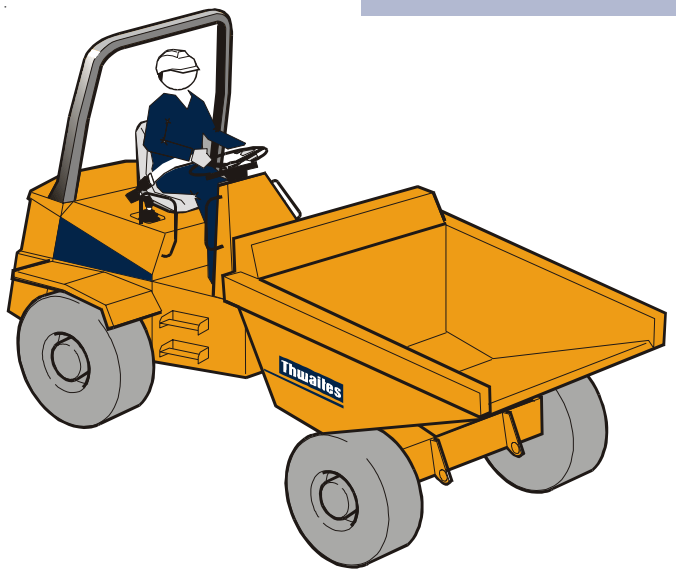
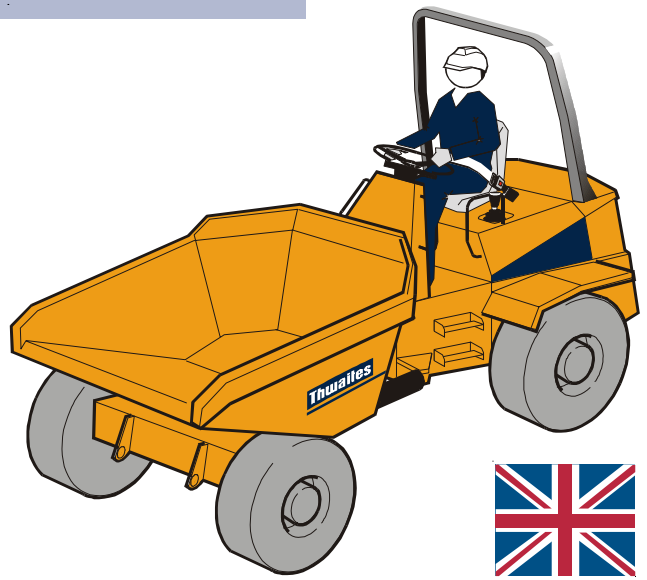
3 - 4 Tonne

Thwaites

service manual





3-4 tonne

Thwaites

This manual has been written to provide maintenance and service information necessary to keep the Thwaites machine operating safely and efficiently throughout its service life.

Prior to Commencing Maintenance Work You Must :

- Read and fully understand the enclosed working instructions.
- Ensure that any required safety precautions have been taken.
- Adhere to safety notices contained within this manual.
- Fully understand the risks involved and be competent to perform the work.
- Use only genuine spare parts as replacement items.
- Ensure that prior to the machine being used, after maintenance work has been completed, all safety checks and tests have been completed.

Any problems please contact your local distributor

In compiling this document we have endeavoured to provide the most up to date and accurate information.
Due to Thwaites continual product development we reserve the right to amend information contained within this manual without prior notice.

Thwaites

Contents

Contents

Machine Identification

Fig. 1

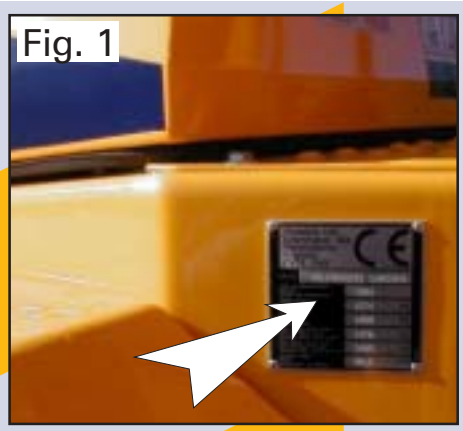


Fig. 2

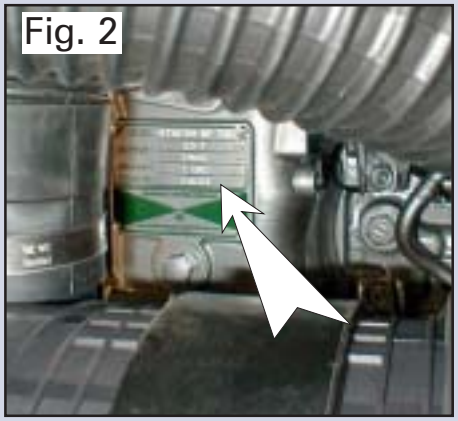


Fig. 3

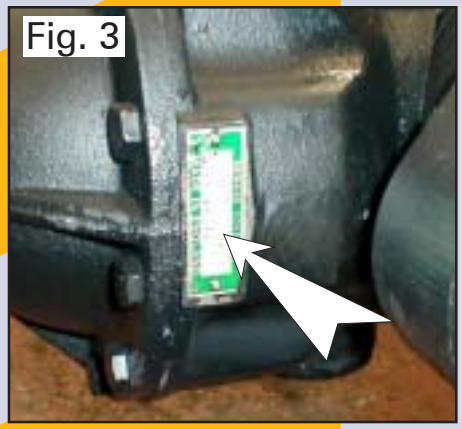
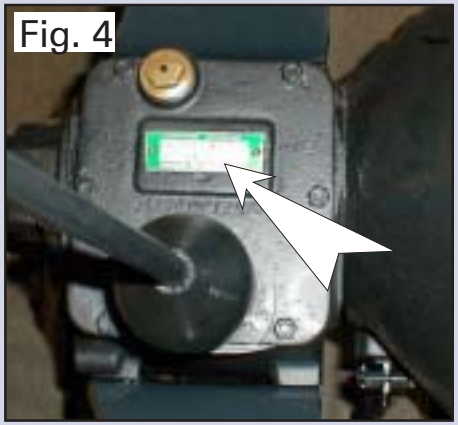


Fig. 4



Serial Numbers

Note machine serial numbers. Always quote them in communication with Thwaites dealer or Head Office.

Model Type (Fig 1.)

Vin Nº (Fig. 1)

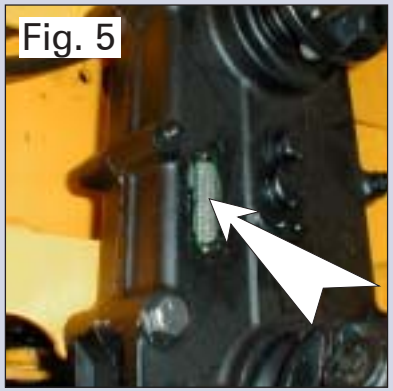
Engine Serial Nº (Fig. 2)

Axle Serial Nº (Fig. 3)

