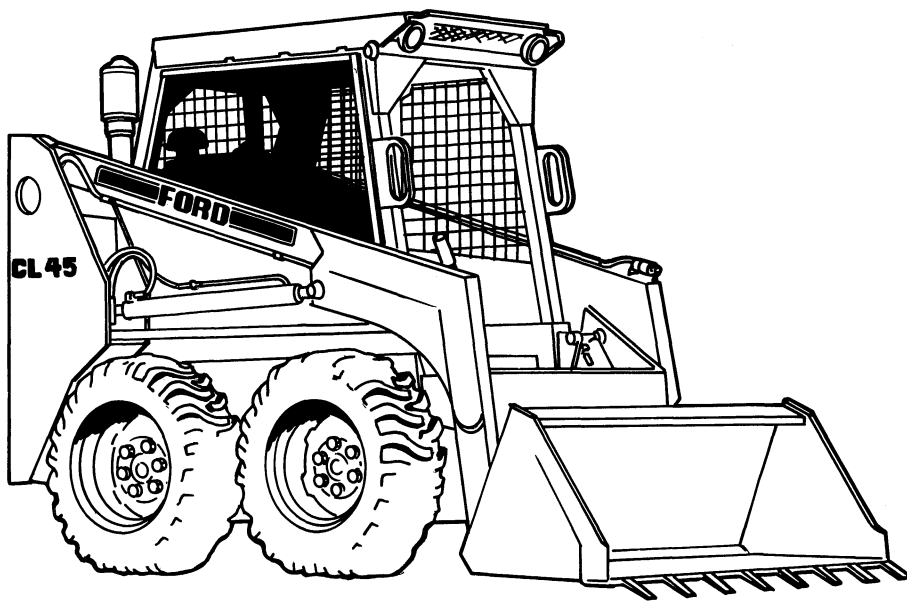


FORD

Compact Loader

CL-35 CL-45



repair manual

FOREWORD

This repair manual provides information for the proper servicing and overhaul of Ford Model CL35 and CL45 Compact Loaders and is an essential publication for all service personnel carrying out repairs and maintenance procedures.

This manual covers units produced in 11/82 and later. Special service instructions are identified by loader serial number or applicable production dates throughout the text.

The manual is divided into 8 sections, each divided into subsections. Each subsection contains information on general operating principles, detailed inspection and overhaul and, where applicable, trouble shooting, special tools and specifications.

The material contained in this manual was correct at the time of going to print but Ford policy is one of continuous improvement and the right to change prices, specifications, equipment or design at anytime without notice is reserved. All data in this manual is subject to production variations, so overall dimensions and weights should be considered as approximate only and illustrations do not necessarily depict the unit to standard built specifications.

Tractor Operations
Ford Motor Company



SAFETY PRECAUTIONS



Practically all Service work involves the need to drive the loader. The Operator's Manual, supplied with each loader, contains detailed safety precautions relating to Driving, Operating and Servicing that loader. These precautions are as applicable to the service technician as they are to the operator, and should be read, understood and practiced by all personnel.

Prior to undertaking any maintenance, repair, overhaul, dismantling or re-assembly operations, whether within a workshop facility or out "in the field", consideration should be given to factors that may have an effect upon Safety, not only upon the mechanic carrying out the work, but also upon bystanders.

PERSONAL CONSIDERATIONS

- The wrong clothes or carelessness in dress can cause accidents. Check to see that you are suitably clothed.
Some jobs require special protective equipment.
- **Eye Protection**
The smallest eye injury may cause loss of vision. Injury can be avoided by wearing eye protection when engaged in chiselling, grinding, discing, welding, painting, etc.
- **Breathing Protection**
Fumes, dust and paint spray are unpleasant and harmful. These can be avoided by wearing respiratory protection.
- **Hearing Protection**
Loud noise may damage your hearing and the greater the exposure the worse the damage. If you feel the noise excessive, wear ear protection.
- **Hand Protection**
It is advisable to use a protective cream before work to prevent irritation and skin contamination. After work clean your hands with soap and water. Solvents such as white spirit, paraffin, etc., may harm the skin.
- **Foot Protection**
Substantial or protective footwear with reinforced toe-caps will protect your feet from falling objects. Additionally, oil-resistant soles will help to avoid slipping.
- **Special Clothing**
For certain work it may be necessary to wear flame or acid-resistant clothing.
- Avoid injury through incorrect handling of components. Make sure you are capable of lifting the object. If in doubt get help.

EQUIPMENT CONSIDERATIONS

- **Machine Guards**
Before using any machine, check to ensure that the machine guards are in position and serviceable. These guards not only prevent parts of the body or clothing coming in contact with the moving parts of the machine,

but also ward off objects that might fly off the machine and cause injury.

- **Lifting Appliances**

Always ensure that lifting equipment, such as chains, slings, lifting brackets, hooks and eyes are thoroughly checked before use. If in doubt, select stronger equipment than is necessary.

Never stand under a suspended load or raised implement.

- **Compressed Air**

The pressure from a compressed air line is often as high as 100 psi (6.9 bar) 7 (kgf/cm²). It is perfectly safe if used correctly. Any misuse may cause injury.

Never use compressed air to blow dust, filing, dirt, etc., away from your work area unless the correct type of nozzle is fitted.

Compressed air is not a cleaning agent, it will only move dust, etc., from one place to another. Look around before using an air hose as bystanders may get grit into their eyes, ears or skin.

