FIAT-ALLIS

FL 9
crawler loader

Operator's manual

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WARNING

Do not operate the machine without first reading this Manual

Most job accidents are due to neglect of simple safety rules or precautions and can be avoided by taking appropriate preventive actions. No device or protective system, however well designed, can prevent accidents more effectively than will caution and alertness in the use of the machine. Look for the safety rules in this Manual.

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FILL-UP DATA. . . . . inside back cover

Each machine is supplied with a copy of this manual. The descriptions and illustrations appearing in this manual are not binding. FIAT-ALLIS reserves the right — while retaining the basic features of the model herein described and illustrated — to make at any time, and without necessarily bringing this manual up-to-date, any alteration to units, parts, accessories or their supply, deemed expedient for improvement or for any manufacturing or commercial reason. For any clarifications refer to your Dealer or FIAT-ALLIS Head Offices who will provide any information you may need.

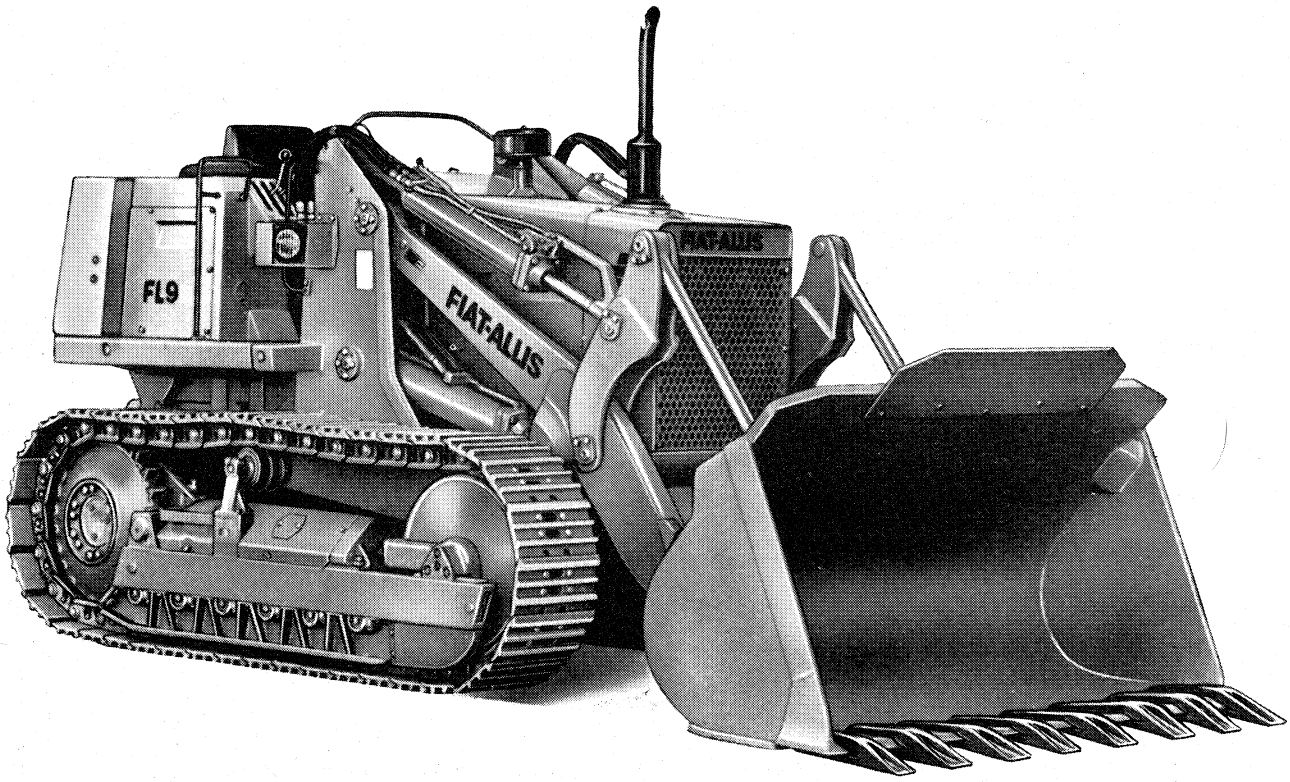


Fig. 1 - FL 9 Crawler Loader

IDENTIFICATION DATA

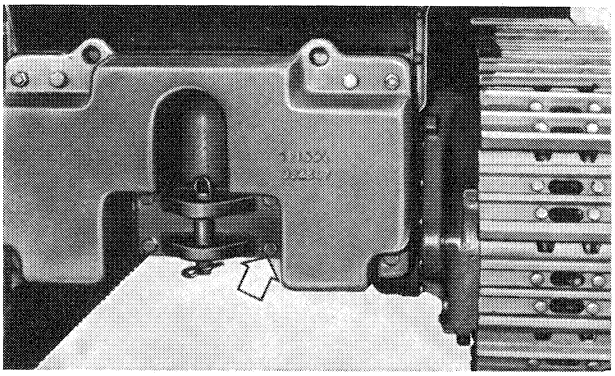


Fig. 2 - Frame Type and Number

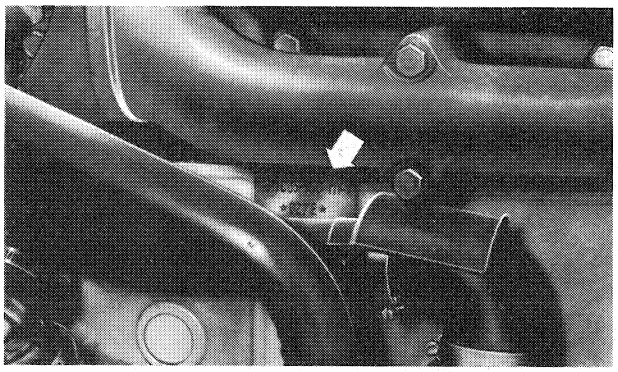


Fig. 3 - Engine Type and Number

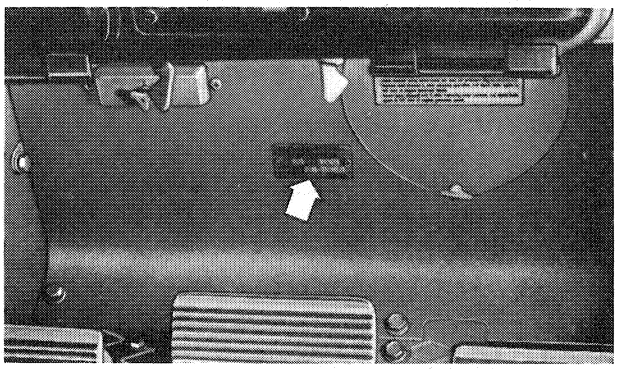


Fig. 4 - Frame and Engine Data Identification Plate

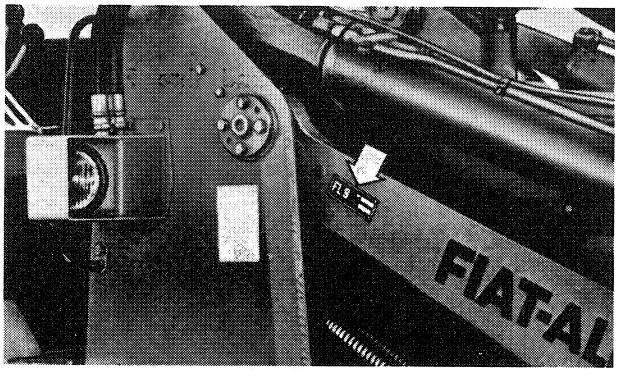


Fig. 5 - Loader Number
(for the ripper, when fitted, see the plate on its frame)

SERVICE

Repairs involving major disassembly operations should be entrusted to a FIAT-ALLIS authorized Service Center where skilled personnel and suitable equipment, as well as genuine spares, are available.
The FIAT-ALLIS Service Dept. is at your full disposal for any suggestions or advice you may need should the machine develop possible operational troubles.

SPARE PARTS

To ensure perfect operation of your machine, it is essential that all worn or damaged parts be replaced with genuine FIAT-ALLIS spares.
In placing your order, please specify:
— Frame type and number.
— Engine type and number.
— Catalog part number(s) of spare(s) required.
When ordering equipment parts (loader bucket and/or ripper) indicate also the type and number of the equipment involved.

IMPORTANT

All conversions are given merely for Customer's convenience and, though the closest possible approximation is sought, they are sometimes rounded off for practical reasons.
It must therefore be understood that in case of any discrepancy the metric units are the only valid reference.

SAFETY RULES

Always operate with utmost caution and remember that carelessness is a frequent cause of accidents.

Assuming the Operator knows all the different controls perfectly well, the main safety rules to be followed are:

Before starting the engine, make sure the gearshift lever is locked in neutral and the equipment control levers are in hold position.

Never use the machine or the bucket to transport or lift persons.

When carrying loads or during transfers keep the bucket at 30-40 cm (1-1½ ft) above ground to provide good Operator visibility, maintain overall machine stability (even on slopes) and prevent striking any humps in the ground.

In cold climates do not operate the bucket (or optional ripper) with engine running at high rpm during the first minutes on the job, particularly if machine was stopped for long.

If the machine is not equipped with safety frame or cab, the Operator should wear a helmet.

When working in dusty environments prevent eye injuries by wearing goggles.

Do not jump off or on the machine while in motion.

On the job be sure no persons are within the machine operation range.

Never clean, lubricate or repair machine while in operation.

Before leaving the seat, or any maintenance or repair, lower the equipment to ground, set and lock gearshift lever in neutral, then stop the engine.

If on a grade, immobilize the machine by applying the brakes.

If radiator filler cap must be removed while engine is hot, be careful not to get scorched.

Carry a first-aid kit on the machine. It may prove very hand some day.

Do not forget to turn off the engine when in closed premises: exhaust gases are highly toxic.

Before attempting any maintenance or repair operations with raised bucket or ripper these must be locked or supported safely by other means.

Don't take unnecessary risks ! - Remember that alertness is your best safeguard against accidents. There is no rule covering any and all unexpected situations. Your only valid defense is to use common sense and create a margin of safety in which to act.

RUN-IN PERIOD

A minimum run-in period of 50 hours is required. Proceed as follows:

Before driving away after starting from cold, warm up engine at idle speed for a few minutes.

Avoid prolonged full power operation.

Inspect the machine frequently, making sure there are no oil or water leaks.

During the initial period of machine operation, in addition to the routine maintenance described on page 15 you are advised to carry out the following supplementary servicing that later may be omitted or delayed to longer intervals.

Within the first 100 working hours

Change engine oil and filter.
Clean fuel bowl filter.
Clean converter/transmission oil filters.

Within 100 and at 500 working hours

Check fuel injectors and valve clearance.
Change the equipment hydraulic system return filter and wash the metal filter/magnetic rod.

Within 100 and at 250 and 500 working hours

Renew the oil in track rollers and idlers (see page 26).
All the above recommendations apply also to newly overhauled machines.

OPERATION

INSTRUMENTS AND CONTROLS

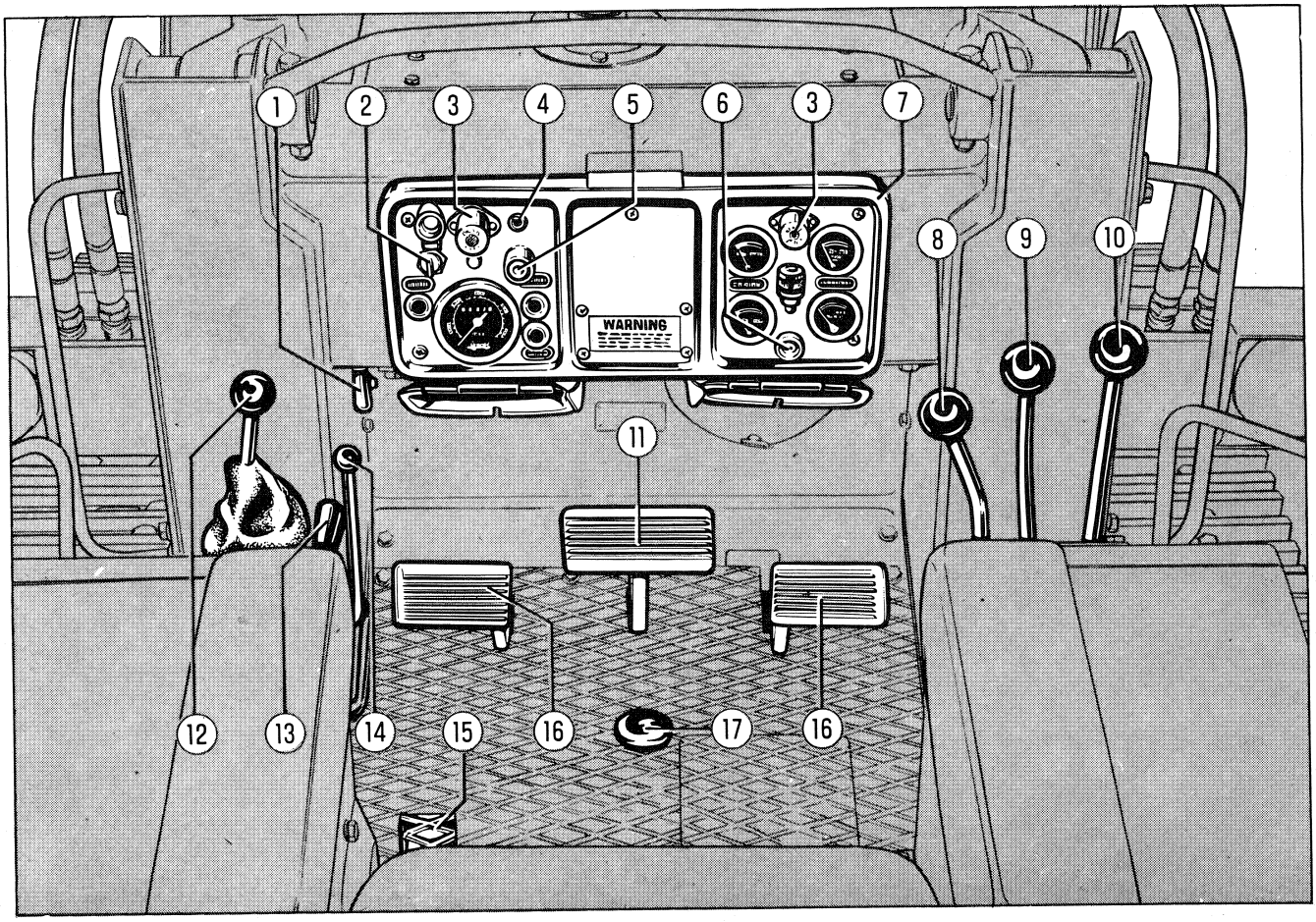
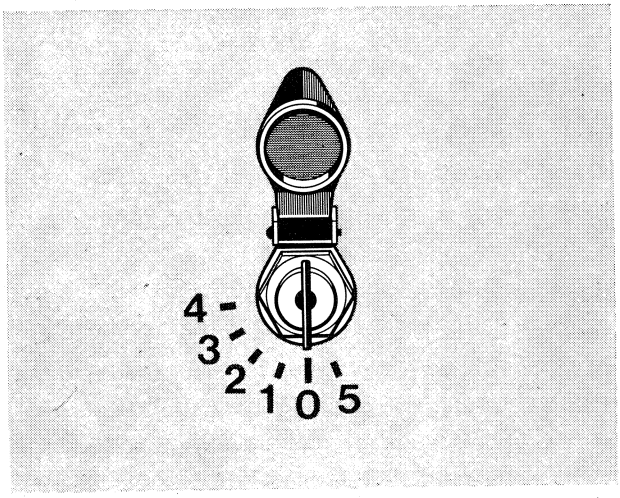


Fig. 6 - Controls

Fig. 7 - Lock switch key positions



1. **Inspection lamp receptacle.**

2. **Lock switch.** The possible positions are shown in fig. 7:
   - — Position 0 = No circuits energized, except receptacle **1** (key removable).
   - — Position 1 = The following circuits are energized: engine starting, battery charge indicator, transmission lube oil low pressure indicator, bucket oil return filter clogging indicator and horn.
   - — Position 2 = As position 1 plus rear spot lamp energized and dashboard lamps ON.
   - — Position 3 = As position 2 plus headlamp low beams.
   - — Position 4 = As position 2 plus headlamp high beams (non-sealed beam units only).
   - — Position 5 = Dashboard lights ON and rear spot lamp circuit energized (key removable).

3. **Dashboard lamps.**

4. **Rear spot lamp switch.**

5. **Engine starting button.** Makes the electric circuit between the batteries and the starter motor. Starting is possible only when the key in lock switch **2** is set in one of the first four click positions. See also gearshift locking lever.

6. **Horn button.**

7. **Dash gauges and indicators.** See fig. 10.

8. **Bucket tilt control lever.** See page 10.

9. **Bucket lift and lower control lever.** See page 10.

10. **Optional ripper control lever.**

11. **Brake pedal.** It controls simultaneous braking of both tracks.

12. **Gearshift lever.** The positions for the engagement of the three speeds forward and of the three reverses are illustrated in fig. 9. Gearshifting and drive reversals can be performed indifferently with machine in motion or stationary. With engine stopped the gearshift lever moves to and remains in neutral.

13. **Lever for gearshift locking in neutral.** It may be set in two positions (see fig. 8):
    - — Down **B** = The gearshift lever is locked in neutral.
      With lever in this position (necessary to facilitate Operator in getting off and on machine) accidental shifts into any gear are prevented during stopovers with engine running.
    - — Up **A** = The gearshift lever is free.
      During machine operation, the locking lever must be in this position to allow gearshifts.

    On some versions, in downmost position the lever cuts out the engine starting button current.

14. **Engine accelerating and stopping lever.**
    - — Forward = Idle.
    - — Back = Full acceleration.
    - — Pushed up all the way forward, beyond idle position = Engine stopping.

