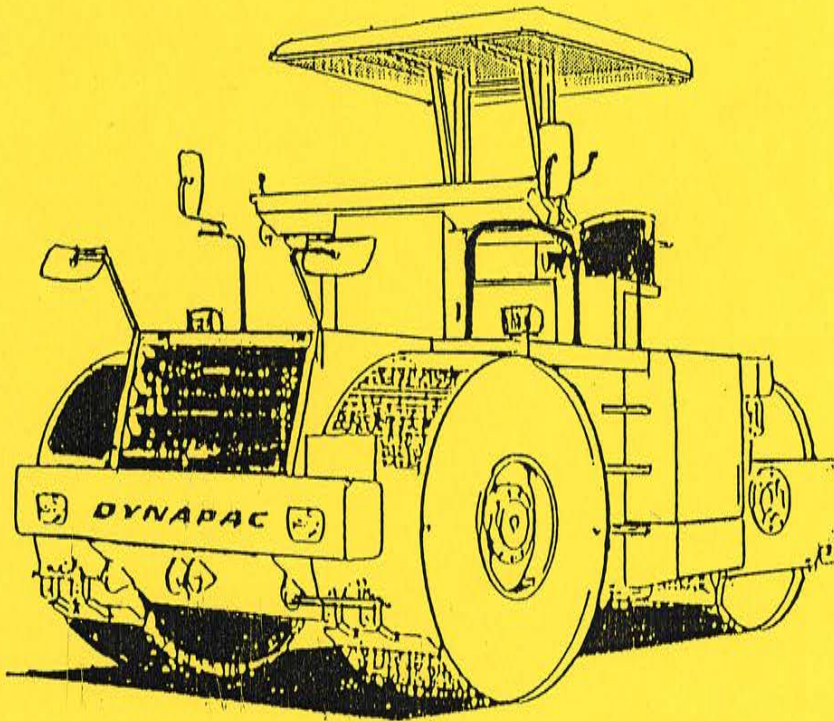


DYNAPAC®

- DESCRIPTION
- OPERATING
- MAINTENANCE



CS12

3WHEEL ROLLER

DESCRIPTION

E-1-4001
CS 1 2 III

CONTENTS	Page	Page
General.....	1	Hydraulic diagram..... 5
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Technical particles.....	3	

GENERAL

The DYNAPAC CS12 static three wheel roller is primarily designed for compacting asphalt but is also suitable for compaction of base course and fill.

Moderate weight distribution for three drums make this roller particularly suitable for work on streets, roads, car park and industrial yards.

The roller is extremely easy to manoeuvre and it can also be used to advantage on minor jobs such as pavements and cycle paths where space is restricted.

TECHNICAL PARTICULARS

Weights

Net weight 10.285 kg
Operating weight incl. driver +50% of fuel

Engine specifications

Make and model HINO, model W04D
Type Diesel, four cycle, direct injection, in-line
four cylinder, overhead valve, water-cooled
type.
Fuel Automotive diesel fuel ASTM 2D or equivalent
Number of cylinders-bore x stroke ..4- 104 x 118 mm
Output 80ps/ 2400rpm
Fuel consumption 169g/PS·h at max. power rating with full
load.

Braking system

Service brake Hydrostatic type.
Parking brake Internal expanding double shoe.
Emergency brake Multi-disk brake built in hyd. motor

Steering system

Type Hydrostatic type, of gear pump and Orbitrol
control valve with independent hyd.-circuit
Steering valve Orbitrol type.
Hydraulic oil filter Replaceable cartridge type.

Drive system

Type Hydraulic pump and motor drive.
Of high/low speed gear box and front axle
type.
Front axle Of Banjo-type axle case with differential
gear with none-slip device, and planetary
gear for final drive gear reduction.
Rear drum By hydraulic motor direct drive.
Make and type of hydraulic system.. DAIKIN Pump PV22
Motor MF21
BM22
Line filter WAKO paper element type

- 8 After the new engine starting or daily cold engine starting, do not raise the engine speed abruptly, keep the engine running in about 750 r/min during 10 minutes to warm up the engine and hydraulic oil.

Although colour of exhaust is dark and engine noise level is higher than normal condition before the warming up has been achieved completely, the engine is in normal condition. Such phenomenon will disappear after the engine has warmed up thoroughly.

Keep the engine coolant temperature within green belt of the coolant temperature gauge.

OPERATING

CS 1 2

From Serial No. _____

CONTENTS		Page	Page
Safety recommendation	2	Stopping the roller	7
Before starting the new roller ...	3	Parking	8
Starting the engine and driving ..	4	Lifting instruction	9
Driving	6		

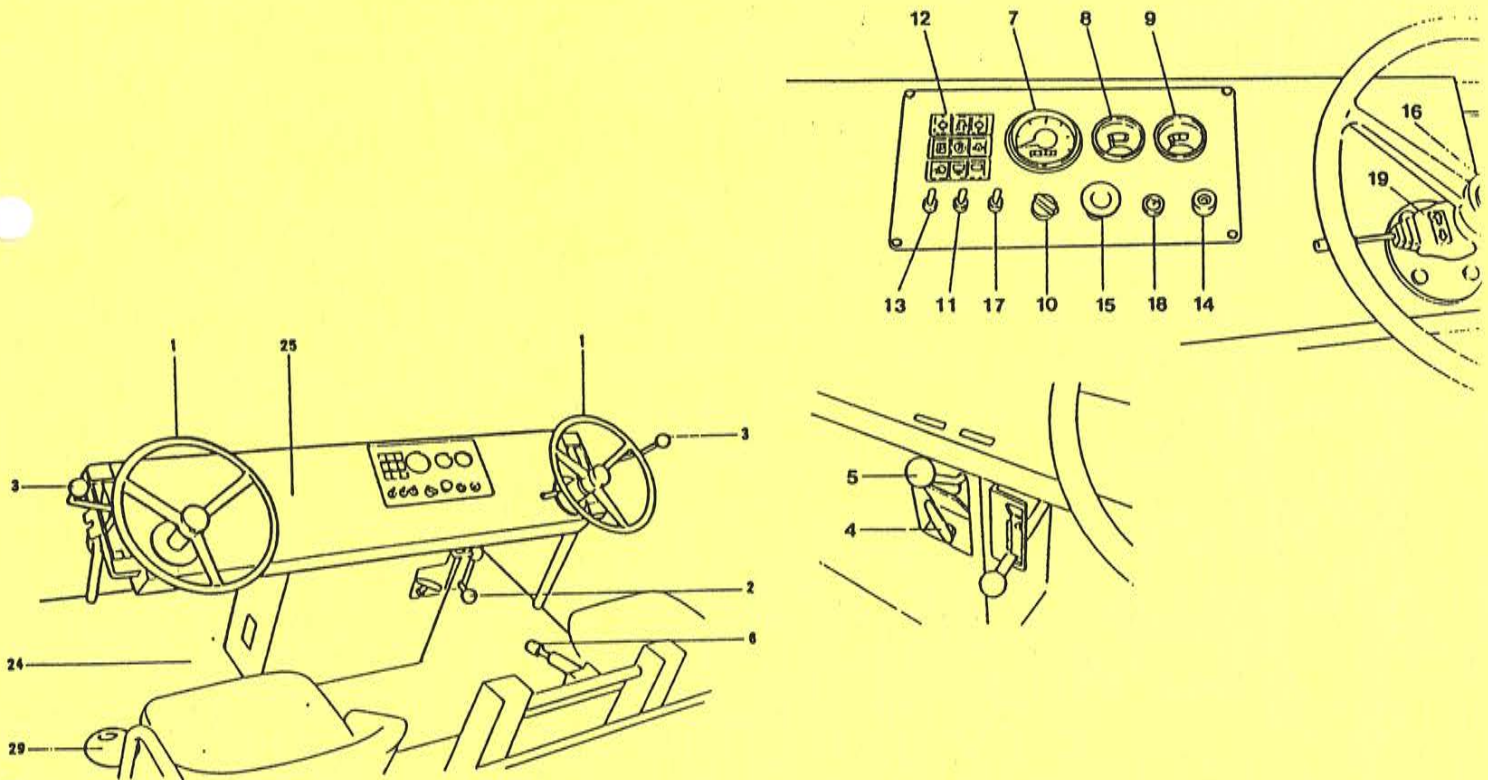


Fig. 1 Driver console and platform

- | | |
|---------------------------|------------------------------|
| 1 Steering wheel | 12 Monitor lamps |
| 2 Gear lever | 13 Parking lamp switch |
| 3 Forward/ reverse lever | 14 Starter switch |
| 4 By- pass valve | 15 Engine stop button |
| 5 Engine throttle lever | 16 Horn button |
| 6 Parking brake lever | 17 Sprinkler pump switch |
| 7 Engine rpm meter | 18 Glow indicator |
| 8 Water temperature meter | 19 Direction light switch |
| 9 Fuel oil meter | 24 Operator platform |
| 10 Head light switch | 25 Console panel |
| 11 Working light switch | 29 Filler cap for water tank |

BEFORE STARTING NEW ROLLER

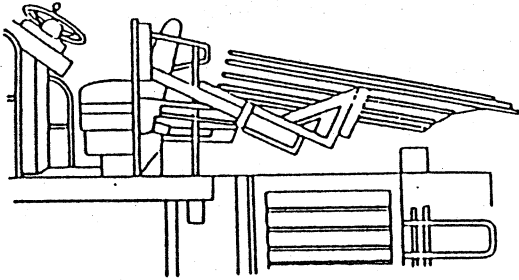


Fig. 2 Canopy (folded)

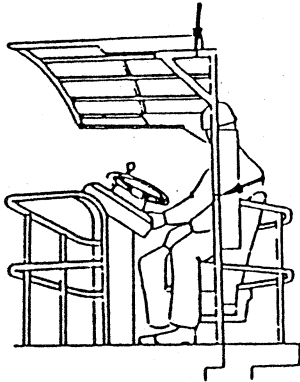


Fig. 3 Canopy (stood)

- 1 Stand the canopy to up- light position as Fig. 3, if canopy is equipped on the roller and lock it with lock pins attached to the canopy. Fasten the canopy sheet. Firmly secure the lock pins with cotter pin.
- 2 Perform the daily maintenance described in the maintenance instruction.
- 3 Check the battery cable for loosen connection. Also check that the engine air intake is not obstructed.
- 4 Check all levers, switches are in proper function.
- 5 Adjust the driver seat so that the controls are easily accessible.
- 6 Supply sprinkling water from water tank filler if so required. Also fill the ballasting water into drums when required.

8 After the new engine starting or daily cold engine starting, do not raise the engine speed abruptly, keep the engine running in about 750 r/min during 10 minutes to warm up the engine and hydraulic oil.