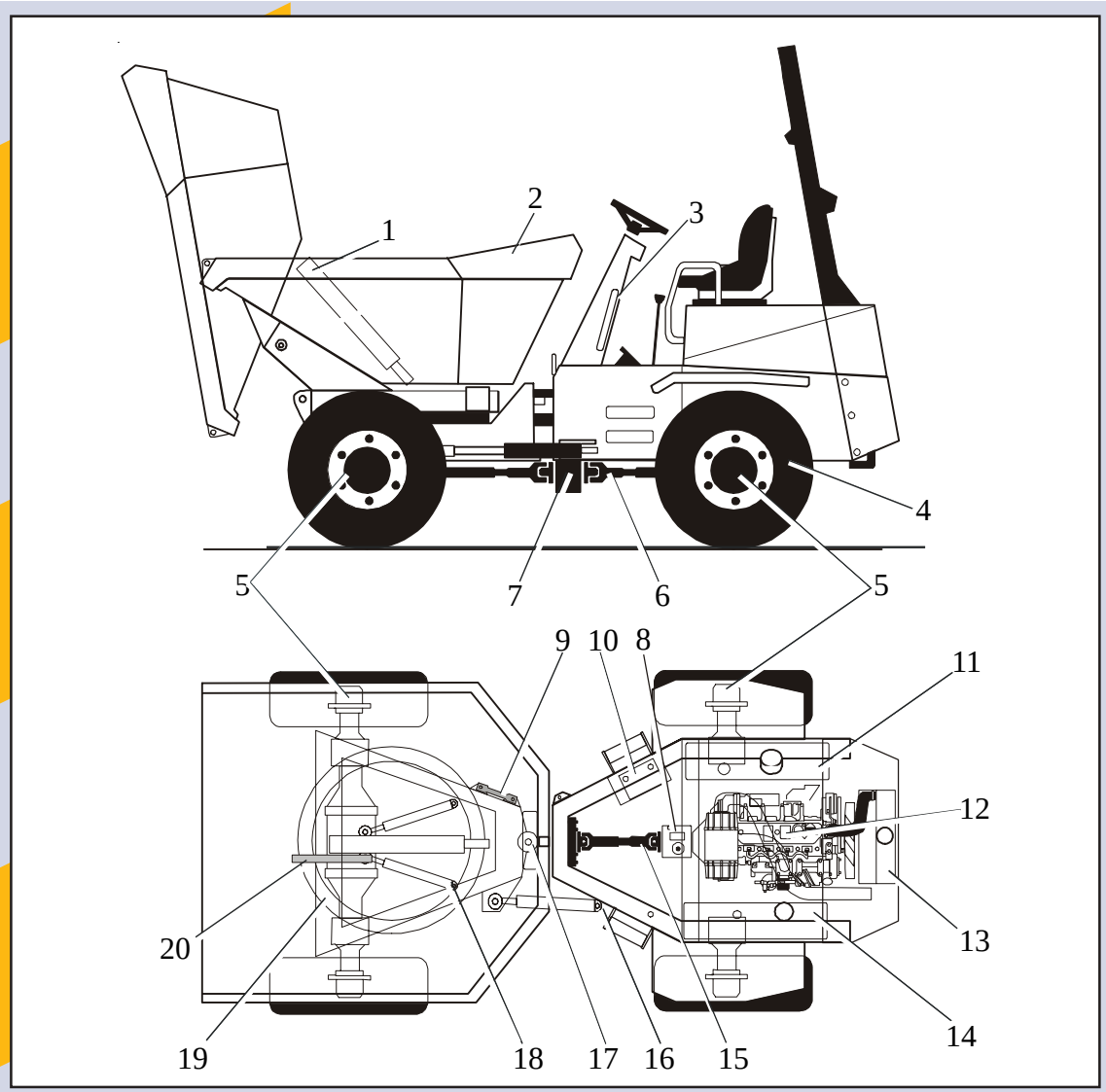
Gearbox Serial Nº (Fig. 4)

Transfer Gearbox Serial Nº (Fig. 5)

Fig. 5



Location of Major Components



1. Tipping Ram
2. Skip/Bucket
3. Operator Manual Pocket
4. Wheel
5. Axle
6. Propshaft
7. Transfer Box
8. Gearbox
9. Chassis Locking Bar
10. Battery Box
11. Hydraulic Tank
12. Engine
13. Radiator/Oil Cooler
14. Fuel Tank
15. Top Propshaft
16. Steering Ram
17. Kinklink
18. Slew Ram
19. Slew Ring
20. Skip Prop

System Fluid Capacities

	Ltrs
Engine oil (with filter)	5.8
Axle Front	6.0
Axle Rear	6.0
Gearbox	2.0
Transfer Box	0.6
Cooling system	11.0
Hydraulic system	45.0
Brake reservoir	0.33
Fuel tank	45.00

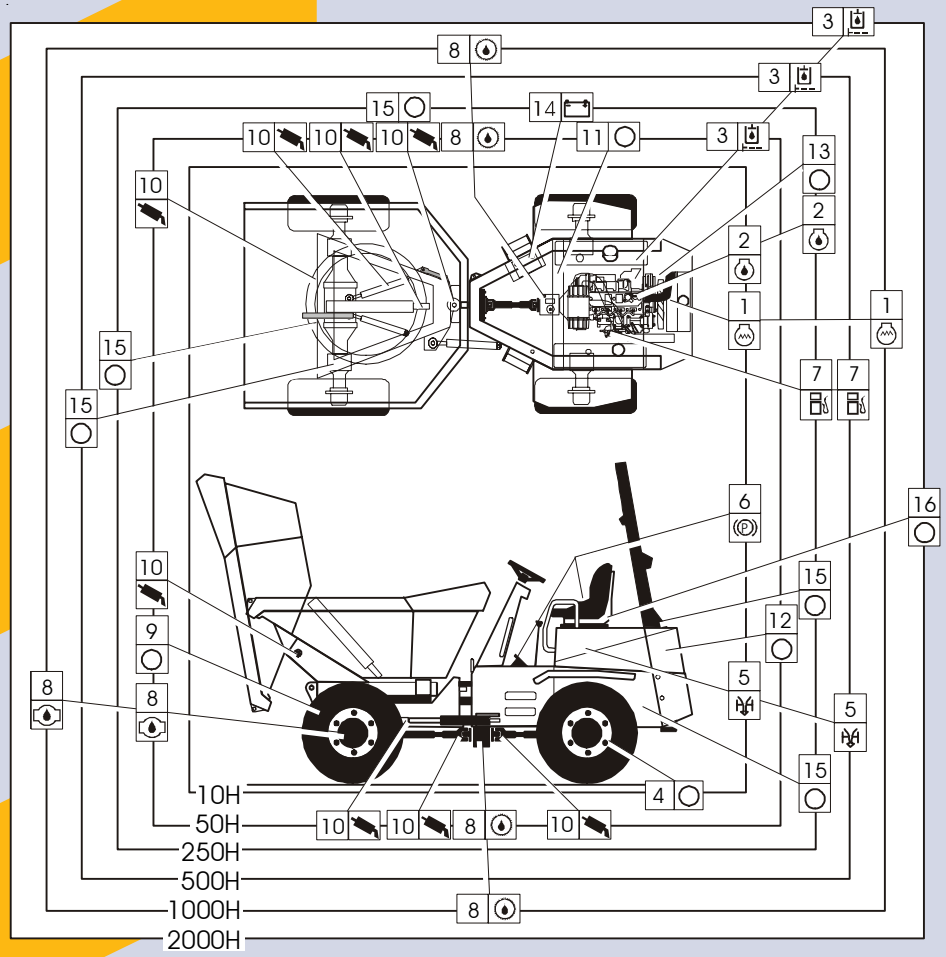
Torque Settings

	Nm
Centre Pivot	486
Kinglink Bearing Pins Upper	330
Bearing Mounting Plate Bolt	56
Wheel Nuts	270
Roll Bar Mounting Bolts	127
Slew Ring Bolts	169
Engine/Chassis Bolts	100
Engine Brackets/Engine Mounts	56
Diesel/Hydraulic Tank Drain Plugs	25
Axle Bolts	206
Propshaft Bolts	56
Transfer Box Mounting	206
Ram Pin Nuts	250

Contents

Note:
The following service period recommendations are the maximum permissable and should never be exceeded.

Lubrication and Maintenence Chart



	COOLANT	1	$H^2 0$ + 33% Antifreeze
	ENGINE OIL	2	SAE 10w 30 NA/Turbo
	HYDRAULIC OIL	3	Mobil DTE 24
	OTHER SERVICES	4	Wheel Nut Tightness
	INDUCTION	5	Clean Filters
	BRAKES	6	Operation of Brakes
	FUEL	7	Diesel
	GEAR/TRANSFER BOX	8	MOBIL HD 90
	AXLE OIL	8	MOIBILFLUID 422
	OTHER SERVICES	9	Tyre Pressure - Refer to Operators Manual
	GREASE	10	Mobilplex Special or Mobilplex 47
	BRAKE SYSTEM	11	Mobil DTE 24
	OTHER SERVICES	12	Fan/Drive Belts
	OTHER SERVICES	13	Hoses
	BATTERY	14	Battery Cable Connections
	OTHER SERVICES	15	Bolt tighness (Ref Page 1.3)
	LAP BELTS	16	Replace
	WIRING	17	Inspect

IMPORTANT NOTE

After first 50 hours - Change engine oil - Change engine oil filter - Change hydraulic oil filter element- Adjust fan belt tension.