15. **Brake pedal locking treadle.** Operates on the brakes of both tracks and is used to immobilize the machine during stopovers.

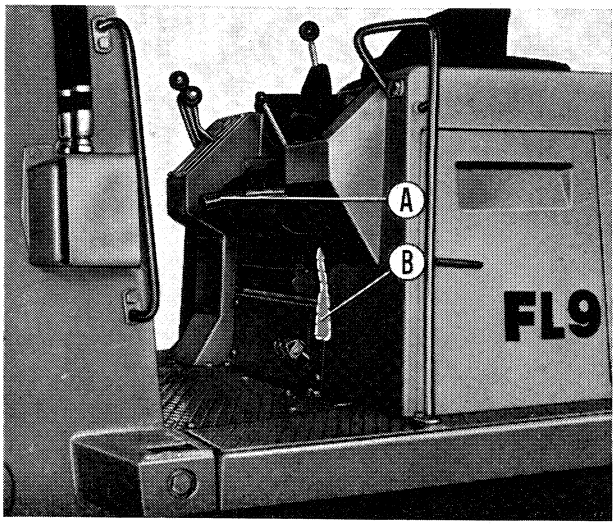


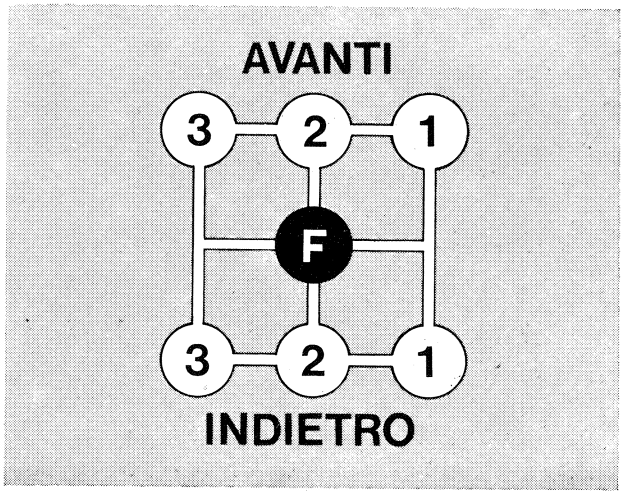
Fig. 8 - Lever for gearshift locking in neutral

To lock, push up the treadle and then press brake pedal **11**; to unlock, press brake pedal **11** and push down the treadle.

16. **Steering clutch (and brake) control pedals.** Depressing one of the two pedals disengages the respective clutch, the track on the same side slows down and the machine steers. By further depressing the pedal the brake enters into action and the machine turns more sharply on the braked track.

17. **Engine deceleration pedal.** It serves for temporary engine slowdowns and for drive reversals.

Fig. 9 - Gearshifting pattern
AVANTI = Forward; **F** = Neutral; **INDIETRO** = Reverse



DASH GAUGES AND INDICATORS

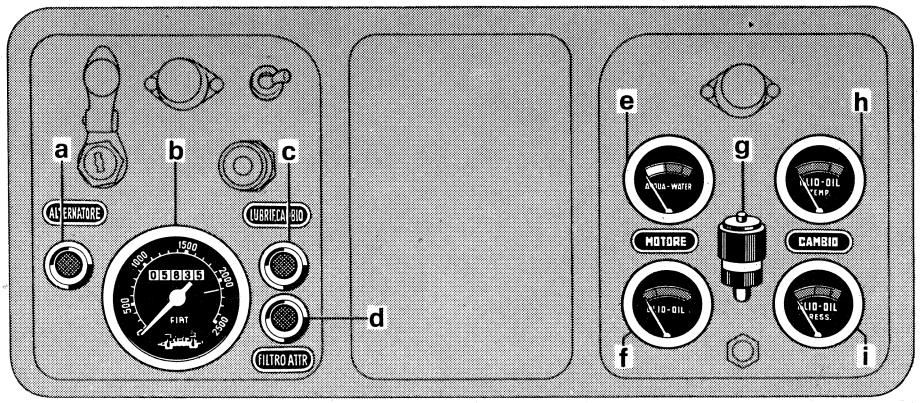


Fig. 10 - Gauges and indicators

a. Battery charge indicator (Red). If everything is normal, this light will go on when key is set on one of the first four lock switch positions and go out as soon as engine is started.
Otherwise, the following may occur:

— With engine running the indicator stays on: check and if necessary replace the voltage regulator fuse (see page 27).

— With engine running or stopped the indicator stays off: check the indicator bulb and the indicator relay.

— With engine stopped the indicator stays off and with engine running it glows feebly: check and if necessary replace the indicator relay fuse (see page 27).

If the causes of trouble are not singled out apply to skilled servicemen.

b. Tacho-hourmeter. Indicates engine rpm rates and totalizes the working hours. The green line on rpm scale shows the engine max. output speed rate (2100 rpm).

The centrally located totalizer (hour recorder) is a 5-digit unit. The figures on black barrels indicate full hours and the last figure to the right (on red barrel) indicates tenths of an hour.

c. Transmission lube oil low pressure indicator (Red). Lights up when the lock switch key is set in one of the first four positions and goes out a few instants after engine has started if everything is normal. Should the indicator stay on with engine running this is a warning that transmission oil pressure is low due to one of the following causes:

— Insufficient oil level.
— Clogged oil filters.
— Use of oil whose viscosity grade is unsuitable for contingent temperature conditions.
— Defective hydraulic system operation.

Check and remedy as required. If the trouble persists report to an authorized Service Center.

d. Equipment oil return filter clogging indicator (Red). Under normal conditions this light should stay OUT. Should it glow (engine at max. speed rate, system oil hot, bucket and optional ripper levers in hold position) the hydraulic system oil return filter cartridge must be replaced (see page 26).

e. Engine cooling water temperature gauge. A few minutes after engine starting, the pointer should shift onto the **green** sector of dial.

If the pointer stays on the **white** sector it indicates that water temperature is too low. This may be due to faulty thermostat operation or performance of light jobs in cold climates. Moving of the pointer onto the **red** sector is a warning of engine overheating. Causes may be:

— Water level in radiator too low.

— Caked or otherwise obstructed radiator core: clean with an air or water jet (engine cold).

— Scaled cooling system: flush as described (see page 23).

— Slack fan belts: adjust tension (see page 19).

— Faulty thermostat: have it checked for proper operation (see data on page 31) and replaced if necessary.

— Excessive temperature of converter-transmission oil circulating in heat exchanger.

f. Engine lube oil pressure gauge. During work the pointer should be on the **green** sector of dial. Dwelling of the pointer on dial **red** sector indicates insufficient oil pressures which may be caused by:

— Low oil level.

— Clogged oil filter.

— Use of oil whose viscosity grade is unsuitable for contingent temperature conditions.

— Defective hydraulic system operation.

When required, perform the specified checks and remedy accordingly, but if the trouble persists turn to an authorized Service Center.

Caution. - Even when everything is under control, the pointer might stay on the **red** sector if engine is very hot and idles.

g. Clogged air cleaner indicator. The appearance of the red signal is a warning of clogged filtering cartridges which shall be either cleaned or replaced (see page 25).

To cancel the signal press in the top button.

h. Converter/transmission oil temperature gauge. Under normal conditions the pointer must be on the **green** sector of dial; pointer on the **red** sector indicates excessive oil temperatures which may be due to:

— Low oil level.

— Clogged oil suction filter.

— Prolonged use of machine under severe or off-normal conditions.

— Hydraulic system operation faults.

Oil overheating should be avoided because it might alter the oil properties and be prejudicial to proper operation of system components.

Operation with oil at rather high temperatures (pointer on the boundary of the **red** sector) can be tolerated only for short periods provided the engine water, which by circulating in the exchanger cools the oil, does not attain an excessive temperature. Should the excessively high oil temperature condition persist it is advisable to reduce the effort of the machine by engaging a lower gear or, if already in bottom gear, by limiting the work load.

In case the oil temperature does not drop, it will become absolutely necessary to stop the engine -after a few minutes at idle - trace the cause of trouble and remedy accordingly after consulting an authorized Service Center.

Caution. - In any case, remember that to obtain optimum converter efficiency the gear selected must be suitable for the work to be performed.

i. Transmission clutch engagement oil pressure gauge. During work the pointer should dwell on the **green** sector of the dial.

When the pointer moves onto the dial RH or LH **red** sectors it indicates excessive or insufficient pressures, respectively.

High or low pressures may be caused by:

— Low oil level.

— Clogged oil filters.

— Use of oil whose viscosity grade is unsuitable for contingent temperature conditions.

— Hydraulic system operation faults.

If necessary, check and remedy as required: if trouble persists, turn to an authorized Service Center.

DAILY CARE

Replenishments

Every day, before starting out on the job, check:

— The oil level in sump and converter-transmission hydraulic system (see page 16). A good practice is to keep oil level at the maximum limit letting it drop to the minimum only in the period immediately before a replacement is due.

— The water level in radiator: it must be close to filler neck brim. When outdoor temperature approaches 0° C (32° F), or falls below, use an anti-freeze mixture (see page 14).

— The fuel level in tank. Always use decanted fuel. To transfer fuel from the settling vessel to the machine tank use a pump provided with fine-mesh strainer.

It is recommended to fill up the fuel tank at the end of each day's work: this will prevent the condensation (especially overnight) of water vapors in the air and consequent water deposits.

Do not let the tank run dry as this would allow entrance of air in the fuel system with the consequent need for a bleeding operation.

FUEL SYSTEM BLEEDING

The admission of air in the fuel system occurs when the filters and/or the lines are taken down, when fuel supply in tank is used up or when the machine is left inoperative for long periods.

Presence of air in the system makes engine starting difficult and it must therefore be removed. For the bleeding operation, with filled fuel tank, check that cock **C** behind the seat is open, and proceed as follows:

— Back out about three turns screw **1**; unscrew priming knob **3**, and pump the knob until the fuel flowing out of the hole in screw is free from air bubbles. Retighten the screw.

— Slacken about two turns screw **2** and actuate again the priming knob until the fuel flowing out of the hole under screw head is free from air bubbles. Re-tighten the screw, pump the knob some more strokes and screw back in place.

Fig. 11 - Fuel tank, indicator and cock
A. Fuel tank filler level indicator - **B.** Fuel filler - **C.** Fuel cock on engine feed line.

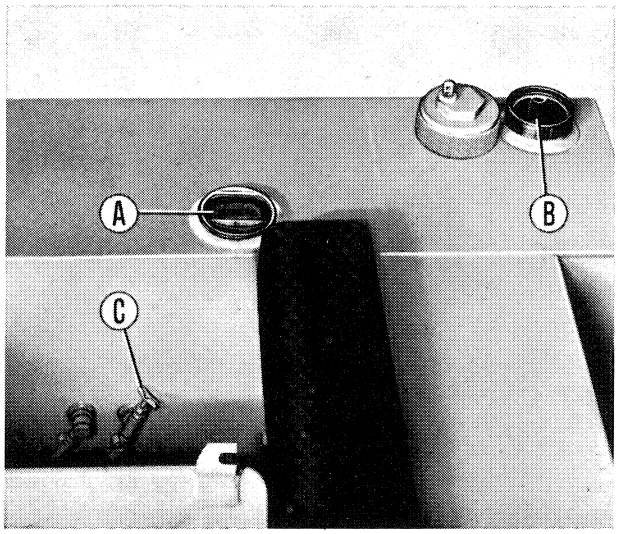
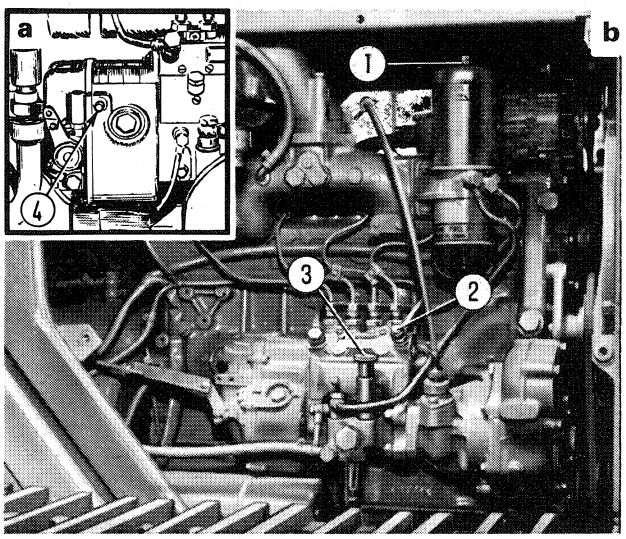


Fig. 12 - Fuel injection pump
1. Fuel filter bleeder screw - **2.** Injection pump bleeder screw - **3.** Priming pump knob - **4.** Injection pump fuel delivery booster button (cold starting aid).
a. FIAT pump - **b.** BOSCH pump



STARTING THE ENGINE

a. Engines with FIAT injection pump having fuel delivery booster button.

Make sure the gearshift lever is locked in neutral and the bucket (and ripper) control levers are in hold position.

Bring accelerator lever to midtravel.

Check that feed line cock (**C**, fig. 11) is open. If engine was inactive for long or when starting the first time in low outdoor temperature, unscrew priming pump knob (**2**, fig. 12) and pump about twenty strokes to circulate fuel in the feed lines.

Press in the injection pump delivery booster button (**4**, fig. 12). This is not needed when engine is warm.

Turn lock switch key to the first click and then press the starting button.

Before getting the machine under way let engine run at a low rpm rate for a few minutes without sudden accelerations.

Should engine fail to start do not insist with pointless attempts as completely dead batteries may be the only result. In any case, wait until engine stops before trying a new start.

The more frequent causes of starting failures may be: presence of air in the fuel system, low battery charge, faulty operation of the starter motor or faults in the electric system.

b. Engines with BOSCH injection pump having an automatic fuel delivery boosting device. Proceed as described above, except that in case extra fuel is needed for starting just pull back fully the accelerator lever instead of pressing the button.

Caution. - Before starting or with engine running: check all dash indicators and instruments for proper operation.

STARTING THE MACHINE

Lift the bucket (and ripper, when fitted) clear of ground.

Accelerate the engine gradually.

Release the brakes.

Push up the gearshift locking lever and shift into gate position of the speed and travel direction desired (see fig. 9).

In cold weather, before actually starting any work: Drive the machine on a short run under no load to warm up the oil in the converter/transmission system. If sufficient space is not available, lock the brakes, engage the 3rd gear, and run the engine at half acceleration for a few minutes.

Do not operate the bucket (or ripper) while engine is running at high rpm rates, during the first few minutes on the job.

STOPPING THE MACHINE

Slow down the engine, move gearshift lever into neutral and lock in this position.

Lower down the equipment.

If the machine is not on level ground apply and lock the brakes.

STOPPING THE ENGINE

Push accelerator lever beyond idle position. Once engine has stopped set the key in position **O**, (fig. 7) or remove from lock switch.

Should engine be hot it is advisable to let it idle for a few minutes before turning it off.

If outdoor temperature is below 0° C (32° F) and the engine cooling system is filled with plain water, it will be necessary to drain the system through the cocks provided (see page 23).

SEAT ADJUSTMENT

The seat is provided with the necessary devices which allow adjustments of cushion inclination, back rake and controls reaching distance (Fig. 13). The Operator may hence choose the position which suits him best for driving and then change it during work if he so desires.

The complete seat is tiltable forward.

Fig. 13 - Operator's seat

1. Back rake adjustment lever (push down - 4 positions) - **2.** Cushion inclination adjustment knob (turn - 4 positions) - **3.** Controls reaching distance adjustment lever (pull up - 8 positions).

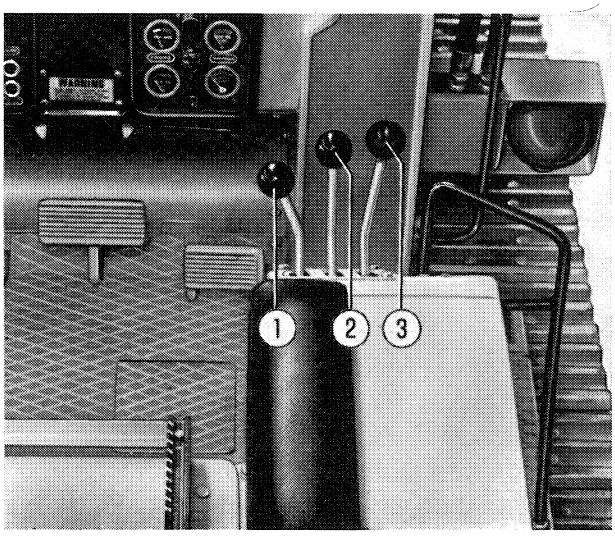


Fig. 14 - Equipment control levers
1. Bucket tilt lever. - **2.** Bucket lift and lower lever - **3.** Ripper lever (optional).

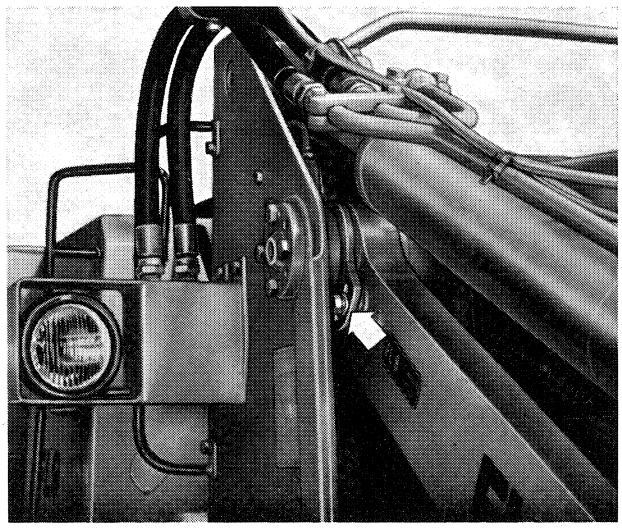


Fig. 15 - Hydraulic limiter for max bucket lift control
Maximum lift is set by slackening the mounting screw and shifting the plate as required.