Although colour of exhaust is dark and engine noise level is higher than normal condition before the warming up has been achieved completely, the engine is in normal condition. Such phenomenon will disappear after the engine has warmed up thoroughly.

Keep the engine coolant temperature within green belt of the coolant temperature gauge.

- 3 When driving, check that the instruments indicate normal readings and that the warning lamps do not light on.
- 4 When the sprinkling is required in a compaction, operate an of toggle type sprinkler switch 21 of Fig.1 in page 1, then water spray out from the sprinkler nozzles to wet the drum surface.

STOPPING THE ROLLER

- 1 Stop the roller by setting the forward/ reverse lever to neutral position.
- 2 Pull out the throttle lever until the engine idles at about 750 r/min and allow it to run for five minutes.
Push the button (15 in Fig.1) full to stop the engine.
- 3 Apply parking brake.
- 4 Turn the starter switch key to OFF position and remove it.

MAINTENANCE

CS 1 2

From serial No.

CONTENTS	Page	Page	
Lubricants and fuel	1	Every month	19
Maintenance schedule	3	Every three months	27
Daily	7	Every six months	29
Weekly	10	Every year	30
Every 14 days	17		

READ THIS INSTRUCTION BEFORE STARTING ANY SERVICE WORK

Correct maintenance is essential to ensure that the roller will give many years of satisfactory service, therefore the instructions given here should be carefully observed.

The engine instruction manual must be used in conjunction with these instructions.

LUBRICANTS

A B C D and E refer to the maintenance schedule.

Always use specified lubricants in the stated amounts.
Excessive or insufficient grease or oil will cause parts to run hot,
thus lead rapid wear.

A GREASE Lithium base with EP additive(lead oleate), NLGI No.2, Shell Alvania EP Grease 2.

B ENGINE OIL For API Service CD/SE, SAE 20W/30/40, 10W/30.

The instructions for the diesel engine(oil intervals, etc) described in the manufacturer's instr. manual should be followed, in addition to those listed here.

C HYDRAULIC OIL With anti- wear additive- Shell Tellus Oil T68

D LUBRICANTES OIL SAE 90 HD (API, GL- 5).

NOTE : Other lubrication recommendations apply if the roller is to be used under exceptionally hot or cold conditions, please contact DYNAPAC.

MAINTENANCE SCHEDULE

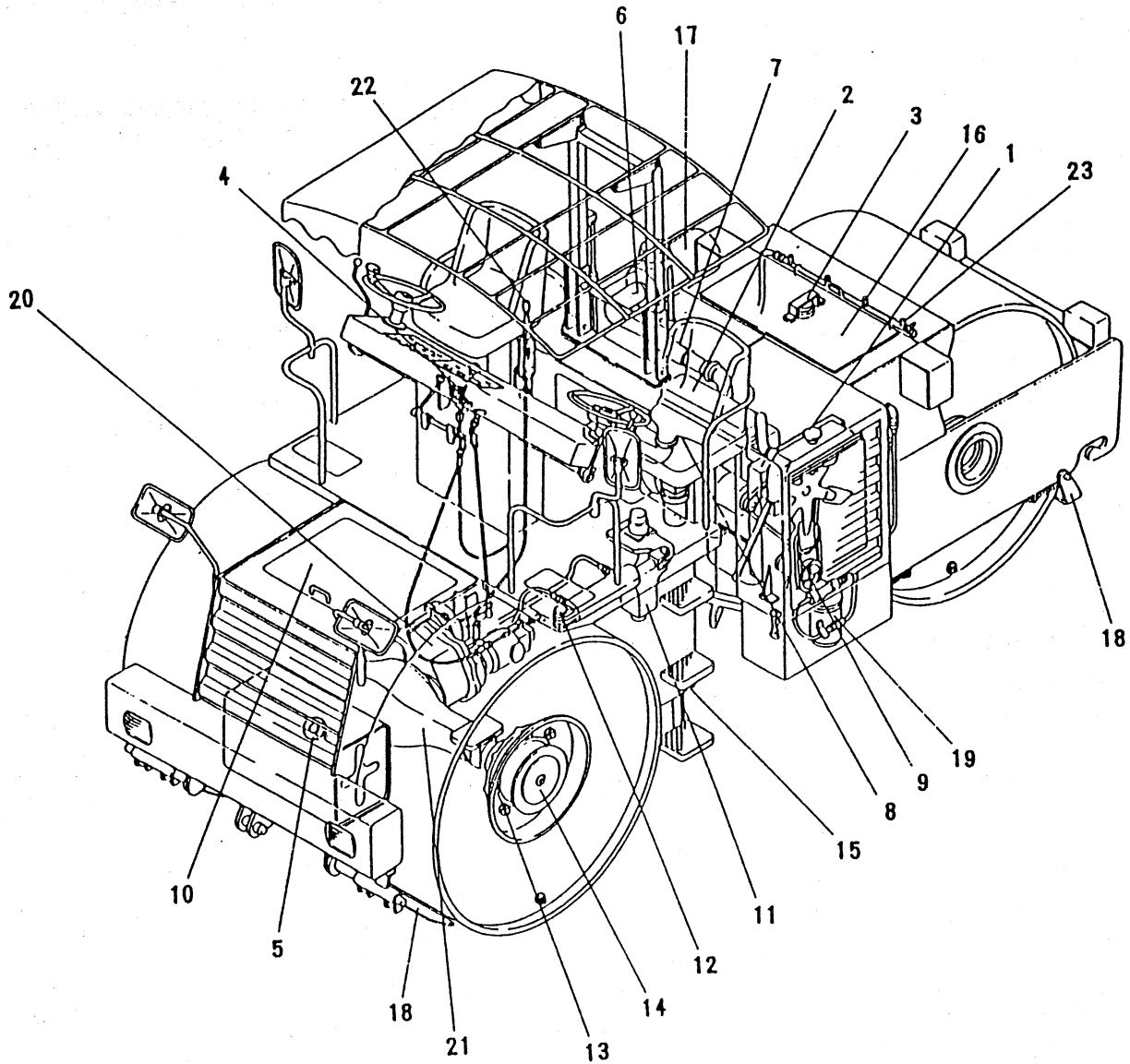


Fig. 1 Service points of model CS12

- | | |
|----------------------------------|---------------------------------|
| 1 Radiator | 14 Planetary gear |
| 2 Engine | 15 Water sprinkler pump, filter |
| 3 Hydraulic oil tank- filler cap | 16 Hydraulic oil filter |
| 4 Control linkage | 17 Air cleaner |
| 5 Fuel oil tank | 18 Scraper |
| 6 Air cleaner- dust indicator | 19 Hydraulic oil filter |
| 7 Intake hose | 20 Transmission |
| 8 Oil level gauge | 21 Rear axle differential |
| 9 Fan belt | 22 Parking brake lever |
| 10 Battery | 23 Water sprinkler nozzle |
| 11 Center- pin | |
| 12 Steering cylinder stroke pin | |
| 13 Drum nuts | |

EVERY 14 DAYS (EVERY 100 HOURS OF OPERATION)

2	Engine valve clearance- check	
1	Radiator core surface- clean	
21	Front axle oil level- check	D
14	Front axle planetary gear oil level- check	D
9	Engine V- belt tension- check	

EVERY MONTH (EVERY 200 HOURS OF OPERATION)

17	Air cleaner dust collector- clean	
19	Hydraulic oil line and steering filter element- change	
22	Parking brake- check and readjust	
20	Gear box oil- change	D
21	Front axle oil level- check	D
16	Hydraulic oil tank- drain sediment	C
4	Control linkage- lubricate	A
8	Engine oil- change	B
2	Engine oil filter- change	B

EVERY THREE MONTHS (EVERY 500 HOURS OF OPERATION)

2	Engine valve clearance- readjust	
2	Engine injection nozzle pressure- check readjust	
2	Engine fuel filter- replace	

DAILY
(Every 10 hours of operation)

Coolant level- check

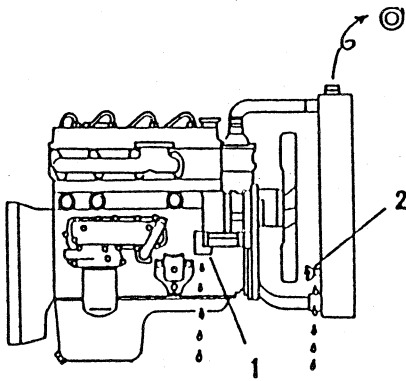



Fig. 2 Radiator filler cap
1. Drain cock
2. Drain cock

Coolant levels should be checked each day before the machine is run. If the coolant level must be checked at operating temperature the engine should be stationary.

Place a piece of cloth or such like over the filler cap and turn the cap to the first stop. When the pressure has fallen, press down the cap, turn further and then remove. The coolant level should reach the level tab in the radiator.

 CAUTION THE COOLANT IS PRESSURISED. IF THE CAP IS REMOVED QUICKLY, COOLANT WILL BE RELEASED IN THE FORM OF STEAM AND MAY CAUSE SCALDING. USE GLOVES AND PROTECTIVE GOGGLES.

Engine oil level-check

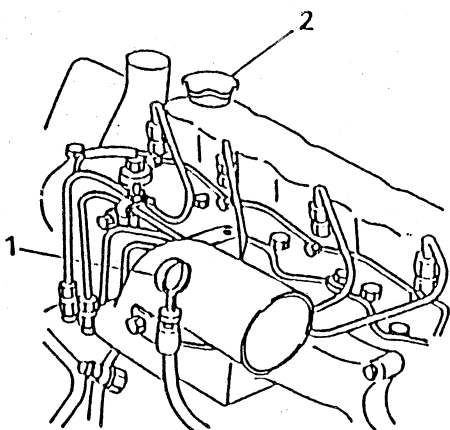


Fig. 3 Engine
1 Dipstick
2 Oil filler cap

- 1 Drive the roller onto a level surface and stop the engine.
- 2 Remove the dipstick(1) and check the oil level.
- 3 If the oil level is close to the lower mark, replenish with B oil as recommended on page 1 in "Lubricants".

Air cleaner dust indicator-check

- 1 Check the indicator on the air cleaner when the engine is running at maximum rpm. If the indicator (1) shows red, the filter should be cleaned (see under the heading "EVERY WEEK", Air cleaner Cleaning).

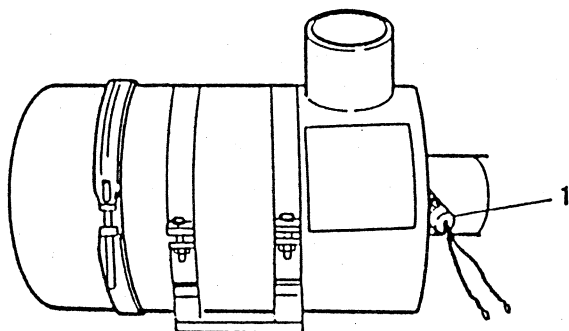


Fig. 7 Air cleaner
1 Dust indicator



NEVER USE A NAKED FLAME WHEN CHECKING THE FLUID LEVEL, SINCE EXPLOSIVE GAS IS FORMED IN THE BATTERY WHEN IT IS BEING CHARGED.

