510 Tractor

JOHN DEERE

OPERATORS MANUAL

510 Tractor

OML25009 K6 English

OML25009 K6

LITHO IN U.S.A.
ENGLISH

Introduction

This new "John Deere" high performance tractor, suitable for a variety of applications, is constructed to satisfy the requirements of modern agricultural operations.

The tractor has the following special features:

Easy and convenient application.

Hydraulic power for all applications.

The most economical operation is ensured under all conditions by a close correlation of engine-speed, power output and travelling speed with the particular requirements of the job in hand.

Simple maintenance.

Modern in design and appearance.

Maintained and operated according to these Operating Instructions, this modern tractor will help you to work more easily and more economically and to do a better job.

Unless attention is paid to correct operation and maintenance, no machine can be expected to provide a first-class performance. These operating instructions belong in the hands of the man who operates the tractor.

Before starting up the engine for the first time the operator must read the Operating Instructions, bear them in mind, and follow them.

No claims can be made under the guarantee for any damages resulting from wrong operation or maintenance.

In all matters of operation and maintenance, take the advice of your John Deere dealer. You can be sure that for maintenance and overhauls he will use only

"Original John Deere spare parts".

In all correspondence with your dealer or with our distributors or our factory, and particularly when ordering spare parts, please quote the chassis number of the tractor as well as the engine number (see illustration below).

In the present instructions the directions "right" and "left" indicate the sides of the tractor when looking forwards in the direction of travel.

The rear number plate must be attached as shown in Fig. 209 page 83. It must have the dimensions 9.5 x 5.1 ins (240 x 130 mm).

Engine No. Chassis No.

Enter engine and chassis numbers in the spaces above.

Contents

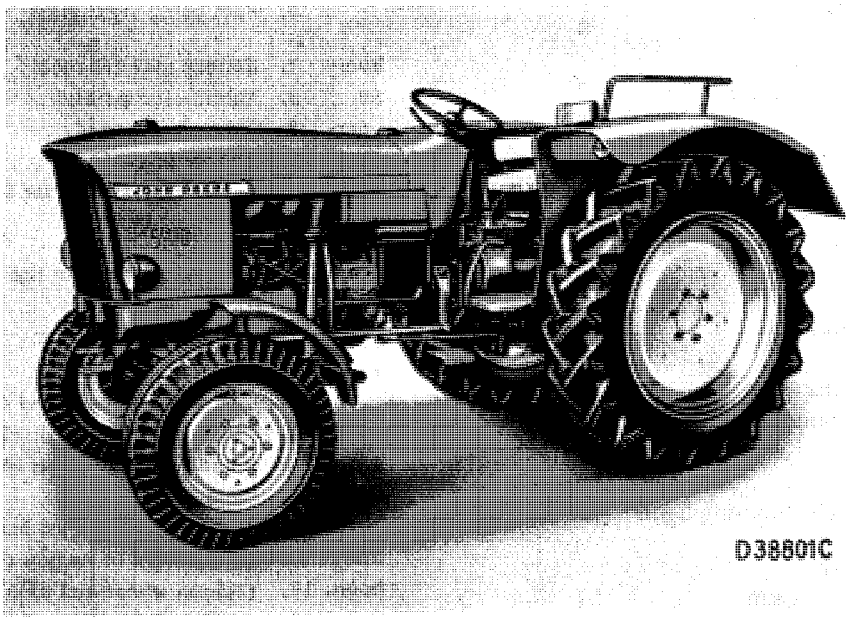


Fig 1: Tractor, left hand side

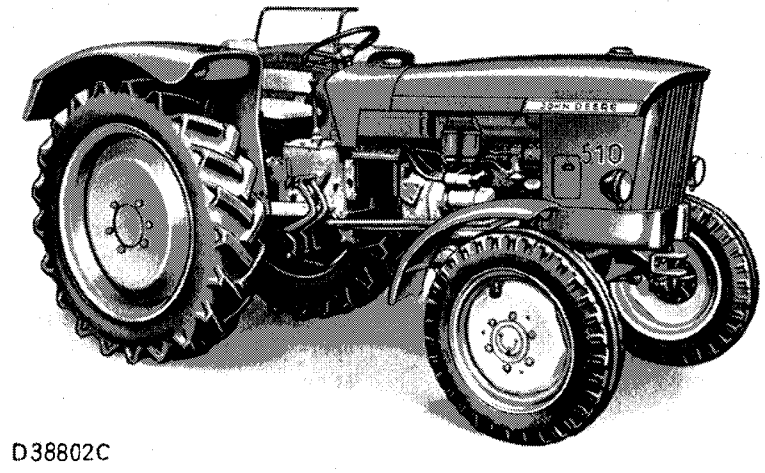
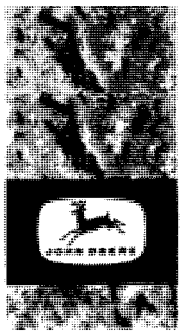


Fig 2: Tractor, right hand side.