Lubrication and Maintenance Schedule

Interval	Position	Item	CHECK	CLEAN	LUBE	CHANGE
Every 10 Hours or Daily	1	Coolant level	•			
	2	Engine oil level	•			
	4	Wheel nut tightness	•			
	5	Air cleaner indicator	•			
	6	Operation of brakes (Park/Foot)	•	•		
	3	Hydraulic oil level	•			
Every 50 hours or weekly	8	Axle oil level front and rear	•			
	8	Gearbox oil level	•			
	8	Transfer case oil level	•			
	9	Tyre pressure front and rear	•			
		Pins:-				
	10	Steering rams and pins			•	
	10	Tipping rams and pins			•	
	10	Slew rams and pins			•	
	10	Kinglink			•	
	10	Skip pins			•	
	10	Turntable			•	
	10	Centre lock (Swivel)			•	
	10	Propshaft			•	
	10	Park brake levers			•	
	11	Brake fluid reservoir	•			
	12	Condition and tension of fan/drive belts	•			
	3.7.8.10	Any fluid leak	•			

Interval	Position	Item	CHECK	CLEAN	LUBE	CHANGE
Every 250 hours	2	Engine oil with filter				•
	13	Hoses tightness/chaffing	•			
	7	Fuel Filter Element		•		
	7	Sediment filter bowl		•		
		Torque settings:-				
	15	Slew ring bolts	•			
	15	Spherical bearing bolts	•			
	15	Engine mounting Brackets	•			
	15	ROPS mounting Bolts	•			
	14	Battery cables/connections	•			
		Harness routing (chaffing)	•			
Every 500 hours	7	Fuel Filter Element				•
	7	Replace sediment element				•
	3	Hydraulic oil filter element				•
	5	Air filter elements (If not changed earlier)	•			•
	15	Check axle mounting bolts	•			
Every 1000 Hours	8	Axle oil front & rear				•
	1	Coolant (yearly)				•
		Adjust engine valve clearances etc (consult dealer)				
Every 2000 Hours	3	Hydraulic oil				•
	16	Lap Belt				•

Safe Working Practice

Before lubrication and maintenance tasks:

- Machine must be on firm level ground.
- Apply parking brake.
- Stop engine and remove ignition key.
- Isolate the Battery.
- Allow engine to cool.
- Place motion/gear lever in neutral.
- Fit pivot lock (Fig. 1).
- Chock wheels.
- Prop bucket when working beneath.
- Lock tip lever (Fig. 2).

Lubrication General

Warning - Fluids

Handle fluids with care. Avoid skin contact with used oil. Protect hands with an effective barrier cream and/or gloves.
Fluids under pressure can escape from extremely small holes.
When checking for leaks use a piece of card, **NEVER** use your hand.
Always dispose of waste lubricants and filters in a responsible manner.

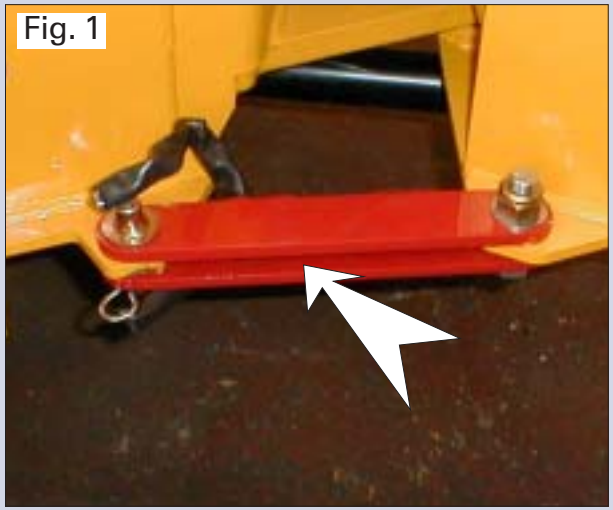
Caution

The alternator wiring must be disconnected when welding. Avoid damaging the alternator.

Warning - Fuel Handling

Diesel fuel is FLAMMABLE. Never refuel or service the fuel system while smoking or near naked flames. Never refuel the machine while the engine is running.

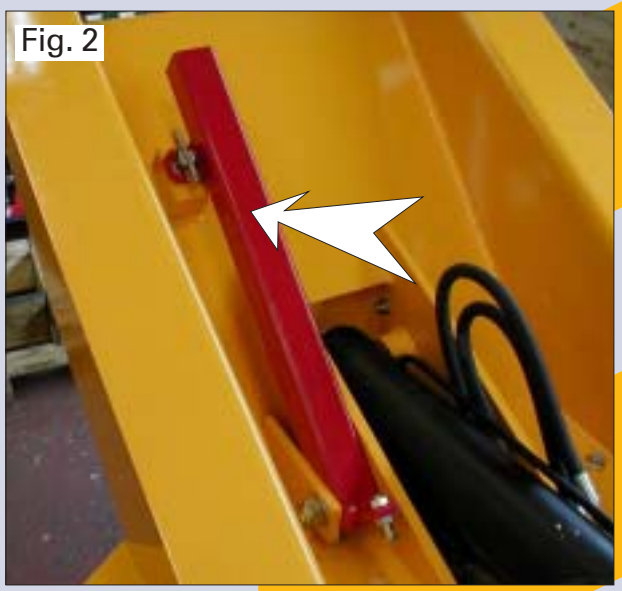
Fig. 1



Warning-Hydraulic Connections

Ensure all hydraulic connections are tight. Relieve all pressure by moving the hydraulic control levers and allow the system to cool before disconnecting hoses or lines.

Fig. 2



Warning - Tyre Fitting

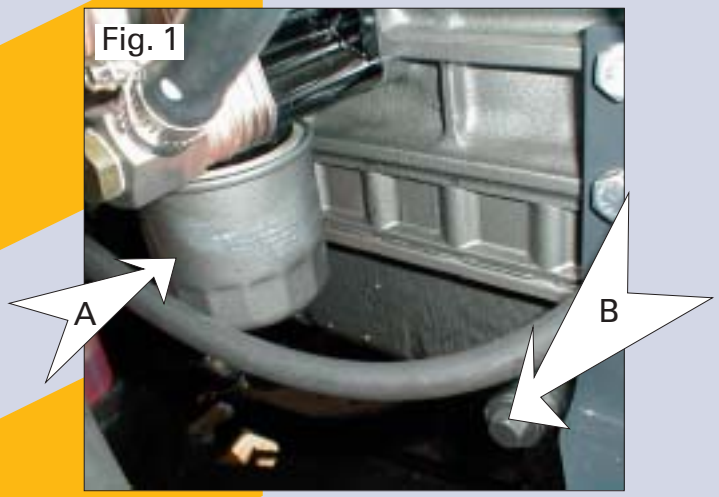
Do not attempt to fit a tyre unless you have the proper equipment and experience to perform the task.
Failure to follow the correct procedure when fitting a tyre on to a wheel rim can cause an explosion.

Change Engine Oil With Filter (2)

- Drain oil with engine hot.
- Clean area around drain plug (Fig. 1(B)).
- Position a suitable container beneath drain plugs on sump.
- Unscrew the drain plugs and drain oil.

Caution
Hot oil avoid scalding

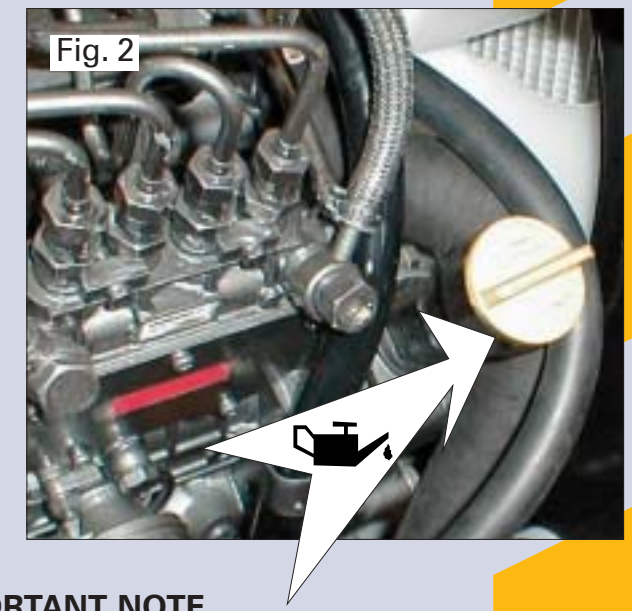
- Allow ten to fifteen minutes for oil to drain completely.



- Position container beneath oil filter.
- Remove filter (Fig 1(A)).
- Wipe filter mounting surface.
- Smear sealing ring of new filter with clean engine oil.

Change Engine Oil With Filter (2) (Continued)

- Screw filter into position and tighten BY HAND ONLY.
- Clean and refit drain plugs.
- Refill engine using correct amount of recommended lubricant.
- Allow to settle.
- Refit filler cap (Fig. 2), start engine and check for leaks.