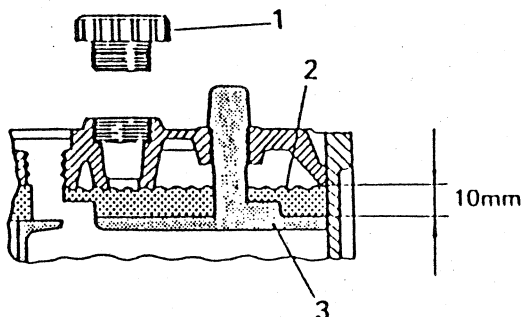


Fig. 11 Battery liquid level

- 1 Cell plug
- 2 Liquid level
- 3 Plate

Articulated joint-lubricate



ENSURE THE VICINITY OF THE ARTICULATED JOINT IS CLEAR OF PERSONAL WHEN THE ENGINE IS RUNNING. INJURIES COULD OCCUR IF THE STEERING IS OPERATED.

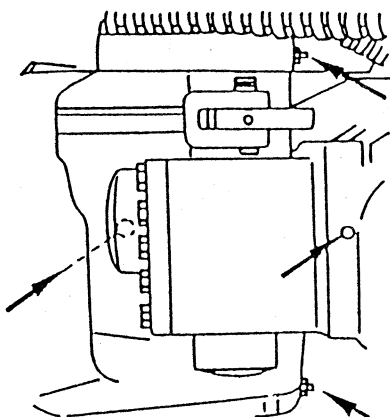


Fig. 12 Grease nipples-articulated joint

- 3 Remove the cell filler plugs and ensure the level of the liquid is approx. 10mm above the plates.

Check the cells. If the level is lower, top up to the correct level with distilled water.

If the air temperature is below freezing, run the engine for a while after adding the distilled water since the water may otherwise freeze.

- 4 Ensure that the breather holes in the cell filler plugs are not blocked. Then replace the plugs.

- 5 The cable terminals should be clean and securely tightened. If corroded, clean and coat with petroleum jelly.

- 1 Articulate the roller to the left so that all the grease nipples on the right-hand side of the articulated joint are accessible.

- 2 Clean any dirt and grease on the four nipples.

- 3 Grease each nipple with five strokes of the grease gun. Ensure that grease enters the bearings.

- 4 Turn the drum section to the right and apply grease to the nipples on the left hand side of the articulated joint in the same manner.

Use type A grease as recommended on page 1 in "Lubricants". Leave a little grease on the nipples after greasing to prevent dirt from entering.

N. B.! If the grease does not enter the bearings, it may be necessary to reduce the load on the steering pivot by using a jack, and then repeat the lubrication procedure.

Front axle oil-change



NEVER WORK UNDER THE ROLLER WHEN THE ENGINE IS RUNNING. PARK THE ROLLER ON A LEVEL SURFACE. BLOCK DRUM AND WHEELS.

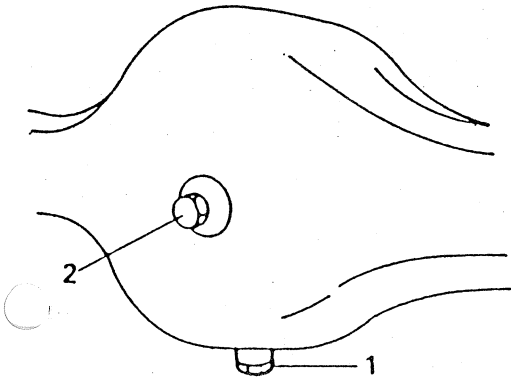


Fig. 16 Axle differential gear

1. Drain plug
2. Level plug

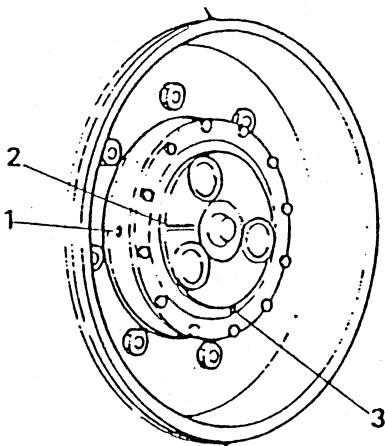


Fig. 17 Planetary gear

- 1 Oil level plug
- 2 Level mark
- 3 Filler plug/drain plug

- 1 Drive the roller onto a level surface and stop the engine.
- 2 Clean the area around the drain plug(1) and the filler plug(2).
- 3 Place a receptacle of approx. 15 liters capacity under the drain plug.
- 4 Remove the filler plug and the drain plug. Collect the oil in the receptacle.
- 5 Clean the drain plug and refit when all oil has drained.
- 6 Replenish with oil through the filler plug hole until the oil level reaches the bottom edge of the hole. The differential holds approx. 8 liters of oil.

Use D oil as recommended on Page 1 in "Lubricants"
- 7 Refit the filler plug.

Regardless of the normal oil change intervals, this oil change should be done after initial 50 hours of operation.

Air cleaner element-cleaning

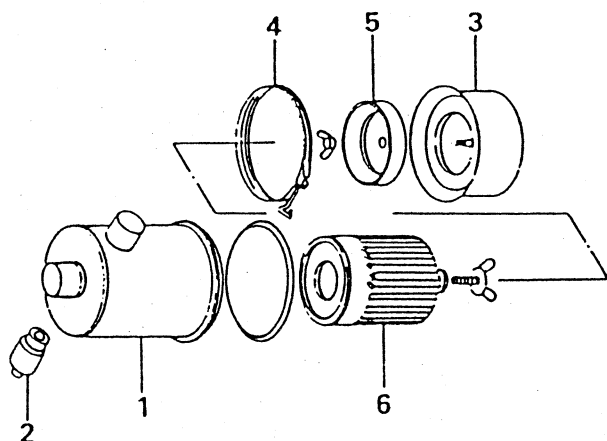


Fig. 20 Air cleaner.

- 1 Filter housing
- 2 Dust indicator
- 3 Outer cover/dust collector
- 4 Clamp
5. Inner cover
- 6 Main filter

N. B. ! The air cleaner is equipped with an indicator. The main filter must be cleaned when the indicator shows red.

- 1 Release the clamp(4) and remove the outer cover(3).
- 2 Unscrew the wing nut in the centre of the filter and remove the inner cover(5). Use a clean cloth to clean the outer cover(3).
- 3 Unscrew the wing nut and remove the main filter(6).
- 4 Ensure that dust does not be entered into the engine induction hose or pipe in this work.

And also carefully check if any dust has already been entered into the induction piping.

Should any dust or dirt be found, it means that the connections, hoses or element have a leak and must therefore be replaced with new parts.

- 5 Wipe the inside of the filter housing(1) and the induction pipes clean, using a clean cloth.
- 6 Ensure that the connections and the hoses between the filter housing and the engine are intact and do not leak.

EVERY 14 DAYS

(Every 100 hours of operation)

Engine valve clearance- check

Radiator core- cleaning

Radiator core which is covered with dirt lowers the cooling efficiency. Therefore, clean the core with spurting water.

CAUTION ! NEVER WORK UNDER THE ROLLER WHEN THE ENGINE IS RUNNING. PARK THE ROLLER ON A LEVEL SURFACE. PLACE CHOCKS UNDER THE WHEELS.

Front axle oil level-check

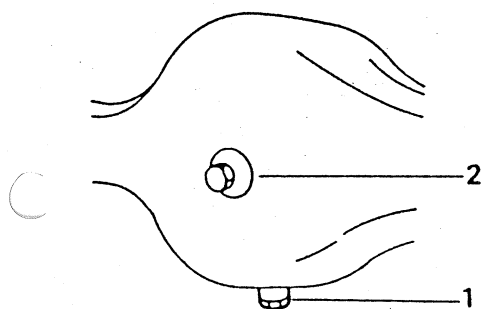


Fig. 22 Front axle
1 Drain plug
2 Oil level plug

1 Ensure that the roller is standing on a level surface.

2 Remove the level plug(2) and ensure that the oil level is up to the level plug hole.

If the oil level is low, replenish to the correct level through the plug hole.

Replenish with type D oil as recommended on page 1 in "Lubricants".

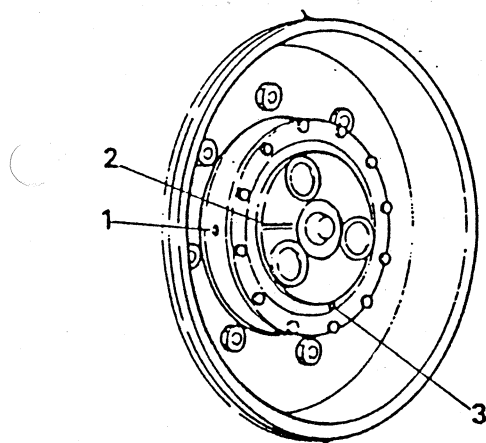


Fig. 23 Front axle (planetary gear)
1 Oil level plug
2 Oil level mark
3 Drain plug and filler plug

1 Drive the roller onto a level surface, until one of the planetary gears level plugs(1) is in the correct position.

The mark(2) on the planetary gear housing should then be horizontal.

2 Remove the level plug and ensure that the oil level is up to the plug hole.

If the oil level is low, replenish with oil to the correct level through the level plug hole.

Replenish with type D oil as recommended on page 1 in "Lubricants".

3 Check the planetary gear oil level on the other side in the same manner as described in 1 and 2 above.

EVERY MONTH

(Every 200 hours of operation)

Air cleaner dust collector-cleaning

N. B. ! The air cleaner is equipped with an indicator. The main filter must be cleaned when the indicator shows red.

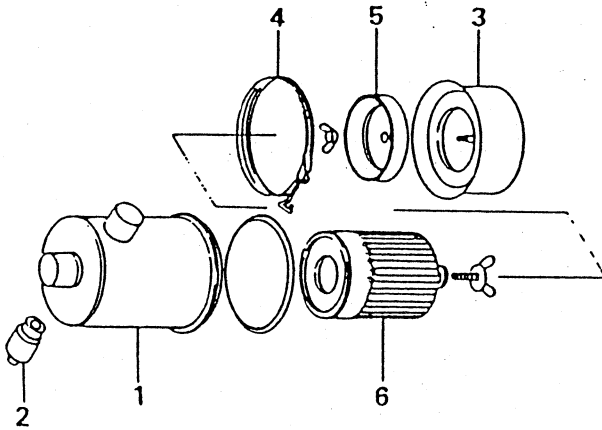


Fig. 26 Air cleaner
1 Filter housing
2 Dust indicator
3 Outer cover dust collector
4 Clamp
5 Inner cover
6 Main filter

- 1 Release the clamp(4) and remove the outer cover(3).
- 2 Unscrew the wing nut in the centre of the filter and remove the inner cover(5). Use a clean cloth to clean the outer cover(3).
- 3 Unscrew the wing nut and remove the main filter(6).
- 4 Ensure that dust does not get sucked- in into the engine air intake duct in this work.