- **Hand Tools**

Many cuts, abrasions and injuries are caused by defective tools. Never use the wrong tool for the job, as this generally leads either to some injury, or to a poor job.

Never use

- A hammer with a loose head or split handle.
- Spanners or wrenches with splayed or worn jaws.
- Spanners or files as hammers; or drills, clevis pins or bolts as punches.

For removing or replacing hardened pins use a copper or brass drift rather than a hammer.

For dismantling, overhaul and assembly of major and sub components, always use the Special Service Tools recommended.

These will reduce the work effort, labor time and the repair cost.

Always keep tools clean and in good working order.

- **Electricity**

Electricity has become so familiar in day to day usage, that its potentially dangerous properties are often overlooked. Misuse of electrical equipment can endanger life.

Before using any electrical equipment — particularly portable appliances — make a visual check to make sure that the cable is not worn or frayed and that the plugs, sockets, etc., are intact. Make sure you know where the nearest isolating switch for your equipment is located.

GENERAL CONSIDERATIONS

- **Solvents**

Use only cleaning fluids and solvents that are known to be safe. Certain types of fluids can cause damage to

components such as seals, etc., and can cause skin irritation. Solvents should be checked that they are suitable not only for the cleaning of components and individual parts, but also that they do not affect the personal safety of the user.

- **Housekeeping**

Many injuries result from tripping or slipping over, or on, objects or material left lying around by a careless worker. Prevent these accidents from occurring. If you notice a hazard, don't ignore it — remove it.

A clean, hazard-free place of work improves the surroundings and daily environment for everybody.

- **Fire**

Fire has no respect for persons or property. The destruction that a fire can cause is not always fully realized. Everyone must be constantly on guard.

- Extinguish matches/cigars/cigarettes, etc., before throwing them away.
- Work cleanly, disposing of waste material into proper containers.
- Locate the fire extinguishers and find out how to operate them.
- Do not panic — warn those near and raise the alarm.
- Do not allow or use an open flame near the tractor fuel tank, battery or component parts.

- **First Aid**

In the type of work that mechanics are engaged in, dirt, grease, fine dusts, etc., all settle upon the skin and clothing. If a cut, abrasion or burn is disregarded it may be found that a septic condition has formed within a short time. What appears at first to be trivial could become painful and injurious. It only takes a few minutes to have a fresh cut dressed, but it will take longer if you neglect it. Make sure you know where the First Aid box is located.

- **Cleanliness**

Cleanliness of the loader hydraulic system is essential for optimum performance. When carrying out service and repairs plug all hose ends and component connections to prevent dirt entry.

Clean the exterior of all components before carrying out any form of repair. Dirt and abrasive dust can reduce the efficiency and working life of a component and lead to costly replacement. Use of a high pressure washer or steam cleaner is recommended.

OPERATIONAL CONSIDERATIONS

- Stop the engine, if at all possible, before performing any service.
- Place a warning sign on loaders which, due to service or overhaul, would be dangerous to start. Disconnect the battery leads if leaving such a unit unattended.
- Do not attempt to start the engine while standing beside the loader or attempt to by-pass the safety start system.
- Avoid prolonged running of the engine in a closed building or in an area with inadequate ventilation as exhaust fumes are highly toxic.

- Always turn the radiator cap to the first stop, to allow pressure in the system to dissipate when the coolant is hot.
- Never work beneath a loader which is on soft ground. Always take the unit to an area which has a hard working surface — concrete for preference.
- If it is found necessary to raise the loader for ease of servicing or repair, make sure that safe and stable supports are installed, beneath the main frame, before commencing work.
- Use footsteps or working platforms when servicing those areas of a loader that are not within easy reach.
- Before loosening any hoses or tubes, switch off the engine, remove all pressure in the lines by operating the foot pedals several times. This will remove the danger of personal injury by oil pressure.
- Prior to pressure testing, make sure all hoses and connectors not only of the loader, but also those of the test equipment, are in good condition and tightly sealed. Pressure readings must be taken with the gauges specified. The correct procedure should be rigidly observed to prevent damage to the system or the equipment, and to eliminate the possibility of personal injury.
- Always lower equipment to the ground when leaving the loader.
- If high lift attachments are installed on a loader beware of overhead power, electric or telephone cables when travelling. Drop attachment near to ground level to increase stability and minimize risks.
- Do not park or attempt to service a loader on an incline. If unavoidable, take extra care and block all wheels.
- Prior to removing wheels and tires from a loader, check to determine whether additional ballast (liquid or weights) has been added. Seek assistance and use suitable equipment to support the weight of the wheel assembly.
- When inflating tires beware of over inflation — constantly check the pressure. Over inflation can cause tires to burst and result in personal injury.

Safety precautions are very seldom the figment of someone's imagination. They are the result of sad experience, where most likely someone has paid dearly through personal injury.

Heed these precautions and you will protect yourself accordingly. Disregard them and you may duplicate the sad experience of others.

SERVICE TECHNIQUES

A. SERVICE SAFETY

Appropriate service methods and proper repair procedures are essential for the safe, reliable operation of all motor vehicles as well as the personal safety of the individual doing the work. This Shop Manual provides general directions for accomplishing service and repair work with tested, effective techniques. Following them will help assure reliability.

There are numerous variations in procedures, techniques, tools, and parts for servicing vehicles, as well as in the skill of the individual doing the work. This Manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this Manual must first establish that he compromises neither his personal safety nor the vehicle integrity by his choice of methods, tools or parts.