IMPORTANT NOTE

After first 50 hours - Change engine oil - Change engine oil filter - Change hydraulic oil filter element- Adjust fan/drive belt tension.

Change Hydraulic Oil Filter Element (9)

Caution

It is imperative that hydraulic oil is clean.
Avoid damage to hydraulic components.

- Remove filler cap (Fig. 1(A)).
- Remove filter element (Fig. 3(C)).
- Clean all parts and lubricate 'O' rings.
- Fit new filter element, ensuring element clip is fitted and visible from the top of the tank (Fig. 2(B)).
- Refit filler cap and hand tighten.

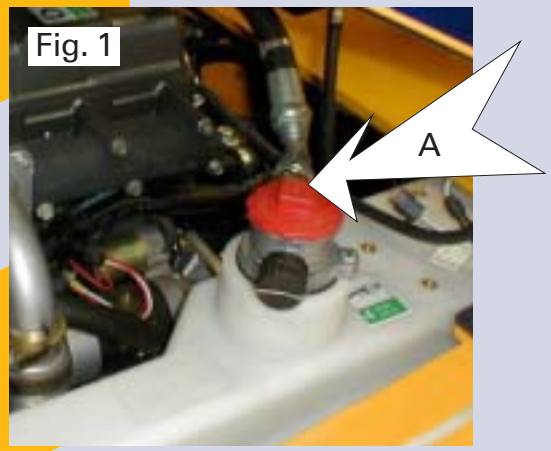


Fig. 1

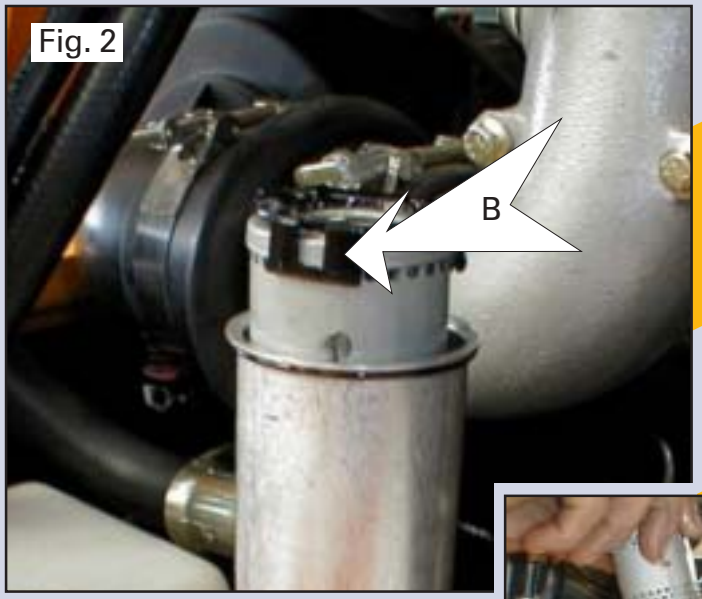


Fig. 2

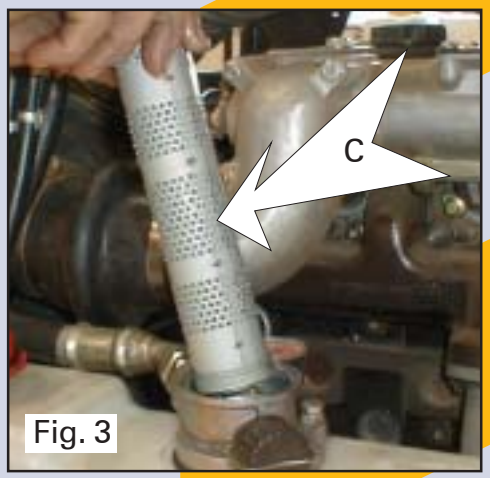


Fig. 3

IMPORTANT NOTE
After first 50 hours - Change engine oil - Change engine oil filter - Change hydraulic oil filter element- Adjust fan/drive belt tension.

Check Fan/Drivebelt Tension (15)

Warning

Before servicing or making adjustments to the electrical system, Isolate the battery.

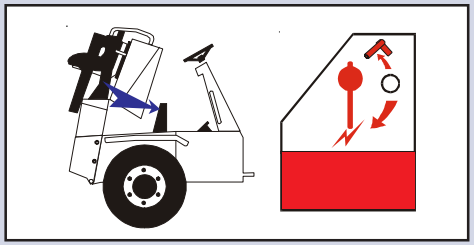


Fig. 1

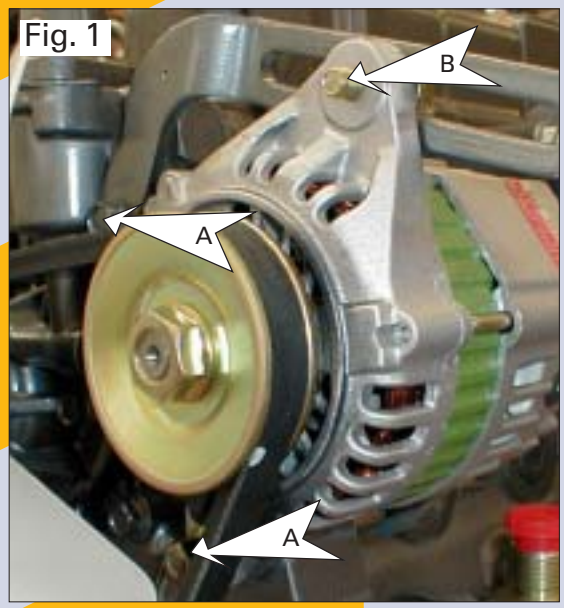
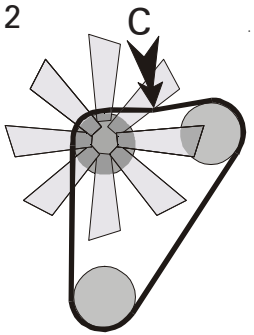


Fig. 2



- Loosen the pivot bolts (Fig. 1(A)) and adjusting link bolt (Fig. 2(C)).
- Move the alternator to give 10-15mm movement in the drive belt (Fig. 2(C)).
- Tighten the adjusting link bolt and pivot bolts.

Section 2 - Maintenance

Check Coolant level (1)

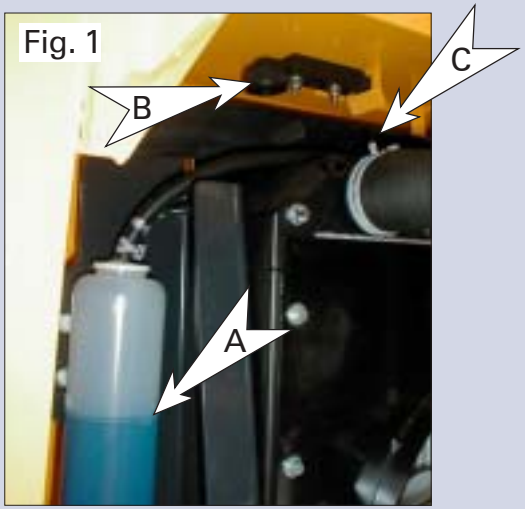
Warning

DO NOT attempt to remove radiator cap until system has cooled down.

- Pull lever (Fig. 1(B)) to release filler flap.
- Remove radiator cap (Fig. 1 (C)).
- Check water level is visible in the radiator, top up as required.
- Maintain coolant at indicated level (Fig. 1 (A)).
  Ensure radiator fins are clean and clear of all obstructions.

Solution	Starts to freeze at deg C	deg F
15%	-8	17
33%	-19	-2
57%	-30	-22

Fig. 1



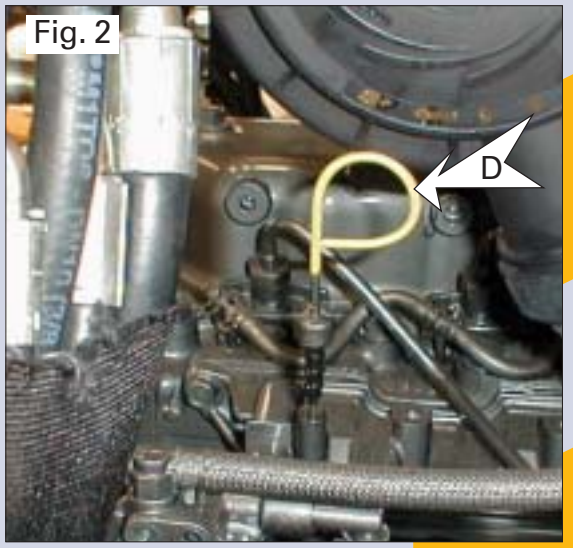
Note:- In climates where antifreeze is not required a reputable corrosion inhibitor must be added.