Also carefully check if any dust has already been sucked into the duct element such as hose or pipe.

Should any dirt be found inside duct, it means that the connections, hoses or element have a leak and therefore must the clamp be retighten or replaced with a new one if necessary.
- 5 Wipe the inside of the filter housing(1) and the induction pipes clean, using a clean cloth.
- 6 Ensure that the connections and the hoses between the filter housing and the engine are intact and do not leak.

Parking brake effectiveness-test and adjust

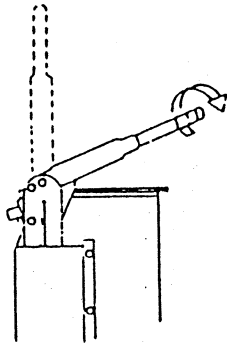


Fig. 28 Parking brake lever

- 1 The brake is correctly adjusted when it is just possible to pull the lever completely.
- 2 Adjust the brake by turning the lever knob clockwise.

Gear box oil-change

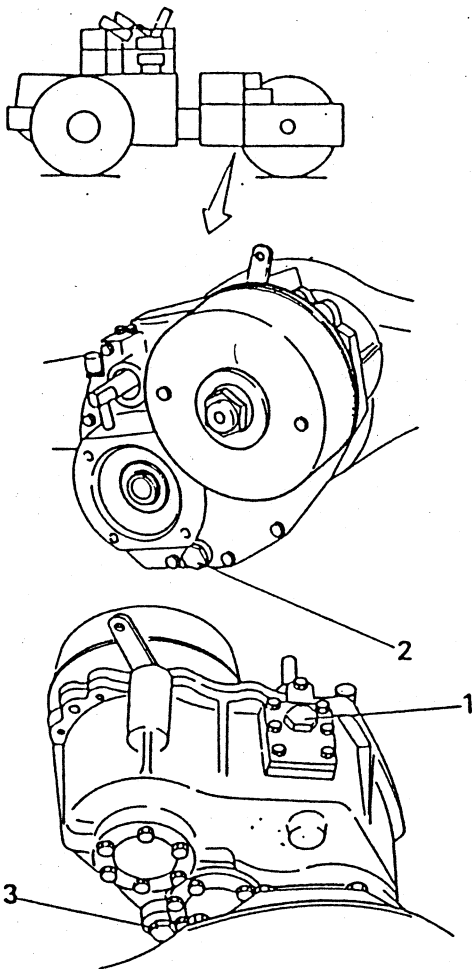


Fig. 29 Gear box
 1 Filler plug
 2 Drain plug
 3 Level plug

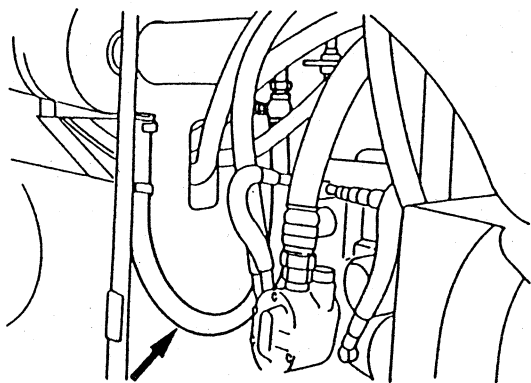
- 1 Drive the roller onto a level surface and stop the engine.
- 2 Clean the area around the filler plug(1) and drain plug(2).
- 3 Place a receptacle of about 2 liters capacity under the drain plug(2).
- 4 Remove the filter plug(1) and the drain plug(2). Drain the oil into the receptacle.
- 5 Clean the drain plug and refit.
 The drain plug is magnetic and attracts any magnetic particles in the oil.
- 6 Replenish with oil, through the filler plug(1) hole, until the oil level reaches the bottom edge of the hole. The gearbox holds approx. 2,0 liters of oil.

Use type D oil as recommended on page 1 in "Lubricants".

- 7 Refit the filler plug(1).

Hydraulic oil tank-drain sediement

Rotary valve for drain is located at the bottom of the tank.



- 1 Place a container under the stretched hose to contain the drained sediment.
- 2 Turn the valve for a while until the sediment has drained out.
- 3 After no more sediment is observed in the draining hydraulic oil, retighten it.

Fig.32 Extension hose

Replenishing

- 1 Replenish with fresh B oil as shown on page 1 in "Lubricants".

Oil capacity- Max. 8 liters
Min. 5 liters

- 2 After the engine is filled with the amount of oil required, check the engine oil level with the dipstick twice, once before starting the engine and at least 30 minutes after the engine stops.

Otherwise, oil will cling to the upper part leading to that no actual level will be indicated.

Do not mix engine oil, either by brand or type.
Do not overfill oil into the engine.
Excessive oil amount will cause oil consumption to increase or be blown out the cylinder block breather.

Engine oil filter-replace

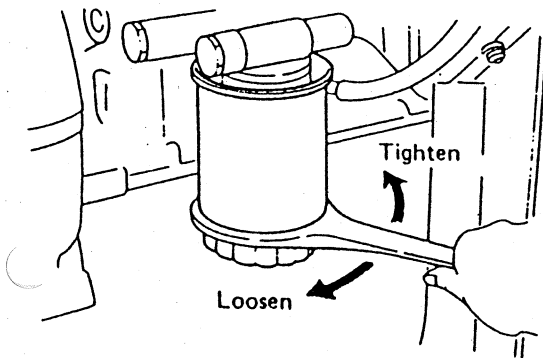


Fig. 34 Engine oil filter

The full flow and cartridge type filter is equipped on this engine, therefore, the filter cannot be cleaned or reused.

Be sure that the replacement of the oil filter will be done at the same time when the engine oil is changed.

- 1 To remove the filter, loosen the filter turning the filter shell with a band wrench or special wrench as shown in Fig. 34
Discard the removed filter.

- 2 Apply the engine oil to the oil filter gasket. Then install a new filter by screwing by hand until it lightly touch to the filter head.

- 3 Then tighten it about 3/4 to one turn with tool.

After installed, run the engine and check the oil filter for leak.

N. B. ! Do not install the filter too tight, or the gasket might be damaged.

EVERY THREE MONTHS

(Every 500 hours of operation)

Engine valve clearance- check

Do the engine valve clearance readjustment in accordance with engine manufacturer's OPERATION HANDBOOK.

Engine fuel filter-replace

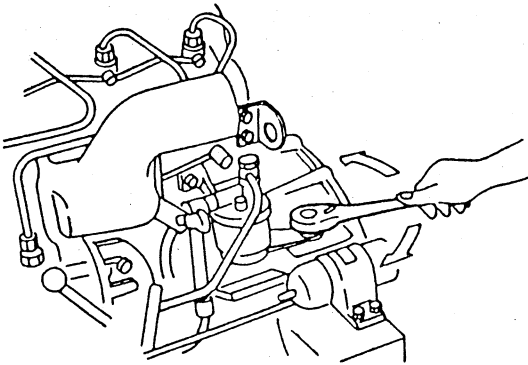


Fig. 36 Fuel filter
1 Bleeder plug

A disposable cartridge type fuel filter is equipped in this engine.

1 Remove the fuel filter by loosening the filter shell as shown in Fig. 36

2 Clean the sealing surface of the filter holder.

N. B. ! Ensure that the old gasket is not left on the filter head sealing surface, otherwise, fuel leakage will take place after installment of new filter.

3 Apply a thin film of diesel fuel to the new filter gasket.

4 Screw- in the filter by hand to the filter holder until the filter touch the filter holder in light touch.

5 Then tighten it about 3/2 turn of one turn with tool.

After this work, do the air bleeding for the fuel system in accordance with the procedure described in page 29.

EVERY SIX MONTHS

(Every 1000 hours of operation)

Fuel tank-drain sediment and clean inside

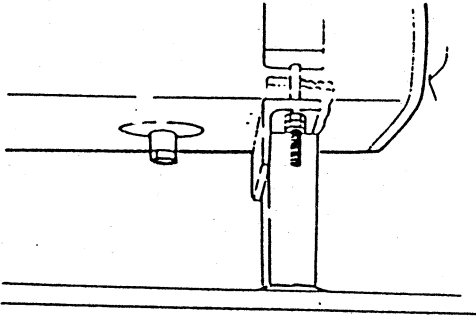


Fig. 38 Fuel tank drain plug

- 1 Place a container to contain sediment drained from the fuel tank.
- 2 Remove the drain plug and allow the sediment at the tank bottom to be drained out.
- 3 After clean fuel is drained from the drain hole, refit the drain plug securely.
- 4 If the tank once been emptied, do the air bleeding in accordance with the procedure in page 29.

Gear box-oil change

Do the oil change in accordance with the procedure described in page 10.

Engine fuel filter-replace

Do the fuel filter replacement in accordance with the procedure described in page 28.

Engine cooling system-flashing

Do the engine cooling system flashing in accordance with engine manufacturer's OPERATION HANDBOOK.

- 5 Refit the cover plates. Fit a new gasket and use Loctite sealing compound or its equivalent to ensure a good seal.