B. SERVICE TECHNIQUES

Clean the exterior of all components before carrying out any form of repair. Dirt and abrasive dust can reduce the efficient working life of a component and lead to costly replacement.

Time spent on the preparation and cleanliness of working surfaces will pay dividends in making the job easier and safer and will result in overhauled components being more reliable and efficient in operation.

Use cleaning fluids which are known to be safe. Certain types of fluid can cause damage to 'O' rings and cause skin irritation. Solvents should be checked that they are suitable for the cleaning of components and also that they do not risk the personal safety of the user.

Replace 'O' rings, seals or gaskets whenever they are disturbed. Never mix new and old seals or 'O' rings, regardless of condition. Always lubricate new seals and 'O' rings with hydraulic oil before installation.

When replacing component parts use the correct tool for the job.

HOSES AND TUBES

Always replace hoses and tubes if the end connections are damaged.

When installing a new hose loosely connect each end and make sure the hose takes up the designed position before tightening the connection. Clamps should be tightened sufficiently to hold the hose without crushing and to prevent chafing.

The hoses are the arteries of the unit, be sure they are in good condition when carrying out repairs or maintenance otherwise the machine's output and productivity will be affected.

After hose replacement to a moving component check the hose does not foul by moving the component through the complete range of travel.

Be sure any hose which has been installed is not kinked or twisted.

Hose connections which are damaged, dented, crushed or leaking, restrict oil flow and the productivity of the components being served. Connectors which show signs of movement from the original swaged position have failed, and will ultimately separate completely.

A hose with a chafed outer cover will allow water entry. Concealed corrosion of the wire reinforcement will subsequently occur along the hose length with resultant hose failure.

Ballooning of the hose indicates an internal leakage due to structural failure. This condition rapidly deteriorates and total hose failure soon occurs.

Kinked, crushed, stretched or deformed hoses generally suffer internal structural damage which can result in oil restriction, a reduction in the speed of operation and ultimate hose failure.

Free-moving, unsupported hoses must never be allowed to touch each other or related working surfaces. This causes chafing which reduces hose life.

BEARINGS

Bearings which are considered suitable for further service should be cleaned in a suitable solvent and immersed in clean lubricating oil until required.

Installation of a bearing can be classified in two ways: press fit on rotating parts such as shafts, and gears, and push fit into static locations such as reduction gear housings. Where possible, always install the bearing onto the rotating component first.

Use the correct tools or a press, to install a bearing or bushing. In the absence of the correct tools or press, heat the bearings and/or the casing in hot oil to assist the installation of the bearing.


When bearings or bushings are removed always carefully check that the bearing is free from discoloration and signs of over-heating. Also check for mechanical damage such as excessive clearance, nicks and scuffing. If in doubt replace the bearings or bushings.

Bearings should never be removed unless absolutely necessary. Always use the recommended puller to reduce the risk of bearing or related component damage.

The reliability and durability of a unit depends on the effective operation of the many types of bearings and bushings which are incorporated in the complete assembly.

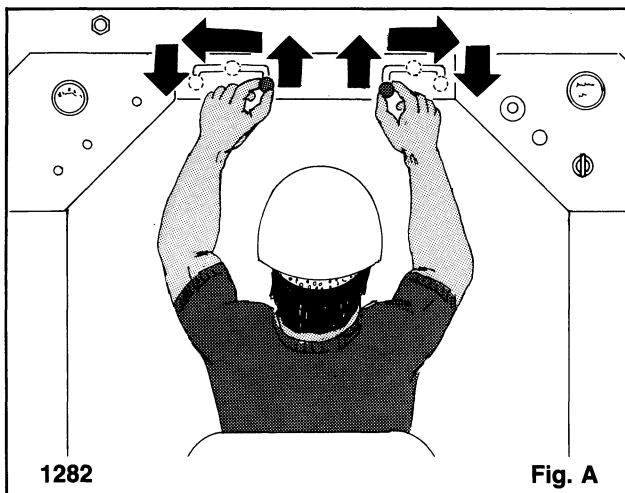
These bearings and bushings are subjected, in normal operation, to high working loads and adverse conditions.

Be sure during normal routine servicing, maintenance or repair that bearings are given the right attention and are installed with care.



WARNING

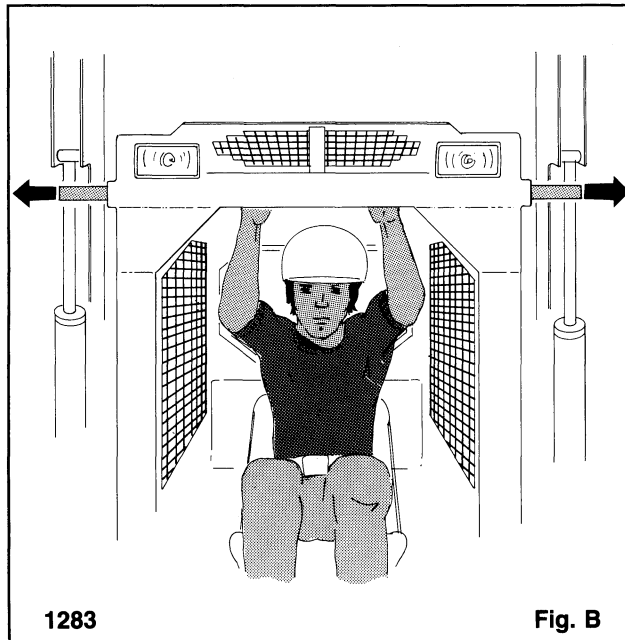
To avoid personal injury service the loader with the boom arm down and the bucket or attachment on the ground. If it is necessary to service the loader with the boom arms raised be sure to engage the boom locks (fig. A & B). Never work under or around a loader with raised boom arms without the boom locks engaged.



