 lbf/ft).

- Install the fuel tank as previously described.

C. SPECIFICATIONS

DIESEL ENGINES

Tractors built October 1985 onwards.

	Ford 5610		Ford 6610		Ford 7610		Ford 7710	
	Less De-Luxe Cab	With De-Luxe Cab	Less De-Luxe Cab	With De-Luxe Cab	Less De-Luxe Cab	With De-Luxe Cab	Less De-Luxe Cab	With De-Luxe Cab
Fuel Tank Capacity Less Auxiliary Fuel Tank:								
Imp. Gallons	17.6	22.4	17.6	22.4	17.6	—	23.3	23.3
U. S. Gallons	21.0	26.9	21.0	26.9	21.0	—	28.0	28.0
Litres	80.0	102	80.0	102	80.0	—	106	106
Fuel Tank Cap-acity With Auxiliary Fuel Tank:								
Imp. Gallons	28.7	33.4	28.7	33.4	28.7	33.4	39.1	39.1
U. S. Gallons	34.5	40.0	34.5	40.0	34.5	40.0	47.0	47.0
Litres	130	152	130	152	130	152	178	178
Injection Pump Type	In-Line							
In-Line Type Fuel Injection Pump Lubricating Oil Capacity	0.73 Imp. pt. (0.88 U.S. pt.) (414 cc)							
Fuel Injector Nozzle Opening Pressure	2666–2887 lbf/in^2 (184–199 bar) (187–203 kgf/cm^2)				3053–3275 lbf/in^2 (210–226 bar) (215–230 kg/cm^2)			
Pump Timing	23°B.T.D.C.		27°B.T.D.C.		25°B.T.D.C.		25°B.T.D.C.	
Maximum No-Load Engine Speed (rev/min) For Austria, Belgium, Denmark, France, Germany, Greece, Italy, Luxembourg, Morocco, Netherlands, Portugal, Republic of Ireland, Spain, Switzerland and United Kingdom.	2215–2265				2215–2265 Except Germany [2160–2180 Germany only]			
Maximum No-Load Engine Speed (rev/min) For All Countries Except Those Countries Listed Above.	2250–2320				2250–2320			
Idle Speed (rev/min)	600–850				700–850			

TEST PLANS

FUEL INJECTION PUMP–IN-LINE TEST PLAN

TEST PLAN–FORD 5610–256in^3 (4186 cm^3) Engine

IN-LINE TYPE FUEL INJECTION PUMP – TYPE NUMBER P5675/B

All tests should be performed using Hartridge 875 or 1100 test machines.
The test fuel oil should be at 40°C±2°C (104°F±4°F).

Type	Enclosed camshaft with mechanical governor
Plunger Stroke and Diameter	7 mm×9.5 mm
Camshaft Rotation	Clockwise from drive end
Lubrication	Change oil every 300 hours and clean breather
Oil Capacity	0.73 Imp.pint (0.88 U.S. pint) (414 cc)
Oil Grade	Same as engine
Pump Timing	23° B.T.D.C.
Camshaft End Float	0.002–0.005 in (0.051–0.127 mm)
Camshaft End Float Shims	0.004–0.008 in (0.102–0.203 mm)
Dimensions, rear control fork to end of square section on control rod	0.02 in (0.5 mm)
Dimensions, B.D.C. to point of spill cut-off	0.114–0.122 in (2.90–3.10 mm)
Phasing Spacers:	
Number 1.	0.151–0.153 in (3.85–3.90 mm)
Number 2.	0.155–0.157 in (3.95–4.00 mm)
Number 3.	0.159–0.161 in (4.03–4.10 mm)
Number 4.	0.163–0.165 in (4.15–4.20 mm)
Number 5.	0.167–0.169 in (4.25–4.30 mm)
Phasing Tolerance	±½° (Pump)
Plunger Arm Clearance	0.008–0.020 in (0.2–0.5 mm)
Lower Spring Seat	Seats graded in thickness from 0.023–0.085 in (0.60–2.10 mm) in steps of 0.004 in (0.1 mm)
Maximum Fuel Delivery	16.2±0.2 cc–900 rev/min for 200 shots

Governor

Type	Mechanical
Pump No Delivery Speed	1150 rev/min (Pump)
Idling	2.0±0.5 cc in 200 strokes at 300 rev/min
Governor Spring Identification	BLUE/GREEN

Tightening Torques

	lbf ft	Nm	Mkg
Screws, Governor Backplate to Pump	9	12	1.2
Delivery Valve Holders	40–45	54–61	5.5–6.2
Pump Drive Gear Adaptor Retaining Nut	45	61	6.2
Governor Spring Retaining Bolt	2–4	2.7–5.4	0.3–0.6
Control Fork Socket Screws	2	2.7	0.3
Pump Body, Socket Screws	5	6.8	0.7
Fuel Injection Pump to Front Plate	26–30	36–41	3.6–4.2
Bolt Gear to Injection Pump	20–25	27–34	2.8–3.5

TEST PLAN–FORD 6610–268in^3 (4390 cm^3) Engine

IN-LINE TYPE FUEL INJECTION PUMP – TYPE NUMBER P5598/2E

All tests should be performed using Hartridge 875 or 1100 test machines. The test fuel oil should be at 40°C±2°C (104°F±4°F).