N. B. | Ensure that no sealing compound enters the tank.

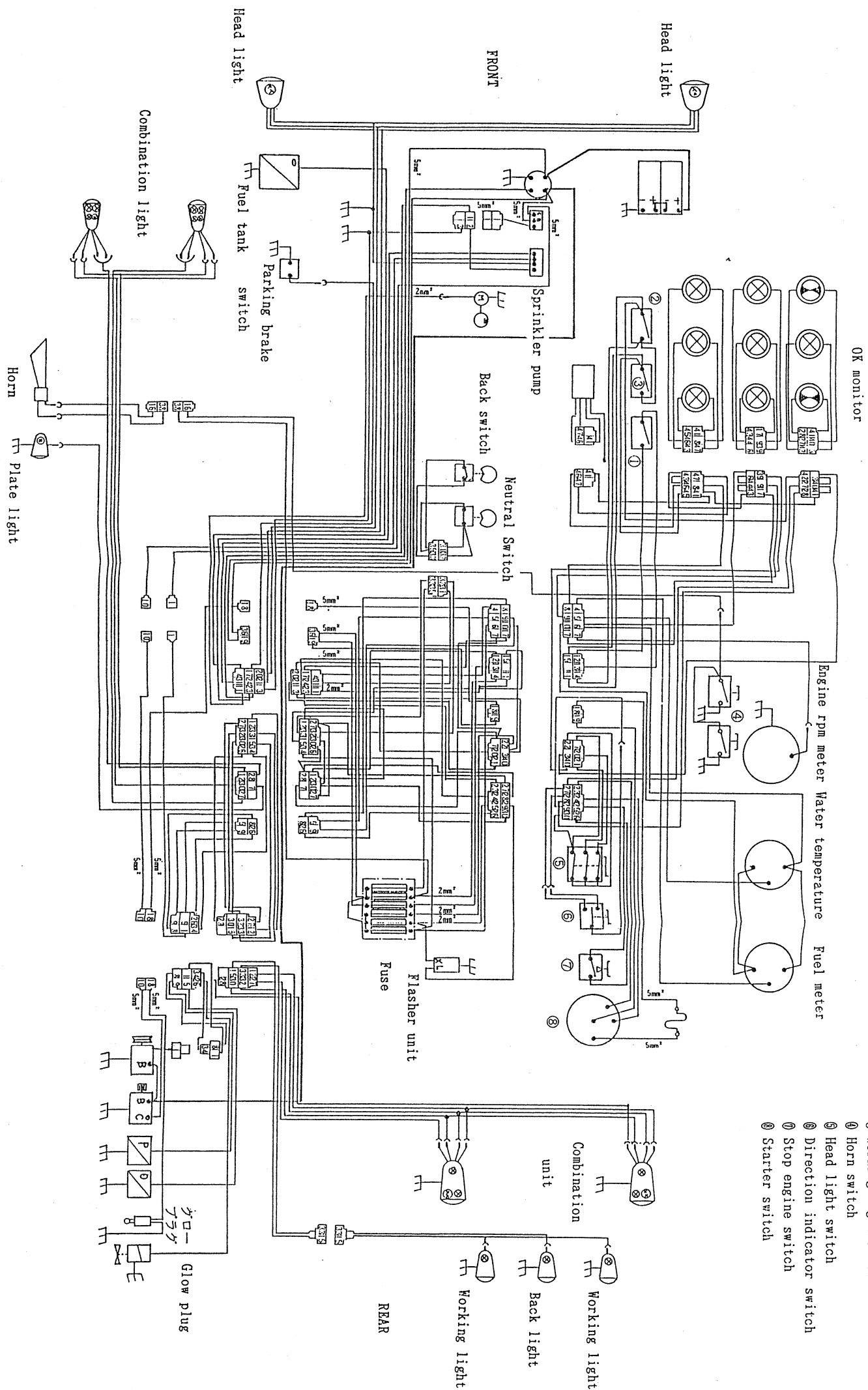
GEAR BOX- OIL CHANGE

Do the gear box oil change in accordance with the description in page 21

FRONT AXLE OIL- CHANGE

Do the front axle oil change in accordance with the description in page 13

WIRING DIAGRAM

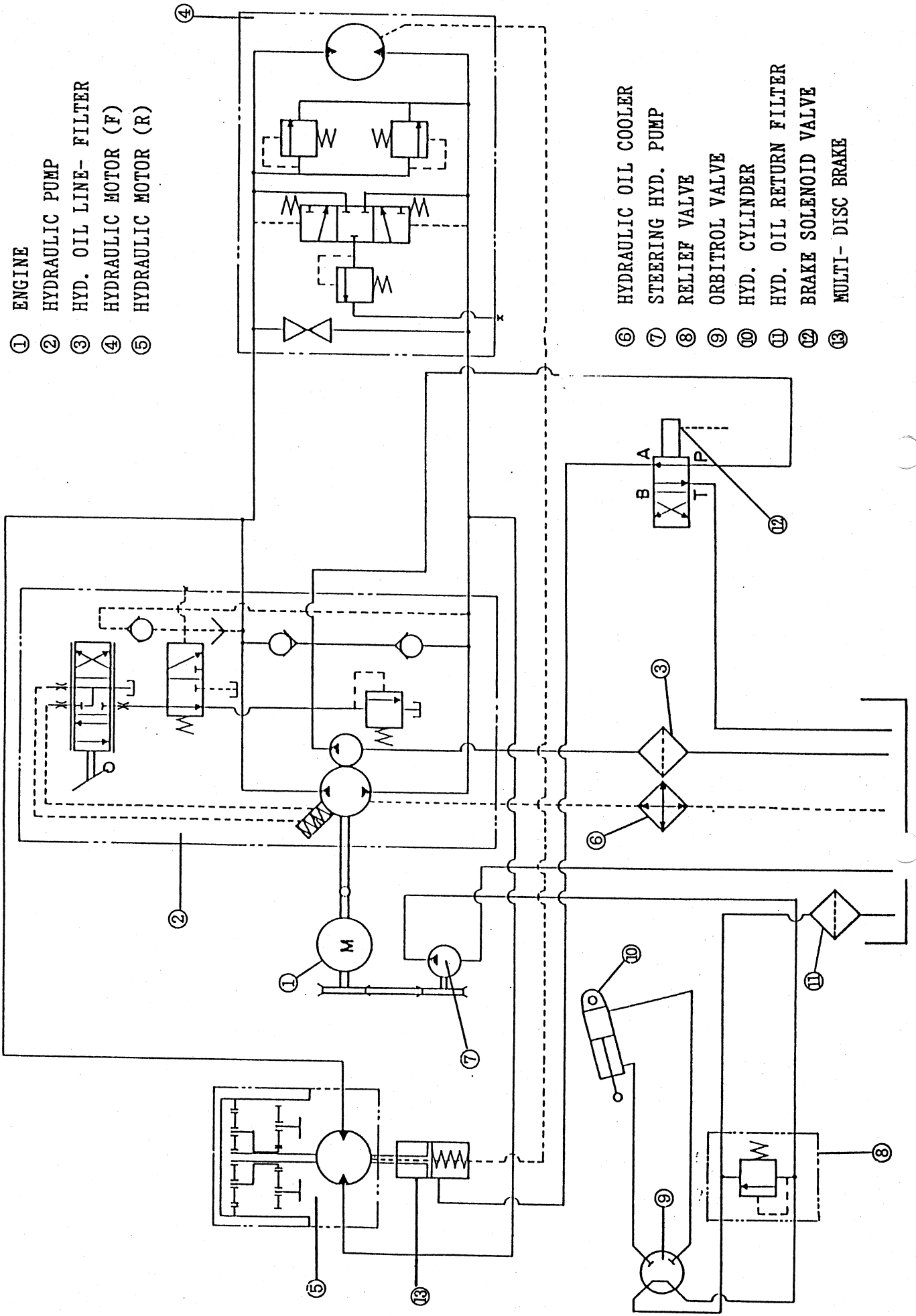


- ① Parking light switch
- ② Water sprinkler switch
- ③ Working light switch
- ④ Horn switch
- ⑤ Head light switch
- ⑥ Direction indicator switch
- ⑦ Stop engine switch
- ⑧ Starter switch

HYDRAULIC DIAGRAM

- ① ENGINE
- ② HYDRAULIC PUMP
- ③ HYD. OIL LINE- FILTER
- ④ HYDRAULIC MOTOR (F)
- ⑤ HYDRAULIC MOTOR (R)

- ⑥ HYDRAULIC OIL COOLER
- ⑦ STEERING HYD. PUMP
- ⑧ RELIEF VALVE
- ⑨ ORBITROL VALVE
- ⑩ HYD. CYLINDER
- ⑪ HYD. OIL RETURN FILTER
- ⑫ BRAKE SOLENOID VALVE
- ⑬ MULTI- DISC BRAKE



EVERY YEAR

(Every 2000 hours of operation)

Hydraulic oil tank- drain and replace with new oil.

N. B. ! The strictest cleanliness is essential when servicing the hydraulic system, to ensure trouble free operation of the roller.

The hydraulic oil should be changed when the system is hot, i.e. at the end of a shift. Oil flows more freely when it is hot and any impurities will then be well mixed with the oil and it will flow out when drained.

- 1 Thoroughly clean the exterior of the tank drain plug.
- 2 Obtain a container of at least 120 liters capacity to collect the oil. An empty oil drum or the like is suitable.
- 3 Clean and remove the cover plates located on the top of the hydraulic oil tank.

N. B. ! Take care to prevent impurities from entering the tank.

- 4 Cleaning the tank. This is most easily achieved by drawing up the sediment from the bottom of the tank by means of a filter unit. If cloths or brushes are used, they must be completely clean and free from dust and loose ends.

N. B. ! If the tank is rinsed out with hydraulic oil, all connections in the bottom of the tank must be plugged to prevent impurities from entering the hydraulic lines.

Important: Do not forget to remove these plugs after cleaning.

Air bleeding for the fuel system

When service has been done on the fuel system, air bleeding for the system should be done in accordance with the following procedure.

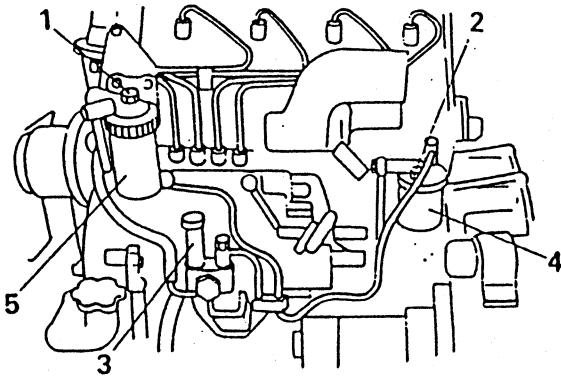


Fig. 37 Engine air bleeder plugs

- 1 Air bleeder plug
- 2 Air bleeder plug
- 3 Priming pump
- 4 Fuel filter
- 5 Water sedimenter (if equipped)

1 Loosen the fuel priming pump knob by turning the knob anti-clockwise, then the knob is protruded to operative position.

2 Loosen the air bleeder plug 1 and 2 of Fig. 37 with a 10mm wrench and pump the fuel with the priming pump operating the pump knob up and down until fuel flows out in bubble free condition.

3 Tighten the bleeder plug and also screw in the pump knob.

N. B. ! Never forget to screw down the priming pump knob.
Engine run in the priming pump knob protruded condition will cause a feed pump failure.

Engine injection nozzle pressure-check

To do a fuel injection nozzle pressure check, a nozzle tester is needed, please ask your DYNAPAC service outlet.