PRESSURE TESTING

Prior to pressure testing be sure all hoses are in good condition and all connections tight. Pressure readings must be taken with gauges of specified pressure ratings.

The correct procedure should be rigidly observed to prevent damage to the system or the equipment and to eliminate the possibility of personal injury.



SECTION 1

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SECTION 1 HYDRAULICS

1.1.1 Specifications:

	CL35	CL45
Pump type	Gear	
Capacity (at rated RPM and Pressure)	9.2 GPM (34.8 l/m)	14.1 GPM (53.4 l/m)
Rated RPM	2800	2450
Rated Pressure	2150 PSI (148 Bar)	
Reservoir Capacity	8 gal. (30.3 l.)	
Fluid type	10W30 API class SE, CD or Ford oil no. 48	
Filtration	10 Micron	
Filtration, reservoir	Two, 100 micron elements	
Control valve, type	Series type with float on lift and detent on auxiliary	
Oil cooler	440 BTU	
Cylinders	LIFT	TILT
Type	Double Acting	Double Acting
Qty. per machine	2	2
Bore dia.	2 in.	2.5 in.
Rod dia.	1.25 in.	1.125 in.
Stroke	27.125 in.	13.375 in.

1.1.2 General Information — Hydraulic System

Operation:

(Refer to illustration 1.1.2)

Oil flows from the hydraulic reservoir (1) through a 100 micron element (2) located in the reservoir to the hydraulic pump (3).

The hydraulic pump (3) is a gear type pump which is driven by a shaft through the hydrostatic drive pumps (4) at engine speed. The hydraulic pump (3) capacity is directly

related to engine speed. Oil goes from the hydraulic pump (3) to the hydraulic control valve (5).

The hydraulic control valve (5) is equipped with an adjustable relief valve (6) which is set at 2150 PSI (148 BAR). The hydraulic control valve (5) is a 3 spool, mono block, series type valve. The third spool provides hydraulic flow to the two bucket cylinders (7). The center spool provides flow to the auxiliary hydraulic circuit (8) allowing operation of hydraulic attachments and tools. The center spool is equipped with a detent position to allow constant flow to the auxiliary hydraulic circuit (8). The first spool provides hydraulic flow to the two boom lift cylinders (9). The lift section spool is equipped with a float position.

Oil flows from the control valve to the hydraulic filter (10). The hydraulic filter (10) has a replaceable 10 micron element with a built in by-pass valve to allow the hydraulic fluid to flow if the element is plugged.

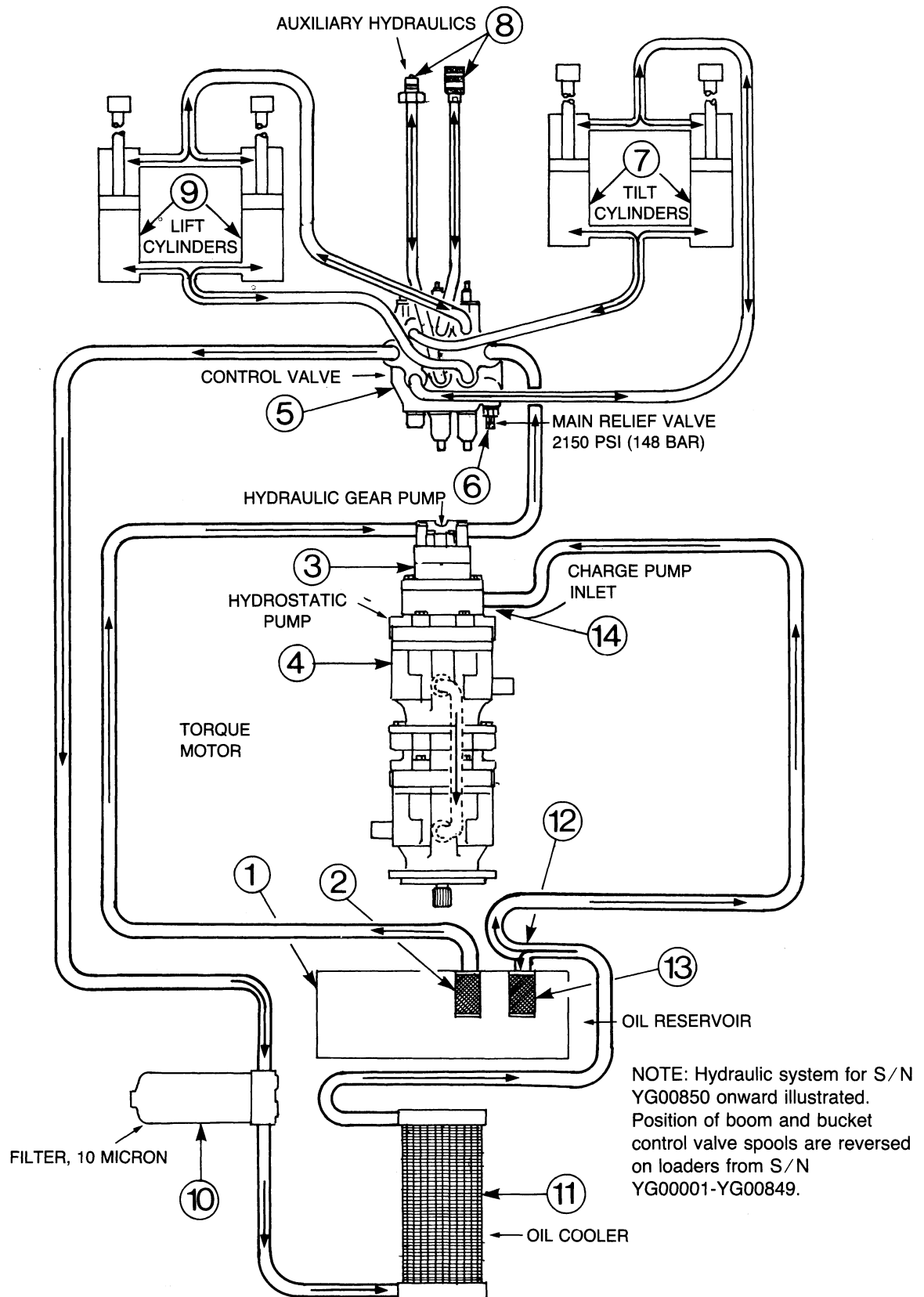
Oil flows from the hydraulic filter (10) through a 440 BTU hydraulic oil cooler (11). Oil flows from the hydraulic oil cooler (11) to a tee (12) located at the hydraulic reservoir (1). Oil flows from the tee (12) into the hydraulic reservoir (1) through a 100 micron element (13) and also to the hydrostatic drive pump (4) charge pump inlet (14). All hydraulic oil flowing to the hydrostatic drive pumps passes first through the 10 micron hydraulic filter (10) and the hydraulic oil cooler (11).