Check oil level (2)

Check engine oil level with machine on firm level ground and the engine cold.
Maintain level between marks on dipstick.

- Fully remove dipstick (Fig 2(D)).
- Wipe clean.
- Re insert fully.
- Withdraw dipstick and check oil level.
- Top up oil level, through filler cap, as required.
- Replace dipstick.

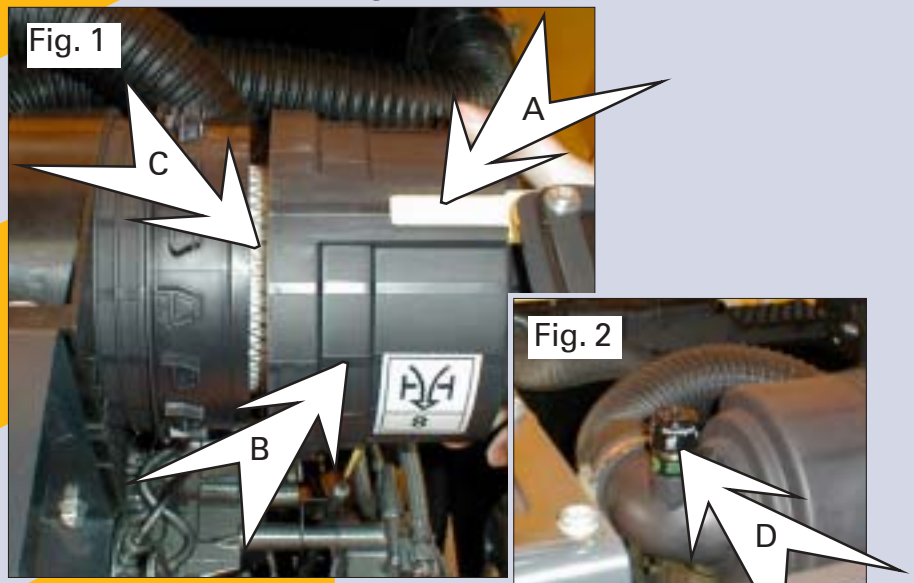
Fig. 2

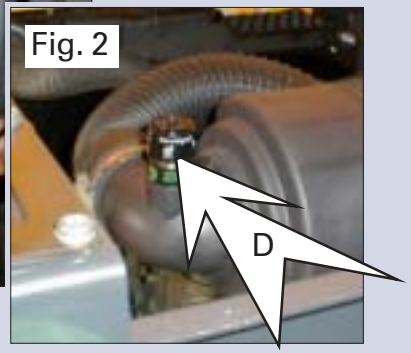


Section 2 - Maintenance

Check Air Cleaner Elements (5)

- When window 'D' shows RED replace or clean filter.
- Pull release clip (Fig.1(A)) and twist to remove the end cup (B).
- Remove primary element (C) and secondary element.
- Clean inside body (Fig. 1(B)).
- Refit or replace elements ensuring correct seating.
- Refit the end cup (Fig. 1(B)) and secure clip (A).



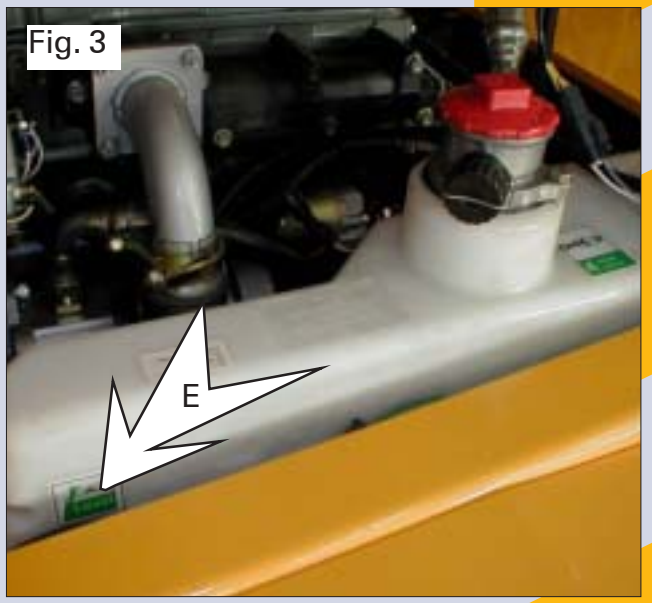


Caution

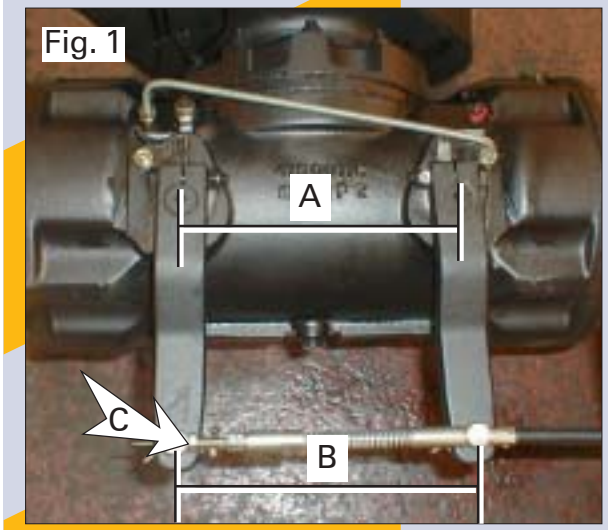
DO NOT run engine with air cleaner removed.

Check Hydraulic Oil Level

- Check hydraulic oil level in tank (Fig. 3(E)).



Section 2 - Maintenance



Initial Set-up of Parkbrake Cable/Lever

- Connect handbrake cable to Parkbrake Lever and set cable adjuster (Fig. 2 (E)) to 10mm.
- Set the Parkbrake to the off position.
- Before the cable is connected, the 2 levers (Fig. 1), distance at 'A' is between:
  Min 190mm
  Max 215mm

Connecting the Parkbrake cable, setting the trunnions so the dimension at 'B' is 6mm greater than the dimension at 'A'.
Therefore if 'A' = 197mm,
'B' = 203mm.

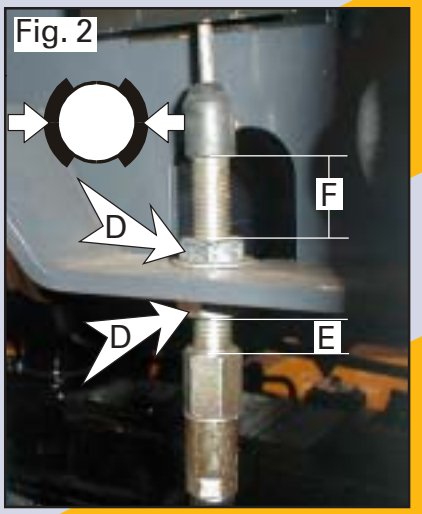
- Apply the Parkbrake, if too much effort is required to apply the Parkbrake, remove the rubber lever grip, release the locking screw(2mm hexagonal key) and rotate the adjusting collar, one turn at a time anti clockwise.
- Carry out the Parkbrake Test procedure, the machine must stall in 3rd gear with the parkbrake applied.
- After setting, re tighten the locking screw on the Parkbrake lever, if applicable, and replace the rubber grip.

Check Park Brake Operation (6)

If the Machine has moved and therefore failed the brake test, the cable will require adjustment:

- Loosen locknuts (Fig. 2 (D)) and use a full turn of these locknuts into the adjustment of the cable (F).
- Tighten locknuts and repeat the handbrake test procedure.

When there is no more cable adjustment at the lever, to prolong the life of the cable, adjustment can be made at the lever end of the cable (Fig. 1(C)).



Section 2 - Maintenance

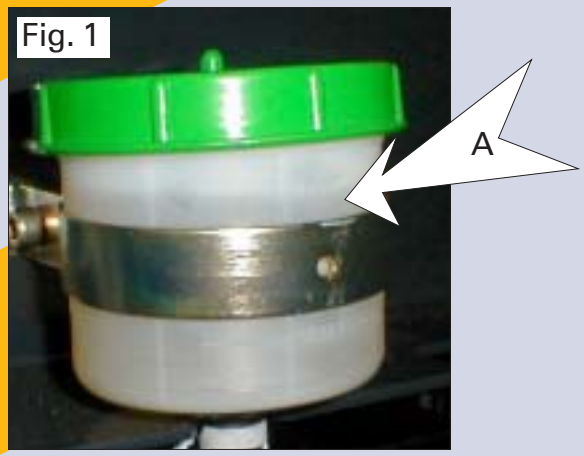
Check Brake Oil Level (14)

Warning

Before maintenance on braking system, ensure dumper is on firm level ground, wheels chocked securely.