BUCKET CONTROL

Bucket tilting lifting, and lowering are controlled by two levers (see fig. 14) operating the hydraulic system main control valve.

Tilting

Move lever **1** backward to tilt back and forward to dump the bucket. To stop bucket rotation release the lever which will trip back to hold position. To obtain slower (controllable) tilting move lever **1** gradually.
For combined lift/dump operation, first pull back lever **2** then push forward lever **1** (fig. 14).
Combined lower/tilt is obtained by pulling back lever **1** (held by detent) and pushing forward lever **2**.

Lifting and lowering

Shift lever **2** respectively backward and forward. Stopping of the bucket in the desired position is obtained, in either case, by releasing the lever which trips back automatically to hold position. When the bucket must be raised to its highest position, pull back control lever **2** to its stroke end where it will be held by a specially provided detent; in this case, the lever will return automatically to hold position the instant in which bucket reaches the maximum lift under the action of hydraulic limiter, (see Fig. 15).
To lower the bucket more slowly (controlled lowering) lever **2** must be shifted gradually.

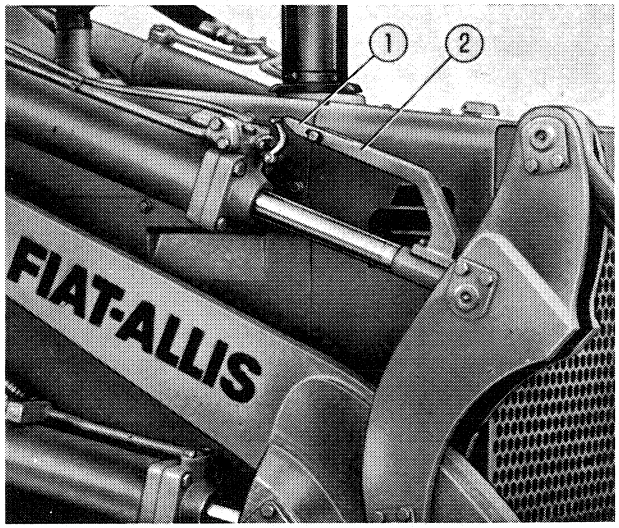
Floating

To obtain this position, i.e., bucket bearing on ground under its own weight, push lever **2** forward to stroke end, beyond the lowering position, where it will be retained by a detent. The bucket will keep floating until the lever is pulled back to the hold position.

Automatic positioner

The tilting system is provided with automatic bucket positioner whose function is to reset the bucket automatically in the horizontal position, or in tilted digging position every time the loader starts a new cycle after dumping.

Fig. 16 - Automatic bucket positioner
Moving rod **1** towards arm **2** varies tip angle from 5° 30' to 0° (horizontal bucket).



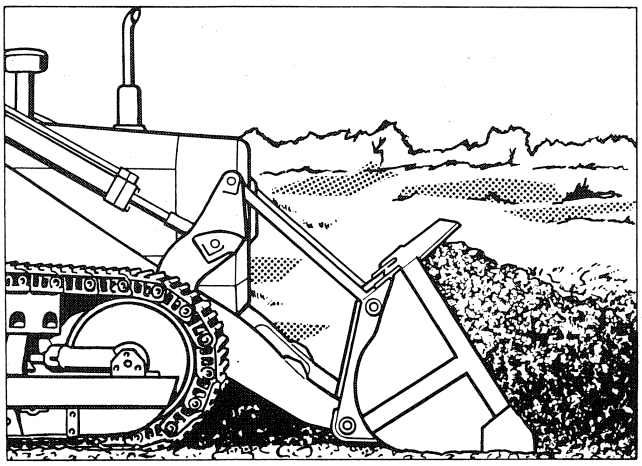


Fig. 17 - Loading the bucket from stockpiles

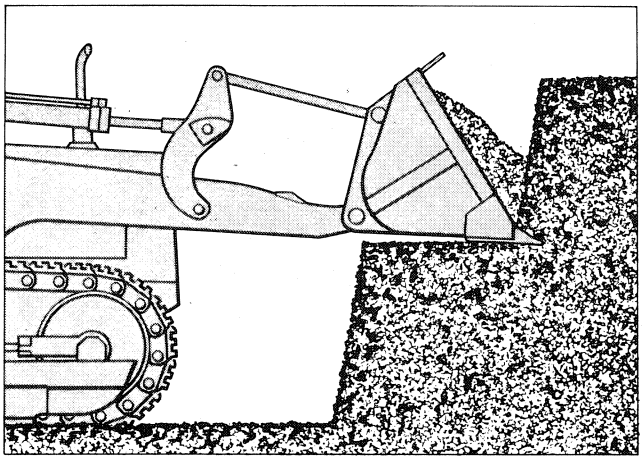


Fig. 18 - Digging and loading from banks

To this end, when the bucket is dumped, pull lever **1** backward to stroke end where it is retained by a detent; the lever will trip back automatically to " hold " once the bucket has reached the desired position.
This position (bucket horizontal or with a tip angle up to 5° 30') is pre-settable by a proper tripping rod (see fig. 16).

HOW TO USE THE BUCKET

Foreword - Instructions given below cover the more commonly encountered field conditions.
However, procedures may vary from case to case depending on material nature, the space available to move in and, particularly, the Operator's skill.

Loading from Strockpiles

Lower the bucket down to ground level. Drive the machine forward, forcing the bucket into the pile (see fig. 17) then tilt-back the bucket so as to obtain complete loading.

If the stockpile material proves difficult to penetrate, shift tilt lever alternately back and forth: the rocking movement of bucket bit will aid in working the bucket into the dirt.

Loading from Banks

Digging of dirt from banks must be done from the top down in successive layers or benches (fig. 18).

The layers removed must not be excessive to prevent heavy slippage of tracks or of converter and obtain best efficiency.

Loading Below Ground Level

Lower the bucket to the ground, and tilt down to have a sufficient tip angle for bucket bit penetration (fig. 19 A). This angle differs according to ground texture and toughness.

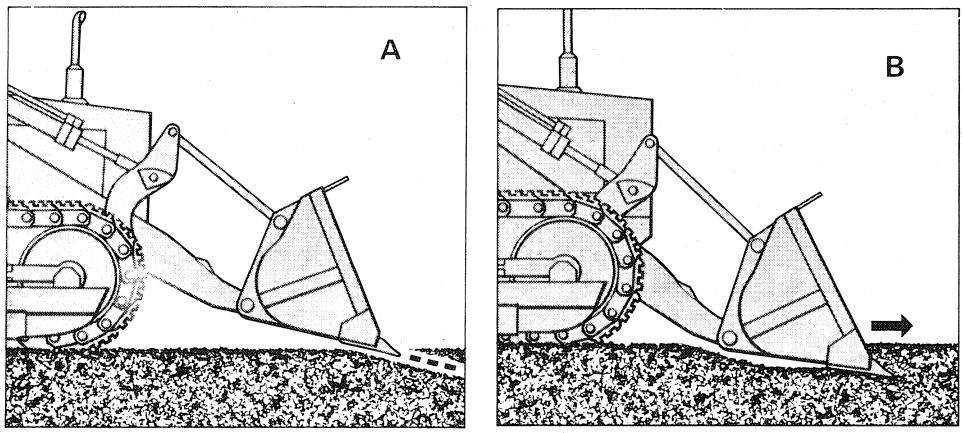


Fig. 19 - Loading the bucket by digging below ground level

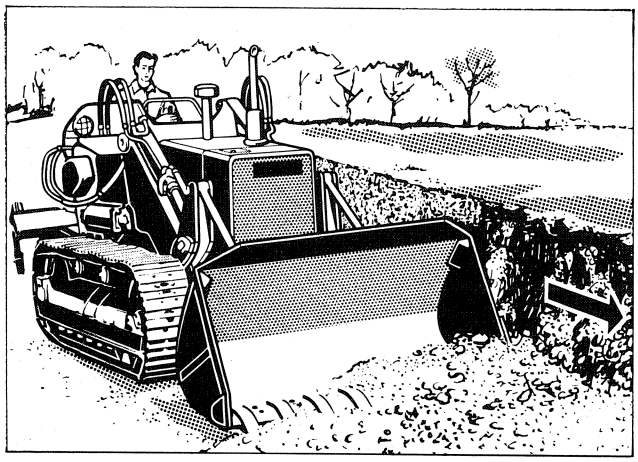


Fig. 20 - Trimming the digging walls

Drive loader forward and simultaneously push the bucket into the ground to the desired depth by rocking it up and down (fig. 19 B).

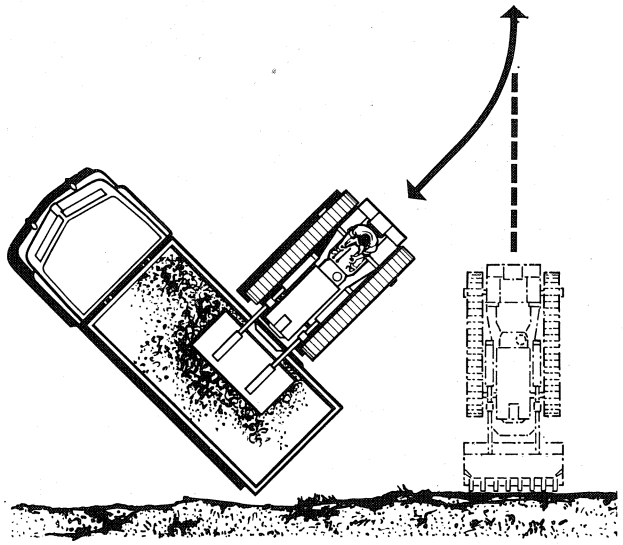
Once the bucket bit is sunk in the ground reduce the tip angle and adjust depth by the lift/lower lever.

Removal of dirt must be done in successive layers over the entire dig area; the thickness of each layer depends on material nature.

Suitable ramps must be provided, either inside the digging area or outside, for loader entrance and exit.

Once digging is over, trim the walls by scraping them with one side of the bucket (see fig. 20).

Fig. 21 - Loading a laterally parked truck



Carrying Loads

When carrying material from the loading area to the job, the loaded bucket must be held in low position (raised approximately 30-40 cm = $1^1/_3$ ft above ground); this will permit transportation of heaped loads and keep spillage to a minimum, as well as maintain overall stability even on slopes.

When carrying loads downhill on steep slopes, travel in reverse: this will favour machine stability and prevent excessive dirt spillage.

Loading Trucks

When loading material on trucks it is advisable to have the loader travel as short a distance as possible.

After filling the bucket the loader backs up, then turns and moves up to truck side and dumps the bucket. To prevent unequal wear of steering clutches and brakes park the truck alternately on the two sides of the loader.

POWER TAKE-OFF

Driven by converter turbine and is therefore operative while engine is running, independently of gearshift lever position. Rotational speed from 0 to 1575 rpm. Rotation: clockwise.

USE OF RIPPER

The ripper, control lever and hydraulic power cylinder are supplied only as optional extra equipment. The power cylinder is operated by the loader system through a specially provided valve.
To raise or lower the ripper, said lever (**3**, Fig. 14) must be shifted backward or forward, respectively; to stop the ripper movement, simply release the lever which will return automatically to hold position.
The ripper has three detachable teeth so that it is possible to work with all three, with the side teeth or with the center tooth only.
As regards the best exploitation of the ripper some considerations should be kept in mind:

Breakage. The soil can be broken in more or less fine or coarse pieces depending on work depth, number and shape of teeth, and pass spacing. Breakage must be established on the basis of the subsequent use of the ripped material. For instance, if the broken material must be spread and back-bladed, pieces need to be finer than when it must be dumped away.

Work depth. It is good practice to work to the maximum depth permitted by the available power and machine adhesion, due account being taken of the breakage desired. Note that:

— With strongly cohesive materials, such as clay, tuff, marl, gypsum, sandstone, calcite and other compact soils, the greater the depth the coarser the breakage.

— With stratified materials, such as limestone, schist, gneiss, travertine, etc., the greater the depth the finer the breakage.

Number and shape of teeth. The number of teeth depends on the power required of the machine in relation to the desired breakage. Generally, the greater the number of teeth the finer the breakage. Exceptions are the stratified materials where large slabs are lifted when working with more than one tooth.

As regards tooth shape, the partially curved type can be considered the universal standard. The curved teeth facilitate the lifting and to some extent also the turning over of the material.

Spacing between passes. It must be such as to complete the breaking of the previous pass, always in relation to the desired fineness. Generally, spacing must be less than work depth.
In plastic soils, e.g. gypsum (in which the implement makes just a cut) or in hard soil (in which the working depth must be reduced) criss-cross passes may be required.

Speed and direction. It is good practice not to exceed 1.5 - 2 km/h (1 m.p.h.) to prevent harmful shocks to the implement and excessive wear. When working on soft materials, it is preferable to increase the depth rather than speed. In the case of stratified materials, work crosswise and against the vein; on the contrary, if the material is land-slipping, work in the direction of the landslide.

Material heaping. Generally it is convenient to heap the material transversally to the ripping direction in order to keep the transport distance to a minimum and to smoothen out any irregularity.

Caution

If when the ripper is sunk-in the rear end tends to lift clear of ground, stop lowering the ripper in order not to reduce traction and not to overload the idlers.
If an excessive resistance to machine forward travel occurs, reduce the working depth.
Sharp turns while the teeth are in the ground are apt to break the shanks. Only ample curves or small directional corrections are permissible when ripper is sunk in.

COLD WEATHER PRECAUTIONS

When outdoor temperature approaches 0° C (32° F) with consequent danger of freezing the cooling system must be protected with a suitable anti-freeze solution. If your engine is running on plain water, drain out and flush cooling system before pouring in any antifreeze mixture (see page 23).

The special **Fiat antifreeze mixture** is recommended in the tabulated percentages.

If mixtures of other brands must be used, follow the instructions labelled on the container.

Use also appropriate grade lubricants as recommended in the Fill-up Data Table (see inside back cover).

Outdoor temperature		Antifreeze		Water	
down to °C	down to °F	Liters	Percent	Liters	Percent
– 8	17.6	5	20	20	80
– 15	5	7.5	30	17.5	70
– 25	– 13	10	40	15	60
– 35	– 31	12.5	50	12.5	50

Parking outdoors

When temperature is extremely low, walk the machine onto planks to prevent freezing of tracks to the ground.

LONG INACTIVITY PERIODS

When the machine must remain inactive for long, it should be protected as follows:

Clean the machine completely and lubricate all the parts provided with grease fittings.

Drain engine water cooling system; this operation is not necessary if the system is filled with antifreeze mixture.

Fill the fuel tank to prevent possible rusting.

Remove injectors and inject some engine oil through their seats in cylinder head after bringing each piston to B.D.C.

Crank the engine a few revolutions with the starter to distribute a uniform coating of oil on cylinder walls. Refit injectors.

Batteries should be recharged once a month.

If the machine is left in the open or under sub-zero environment take out the batteries and store in a place where there is no danger of freezing.

If possible store the machine in a protected area otherwise cover it with a tarpaulin.

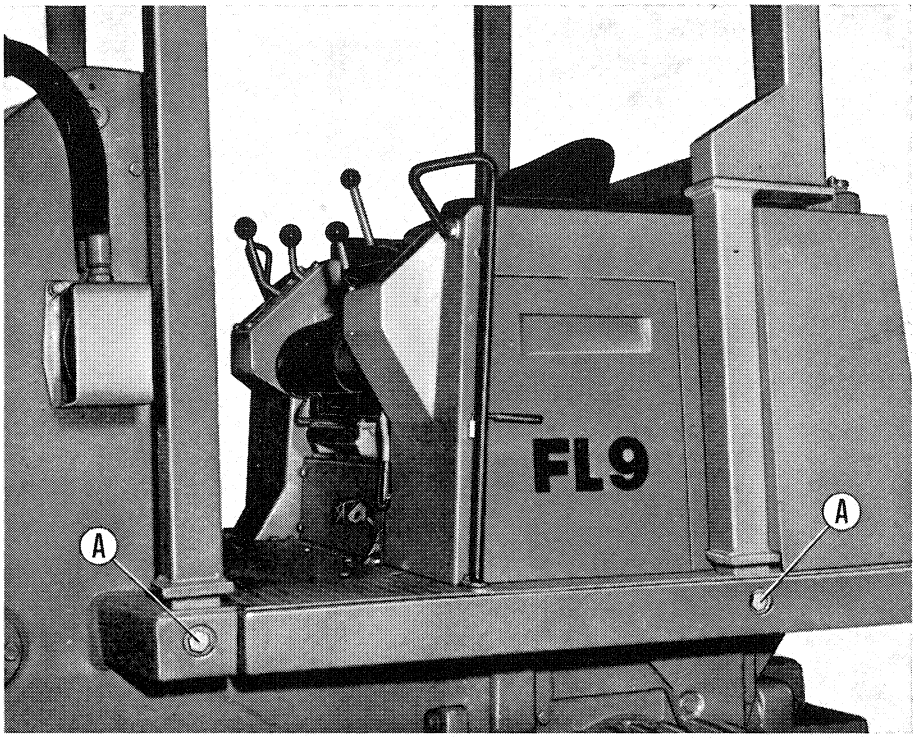
To ensure adequate protection of the power drive, the machine should be moved for a short distance at least once a month in order to renew the oil film on the different components.

ROLLOVER PROTECTION

Fig. 22 - Rollover safty frame mounting

Tightening torque for bolt nuts **A**: 7.5 to 9 kgm (7.3 to 8.8 daN · m *), (55 to 65 ft. lbs).

(*) Deca-Newton per meter: SI system unit.



MAINTENANCE

FOREWORD

The intervals specified here refer to normal operation conditions. During the initial period of use (see page 3) and under particularly severe work conditions the servicing intervals may need changes.

Before starting any maintenance operation lower the bucket (and ripper) to ground and stop the engine.

Oil level checks, draining and refilling must be carried out with machine level.