WARNING

Do not service the loader without instruction or taking the necessary safety precautions. Before working on the loader see the warnings and instructions at the beginning of the service manual.

HYDRAULIC/HYDROSTATIC CIRCUIT



SECTION 1 HYDRAULICS

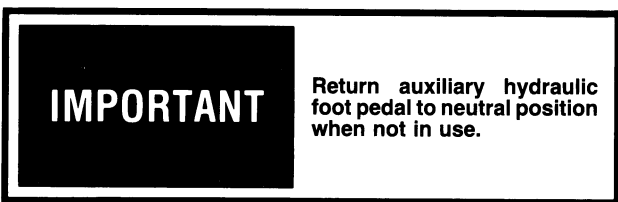
1.1.3 Control Functions:

The CL35 compact loader has a rated lift capacity of *1000 lbs. (454 kg.) to full height. The CL45 has a rated lift capacity of *1300 lbs. (590 kg.). Operation of the loader hydraulic functions are controlled by three foot pedals (fig. 1.1.3).



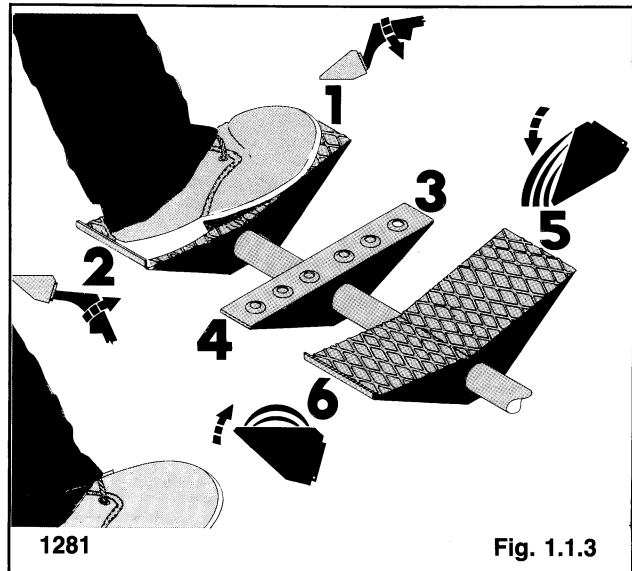
Boom Lift — The L.H. pedal is the boom lift control (fig. 1.1.3). To raise the boom press on the heel (2) of the pedal. To lower the boom press on the toe (1) of the pedal. Firm pressure on the toe (1) of the pedal will lock the boom in float position. This allows the bucket to follow the ground as the loader moves backward.

Auxiliary Hydraulics — The center pedal is used to engage the auxiliary hydraulic circuit to power an attachment such as a back hoe. Pressing on the toe (3) of the pedal provides hydraulic pressure to the female quick-connect coupling located at the front of the boom arms. Firm pressure on the toe (3) of the pedal places the valve in detent position providing a continuous flow of hydraulic oil to the attachment. Pressing on the heel of the pedal (4) provides hydraulic pressure to the male quick-connect coupling reversing the flow of hydraulic oil. When the auxiliary circuit is not in use return the foot pedal to neutral position otherwise starting the loader may be difficult or impossible and damage to the starter may occur.



Bucket Tilt — The R.H. pedal is the bucket tilt (dump) control. Pressing on the toe (5) of the pedal will dump the bucket. Pressing on the heel (6) of the pedal will roll the bucket back.