Engine fuel feed pump strainer-clean

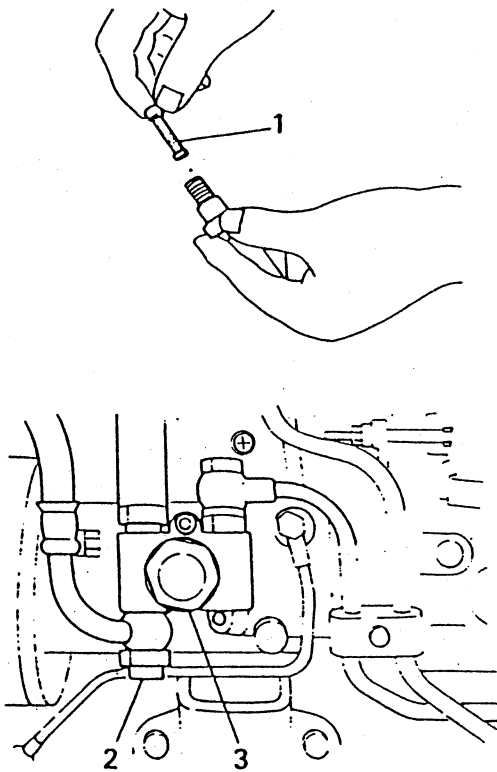


Fig. 35 Fuel feed pump strainer
1 Strainer
2 Pipe joint bolt
3 Feed pump

In this engine, a strainer is incorporated within the fuel pipe joint assembly at the place shown in Fig. 35. Therefore, cleaning is required every month or every 200 hours of operation, otherwise unexpected engine stall or lowered acceleration will be taken place when the strainer is clogged with dust.

Remove the strainer incorporated within the feed pump inlet pipe joint bolt as shown in Fig. 35

Check the strainer for clogging with dust, clean it if necessary.

After this work is done, do the bleeding on the fuel system in accordance with the procedure discribed in page 29.

ENGINE OIL— CHANGE

General about engine oil for HINO
model W04D

Oil change intervals depend on the grade of the lubricating oil and the sulphur content of the fuel.

Changing the oil every month or every 250 hours of operation that is specified in the engine manufacturer's operation handbook is conditional on the use of engine oil of grade "For API Service DC, SAE" and on the use of fuel equivalent quality to "AMTS 2D".

If oil of grade "For API Service CC/ SC, SAE" is used or if the sulphur content of the diesel fuel is much than the specified content of the same in "AMTS 2D", the oil should be changed earlier than 250 hours and more frequently.

Draining

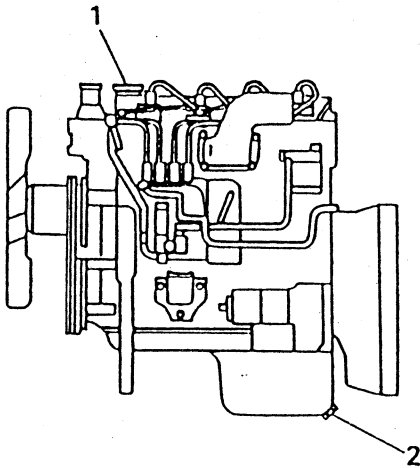


Fig. 33 Engine
1 Filler cap
2 Drain plug

Warm- up the engine thoroughly before draining the oil.

Impurities in the lubricating system will then be well mixed with the oil and will be removed out consequently.

Furthermore, the oil flows more smoothly when it is hot

- 1 Clean the area around the oil filler cap 1 of Fig. 33 and remove the filler cap.
- 2 Clean the area around the drain plug 2 and place a container of at least 8 liters capacity under the drain plug.
- 3 Then remove the drain plug 2 to allow the oil flow out from the engine oil sump.
- 4 Also allow the oil drain out from the oil filter when the filter is replaced. Do not forget, in this case, to place a container under the oil filter.
- 5 After the oil has completely drained out from the engine, wipe the drain plug clean and fit it back into the actual place and tighten securely.

CAUTION ! NEVER WORK UNDER THE ROLLER WHEN THE ENGINE IS RUNNING. PARK THE ROLLER ON A LEVEL SURFACE. PLACE CHOCKS UNDER THE WHEEL.

Front axle oil level-check

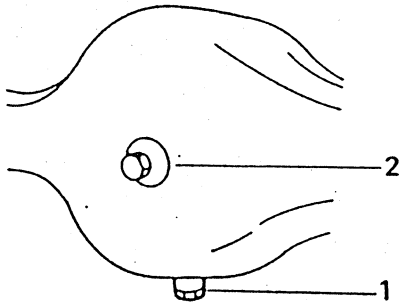


Fig. 30 Front axle
1 Drain plug
2 Oil level plug

Ensure that the roller is standing on a level surface.

Remove the level plug(2) and ensure that the oil level is up to the plug hole.

If the level is low, replenish to the correct level through the level plug hole.

Replenish with type D oil as recommended on page 1 in "Lubricants".

Front axle (planetary gear) oil level-check

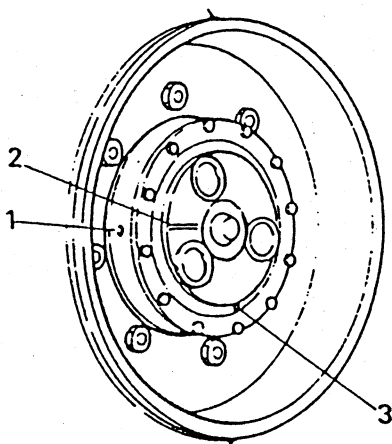


Fig. 31 Front axle (planetary gear)
1 Oil level plug
2 Level mark
3 Drain plug and filler plug

1 Drive the roller to a level surface, until one of the planetary gears level plugs(1) are in the correct position.

The mark(2) on the planetary gear housing should then be horizontal.

2 Remove the level plug and ensure that the oil level is up to the plug hole.

If the oil level is low, replenish with oil to the correct level, through the level plug hole.

Replenish with type D oil as recommended on page 1 in "Lubricants".

3 Check the planetary gear oil level on the other side in the same manner as described in 1 and 2 above.

Hydraulic oil line filter element-change

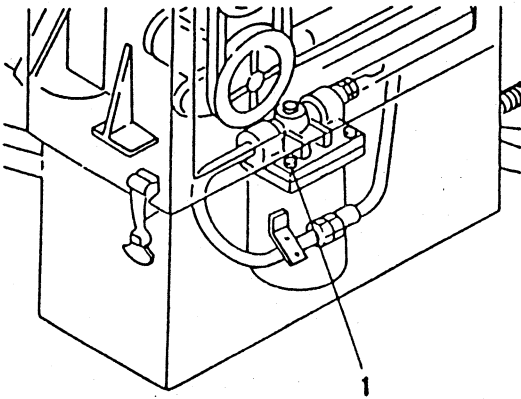


Fig. 27 Hyd. oil line filter
1 Circuit valve
2 Capscrews

- 1 Close Fig. 27- 1 circuit valve with screwing- in. Then the hydraulic oil does not circulates.
- 2 Loosen and remove four cap screws of Fig. 27- 2. Then the filter shell can be removed- out.
Discard the element.
Since it is of disposal type, it cannot be cleaned and reused.
- N. B. ! Make sure that the old gasket is not to be left on the filter head surface, since leakage will take place between the new gasket and the old one.
- 3 Set properly new gasket into the groove of the filter head.
- 4 Apply a thin film of clean hydraulic oil to the new filter gasket.
- 5 Fit the new element into the filter shell and assemble the filter with tightening four cap screws evenly.
- 6 Start the engine and check if oil leaks around the filter.

Change the hydraulic oil filter for steering every 200 hours operation. this filter is of cartridge type.

Engine Vee-belts tension-check

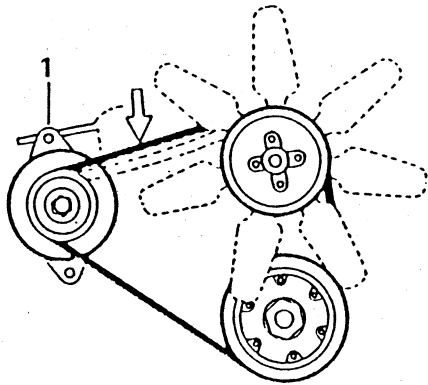


Fig. 24 Depressing amount of drive belt
1 Retaining bolt

Check V- belt tension and also check for any damage, replace it if necessary.

Depress the belt mid- way between the alternator pulley and the coolant pump pulley by 10 kg pressure with your thumb.

Standard depressing amount: 10- 15 mm

V- belt retensioning procedure:

- 1 Loosen the alternator retaining bolt 1 of Fig. 46.
- 2 Tilt the alternator outward until the belt is tensioned properly.
- 3 Retighten bolt 1.

Steering hydraulic pump drive bolt

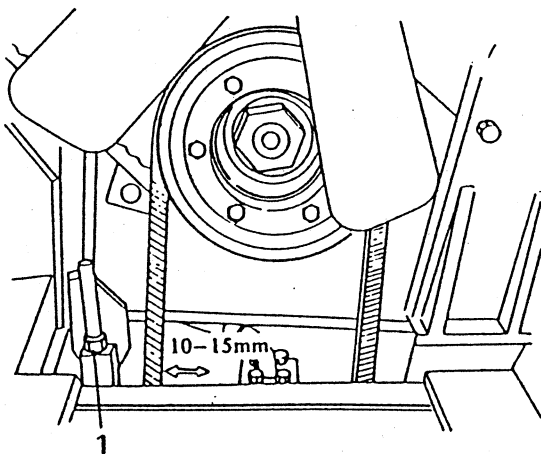


Fig. 25 Hyd. pump drive belt
1 Retaining bolts

Depress the belt mid- way between the idle pulley and hydraulic pump by 10 kg pressure with your thumb.

Standard depressing amount; 10- 15 mm

Retensioning procedure:

- 1 Loosen idle pulley retaining bolt 1 of Fig. 25
- 2 Retighten the retaining bolts.

Cleaning with compressed air

Use compressed air at a maximum pressure of 0,7 MPa (7kgf/cm²).

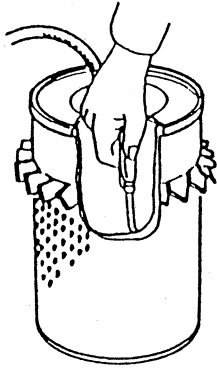
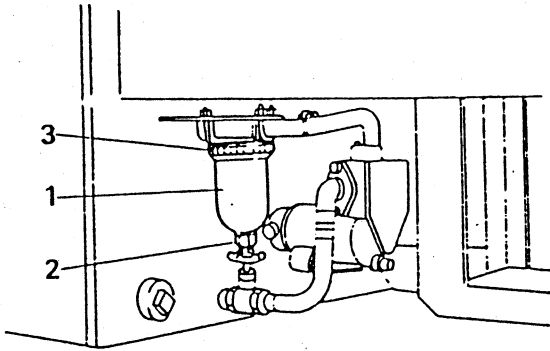


Fig. 21 Main filter

Play the compressed air up and down along the folds of the paper (at 45°) to the inside of the filter element. Hold the nozzle at least 1 cm away from the element to avoid damaging the paper.