The periodical maintenance operations are listed in charts fig. 25. Each operation is identified by a number in the same order as described on the following pages.

When necessary, the charts are a useful aid in coordinating multiple maintenance operations scheduled at the same interval. It is recommended to drain oil immediately after stopping the machine so that oil is warm and flows out more easily. This also ensures the discharge of suspended impurities.

Before and after any lubrication operation wipe clean all fittings, lids and plugs to prevent introduction of dirt or its accumulation on lubricant residues.

Never alter injection timing and adjustment. The seals can be removed only by authorized personnel, otherwise the FIAT-ALLIS warranty is invalidated.

For refill capacities and types of product specified see " Fill-up Data " on inside back cover.

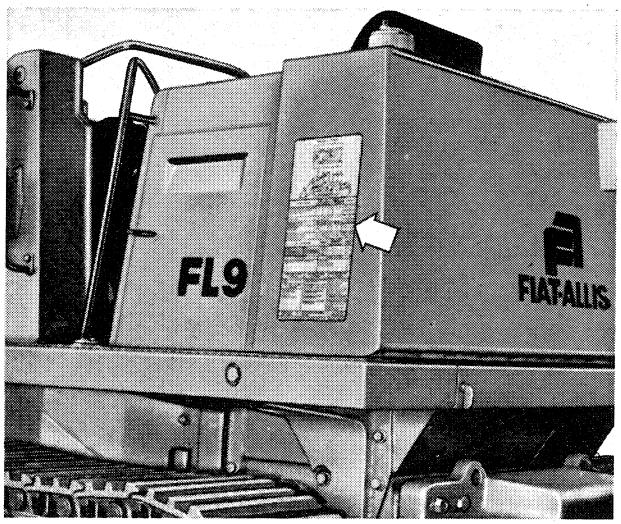


Fig. 23 - Maintenance summary tag
Shows items needing attention and scheduled frequencies.

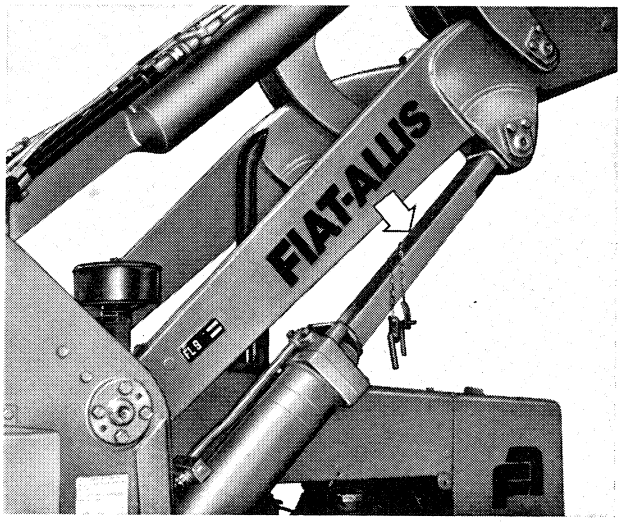
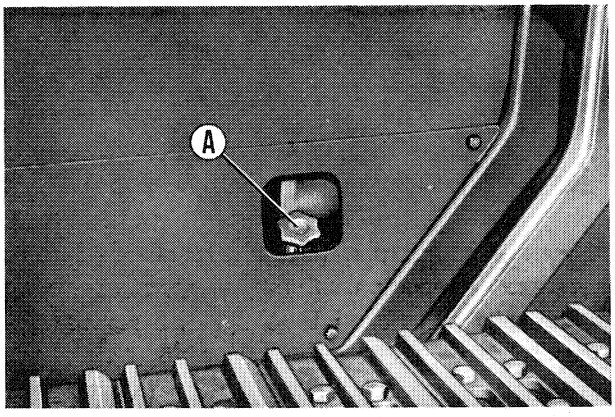
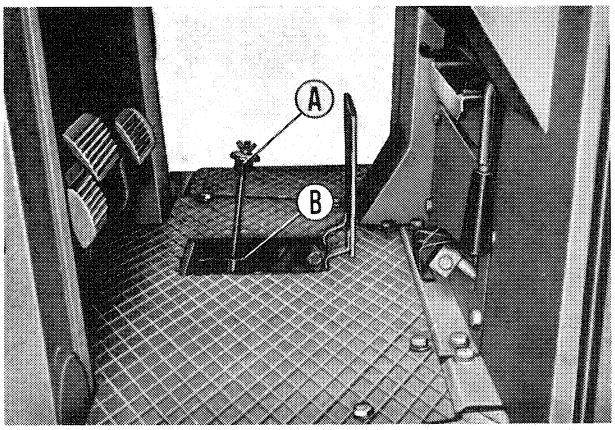
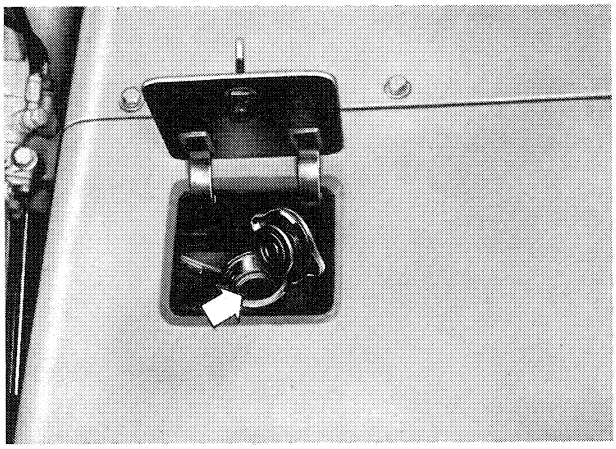


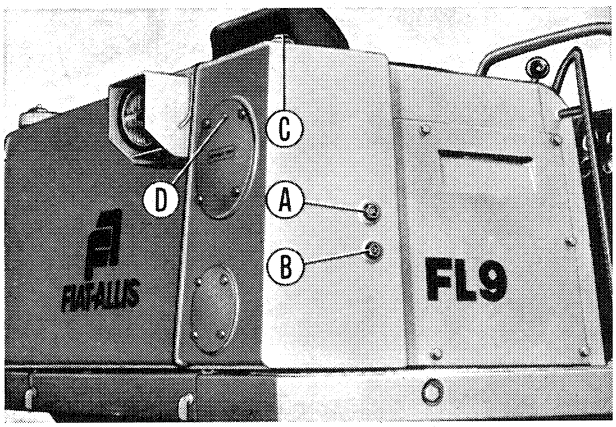
Fig. 24 - Boom safety lock brace
Use during servicing operations with bucket raised. Take from recess under tank after removing rear apron.

SAFETY PRECAUTIONS - Before any repair or maintenance operation, it is essential to lower the equipment onto ground, lock gearshift lever in neutral and stop the engine. On gradients also lock the brakes. When servicing must be carried out with raised bucket, always lock the booms in position by the specially provided brace.









Every 10 working hours or daily

1. Engine oil

About one hour after stopping the engine check oil level with rod **A**. If necessary, top up through filler.

2. Converter/transmission hydraulic system

A few minutes after stopping the engine check that oil level reaches the upper mark on indicator rod **A**; if necessary, top up through filler **B**.

3. Radiator

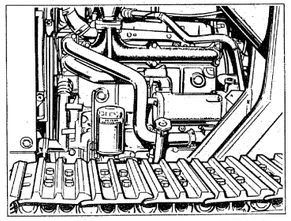
Check that water level is about 3 cm (1 ¼ in) below filler brim. Use caution in unscrewing the cap to prevent injuries. Use clean water, possibly free of chlorinated compounds.
For cooling system protection and to prevent rust formation, the use of a specially formulated product - **FIAT LPR 67** - is recommended in the proportion of 5% by volume. This product is compatible with the FIAT antifreeze.
Check also cap gasket and valve for good condition.

4. Equipment hydraulic system

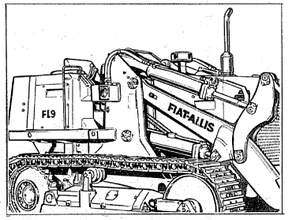
Check that oil level is between the " full " and " low " level indicators **A** and **B** respectively.
If necessary, back out filler plug **C** slowly and add oil.
D = Bleeder plug.
Oil level must be checked with engine stopped, and with bucket (and ripper, when fitted) on ground.

By taking preventive action on initial manifestation of troubles you will notably reduce maintenance costs and machine downtimes. You should therefore check the machine, every day, in a walk-around inspection.

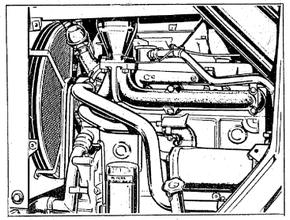
Engine for oil and water leaks



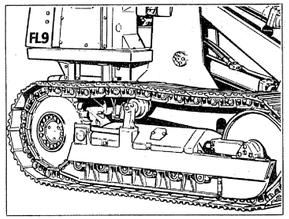
Equipment hydraulic system oil leaks



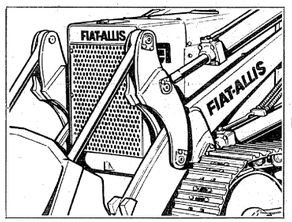
Loose, worn or damaged bolts, nuts and clamps

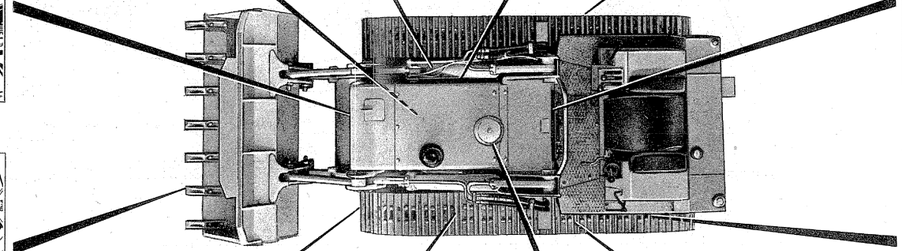


Rollers and idlers for oil leaks

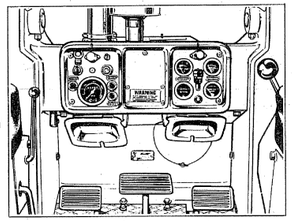


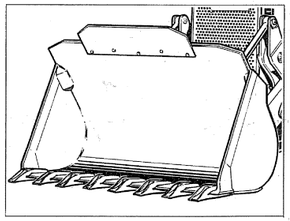
Dirt build-up on radiator



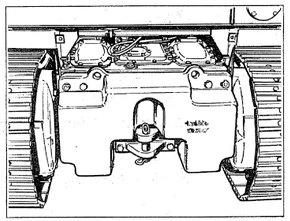


Instrumentation: broken or inoperative

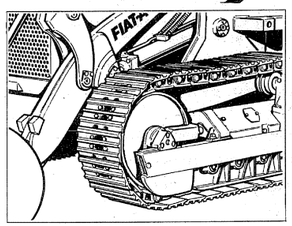




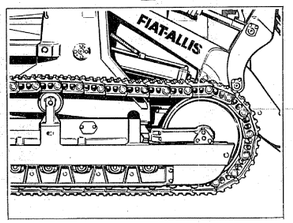
Condition of bucket teeth



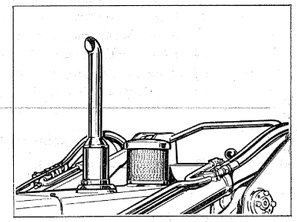
Side final drives and sprockets of oil leaks



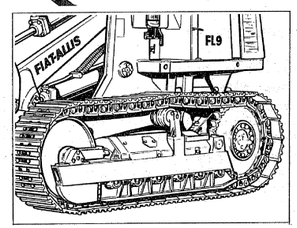
Track shoe bolts and chain general conditions



Track chain tension. Stretcher grease leaks



Accumulation of dirt on prefilter



Dirt caked on track frames

FILL-UP DATA
FL 9 CRAWLER LOADER

ITEMS	QUANTITY			REFILL
	Liters	Imp. Gals	U.S. Gals	
Cooling system . . .	25	5 1/2	6 1/2	Water or anti-freeze mixture
Fuel tank	190	41 3/4	50 1/4	Diesel fuel, decanted and filtered
Crankcase	12	2 3/4	3 1/4	**oliofiat AGERTER** (1)
Converter-Transmission hydraulic system .	20	5 1/2	5 1/4	above 0° C (32° F): **oliofiat AGERTER 30** (SAE 30)
Rear power train (bevel gear set steering clutches) . .	15.5	5 2/4	4	below 0° C (32° F): **oliofiat AGERTER 10 W** (SAE 10 W)
Side final drives (each)	14.5	3 1/2	3 3/4	**oliofiat AW 90/M** (SAE 90 EP)
Bucket hyd. system .	45.5	13 1/4	12	above 0° C (32° F): **oliofiat AP 51**
Supplement for ripper hyd. system . . .	5.5	2	1 1/2	below 0° C (32° F): **oliofiat AP 31**

Oil quantities indicated are for periodical changes as detailed in the drainage and refill instructions for each item.

(1) **Use the following oils depending on outdoor temperature**		
AGERTER 10 W (SAE 10 W)	Minimum below — 15° C (5° F)	
AGERTER 20 W (SAE 20 W)	Minimum between — 15° C and 0° C (5° F and 32° F)	
AGERTER 30 (SAE 30)	Max. up to 35° C (95° F)	Minimum above 0° C (32° F)
AGERTER 40 (SAE 40)	Max. over 35° C (95° F)	

LUBRICANT SPECIFICATIONS

Symbol (*)	Items	FIAT Product	
		Name	International Designation
◇	ENGINE - TRANSMISSION/CONVERTER - BEVEL GEAR STEERING CLUTCHES	AGERTER	MIL-L-2104 C Service API-CD
	TRACK ROLLERS, IDLER WHEELS	AGERTER 30	Same - SAE 30
◈	SIDE FINAL DRIVES	AW 90/M	MIL-L-2105 C - SAE 80 W/90 EP
△	EQUIPMENT HYDRAULIC SYSTEM	AP 31	SAE 10 W oil for hydraulic/control circuits. Contains oiliness, anti-oxidising and anti-wear additives
		AP 51	Same - SAE 20 W
□	GREASE FITTINGS	G 9	Lithium-Calcium base grease, water/high load/temperature resistant N.L.G.I. No. 2 consistency

(*) See fig. 25.

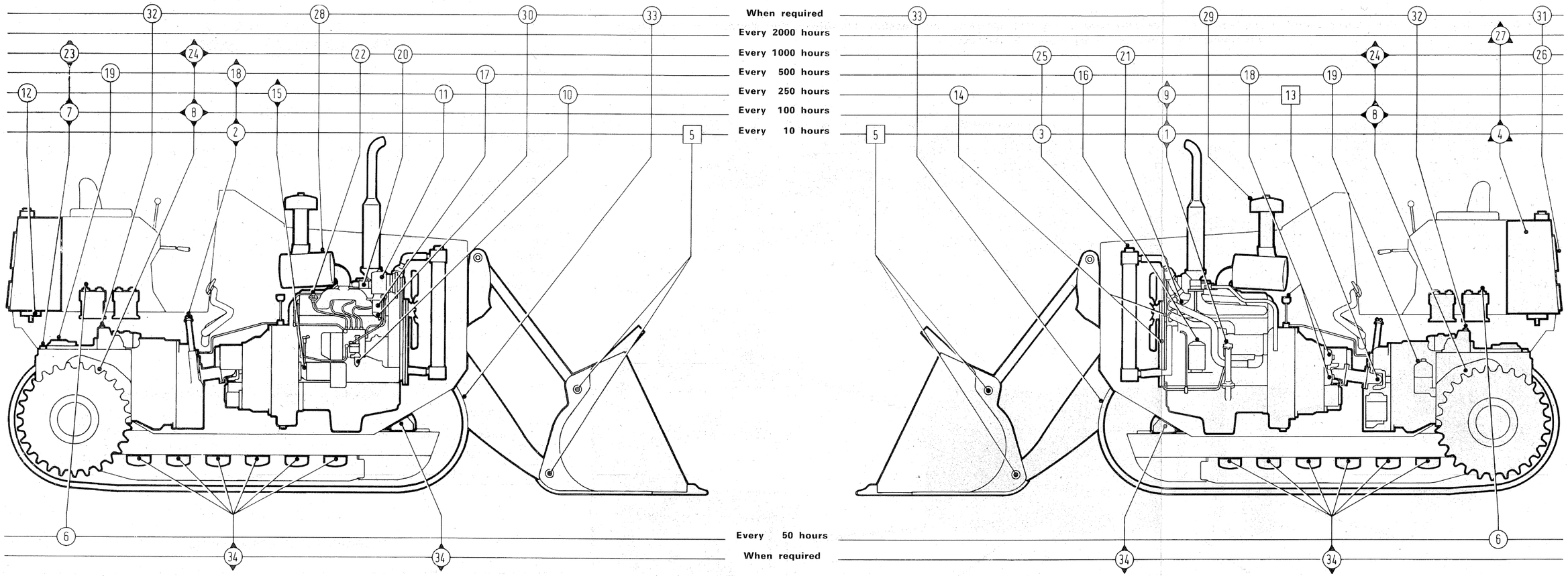


Fig. 25 - Maintenance operation charts

EVERY 10 WORKING HOURS

1. **Engine oil:** check level.
2. **Converter-transmission hydraulic system:** check oil level.
3. **Radiator:** check water level.
4. **Equipment hydraulic system:** check oil level.
5. **Bucket linkage articulations:** lubricate with grease (eighteen lubricators).
- **Ripper linkage articulations:** lubricate with grease.

EVERY 50 WORKING HOURS

6. **Batteries:** check electrolyte level.

EVERY 100 WORKING HOURS

7. **Bevel gear set and steering clutches:** check oil level.
8. **Side final drives:** check oil level.