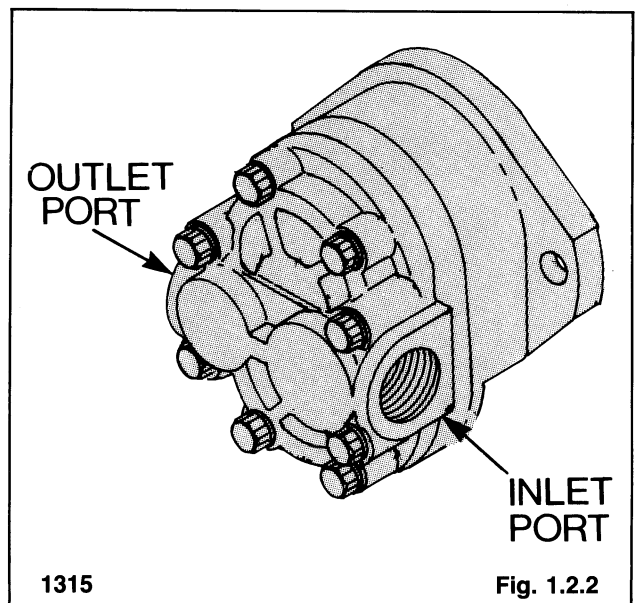
*with equipment specified in section 8



1.1.4 Maintenance Schedule:

	First (Hours)	Every (Hours)
Oil level, check	8	8
Oil filter, change.....	50	200
Oil cooler, clean.....	8	8
General system check (leaks etc.)	8	8
Cylinders, lubricate	8	8
Reservoir filters, change.....	1000	1000
Hydraulic oil, change	1000	1000

1.2 GEAR PUMP



SECTION 1 HYDRAULICS

1.2.1 Specifications:

	CL35	CL45
Pump, type.....	Gear	
Displacement.....	.84 cu. in. (13.8 c.c.)	1.48 cu. in. (24.3 c.c.)
Capacity (at rated speed and pressure).....	9.2 GPM (34.8 l/m)	14.1 GPM (53.4 l/m)
Rated speed (RPM).....	2800	2450
Rated pressure.....	2150 PSI (148 BAR)	
Rotation.....	R.H. (viewed from shaft end)	
Tie bolt torque.....	25-28 ft. lbs. (34-38 N.M.)	

1.2.2 General Information:

The hydraulic gear pump (fig. 1.2.2) is mounted at the end of the two hydrostatic piston drive pumps. The splined shaft of the hydraulic gear pump is driven by the internal splined shaft of the front hydrostatic pump at engine crankshaft speed. The output flow of the hydraulic gear pump is directly related to engine speed. Maximum output will be at full rated engine speed.

Oil is drawn from the hydraulic oil reservoir and enters the hydraulic gear pump at the inlet port. The oil is pressurized and is directed through the outlet port to the hydraulic control valve for boom, bucket and auxiliary hydraulic functions.

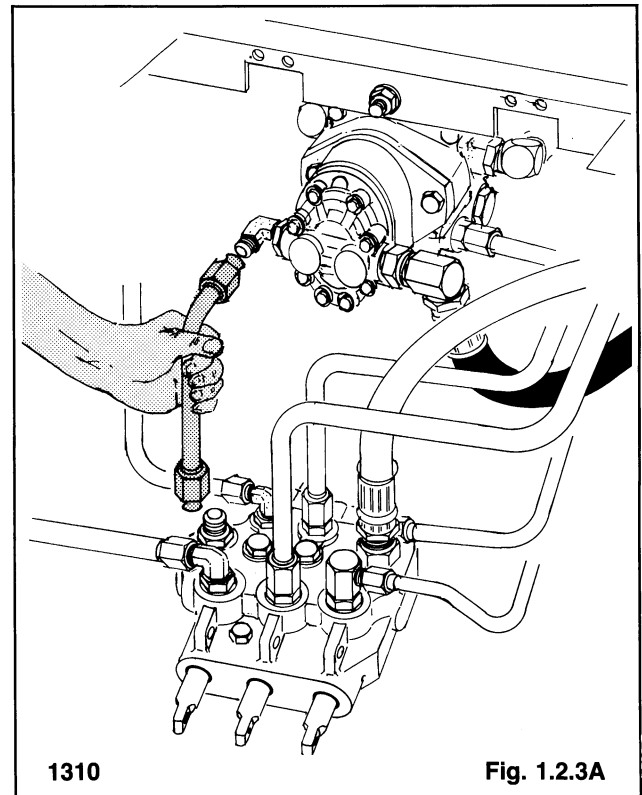
1.2.3 Testing — Hydraulic Pump Flow:

Use test equipment which will meet the following performance figures when performing the test:

Flow Meter — Capable of reading up to 30 GPM (114 l/m) and equipped with a flow control valve.

Pressure Gauge — Capable of reading up to 3000 PSI (206.9 BAR).

1. This test must be performed with the engine running. Before performing the test, block the loader securely with all four wheels clear of the ground.
2. Raise the seat and remove the front shield.
3. Disconnect the line between the hydraulic gear pump and control valve (fig. 1.2.3A).



IMPORTANT

When making repairs to the hydraulic system, keep all parts clean and remove dirt from the work area. Use caps and plugs on all lines and openings.

4. Connect the hydraulic tester between the gear pump and the hydraulic control valve (fig. 1.2.3B).

The inlet hose from the hydraulic tester connects to the outlet port of the hydraulic gear pump.

The outlet hose from the tester connects to the control valve inlet port. Ensure the flow control on the hydraulic tester is fully open before starting the engine to prevent damage to the gear pump.