N. B. ! Do not fit a filter element that has been washed in detergent until it is completely dry.

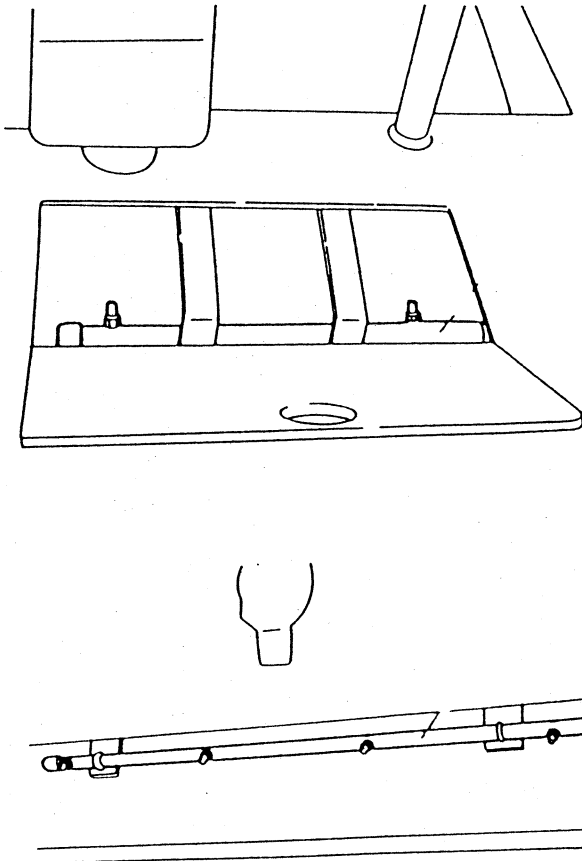
Sprinkler water filter-cleaning



- 1 Filter shell in Fig. 18 can be removed when ring(3) is loosened.
- 2 Remove out all sand or tiny grave deposited in the shell bottom.

In winter, since water remaining in the sprinkler piping or pump might be frozen causing sprinkler system failure, such water should be drained daily after operation.

Fig. 18 Water filter
 1 Filter shell
 2 Drain plug
 3 Ring



- 1 Check sprinkler spray on each drum for proper spray pattern.
- 2 When the spray pattern is inproper, remove the spray nozzle while turning the nozzle anti- clockwise and clean the nozzle spray hole.

Fig. 19 Sprinkler spray nozzle

Steering cylinders — Lubricating

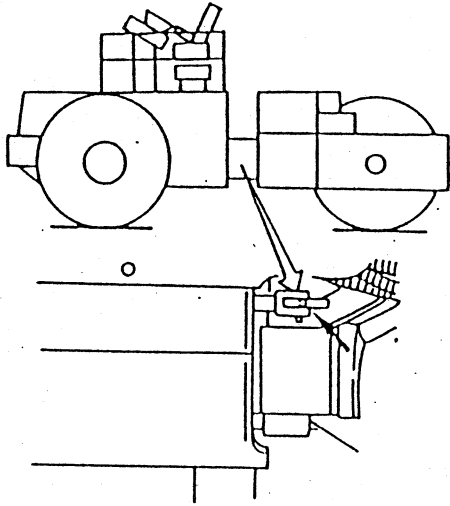


Fig. 13 Grease nipples-steering cylinder

Grease the left- hand steering cylinder mounting immediately after greasing the articulated joint.

- 1 Clean any dirt and grease on the two nipples.
- 2 Grease each nipple with three strokes of the grease gun. Ensure that grease enters the bearings.

Use type A grease as recommended on page 1 in "Lubricants".

Leave a little grease in the nipples after greasing, to prevent dirt from entering.

- 3 Grease the two nipples on the right- hand steering cylinder in the same manner. Check that grease enters the bearings.

Drum nuts tightness-check

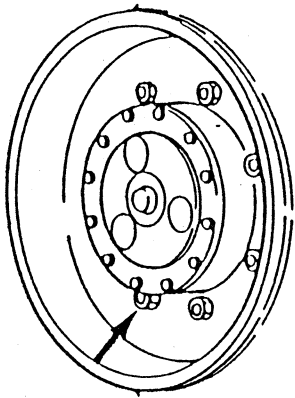


Fig. 14 Drum nut

Check the drum nuts for loosening.

Tightening torque; 589 N·m (60 kgf)

Check all drum nuts on both sides.

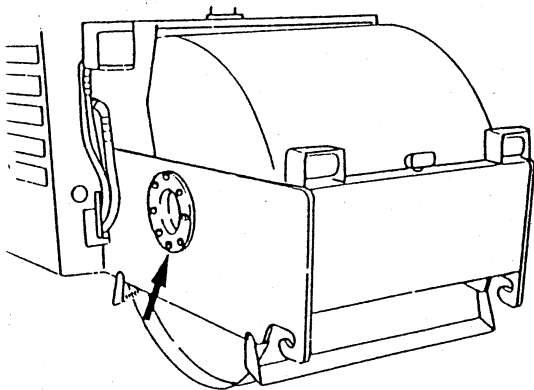


Fig. 15 Drum nut (Rear)

WEEKLY
(Every 50 hour of operation)

Engine oil change

Oil filter cartridge- replace

Air intake duct hose connection
clamps- check for air leak, retighten

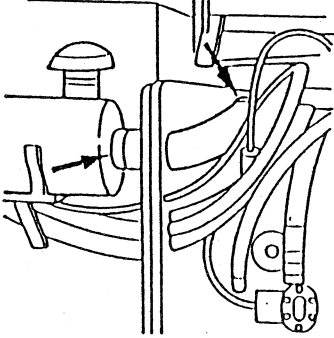


Fig. 8 Air intake duct connections

Check the air intake duct hose connections for air leak from outside.

Retighten the clamps when any loosening is found.

Loosened air intake duct hose clamps leads loose hose connection causing dust is sucked into the engine combustion chambers.

DRUM SCRAPER CONTACT- CHECK

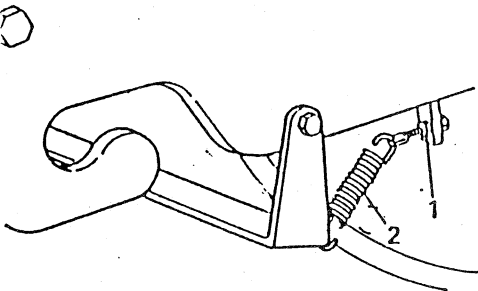


Fig.9 Drum scraper
1 Adjust nut
2 Spring

Check the contact of the scraper and drum surface. No clearance should be given on this part but contact with light touch.

- 1 Loosen adjust nut of Fig. 9 to adjust tension of spring 2.
- 2 Lock the adjust nut with the lock nut.

BATTERY- CHECK

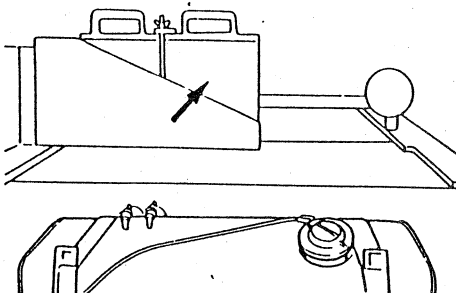


Fig.10 Battery box

1 Open the front body hatch, then the batteries are exposed.

2 Wipe the top of the batteries.

Hydraulic oil level-check

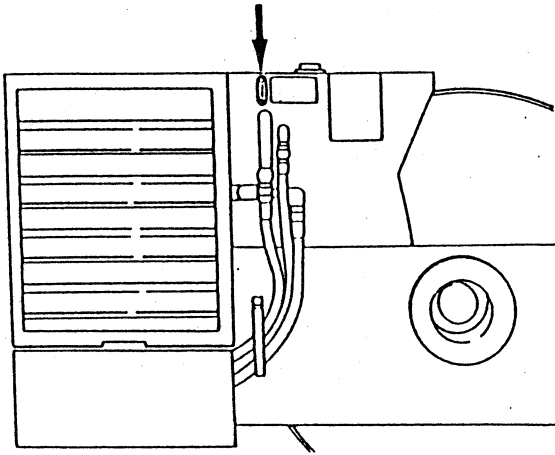


Fig. 4 Hydraulic oil tank

- 1 Drive the roller onto a level surface and check the level of the oil in the sight glass.
- 2 If the oil level is more than 2 cm below the top of the sight glass, replenish with type C oil, as recommended on Page 1 in "Lubricants".

Parking brake effectiveness-testing and adjusting

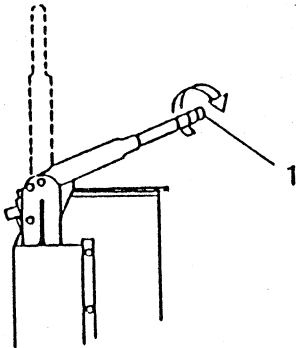


Fig. 5 Parking brake lever
1 Adjusting knob

- 1 The brake is correctly adjusted when it is just possible to pull the lever completely.
- 2 Adjust the brake by turning the lever knob clockwise

Fuel tank, fuel level-check, replenish

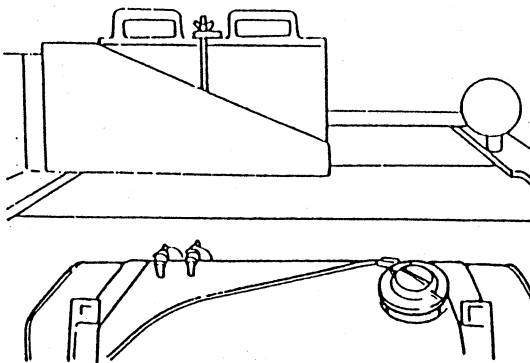


Fig. 6 Instrument board

- 1 Check the fuel level of the fuel tank by fuel gauge.
- 2 Replenish if necessary with proper fuel as recommended in page 2.

It is always recommended to fill up the tank after daily operation in order to prevent the vapor to condense inside the tank and drip into the fuel.