EVERY 250 WORKING HOURS

9. **Engine sump:** change oil.
10. **Bowl fuel filter:** wash strainer in kerosene.
11. **First fuel filter:** change.
12. **Fuel tank:** drain water condensate.
13. **Converter-to-transmission propeller shaft:** pack joint spiders with grease (two lubricators).
14. **Drive belts:** check sag of fan and alternator drive belts.
15. **Starter motor:** lubricate drive end head.

EVERY 500 WORKING HOURS

16. **Engine oil filter:** change.
17. **Second fuel filter:** change.
18. **Converter-transmission hydraulic system:** change oil and wash filters in kerosene (cartridge and magnetic rod on intake side, cartridge on delivery side and bleeder).
19. **Steering clutch hydraulic system filters:** change return cartridge, wash inlet cartridge, and magnetic rod in kerosene.

EVERY 1000 WORKING HOURS

20. **Engine vent:** wash in kerosene.
21. **Engine valves:** have valve clearance checked.
22. **Fuel injectors:** have injectors setting checked.
23. **Bevel gear set and steering clutches:** change oil.
24. **Side final drives:** change oil.
25. **Engine cooling system:** flush system.
26. **Equipment hydraulic system oil intake filter:** wash cartridge and magnetic rod in kerosene.

EVERY 2000 WORKING HOURS

27. **Equipment hydraulic system:** change oil; clean tank interior, service filters and magnetic rod.

WHEN REQUIRED

28. **Air cleaner:** clean outer cartridge.
29. **Air cleaner pre-filter** (some versions only): discharge accumulated dust.
30. **Fuel filters:** drain condensate.
31. **Equipment hydraulic system oil return filter:** change cartridge.
32. **Brakes:** check pedal travel.
33. **Tracks:** check tension.
34. **Track idlers and rollers:** lubricate as required.

◯ **Cleaning, inspection or adjustment**

Engine crankase oil

Hydraulic system oil

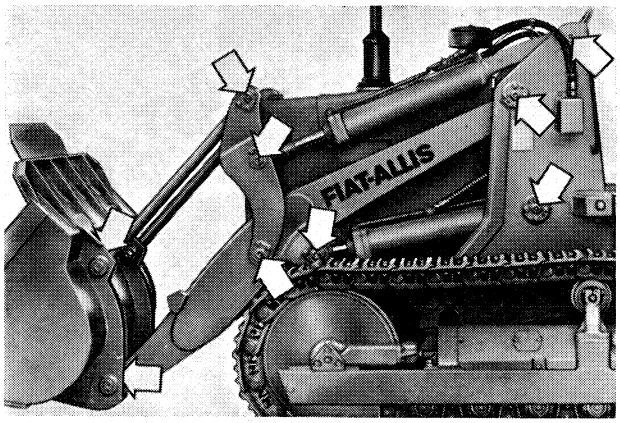
Multi-purpose gear oil

□ **Pressure gun lubricant**

Every 10 working hours
(cont'd)

5. Bucket linkage articulations

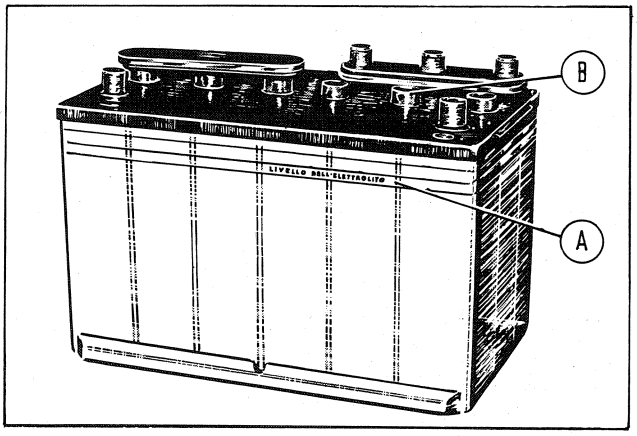
Inject grease in the 18 lubricators (9 on either side in the locations shown by the arrows).



• Ripper linkage articulations

Inject grease in all lubricators.

Every 50 working hours



6. Batteries

Access to batteries is gained by opening the door in seat left armrest.

With engine stopped and machine on level ground check electrolyte level which must lie between the two reference lines **A**: this check must be performed at shorter intervals in summer or in particularly hot environments. To top up level, remove caps and add **distilled water** in funnel **B** of each plug.

Follow these rules to keep batteries efficient :

With engine running, always leave the lock switch key set in one of the first four positions so that the alternator will keep charging the batteries. Instead, whenever the engine is switched off, the key must be turned to its insertion position, or even removed, to prevent the progressive discharge of batteries due to alternator excitation.

Do not keep lights on for long periods when engine is stopped or idles.

Keep batteries, especially their top, clean and dry.

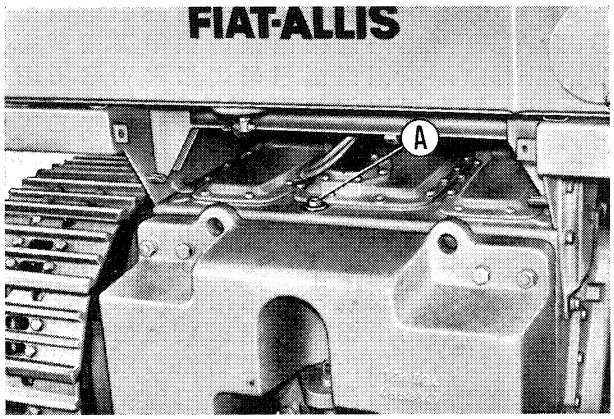
During short stops let engine idle rather than turn it off as each start imposes a heavy current drain on batteries.

In case batteries require topping up at intervals shorter than normal (for instance every two or three days) or they are so run down that it is impossible to start the engine, take the batteries to a qualified shop for inspection.

Never use acid or common water, which would damage the batteries, **but only distilled water or rainwater collected in clean glass or inert plastic containers.** Special care should be taken to prevent dirt or foreign matter from entering the batteries.

Make sure that cable terminal clamps are firmly fixed to posts and are coated with petrolatum.

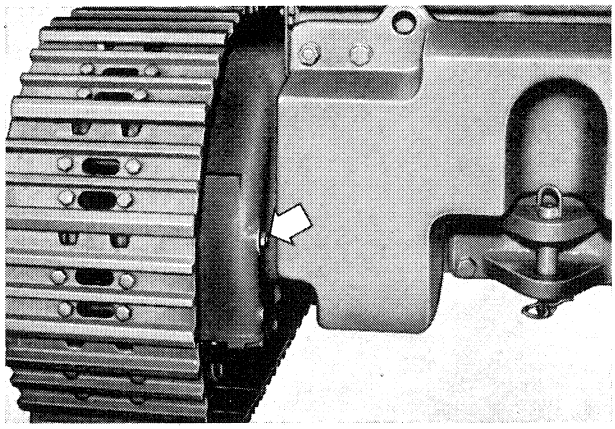
Before carrying out any maintenance involving the terminals, disconnect the ground lead.



Every 100 working hours

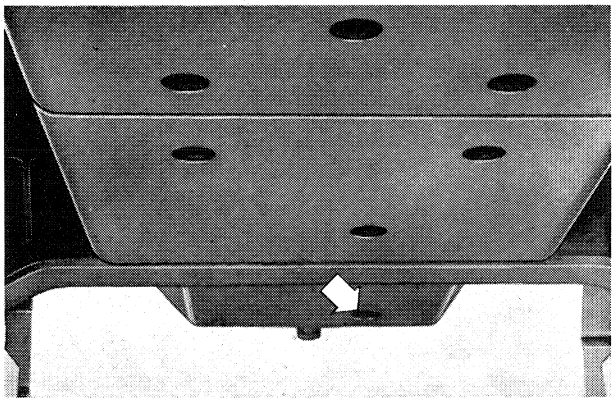
7. Bevel gear set and steering clutches

Remove plug **A**, take out the rod and check that oil level reaches the mark on rod; if necessary top up through rod seat.



8. Side final drives

Check that oil level reaches the plug indicated by the arrow (one plug to each final drive case); top up through the plug hole, if necessary.

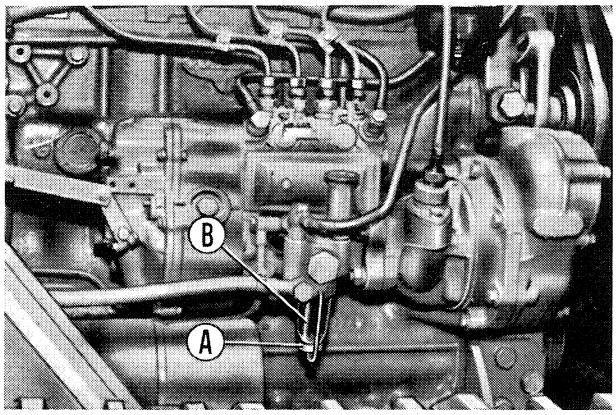


Every 250 working hours

9. Engine sump

Drain oil through bottom plug; to facilitate draining remove the indicator rod (see page 16). When oil stops flowing crank the engine a few seconds by the starter to discharge the oil left in the system. Refill with fresh oil proceeding as follows:
Screw back the drain plug.
Pour in oil up to the MAX mark on rod.
Run the engine at idle speed.
Stop the engine and after a few minutes top up again to the MAX oil level mark on rod.

Note - If the fuel used has a sulfur content higher than 1 %, renew oil at every 150 working hours.



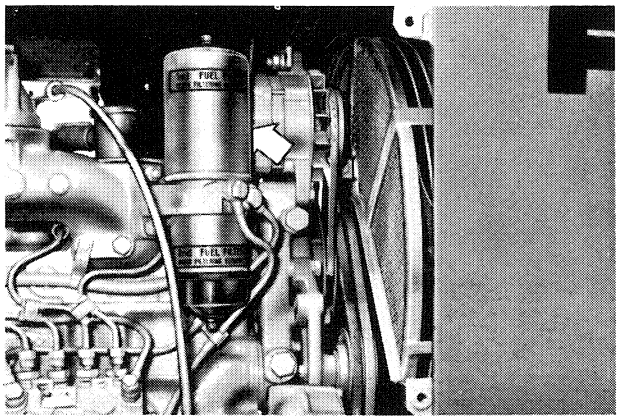
10. Bowl fuel filter

Shut the tank cock (Fig. 11, page 8) unscrew nut **A**, remove strainer from bowl **B** and brush clean with kerosene. After reassembling the filter, open the cock and pump the priming knob a few strokes.

Every 250 working hours (cont'd)

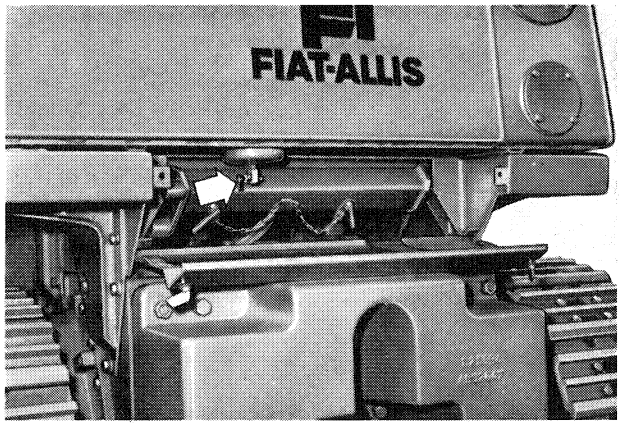
11. First fuel filter

Remove, discard and fit a new filter.
Then, proceed with the bleeding operation as described on page 8.



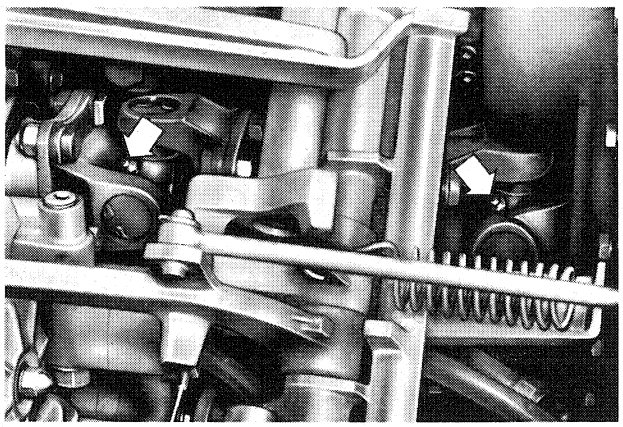
12. Fuel tank

Drain all impurities (water and deposits) collected in the well by opening the bottom cock and letting the liquid flow until clean fuel comes out. This operation must be performed more frequently when the machine is operated in damp environments or in cold climates with marked temperature changes. Also, clean the filler neck strainer, if necessary. When outdoor temperature is above 0° C (32° F) the tank must be purged before starting the engine; instead, when outdoor temperature is below 0° C this operation must be performed at the end of work as, otherwise, the condensate freezes and will not drain out.



13. Converter-to-transmission propeller shaft

Inject grease in the two lubricators on the spiders (3 or 4 shots).
Access to the shaft is gained after removing the footboard.

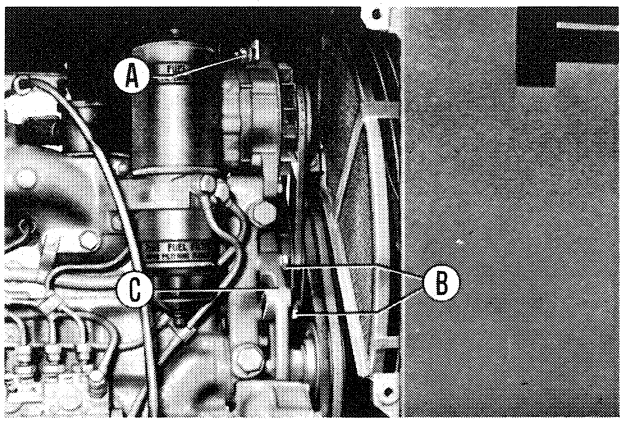


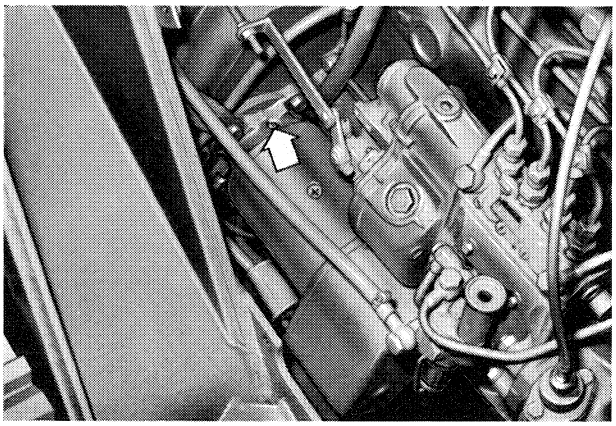
14. Drive belts

Alternator belt - Check that under a pressure of 3 kg (2.9 daN*), (6.6 lbs) belt sag is 1.5 cm ($^5/_8$ in). To adjust tension slacken screw **A** and move alternator support.

Fan belts - Check that under a pressure of abt. 4.5 kg (4.4. daN*), (9.9 lbs) belt sag is 1.5 cm ($^5/_8$ in) in the portion between crankshaft and fan. To adjust tension slacken screws **B** and then move belt stretcher **C** as required.

(*) Deca-Newton: SI system unit.

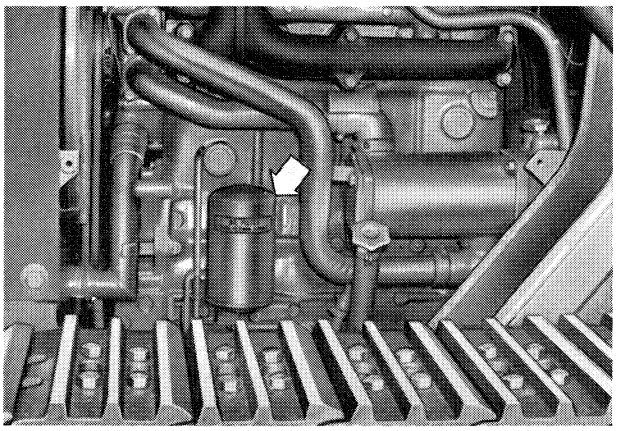




Every 250 working hours (cont'd)

15. Starter motor

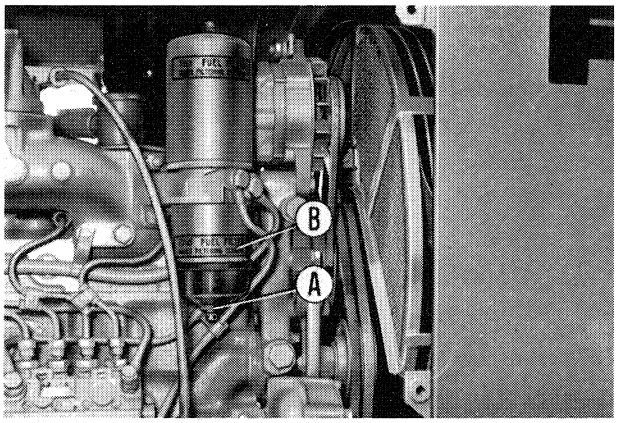
Remove the plug shown and pour in a few drops of engine oil to lubricate drive end head.



Every 500 working hours

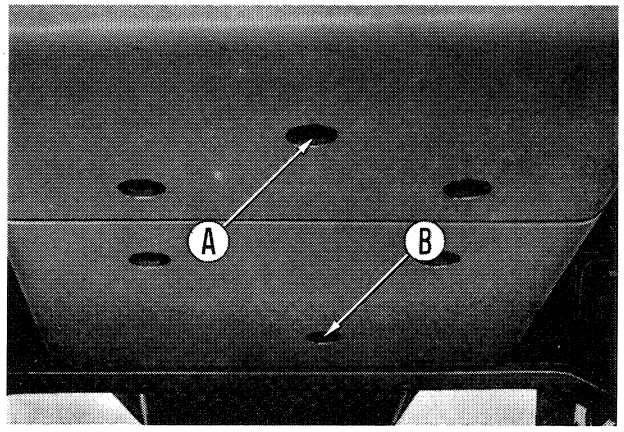
16. Engine oil filter

Remove, discard and fit a new filter.