WARNING

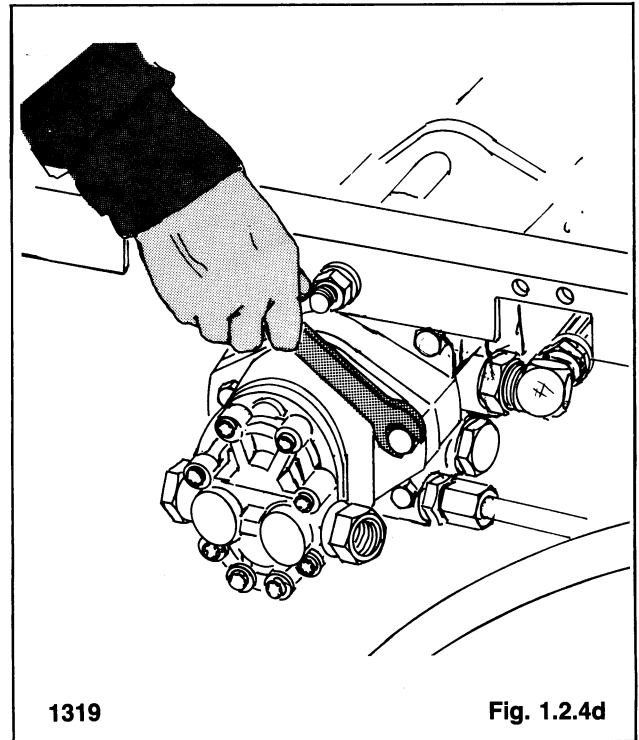
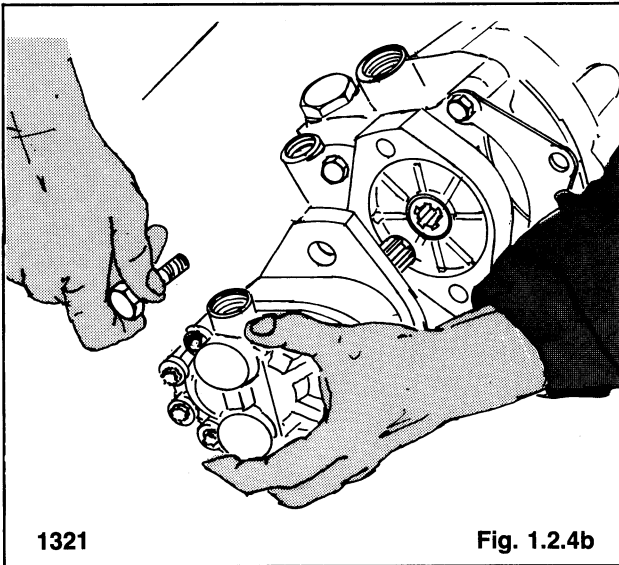
Never repair or tighten hydraulic hoses or fittings with the engine running or the system under pressure.

IMPORTANT

There is no relief valve protecting the pump when the tester is connected. To prevent pump damage do not close the valve on the tester all the way or exceed 2150 PSI (148 BAR).

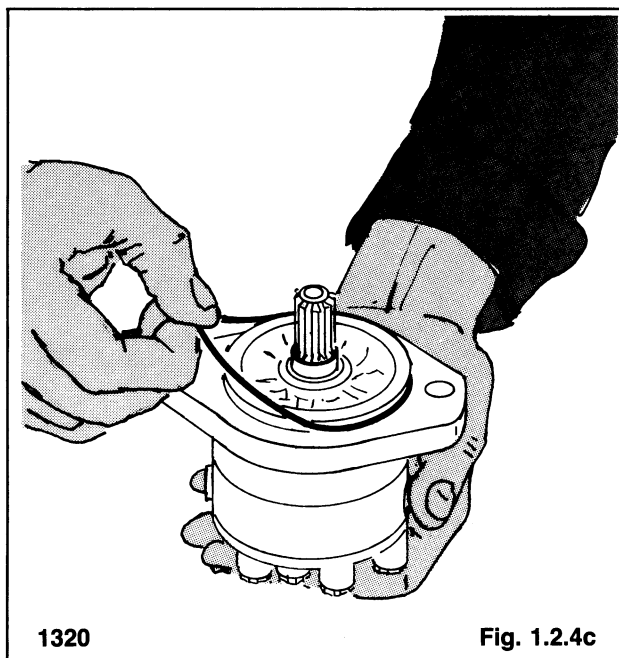
SECTION 1 HYDRAULICS

4. Remove the two (2) bolts which hold the hydraulic gear pump to the hydrostatic pump (fig. 1.2.4b).
5. Remove the hydraulic gear pump from the hydrostatic pump (fig. 1.2.4b).



REASSEMBLY —

1. Install a new O-Ring on the mounting flange of the hydraulic gear pump (fig. 1.2.4c).
2. Install the hydraulic gear pump on the hydrostatic pump.
3. Install the two (2) mounting bolts and torque to 27-31 ft. lbs. (36.6-42 N.M. (fig. 1.2.4d).



4. Install the hydraulic line between the gear pump and hydraulic control valve.
5. Install the hydraulic hose from the oil reservoir at the gear pump inlet.
6. Install the front shield and lower the seat.

IMPORTANT

To prevent damage after removal or repair of hydraulic components refer to start up procedure sect. 1.2.6.

1.2.5 Disassembly and Inspection:

Before disassembling the pump, clean the body with a suitable solvent and dry with compressed air. Ensure all openings are plugged to prevent solvent entering the pump. Mark the pump across the front plate, body and back plate to assist reassembly.



WARNING

To avoid eye injury use safety goggles when cleaning with compressed air.