EVERY SIX MONTHS (EVERY 1000 HOURS OF OPERATION)

5	Fuel tank- drain sediment and clean inside	
20	Gear box oil- change	D
2	Engine fuel filter- replace	
21	Front axle gear oil- change	D

EVERY YEAR (EVERY 2000 HOURS OF OPERATION)

16	Hydraulic oil tank- drain and replace with new oil	C
20	Gear box oil- change	D
21	Front axle oil- change	D
1,2	Engine cooling system- flushing	

Item in Fig. 1	Maintenance required for CS12	Page	Lubricant required
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DAILY (EVERY 10 HOURS OF OPERATION)

1	Coolant level- check		
8	Engine oil level- check		B
16	Hydraulic oil level- check		C
22	Parking brake effectiveness- check		
5	Fuel level- check, replenish		
6	Air cleaner dust indicator- check, clean		

WEEKLY (EVERY 50 HOURS OF OPERATION)

8	Engine oil change		B
2	Oil filter cartridge- replace		
7	Air intake duct hose connection clamp- check for air leak		
10	Battery- check		
11	Articulated joint- lubricate		A
12	Steering cylinder rod pins- check and lubricate		A
13	Drums nuts tightness- check		
14	Front axle oil- change		D
15	Sprinkler water filter- cleaning		
23	Sprinkler nozzle cleanness- check		
17	Air cleaner filter element- cleaning		
18	Drum scraper contact- check		

FUEL

Type of fuel required for HINO model W04D is;

Automotive diesel engine purpose diesel
fuel ASTM 2D or equivalent.

PARKING



NEVER LEAVE ROLLER WHEN THE ENGINE IS RUNNING.

Park the roller off the road.

If the roller is parked on sloping ground, block the drum with a chock.

LIFTING INSTRUCTION

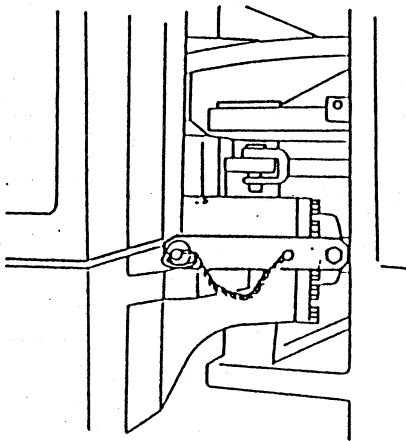


Fig. 6, Articulated joint locking device (this position when locked).



DO NOT WALK UNDER A SUSPENDED LOAD.
ENSURE THAT THE HOOKS OF THE LIFTING TACKLE ARE FITTED SECURELY IN THEIR POSITIONS.

Before lifting the roller, lock the articulated joint to prevent rotation about it. Swing out the arm and lock it as shown in Fig. 6.

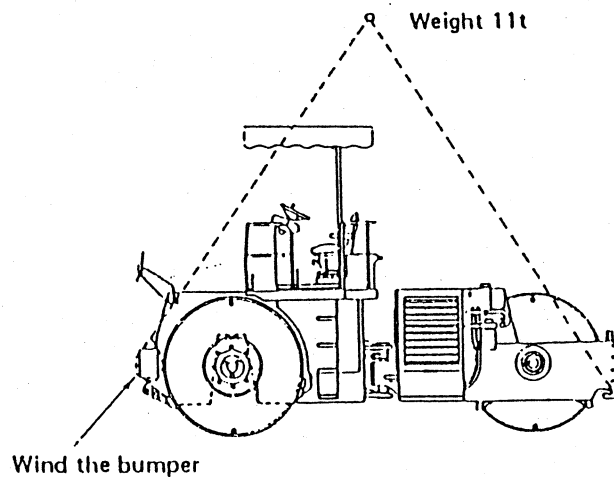


Fig. 7 Fitting a lifting wire rope

Fit a lifting chain or a wire rope into the lifting lugs for rear side and winding up the bumper for front as shown in Fig. 7.

DRIVING

- 1 After engine warming- up has completely been made, do the following check;

Make sure that the forward/ reverse lever stays at neutral position.

Then set the gear lever to a desired position and release the parking brake lever.

Holding the engine speed at 1000 r/ min, set the forward/ reverse lever to the forward position carefully and do a test that the roller moves forward smoothly.

Always do compaction work with more than 1000 r/min engine speed.

Also do the same test for reversing.

Operate the steering wheel clockwise and anti-clockwise gently and check for smooth articulating of the roller.

- 2 After the aforementioned checks has been performed, set the gear lever to a desired position and also set the forward/ reverse lever to a desired position, then the roller start to run.

NOTE:
Always adjust the roller speed with the forward/reverse lever, not with adjusting engine speed.

Use "High Gear" in an on- road travelling and "Low Gear" for compaction.

Since a hydraustatic brake system is adopted on this roller, brake is applied when the forward/ reverse lever is set to neutral position.

Before the roller goes into travel or compaction, do brake test with setting the forward/ reverse lever to neutral position.

When the forward/ reverse lever is set from one direction to another, never set the lever directly but once set the lever to neutral position to allow the roller stop once.

STARTING THE ENGINE

- 1 Before engine starting, set the forward/ reverse lever to the neutral position.

The engine can not be started with the lever setting in any other position.

- 2 Ensure the by- path valve knob(4) is full way depressed- in.
- 3 Apply the parking brake by pulling up the brake lever upward position.
- 4 Depress throttle lever to 1/3 position of full throttle.

Minor turning can be done by turning the throttle knob clockwise or anti- clockwise.

- 5 Insert the starter switch key into the switch barrel.
- 6 Turn the starter switch key clockwise to "1" position.

Then check that the fuel meter indicates reading and oil pressure warning lamp, battery charge lamp and brake warning lamp light on.

When any of such lamps do not light on or gauges do not register, detect the cause and do necessary remedy.

Then turn the switch key counter- clockwise, in a cold engine starting, to engine glow position.

About 15 seconds are required to have sufficient engine glow.

- 7 After the engine glow has been achieved, turn the switch key clockwise to start position, then the engine fire after cranking.

Do not operate starter continuously more than 15 seconds in one time attempt. Give more than 30 seconds interval when reattempt the starting.

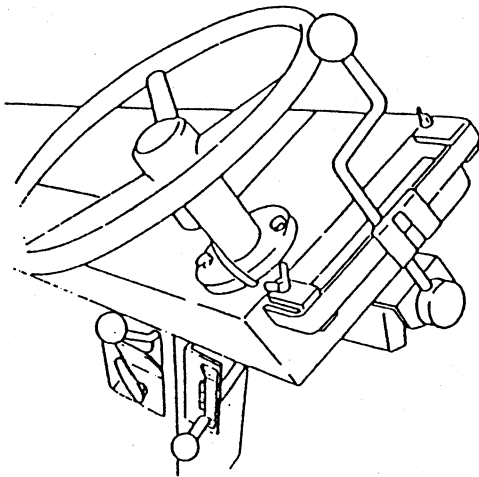


Fig. 4 Forward/reverse lever
1. Neutral position

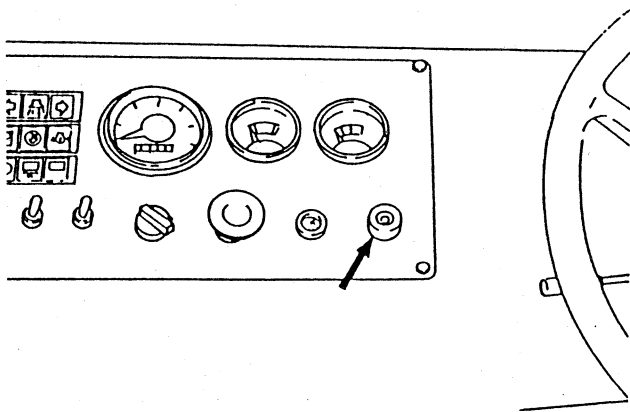


Fig. 5 Starter switch operating notch

Regardless of the environmental temperature of the engine, use the glow plug always in a cold engine starting.



SAFETY PRECAUTIONS



READ CAREFULLY

1. READ AND UNDERSTAND OPERATOR'S MANUAL BEFORE START UP.
2. OBSERVE AND FOLLOW ALL MAINTENANCE AND SERVICE INSTRUCTIONS.
3. DO NOT OPERATE ROLLER UNLESS QUALIFIED BY TRAINING OR EXPERIENCE.
4. DO NOT OPERATE ROLLER IF IN NEED OF REPAIR OR ADJUSTMENT.
5. OBEY ALL SAFETY RULES.
6. VISUALLY INSPECT FOR GROUND HAZARDS.
7. TEST ALL CONTROLS, BRAKES AND STEERING BEFORE WORKING.
8. BEFORE START UP:
 - SET HANDBRAKE
 - PLACE FORWARD/REVERSE CONTROL IN NEUTRAL
 - BE FIRMLY AND SECURELY SEATED AT CONTROLS.
 - LOCK CONSOLE FIRMLY WITH LOCK LEVER.
9. ON A GRADE, DO NOT SHIFT TRANSMISSION UNLESS ROLLER IS FULLY STOPPED WITH SERVICE BRAKE ON, LOCK DRUMS WITH CHOKES.
10. USE CAUTION ON UNEVEN SURFACES AND ROUGH TERRAIN.
11. LOOK BOTH WAYS WHEN REVERSING.
12. NO RIDERS ALLOWED.
13. DO NOT GET ON OR OFF MOVING ROLLER; ALWAYS USE PROPER STEPS AND HAND GRIPS.
14. NEVER COAST OR FREE-WHEEL WITH ROLLER.
15. BEFORE LEAVING ROLLER, ADJUST AND SET PARKING BRAKE, AND SET FORWARD/REVERSE LEVER IN NEUTRAL, ENGINE OFF.
16. KEEP ROLLER CLEAN; AVOID DIRT AND GREASE ON OPERATOR PLATFORM.
17. KEEP ALL OPERATION PLATES AND DECALS CLEAN AND READABLE.
18. BLOCK DRUMS AND FASTEN STEERING LOCK WHEN SERVICING OR REPAIRING ROLLER.
19. EXERCISE CAUTION WHEN FUELING MACHINE:
 - SHUT DOWN ENGINE
 - NO SMOKING
 - GROUND FILLER AGAINST TANK NECK TO AVOID A SPARK.
20. DO NOT MODIFY THIS ROLLER IN ANY WAY WHICH WILL AFFECT SAFETY WITHOUT DYNAPAC WRITTEN APPROVAL.

Electrical system

Type	Of 24V negative grounding type.
Battery	N120- 2
Starter	24V, 4.5 kW
Alternator	24V, 20A
Glow plug	24V, sheathed type.

Road travelling speed

Low gear	0- 8 km/h
High gear	0- 13 km/h

Operating limit

Climbing capacity	27%
Max. permissible side slope angle ...	35°
Turning radius, outer	6.1 m

Oil and fluid capacity

Engine oil	Max. 8 liter
Fuel tank	100 liter
Hydraulic oil tank	100 liter
Ballasting water capacity	
Front drum	1030 liter
Rear drum	1040 liter
Front frame	400 liter (sprinkler tank)
Gear box oil	2.0 liter
Differential gear oil	8.0 liter
Planetary gear oil	2.0 liter
Engine coolant	12 liter

DIMENSIONS