17. Second fuel filter

Back out screw **A** and change cartridge **B**.
After installing the new cartridge proceed with the bleeding operation as described on page 8.



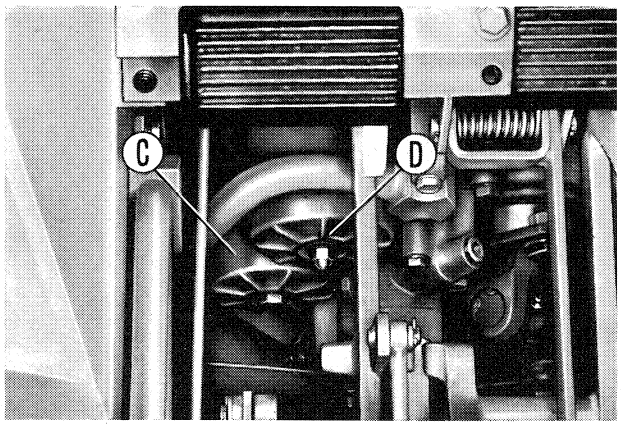
18. Converter/transmission hydraulic system

Change oil and clean filters, proceeding as follows:

Oil draining

With transmission oil warm, remove plugs **A** and **B** and drain (to facilitate oil drainage remove the level rod from filler neck - see page 16).
Once the oil stops flowing out, crank the engine a few seconds with the starter motor to drain the oil left in the system. Re-fit plugs **A** and **B**.

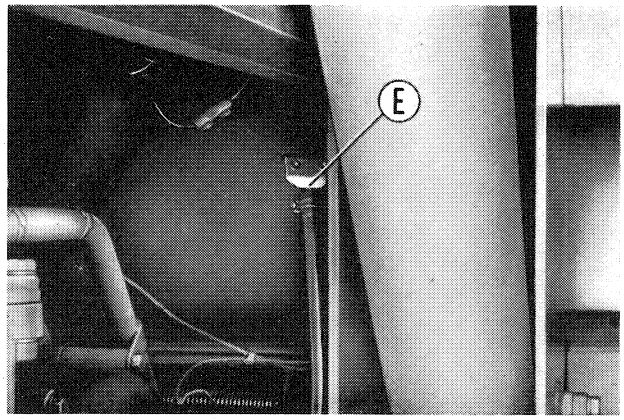
Every 500 working hours
(cont'd)



Filter cleaning

Remove the footboard.
Clean the surfaces adjacent to filters **C** and **D**.
Brush clean with kerosene the following parts:
The cartridge and the magnetic rod located inside intake filter **D**.
The cartridge located in delivery filter **C**.
The containers of both filters.

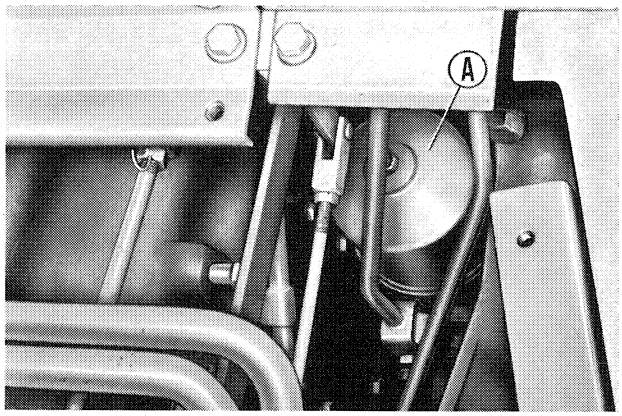
Every two cleanings (i.e., 1000 hours) wash in kerosene also vent **E** (after removal from its housing).



Refilling

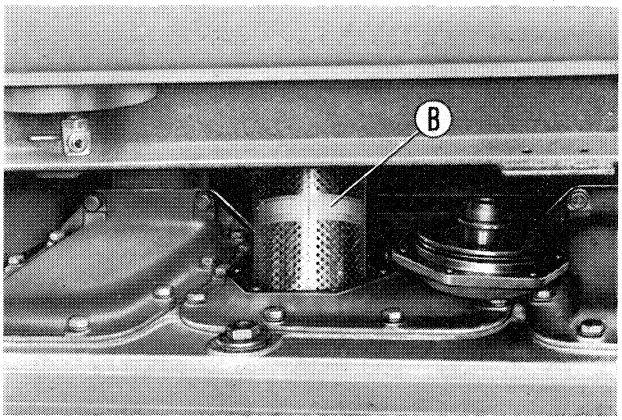
Pour in oil through the filler neck up to the upper mark on rod.
Start the engine and let it idle for at least 15-20 sec; operate the gearshift lever a few times.
Stop the engine and, after a few minutes, top up to the upper mark on rod.

19. Steering clutch hydraulic system filters



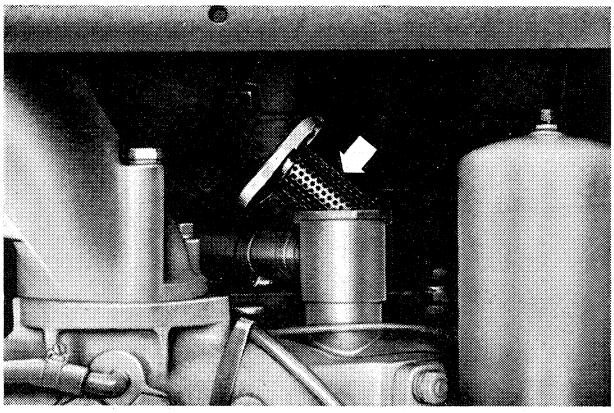
Oil intake filter

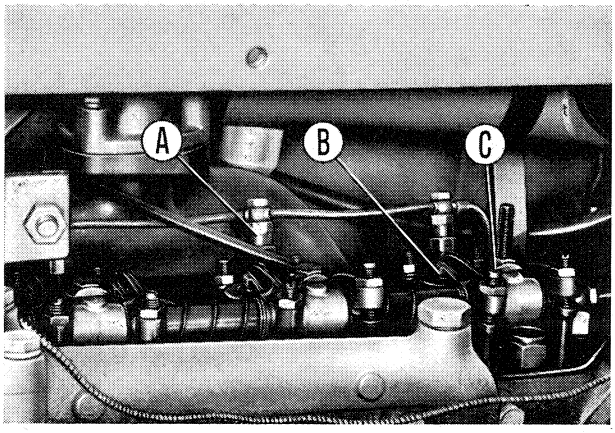
For access to filter, remove footboard. Clean filter exterior. Remove filter cover **A**, cartridge and magnetic rod and wash all these parts with kerosene. Finally, clean container and reassemble the filter.



Oil return filter

For access to filter remove rear apron.
Clean filter cover and the adjacent area. Remove cover of filter **B** and change the cartridge.
Before introducing the new cartridge wait until the oil flows out of container into drive body and clean container interior.





Every 1000 working hours

20. Engine vent

Remove vent from cylinder head cover and wash in kerosene. Let vent drip dry before reinstallation.

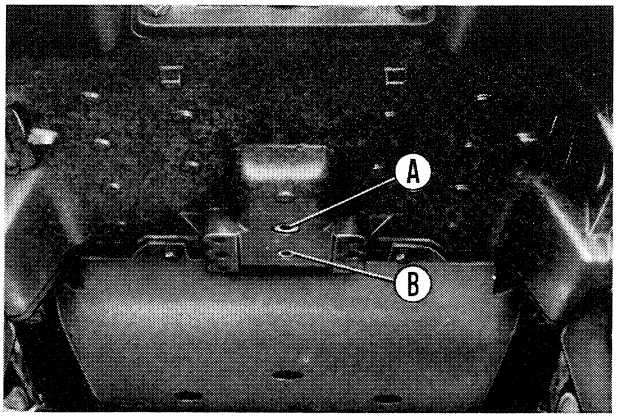
21. Engine valves

Have the tappet clearance checked [specified values: 0.30 mm (.012 in) for the intake valves - 0.50 mm (.020 in) for the exhaust valves.

B = Clearance check point. **C** = Setscrews.

22. Fuel injectors

Have injectors **A** inspected by a specialized shop (setting: 200 kg/cm² - 196 bar* - 2845 psi). To remove injectors from engine disconnect the fuel lines and take off the fixing brackets.



23. Bevel gear seat and steering clutches

Change oil as follows:

Drainage. Remove bottom plug **A** and drain thoroughly. Re-fit plug.

Filter servicing : See page 21.

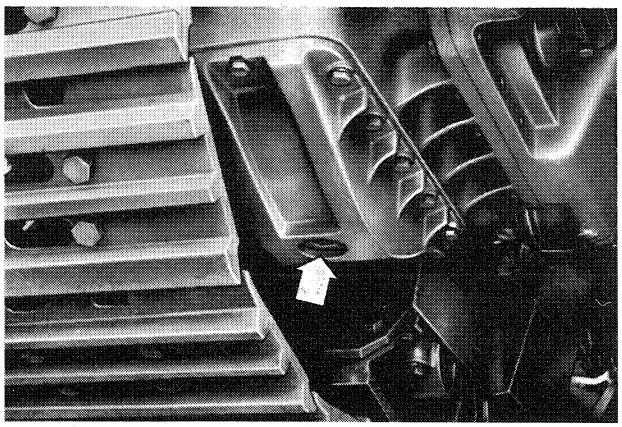
Refilling :

— Pour in oil up to the correct level (see page 18).
— Start the engine and let run at abt. 1000 rpm.
— Actuate a few times the steering clutch levers.
— Stop the engine and after a few minutes check level and, if necessary, top up.

Warning - Unscrew plug **B** to drain oil (if any) seeped from transmission and rear drive cases.

(*) SI system unit.

Every 1000 working hours
(cont'd)

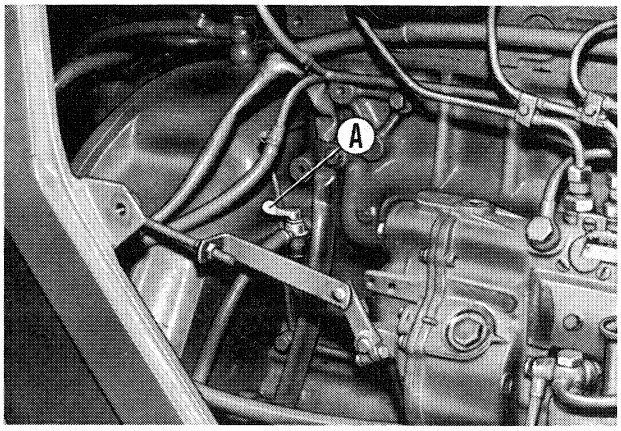


24. Side final drives

Remove bottom plugs (one to each case) and let drain thoroughly. Re-fit plugs.

Refill with new oil.

25. Engine cooling system

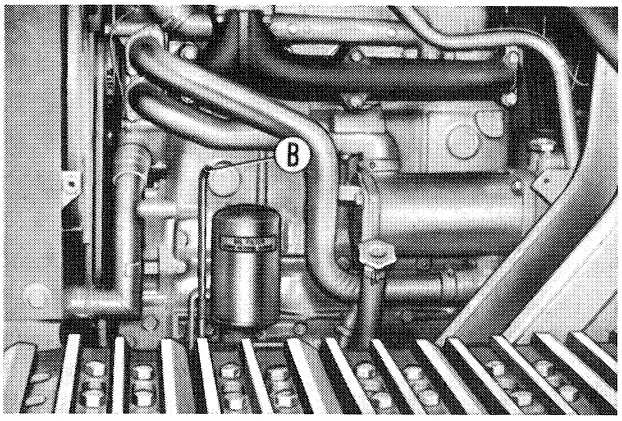


The engine cooling system must be flushed to eliminate all deposits and any time the plain water is replaced with antifreeze mixture or vice-versa.

Flushing must be more frequent when using very hard waters (rich in calcium salts). Proceed as follows:

Drain water with warm engine by opening cocks **A** and **B**. Remove filler cap for faster draining. Shut the cocks.

Dissolve " FIAT Radiator Descaler " or equivalent product (in the proportions stated on container label) in water and pour the solution into radiator, with cold engine.



Use the machine on a job with engine running at high rpm until well warm; slow down to about 1000 rpm and drain. Meanwhile, keep pouring tap water into radiator for at least 40 minutes.

Stop the engine, open the cocks and let all the water drain out thoroughly.

Shut the cocks and replenish the system.

Use an antifreeze mixture (see page 13) if outdoor temperature is close to or below 0° C (32° F).

26. Equipment hydraulic system oil intake filter

Service the filter as follows:

Clean carefully the cover and adjacent area and remove the cover; unscrew the air bleeder plug (see page 16) and remove the cover. Wash cartridge **E** (see page 24) and magnetic rod **F** by brushing in kerosene.

Re-install the filter, magnetic rod and cover.

Refit the vent plug.

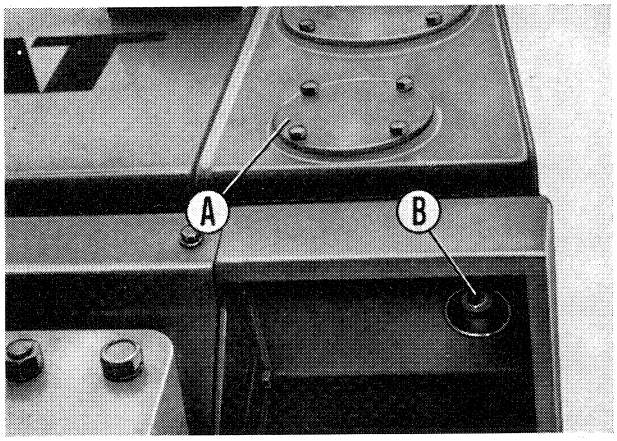
Every 2000 working hours

27. Equipment hydraulic system

Replace the oil operating as follows:

Drainage

— Place the machine with bucket over a pit (or place some wedges under the tracks) so that the bucket can be lowered to full stroke and tilted back without touching the ground.



— If the ripper is fitted remove its teeth.

— Tilt the bucket back and lift to its highest position (if fitted, lift also ripper frame). Stop engine.

— Take off the bleeder plug from filter cover (see page 16).

— Remove the oil filler plug and tank bottom plug **B** to drain the oil from tank. Each time oil flow slows down move a little the bucket control levers to lower and tip the bucket so as to obtain a steady drainage of oil. Once the bucket reaches lower stroke end and is completely tilted, lower also the ripper frame.

— Start engine, run to idle and stop as soon as oil flowing out begins to slow down so as not to damage the pump deprived of oil.

Filter servicing

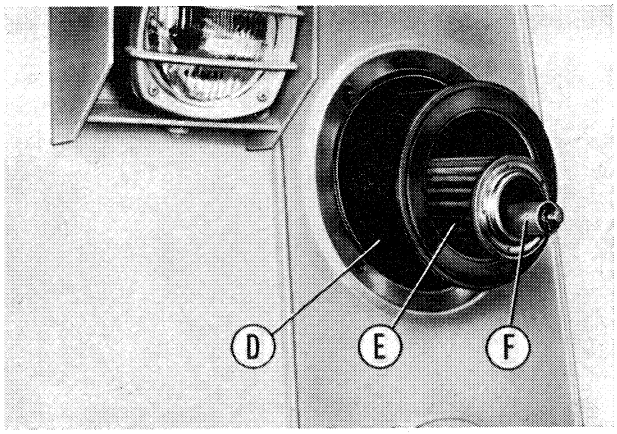
— When washing cartridge **E** of oil intake filter and magnetic rod **F**, change also cartridge **D** of oil return filter unless this was already done shortly before, following the lighting up of the clogging indicator (see page 26).

Tank cleaning

— Clean accurately cover **A** and the adjacent area.

— Remove cover **A**. Brush clean with kerosene the tank bottom and remove any metal particles stuck on the two magnetic disks fixed thereto.

— Re-fit cover **A** and drain plug **B**.



Refilling

— Fill the tank with oil up the max. level (page 16); screw in the filler and bleeder plugs.

— Start the engine; lift and lower the bucket (and ripper frame) several times to fill the cylinders and lines; continue to top up with oil.

— Remove the wedge blocks and set the machine down on level ground (re-install ripper teeth, if removed).

— With bucket (and ripper) on ground stop the engine, check oil level and top up once more, if necessary.

When required

28. Air cleaner

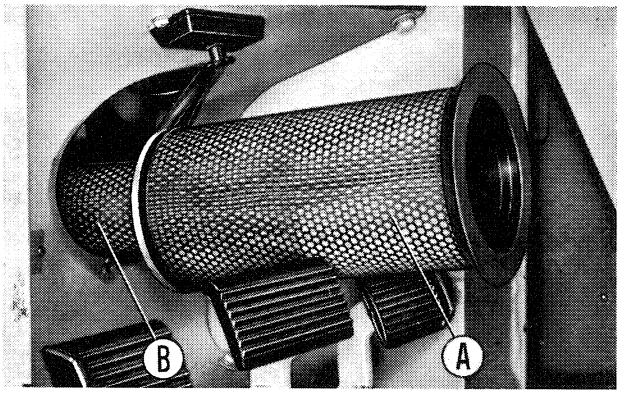
When the red signal appears on the clogging indicator (**g**, Fig. 10), stop the engine then remove and clean outer cartridge **A**. Access to this cartridge is gained by removing outer cover **D** (fixed by wing nuts **C**) then the knob and inner cover clamp. Cleaning must be performed with a dry air blast of about 2 kg/cm² (1.96 bar* - 28.5 p.s.i.) pressure directed inside out, parallel to the cartridge pleats.