SECTION 1 HYDRAULICS

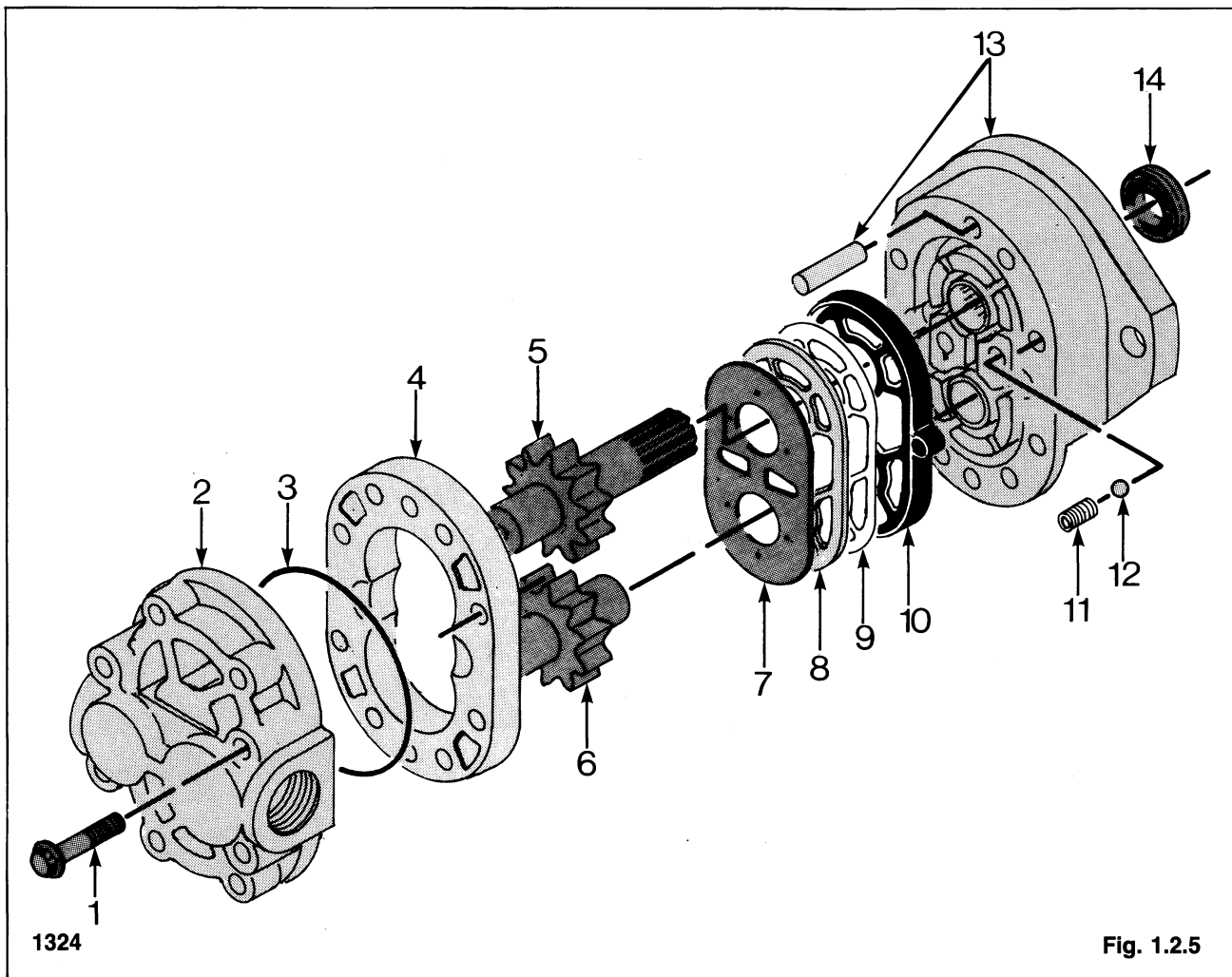


Fig. 1.2.5

- | | | | |
|------------------------|---------------|---------------------|-----------------|
| 1. TIE BOLTS | 4. BODY | 7. DIAPHRAGM | 11. SPRING |
| 2. BACK PLATE ASSEMBLY | 5. DRIVE GEAR | 8. BACK-UP GASKET | 12. BALL |
| 3. O-RING | 6. IDLER GEAR | 9. PROTECTOR GASKET | 13. FRONT PLATE |
| | | 10. DIAPHRAGM SEAL | 14. SHAFT SEAL |

DISASSEMBLY — (Refer to fig. 1.2.5)

1. Remove the eight tie bolts (1).
2. Hold the pump in both hands and tap the drive shaft against a wooden block to separate the front plate (13) from the back plate (2). The body (4) will remain with either the front plate or back plate.
3. To separate the body from the section it remains with, place the drive gear (5) in the body and tap the protruding end of the gear shaft with a plastic mallet.
4. Remove O-Ring (3) from the back plate and discard.
5. Using a sharp tool remove and discard the diaphragm (7) from the front plate.
6. Remove the two springs (11) and two balls (12) from the front plate.

7. Remove and discard the back-up gasket (8), protector gasket (9) and the diaphragm seal (10) from the front plate.
8. Remove and discard the shaft seal (14) from the front plate.

INSPECTION —

1. Thoroughly clean and dry all parts.
2. Inspect the shaft and gear assemblies for roughness or excessive wear at the bearing and seal areas.
3. Inspect the gear faces for scoring or excessive wear. Carefully remove any sharp areas on the gear teeth with emery cloth.

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