Brake master cylinder reservoir must be checked regularly. If oil level is low check system for leaks at all joints and pipes for damage. Top up to correct level with approved oil (Fig. 1(A)).
Should brake reservoir need frequent additions of oil, machine **must not be used**. A thorough check of brake system must be carried out.
Note: Before removing filler cap clean area carefully to prevent contamination.

Fig. 1



Warning

USE MINERAL OIL ONLY

Axles and Transfer Case (8)

Check oil level

- Park on firm level ground.
- Chock wheels on axle not being checked.
- Clean area around level plug and remove (Fig. 2,3(B)).

Note:

- Top up with recommended lubricant until excess flows from level hole, if required.
- Clean level plug and refit (Fig. 2,3(B)).

Fig. 2

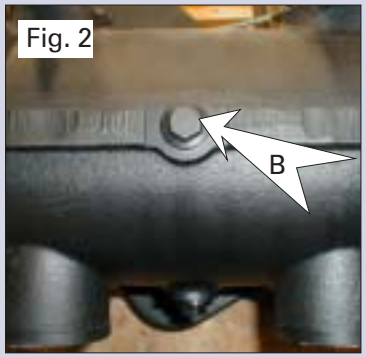
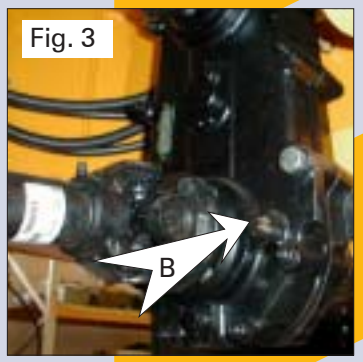
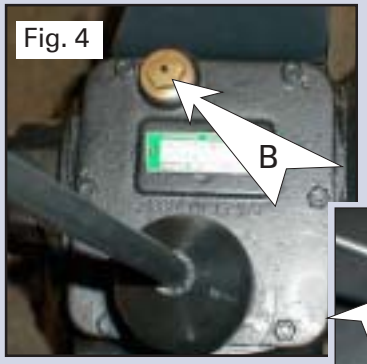


Fig. 3



Gearbox Oil Level Check (8)

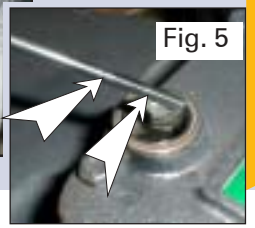
Fig. 4



- Clean area around dipstick plug (Fig. 4) and remove dipstick.
- Wipe clean and re insert fully.
- Withdraw dipstick and check oil level.

Maintain level between marks on dispstick. (Fig. 5)

Fig. 5



Section 2 - Maintenance

Change Engine Oil With Filter (2)

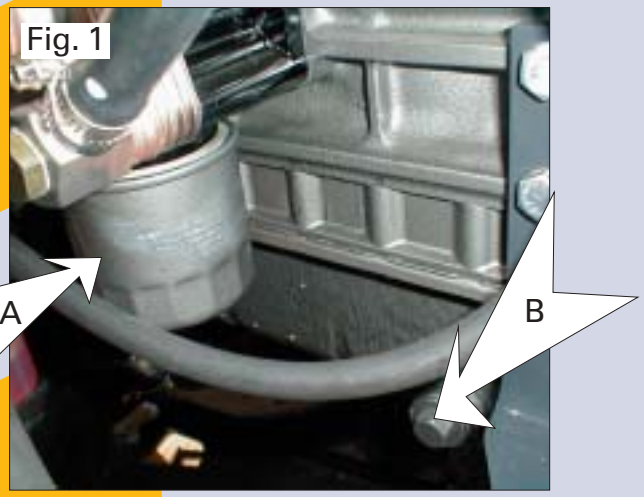
- Drain oil with engine hot.
- Clean area around drain plug (Fig. 1(B)).
- Position a suitable container beneath drain plugs on sump.
- Unscrew the drain plugs and drain oil.

Caution

Hot oil avoid scalding

- Allow ten to fifteen minutes for oil to drain completely.

Fig. 1

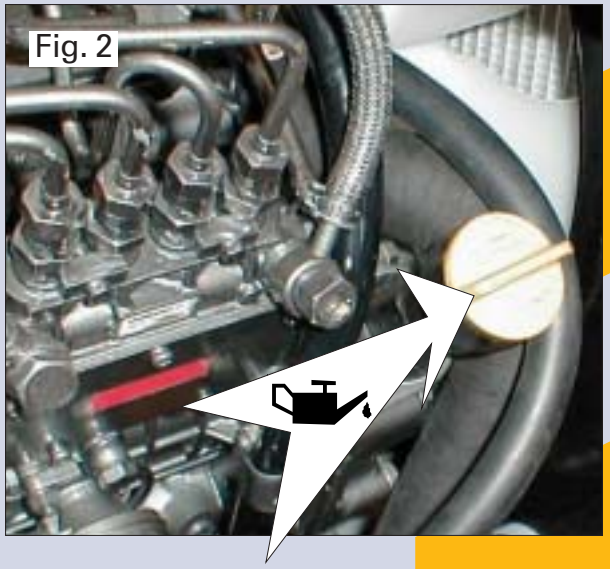


- Position container beneath oil filter.
- Remove filter (Fig 1(A)).
- Wipe filter mounting surface.
- Smear sealing ring of new filter with clean engine oil.

Change Engine Oil With Filter (2) (Continued)

- Screw filter into position and tighten BY HAND ONLY.
- Clean and refit drain plugs.
- Refill engine using correct amount of recommended lubricant.
- Allow to settle.
- Refit filler cap (Fig. 2), start engine and check for leaks.

Fig. 2



Section 2 - Maintenance

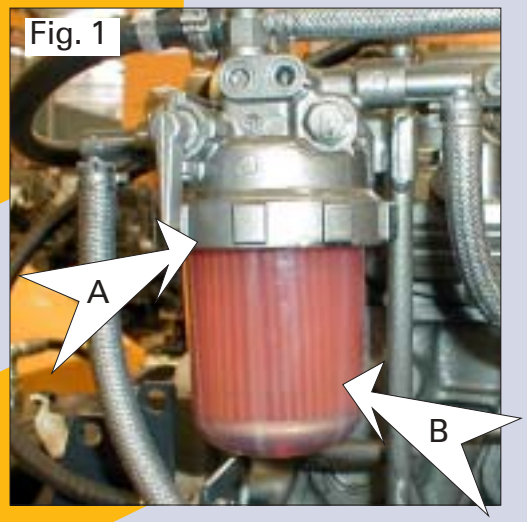
Check Fuel Filter (7)

- Unscrew the filter bowl retaining ring (Fig. 1(A)) and remove the bowl (B).

Provision should be made for spillage containment

- Remove the fuel filter.
- Clean the element with light oil and blow compressed air (2-3 Kg/cm²) through the element to remove dust.
- Remove the dust and water deposited on the bottom of the trap in the filter bowl.
- Reassemble in the reverse order ensuring cleanliness and that the filter retaining ring is hand tight only.

Fig. 1



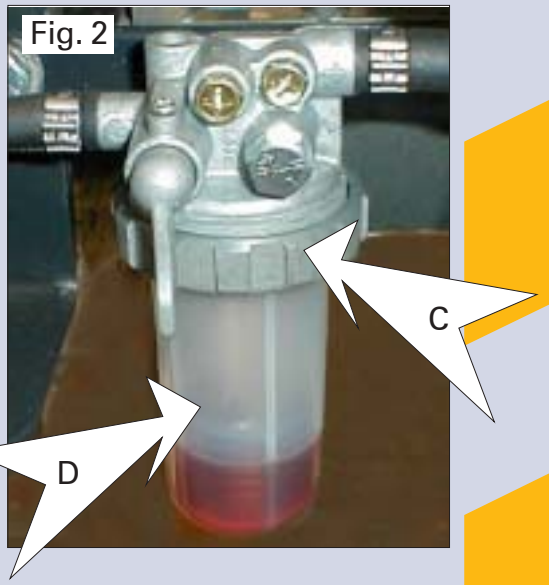
Check Fuel Sediment Bowl (7)

- Unscrew the sediment bowl retaining ring (Fig. 2(C)) and remove the bowl (D).