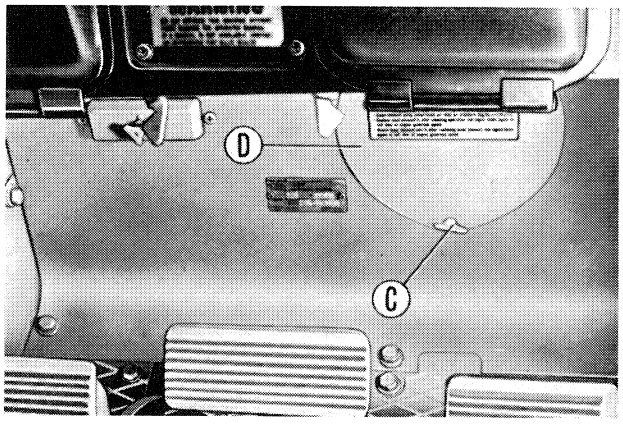
After cleaning, inspect for tears or damages in the skirt by introducing a lit lamp bulb in the cartridge; spots where light is more visible indicate that the skirt it thinned or torn, in which case the cartridge must be replaced. Replace the cartridge also if the gaskets are damaged.

Clean the container and refit the cartridge and cleaner cover.

Cancel the red signal by depressing the top button on indicator. Start the engine and run at maximum rpm rate: if the clogging indicator shows the red signal again the outer cartridge must be renewed. If the signal persists, change also inner cartridge **B** which is screwed into filter base.

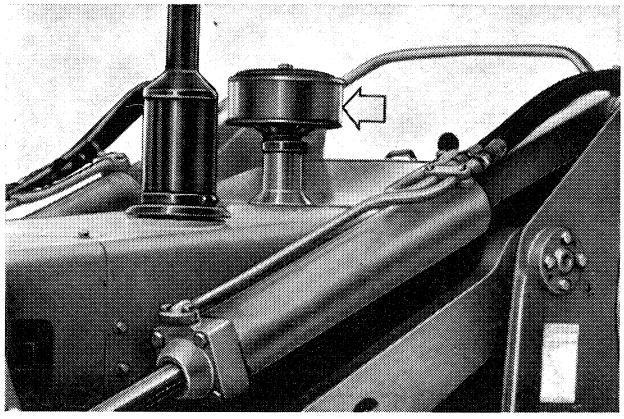
Check the tightening of nuts securing the hoses on intake manifold to prevent admission of unfiltered air into engine.





29. Air cleaner pre-filter

(On some special versions for dusty climates). Check dust accumulation: if about 3 cm (1.2 in) high, disassemble the pre-filter and discharge the dust.

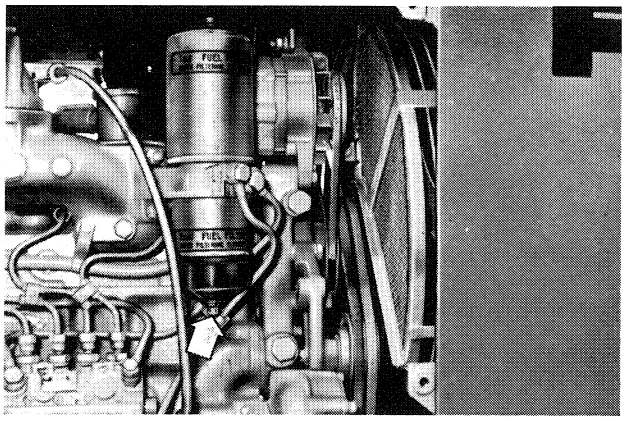


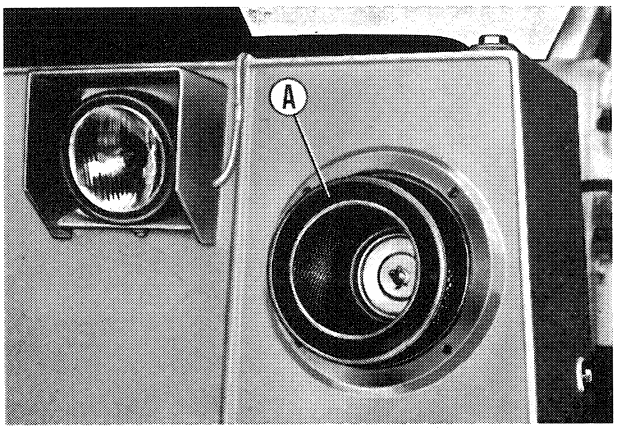
30. Fuel filters

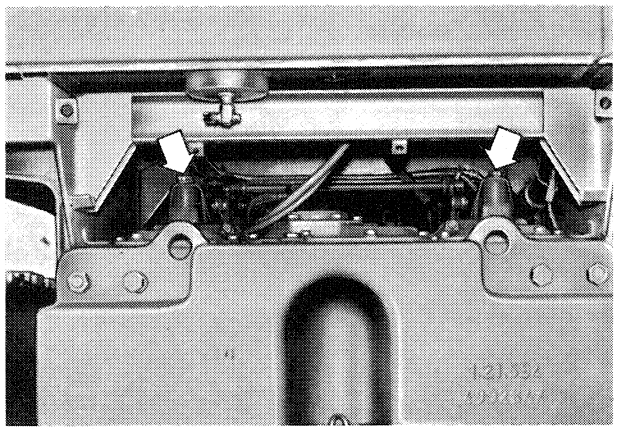
If required, drain water condensate. In cold climates do this with warm engine. Slacken 3 or 4 turns the screw shown and pump primer knob (see Fig. 12).

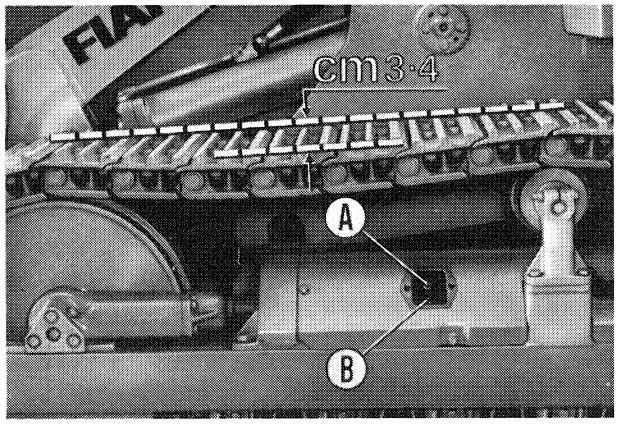
Re-tighten the screw once the outflowing fuel is free of water.

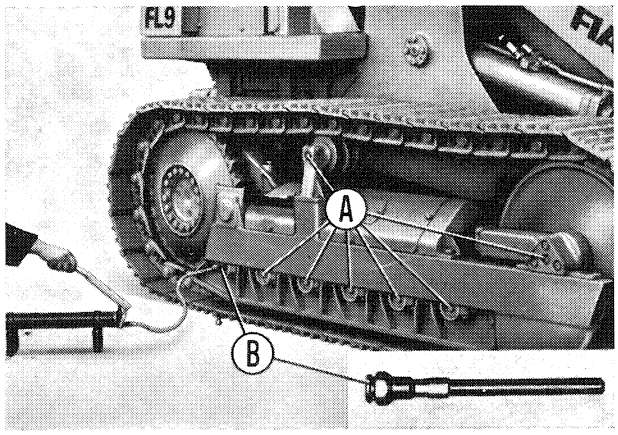
(*) SI system unit.











When required
(cont'd)

31. Equipment hydraulic system oil return filter

If with engine turning at maximum speed the clogged filter indicator (**d**, Fig. 10) lights up, replace the filter cartridge. Should this occur when the hydraulic oil has to be changed, see page 24; otherwise, operate as follows:

— Remove bleeder plug and cover (page 16).
— Change cartridge **A**.
— Re-fit the bleeder plug and the cover.

32. Brakes

With brakes properly adjusted pedal travel is approx. 6 cm ($2^1/_2$ in). When the brakes need adjustment fully tighten the adjustment screws and then back out 2 turns. The notch on hexagonal head serves as reference.

33. Tracks

If sag in the stretch between the carrier roller and idler wheel exceeds 3-4 cm ($1^1/_4$-$1^1/_2$ in) inject grease into connection **B** of adjustment cylinder until resetting the correct tension.
On the contrary, if sag is less than specified discharge some grease from the cylinder by unscrewing a few turns plug **A** and, if necessary, driving the machine a few yards in reverse. Then retighten the plug.

Note - When working on muddy, wet clay terrains, or on sand, gravel, snow or ice, track tension must be somewhat slackened.

34. Track idlers and rollers

Should doubts arise on proper lubrication of idlers and rollers, slacken plugs **A** (eight to each track): if the oil which issues is clean the idlers and rollers are correctly lubricated. If no oil at all issues from plugs or the oil is mixed with water, screw connection **B** (contained in the tool kit) in place of each plug **A** and then with the barrel pump inject oil until clean oil issues from the grooves on connection **B**. At his point unscrew connection **B** and refit the plug.

ELECTRICAL SYSTEM

The system shown in diagram Fig. 27 is protected by eight 8-Amp fuses, as follows:

— **1** = Dashboard left lamp and rear spot lamp.

— **2** = Dashboard right lamp.

— **3** = Current receptacle.

— **4** = Stand-by.

— **5** = Horn, battery charge indicator relay, transmission lube oil low pressure indicator and equipment oil return filter clogging indicator.

— **6** = Headlamp high beams.

— **7** = Headlamp low beams.

— **8** = Voltage regulator.

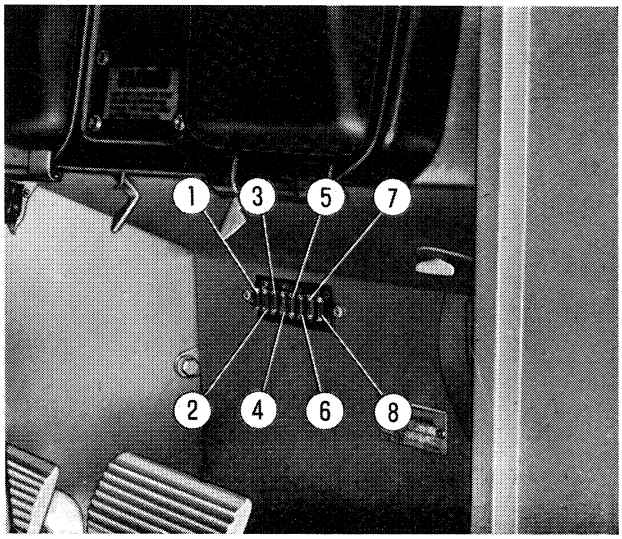


Fig. 26 - Fuses

The system shown in diagram Fig. 28 is protected by eight 8-Amp fuses, as follows:

— **1** = Left headlamp.

— **2** = Right headlamp.

— **3** = Current receptacle.

— **4** = Stand-by.

— **5** = Dashboard lamps and rear spot lamp.

— **6** = Horn, battery charge indicator relay, transmission lube oil low pressure indicator and equipment oil return filter clogging indicator.

— **7** = Voltage regulator.

— **8** = Stand-by.

In case of blown fuse(s) replace immediately. If the trouble recurs have the system inspected by skilled servicemen.

Warning - Never run the engine with alternator terminal **30** disconnected from its cables.

If the machine batteries are partially discharged and engine is therefore started with stand-by batteries, the connections to the on-board batteries must be made by pairing the same signs (plus with plus, minus with minus). This rule should be followed also when recharging the batteries with external means. If the machine is without batteries and the engine is therefore started using stand-by batteries, it will be necessary to first disconnect at alternator the cable of blade plug **67** and keep it disconnected throughout the period of engine operation.

With engine running, always leave the lock switch key set in one of the first four positions (see Fig. 7) to permit battery charging and charge indicator operation.

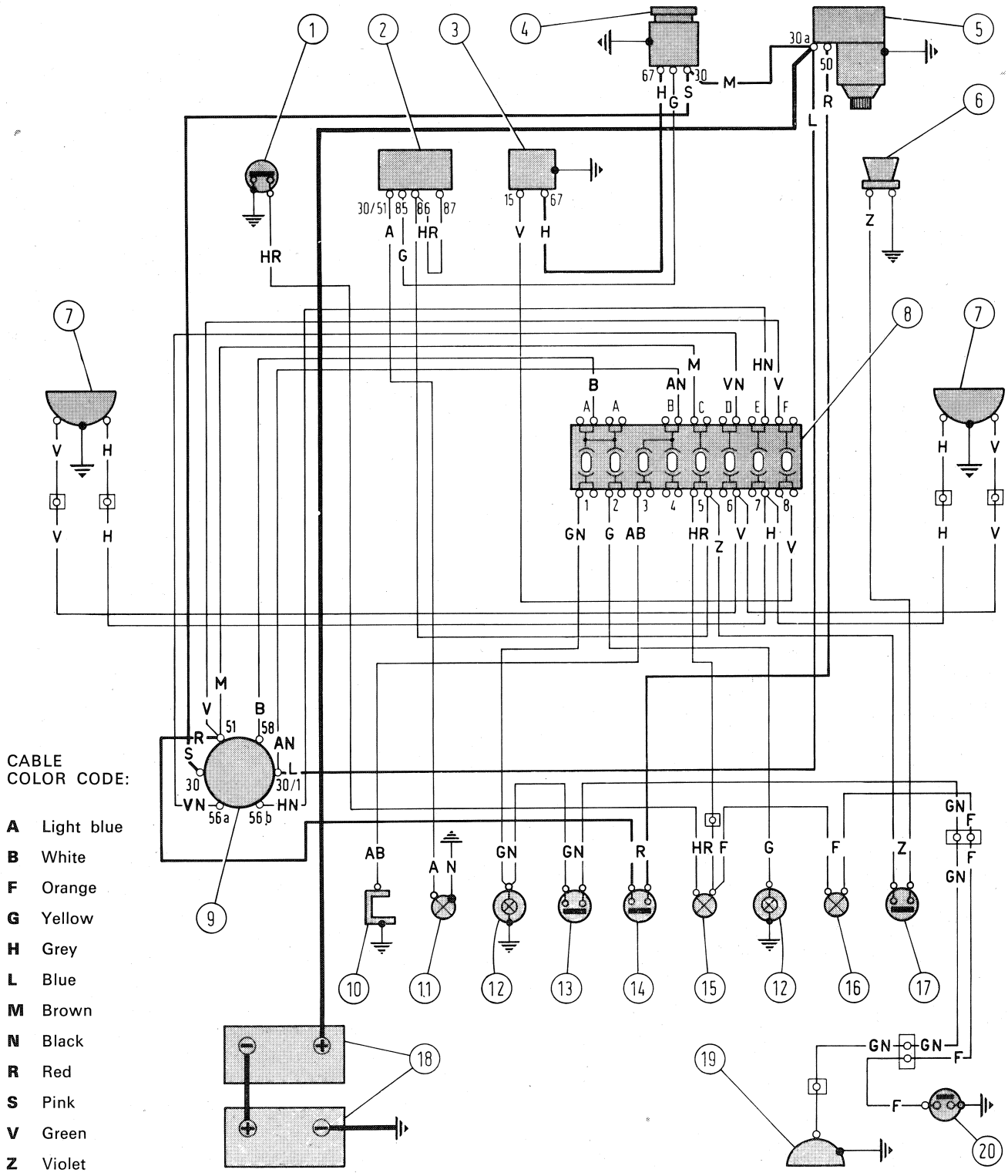


Fig. 27 - Wiring diagram - (24 Volts)

1. Transmission lube oil low pressure indicator sending unit - **2.** Battery charge indicator relay - **3.** Voltage regulator - **4.** Alternator - **5.** Starter motor - **6.** Horn - **7.** Headlamps, high/low beams - **8.** Fusebox - **9.** Lock switch - **10.** Current receptacle (unipolar) - **11.** Battery charge indicator - **12.** Dashboard lamps - **13.** Rear spot lamp switch - **14.** Engine starting button - **15.** Transmission lube oil low pressure indicator - **16.** Equipment return oil filter clogging indicator - **17.** Horn button - **18.** Batteries - **19.** Rear spot lamp - **20.** Clogged filter indicator sending unit.