Type	Enclosed camshaft with mechanical governor
Plunger Stroke and Diameter	7 mm×9.5 mm
Camshaft Rotation	Clockwise from drive end
Lubrication	Change oil every 30 hours and clean breather
Oil Capacity	0.73 Imp.pint (0.88 U.S. pint) (414 cc)
Oil Grade	Same as engine
Pump Timing	27° B.T.D.C.
Camshaft End Float	0.002–0.005 in (0.051–0.127 mm)
Camshaft End Float Shims	0.004–0.008 in (0.102–0.203 mm)
Dimensions, rear control fork to end of square section on control rod	0.02 in (0.5 mm)
Dimensions, B.D.C. to point of spill cut-off	0.114–0.122 in (2.90–3.10 mm)
Phasing Spacers:	
Number 1.	0.151–0.153 in (3.85–3.90 mm)
Number 2.	0.155–0.157 in (3.95–4.00 mm)
Number 3.	0.159–0.161 in (4.03–4.10 mm)
Number 4.	0.163–0.165 in (4.15–4.20 mm)
Number 5.	0.167–0.169 in (4.25–4.30 mm)
Phasing Tolerance	±½° (Pump)
Plunger Arm Clearance	0.008–0.020 in (0.2–0.5 mm)
Lower Spring Seat	Seats graded in thickness from 0.023–0.085 in (0.60–2.10 mm) in steps of 0.004 in (0.1 mm)
Maximum Fuel Delivery	19.1±0.2 cc–900 rev/min for 200 shots

Governor

Type	Mechanical
Pump No Delivery Speed	1150 rev/min (Pump)
Idling	2.0±0.5 cc in 200 strokes at 300 rev/min
Governor Spring Identification	BLUE/PURPLE

Tightening Torques

	lbf ft	Nm	Mkg
Screws, Governor Backplate to Pump	9	12	1.2
Delivery Valve Holders	40–45	54–61	5.5–6.2
Pump Drive Gear Adaptor Retaining Nut	45	61	6.2
Governor Spring Retaining Bolt	2–4	2.7–5.4	0.3–0.6
Control Fork Socket Screws	2	2.7	0.3
Pump Body, Socket Screws	5	6.8	0.7
Fuel Injection Pump to Front Plate	26–30	36–41	3.6–4.2
Bolt Gear to Injection Pump	20–25	27–34	2.8–3.5

TEST PLAN–FORD 7610 AND 7710–268in^3 (4390 cm^3) Turbo-charged Engine

IN-LINE TYPE FUEL INJECTION PUMP – TYPE NUMBER P5597/2G

All tests should be performed using Hartridge 875 or 1100 test machines.
The test fuel oil should be at 40°C±2°C (104°F±4°F).

Type	Enclosed camshaft with mechanical governor
Plunger Stroke and Diameter	7 mm×9.5 mm
Camshaft Rotation	Clockwise from drive end
Lubrication	Change oil every 300 hours and clean breather
Oil Capacity	0.73 Imp.pint (0.88 U.S. pint) (414 cc)
Oil Grade	Same as engine
Pump Timing	25° B.T.D.C.
Camshaft End Float	0.002–0.005 in (0.051–0.127 mm)
Camshaft End Float Shims	0.004–0.008 in (0.102–0.203 mm)
Dimensions, rear control fork to end of square section on control rod	0.02 in (0.5 mm)
Dimensions, B.D.C. to point of spill cut-off	0.114–0.122 in (2.90–3.10 mm)
Phasing Spacers:	
Number 1.	0.151–0.153 in (3.85–3.90 mm)
Number 2.	0.155–0.157 in (3.95–4.00 mm)
Number 3.	0.159–0.161 in (4.03–4.10 mm)
Number 4.	0.163–0.165 in (4.15–4.20 mm)
Number 5.	0.167–0.169 in (4.25–4.30 mm)
Phasing Tolerance	±½° (Pump)
Plunger Arm Clearance	0.008–0.020 in (0.2–0.5 mm)
Lower Spring Seat	Seats graded in thickness from 0.023–0.085 in (0.60–2.10 mm) in steps of 0.004 in (0.1 mm)
Maximum Fuel Delivery	18.8±0.2 cc–900 rev/min for 200 shots

Governor

Type	Mechanical
Pump No Delivery Speed	1150 rev/min (Pump)
Idling	2.0±0.5 cc in 200 strokes at 300 rev/min
Governor Spring Identification	BLUE/PURPLE

Tightening Torques

	lbf ft	Nm	Mkg
Screws, Governor Backplate to Pump	9	12	1.2
Delivery Valve Holders	40–45	54–61	5.5–6.2
Pump Drive Gear Adaptor Retaining Nut	45	61	6.2
Governor Spring Retaining Bolt	2–4	2.7–5.4	0.3–0.6
Control Fork Socket Screws	2	2.7	0.3
Pump Body, Socket Screws	5	6.8	0.7
Fuel Injection Pump to Front Plate	26–30	36–41	3.6–4.2
Bolt Gear to Injection Pump	20–25	27–34	2.8–3.5