Provision should be made for spillage containment

- Remove the sediment filter.
- Clean the element with light oil and blow compressed air (2-3 Kg/cm²) through the element to remove dust.
- Remove the dust and water deposited on the bottom of the trap in the sediment bowl.
- Reassemble in the reverse order ensuring cleanliness and that the sediment retaining ring is hand tight only.

Fig. 2



Note - Removal of Air Locks refer to page 2.13

Warning

KEEP NAKED FLAMES AWAY FROM FUEL SYSTEM.

Section 2 - Maintenance

Note - Removal of Air Locks (Fig. 1)

- Turn fuel filter cock (Fig. 1(A)) to 'OPEN'
- Bleed air by loosening (one at a time) the air bleed screws (Fig. 1(B.C.D)).
- Operate the fuel filter priming lever (Fig. 2(E)) until all air bubbles are removed and re tighten all bleed points.

Fig. 1

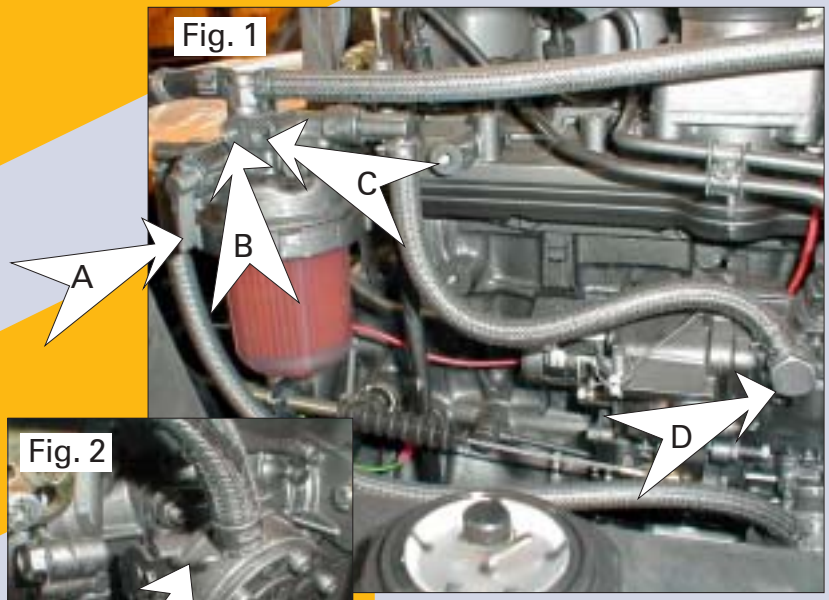


Fig. 2

Warning

KEEP NAKED FLAMES AWAY FROM FUEL SYSTEM.

Hydraulic Oil Sample (6)

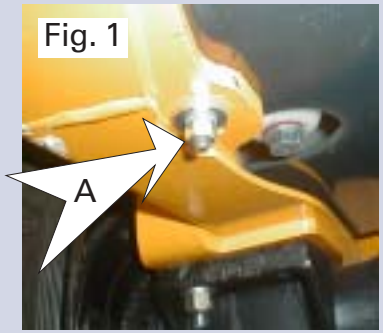
Caution

Ensure hydraulic system has cooled down before attempting to obtain an oil sample.
Wear suitable gloves whilst following out this procedure.

Provision should be made for spillage containment

- Fit gauge point hose to pressure gauge point.
- Start Engine and allow approximately 0.1 of a litre of oil to be drained off and discarded.
- Fill sterile clean sample bottle with oil. Reseal.
- Stop engine and remove hose. Replace cap on gauge point.

Fig. 1



The required standard of the oil sample is:-

Grade '8' - NAS1638 STD or
Grade '17 - 14' ISO4406 STD

Anything above this standard the oil will need changing. **(Page 2.17)**

Section 2 - Maintenance

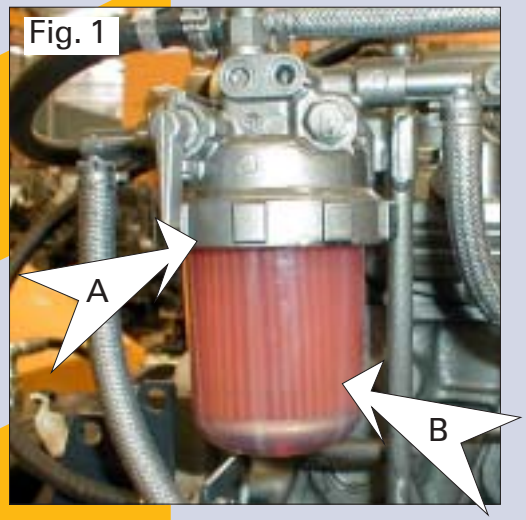
Change Fuel Filter (7)

- Unscrew the filter bowl retaining ring (Fig. 1(A)) and remove the bowl (B).

Provision should be made for spillage containment

- Remove the fuel filter.
- Remove the dust and water deposited on the bottom of the trap in the filter bowl.
- Fit new filter element.
- Reassemble in the reverse order ensuring cleanliness and that the filter retaining ring is hand tight only.

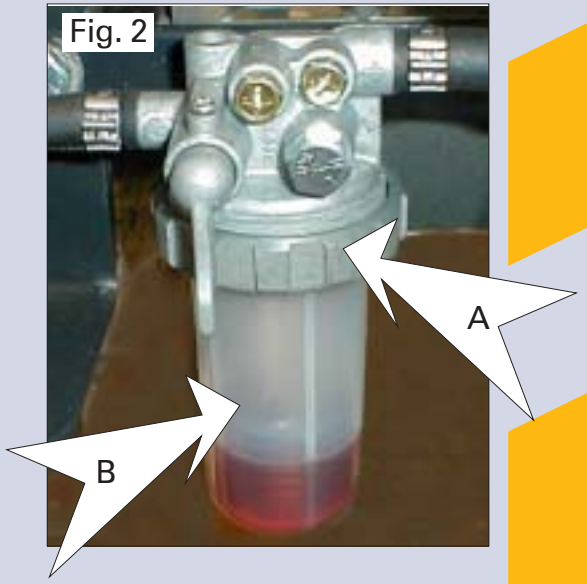
Fig. 1



Change Fuel Sediment Filter (7)

Follow the same procedure as the Fuel Filter.

Fig. 2



(9) Hydraulic oil filter, refer to **page 2.5**

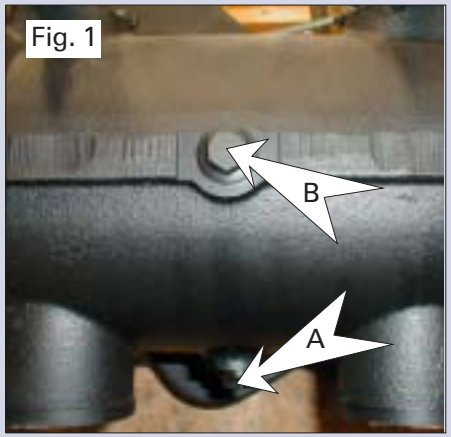
(5) Air filter elements, refer to **page 2.8**

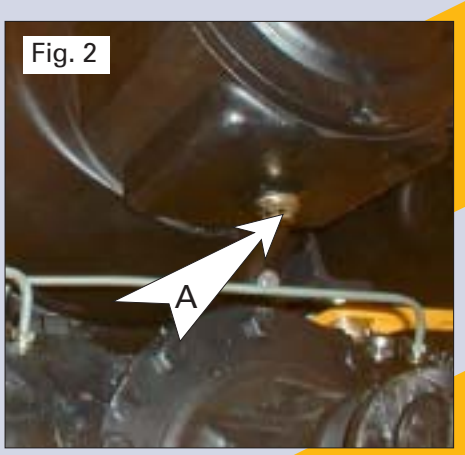
Warning

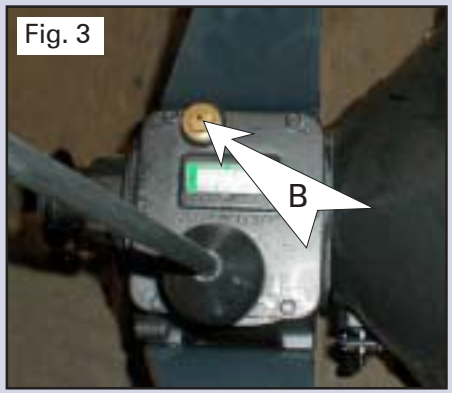
KEEP NAKED FLAMES AWAY FROM FUEL SYSTEM.