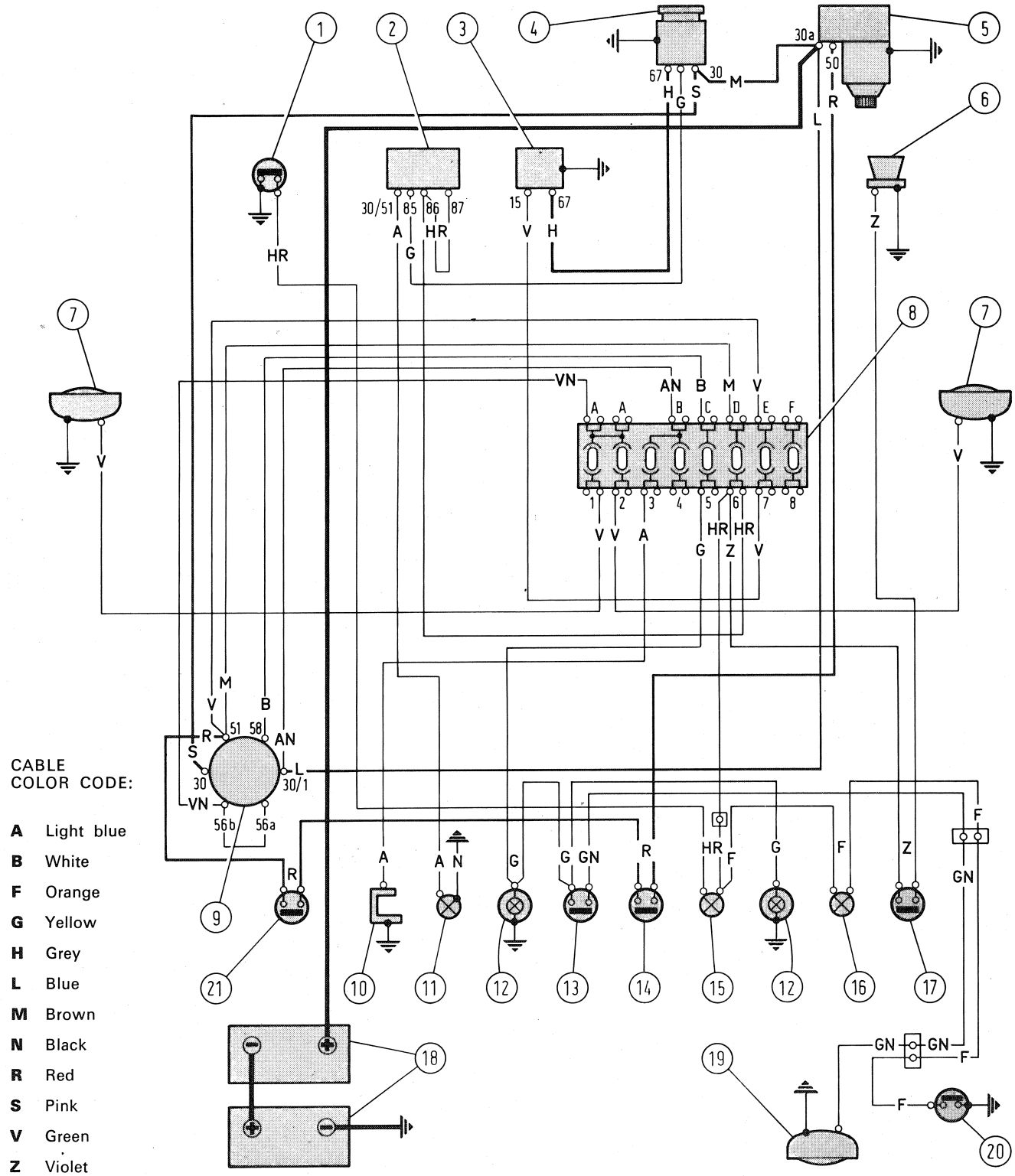


Fig. 28 - Wiring diagram - Version with sealed beams and starting inhibitor switch (24 Volts)

1. Transmission lube oil low pressure indicator sending unit - **2.** Battery charge indicator relay - **3.** Voltage regulator - **4.** Alternator - **5.** Starter motor - **6.** Horn - **7.** Headlamps - **8.** Fusebox - **9.** Lock switch - **10.** Current receptacle (unipolar) - **11.** Battery charge indicator - **12.** Dashboard lamps - **13.** Rear spot lamp switch - **14.** Engine starting button - **15.** Transmission lube oil low pressure indicator - **16.** Equipment return oil filter clogging indicator - **17.** Horn button - **18.** Batteries - **19.** Rear spot lamp - **20.** Clogged filter indicator sending unit - **21.** Starting inhibitor safety switch.

SPECIFICATION

ENGINE

Diesel, 4-stroke, direct injection, type . . OM CO 3 - 130 MT Var. 1

No. of cylinders 4

Bore and stroke . 115 x 130 mm (4.53 x 5.12 in)

Total piston displacement . . 5401 cc (330 cu.in)

Compression ratio . . . . . 17.4 to 1

Max. speed, full load . . . . . 2100 rpm

Counter-rotating weight dynamic balancer.

Valve gear

Overhead valves. Camshaft in crankcase.

Intake	opens: B.T.D.C.	8°
	closes: A.B.D.C.	60°
Exhaust	opens: B.B.D.C.	60°
	closes: A.T.D.C.	8°

Valve-to-rocker clearance for adjustments and normal operation:

— Intake . . . . . 0.30 mm (.012 in)

— Exhaust . . . . . 0.50 mm (.020 in)

Fuel system

Fuel pump, in-line injection pum with centrifugal-weights speed governor, in a single unit. Lubrication branched from engine.

Fuel filtering by: bowl filter with strainer on fuel pump inlet; dual, stacked filter, having lower element with water separator.

Injection pump timing to engine: 25° B.T.D.C., cyl. 1 in the compression stroke (beginning of delivery).

Injection order 1-3-4-2

Injectors with 4-orifice nozzles calibrated to 200 kg/cm² (196 bar* - 2845 p.s.i.).

Dry air cleaner, with pre-filter and paper cartridges. Automatic dust build-up discharge. Clogged-cleaner indicator on dash.

Lubrication

Forced, by dual-gear pump (delivery and scavenge).

Oil pressure (with warm engine at max. rated rpm): 5 kg/cm² (4.9 bar* - 71 p.s.i.).

(*) SI system unit.

Oil filtration: strainer on suction line; easychange filter on delivery line, with pressure relief valve.

Oil cooling by heat exchanger through water recirculated from engine radiator.

Cooling

Water circulated by centrifugal pump.

Upright pipe radiator. Forward-blowing fan mounted on water pump shaft.

Water circulation from engine to radiator governed by thermostat.

Thermostat check data:

Begins to open: 81° to 85° C (178° to 185° F)
Fully open: 94° C (202° F).

Starting

By electric motor.

POWER TRAIN

Converter and transmission

Hydraulic torque converter, 13 in single-stage (max. drive ratio 3.1 to 1).

Transmission: three speeds forward and three reverses controlled by hydraulic powershift mechanism acting on 5 clutches.

Automatic shift into neutral when engine is switched OFF.

Device for locking gearshift lever in neutral.

Power take-off, driven by converter turbine. Located inside drive body and accessible through an opening in rear wall (beneath the tow hook). Maximum speed (with engine at max. power output speed): 1575 rpm.

Converter-transmission oil cooling by heat exchanger through water recirculated from engine radiator.

Bevel gear set and final drives

Bevel gear set at center of rear power train and double-reduction final drive spur gear sets at axle-ends.

STEERING CLUTCHES - BRAKES

Multiplate steering clutches and band brakes on clutch drums, all in oil bath.

Hydraulic control for steering clutches; mechanical control for brakes.

Two pedals for combined control of steering clutches and brakes. One pedal for independent brake; brake locking (for parking) by treadle.

FRAME

Of welded boxed shapes, with support structure for the hydraulic rams and bucket mechanism.

Rear tow hook.

Rear ballasts (560 kg = 1235 lbs).

TRACK FRAMES-SUSPENSIONS

Track frames each with 6-track and 1-carrier rollers with sealed-in lubricant.

Front idlers with sealed-in lubricant and coil spring tension system. Idlers also carry the tracks.

Suspension: by rigid bolster connecting the track frames at front and two cross bars on frames ahead of driving sprockets at rear.

Hydraulically adjustable track tension.

Tracks with 39 links each.

Track shoe width . . 360 mm (14.2 in)

Ground contact area . 15,552 cm² (2410 sq. in)

Specific pressure on ground 0.68 kg/cm²
(0.66 bar* - 9.8 p.s.i.)

EQUIPMENT HYDRAULIC SYSTEM

Engine-driven, gear type pump.

Pump capacity, with engine at max. power rpm rate (2100 rpm) 146 l/min
(32 Imp. GPM - 38½ U.S. GPM)

Rated system pressure 155 kg/cm²
(152 bar* - 2205 p.s.i.)

Triple-section main control valve (one for bucket lift, one for bucket tilt and one for the ripper when fitted). Safety valves, nonreturn valves and backflow valves.

Four-position lifting control: lift, lower, hold and float; automatic lift position release when bucket is at max. height.

Three-position tilting control: back tilt, dump and hold; automatic bucket positioning for digging.

Possibility of bucket lift/dump and lower/tilt simultaneous control.

Two hydraulic rams for lifting and two for tilting control.

Oil filtration: metal cartridge and magnetic rod in inlet line and paper cartridge in the return line.

ELECTRICAL SYSTEM

Voltage . . . . . 24 V

Alternator

Alternator with automatic voltage regulator.

Batteries

Two, 12 Volts each, connected in series. Capacity 77 Amp.hr (at 20 hr-discharge rate).

Starter motor

2.9 kW, with automatic pinion engagement by solenoid.

Lighting system

— Headlamps, type with double filament bulb (50/45 W) for high and low beams or single beam sealed units.
— Rear spot lamp, with 50 W bulb and switch.
— Dash lamps with 10 W-T bulb.

Accessories

— Horn.
— Current receptacle, unipolar.
— Equipment oil return filter clogging indicator with 10 W-T bulb.
— Battery charge indicator with 10 W-T bulb.
— Transmission low oil pressure indicator with 10 W-T bulb.
— 8-Amp. fuses (eight).

(*) SI system unit.

GENERAL DATA

Loader equipment

Bucket capacity (S.A.E.) 1.24 m³ ($1\frac{5}{8}$ cu.yd).

Pull force, with bucket on ground 7034 kg (7,170 da N*), (15,507 lbs)

Lifting force, to max. bucket height 3860 kg (3,934 da N*), (8,509 lbs)

Lifting time . . . . . 6.3 sec

Lowering time . . . . . 2.4 sec

WEIGHT AND SPEEDS

Weight in working order (including supplies and tools) . . . . . 9,100 kg (20,065 lbs)

Max. transfer travel speeds:

	Forward		Reverse	
	kph	mph	kph	mph
1st gear	up to 3.4	up to 2.1	up to 4.1	up to 2.6
2nd »	up to 5.3	up to 3.3	up to 6.2	up to 3.8
3rd »	up to 9.2	up to 5.7	up to 10.5	up to 6.5

(*) Deca-Newton: SI system unit

TOOL KIT

Tool kit for routine maintenance. Optional: filter-pump unit for fuel transfer from settling tank to machine tank.

ACCESSORY EQUIPMENT

Some of the equipment and accessories described and illustrated in this Manual are supplied on certain markets to meet specific requirements. Other special devices and/or attachments on request may be agreed with the Sales Organization.

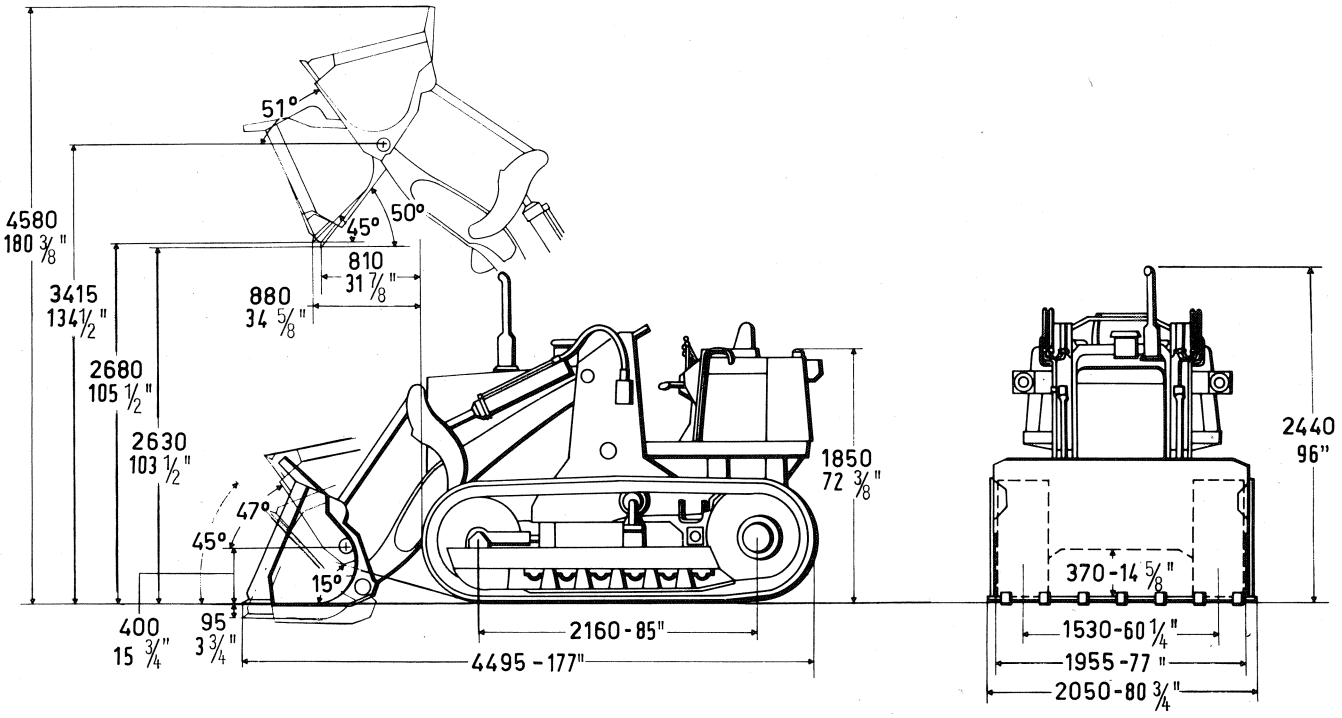
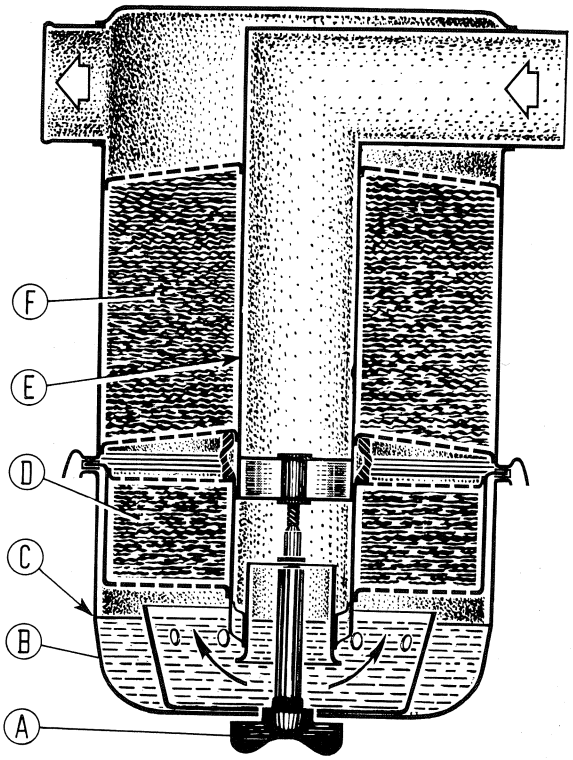


Fig. 29 - FL 9 Loader diagram

OIL-BATH AIR CLEANER (Optional)



Every 10 working hours : At least 15 minutes after engine has stopped back out screw **A**, check if oil in bowl **B** reaches reference **C**; if necessary, top up to this level. The oil supply must be renewed if it contains any impurities or whenever the residues on the bowl bottom have built up to a thickness of about 1 cm.

Use FIAT Agerter oil of the same grade as in the engine: 2 liters ($1^{3}/_{4}$ Imp. Qts. - 2 U.S. Qts).

Clean central tube **E** before reinstalling the bowl.

Every 250 working hours : take out pad **D** and wash in kerosene. Allow to drain well and wet with engine oil before reinstallation. Clean central tube **E**.

Every 500 working hours : Disassemble the complete filter and wash clean all components.

Allow the bottom and top pads - **D** and **F** - to stand for half an hour in kerosene bath.

Allow pads to drain well and wet with engine oil before reinstallation.

FILL-UP DATA
FL 9 CRAWLER LOADER

ITEMS	QUANTITY			REFILL
	Liters	Imp. Gals	U.S. Gals	
Cooling system . . .	25	5 1/2	6 1/2	Water or anti-freeze mixture
Fuel tank	190	41 3/4	50 1/4	Diesel fuel, decanted and filtered
Crankcase	12	2 3/4	3 1/4	**oliofiat AGERTER** (1)
Converter-Transmission hydraulic system .	20	5 1/2	5 1/4	above 0° C (32° F): **oliofiat AGERTER 30** (SAE 30)
Rear power train (bevel gear set steering clutches) . .	15.5	5 3/4	4	below 0° C (32° F): **oliofiat AGERTER 10 W** (SAE 10 W)
Side final drives (each)	14.5	3 1/2	3 3/4	**oliofiat AW 90/M** (SAE 90 EP)
Bucket hyd. system .	45.5	13 1/4	12	above 0° C (32° F): **oliofiat AP 51**
Supplement for ripper hyd. system . . .	5.5	2	1 1/2	below 0° C (32° F): **oliofiat AP 31**

Oil quantities indicated are for periodical changes as detailed in the drainage and refill instructions for each item.

(1) **Use the following oils depending on outdoor temperature**		
AGERTER 10 W (SAE 10 W)	Minimum below — 15° C (5° F)	
AGERTER 20 W (SAE 20 W)	Minimum between — 15° C and 0° C (5° F and 32° F)	
AGERTER 30 (SAE 30)	Max. up to 35° C (95° F)	Minimum above 0° C (32° F)
AGERTER 40 (SAE 40)	Max. over 35° C (95° F)	

LUBRICANT SPECIFICATIONS

Symbol (*)	Items	FIAT Product	
		Name	International Designation
◇	ENGINE - TRANSMISSION/CONVERTER - BEVEL GEAR STEERING CLUTCHES	AGERTER	MIL-L-2104 C Service API-CD
	TRACK ROLLERS, IDLER WHEELS	AGERTER 30	Same - SAE 30
◇	SIDE FINAL DRIVES	AW 90/M	MIL-L-2105 C - SAE 80 W/90 EP
△	EQUIPMENT HYDRAULIC SYSTEM	AP 31	SAE 10 W oil for hydraulic/control circuits. Contains oiliness, anti-oxidising and anti-wear additives
		AP 51	Same - SAE 20 W
□	GREASE FITTINGS	G 9	Lithium-Calcium base grease, water/high load/temperature resistant N.L.G.I. No. 2 consistency

(*) See fig. 25.

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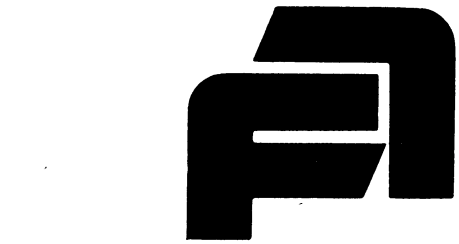

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