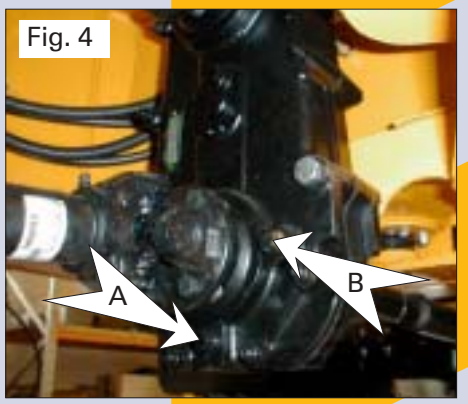
Change Axle, Transfer & Gear Box Oil (8)

- Position machine on firm level ground.
- Apply parkbrake.
- Clean area around drain plug (Fig. 1,2,4(A)) and filler plug/ dipstick (Fig. 1,3,4(B)).
- Place a suitable container under drain plugs.
- Remove plug/s and allow to drain.
- Clean and refit drain plugs.
- Fill with correct quantity of recommended lubricant, until excess flows from (B) (Fig. 1&4).
- Allow for settling and check level.
- Check gearbox oil level - refer to **page 2.10**
- Top up as required.
- Clean and refit level plug (B).









Drain And Refill Cooling System (1)

Warning

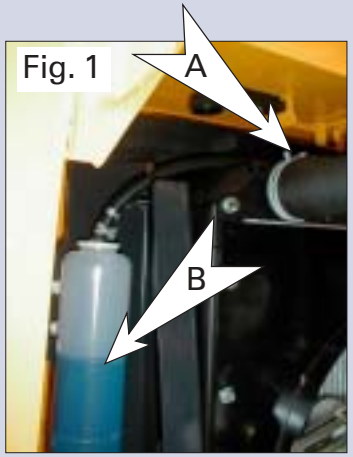
DO NOT attempt to remove radiator cap until system has cooled down.

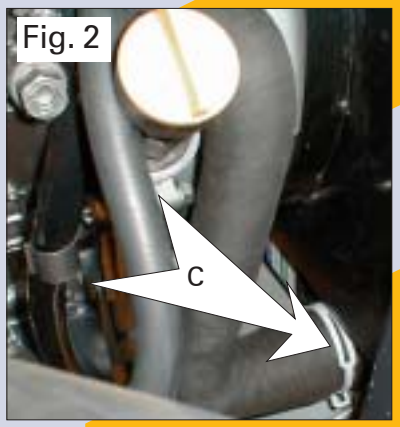
Ensure radiator fins are clean and clear of all obstructions.

- Place a suitable container beneath bottom hose.
- Remove filler cap (Fig. 1(A)) Disconnect bottom hose (Fig. 2 (C)) and allow to drain .
- When coolant has drained, replace hose and refill system via cap (A) with pre-mixed water/antifreeze solution.

Allow 15 minutes to fill, this gives time for air to rise to top of system.

- Add water/anti-freeze solution to expansion bottle level (B).
- When the engine is started the level will drop and must be topped back up to the maximum.





Change Hydraulic Oil (9) (if not changed earlier)

Caution

It is imperative that hydraulic oil is clean.
Avoid damage to hydraulic components.

- Ensure all rams are closed.
- Remove filler cap (Fig. 1(A))
- Place suitable container beneath oil drain plug.
- Unscrew oil drain plug (Fig. 2(B)) and allow oil to drain.
- Clean and refit drain plug.
- Fill tank with recommended lubricant
- Replace filler cap.
- Start engine, activate all hydraulic cylinders until filled with oil and free from air.
- Stop engine and fill tank to level marker.

Fig. 1

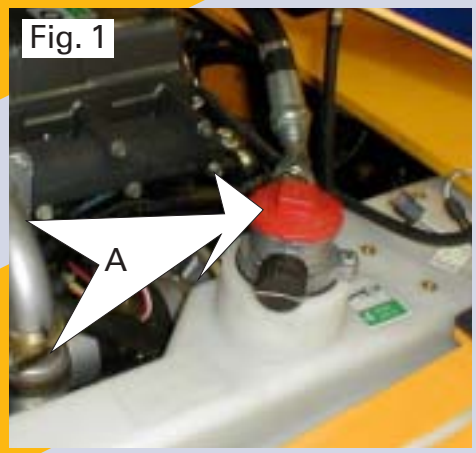
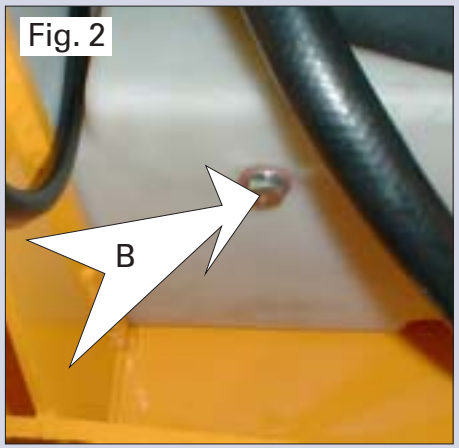


Fig. 2

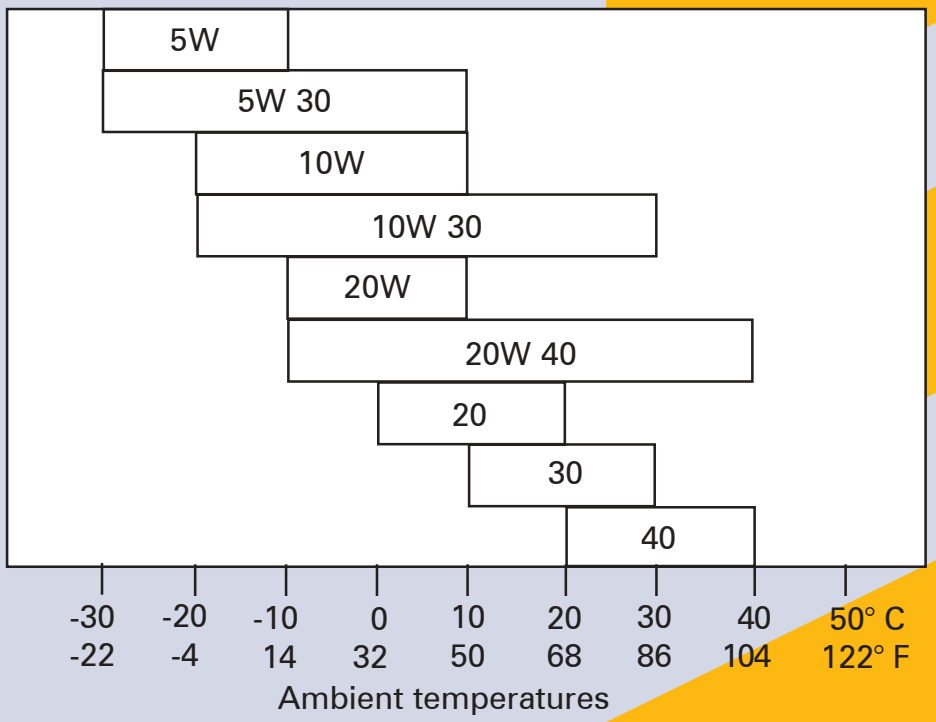


Recommended Lubricants

Thwaites Recommended Lubricants and Coolant

Engine	MOBIL DELVAC SPECIAL 10 W 30 Oil specification MIL-L-46152C (See viscosity chart).
Gearbox/Transfer Box	MOBILUBE HD 90
Axles	MOBILFLUID 422
Hydraulic System	MOBIL DTE 24
Brake System	MOBIL DTE 24
Grease	MOBILPLEX SPECIAL or MOBILPLEX 47
Engine Coolant	B.S. 6580-1992 Specification for corrosion inhibiting Engine coolant concentrate (antifreeze)

Recommended SAE Viscosity Grades



SYNTHETIC OILS SHOULD NOT BE USED IN THESE ENGINES

USE ONLY GENUINE THWAITES FILTERS, REFER TO YOUR PARTS MANUAL FOR PART NUMBERS.

3-4 tonne

Thwaites

Thwaites allparts genuine parts

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YOUR WARRANTY MAY BE INVALIDATED IF INFERIOR ITEMS ARE FITTED.