This tractor complies with the Accident Prevention Regulations.
The necessary protective devices are delivered with the tractor.



Specification

DIESEL TRACTOR "510"

Engine - 152 D 221:

3-cylinder, 4-stroke diesel engine with direct fuel injection, overhead valves, twin circuit cooling with pump and thermostat, pressure lubrication, push button starter and cold starting device.

Firing sequence	1-2-3
Bore	3.86. ins (98mm)
Stroke	4.33 ins. (110mm)
Swept volume	152 cu. ins. (2.49 litres)
Revs/min at full load	2,400
Normal revs/min	1500 to 2400
Idling speed, revs/min	650
Horse Power (Engine Net Flywheel)	39.5 (40 PS DIN)

Travelling Speed in m.p.h.

Standard tractor: With rear tyres

Gear group and gear forwards	11 - 28 (Km/h)	9 - 36, 11- 32 13 - 28 (Km/h)	11 - 36 (Km/h)
I/1	0.9 (1.5)	0.9 (1.5)	1.0 (1.6)
I/2	1.7 (2.7)	1.6 (2.6)	1.7 (2.7)
I/3	3.3 (5.3)	3.2 (5.1)	3.4 (5.5)
II/1	2.2 (3.5)	2.1 (3.3)	2.2 (3.6)
II/2	3.7 (5.9)	3.5 (5.7)	3.8 (6.1)
II/3	7.3 (11.8)	7.0 (11.3)	7.5 (12.1)
III/1	3.0 (4.9)	2.9 (4.7)	3.1 (5.0)
III/2	5.1 (8.3)	5.0 (8.0)	5.3 (8.6)
III/3	10.4 (16.7)	9.0 (16.0)	10.6 (17.1)
I-III/4	12.2 (19.6)	11.6 (18.7)	12.4 (20.0)
reverse			
R/1	1.5 (2.4)	1.4 (2.3)	1.5 (2.4)
R/2	2.5 (4.0)	2.4 (3.9)	2.5 (4.1)
R/3	5.0 (8.0)	4.8 (7.7)	5.1 (8.2)

High speed tractor: With rear tyres

Gear group and gear, forwards	11-28 (km/h)	9-36, 11-32, 13-28 (km/h)	11 - 36 (km/h)
I/1	1.2 (1.9)	1.3 (2.1)	1.2 (2.0)
I/2	2.1 (3.3)	2.2 (3.6)	2.0 (3.2)
I/3	4.2 (6.7)	4.5 (7.2)	4.3 (6.9)
II/1	2.7 (4.4)	2.9 (4.7)	2.8 (4.5)
II/2	4.6 (7.4)	5.0 (8.0)	4.7 (7.6)
II/3	9.2 (14.8)	9.9 (16.0	9.4 (15.2)
III/1	3.8 (6.1)	4.1 (6.6)	3.9 (6.3)
III/2	6.5 (10.4)	7.0 (11.2)	6.6 (10.7)
III/3	13.2 (21.2)	14.2 (22.9)	13.5 (21.7)
I-III/4	15.4 (24.8)	16.7 (26.8)	15.7 (25.3)
reverse			
R/1	1.9 (3.0)	1.9 (3.0)	1.9 (3.1)
R/2	3.1 (5.0)	3.4 (5.4)	3.2 (5.2)
R/3	6.2 (10.0)	6.7 (10.8)	6.4 (10.3)

Power take off shafts:

Front: (mower drive 1008 revs/min at 2400 revs/min engine speed.

Rear: Right hand drive shaft Revs/min	Left hand drive shaft revs/min	At engine revs/min
540	944	2250
572	1000	2380
576	1008	2400

Hydraulic System

(Independent of Clutch)

Working pressure	2190 lbs/sq. in. (154 kg/cm^2)
Lifting power on drawbar (through full lifting range with lift rods at medium length)	
Category I	3352 lbs (1520 kg)
Category II	3594 lbs (1630 kg)
Time of stroke	2.4 secs
Rate of oil flow with 2000 revs/min	3.5 imp gals min (16 litres/min) (3.18 US Gals)
With power steering	7 gals/min (32 litres/min) (8.45 US Gals)

Flat Belt Pulley

Diameter	11.02 ins (280 mm)
Width	5.5 ins (140 mm)
Speed, revs/min	1430
Linear speed of belt at full speed	3950 ft/min (20 metres/sec)

Dynamo 12 Volt, 90/135 Watts

Batteries 2 x 6 Volt = 12 Volt, 98 Ah

Starter 3.9 hp (4 PS)

Tractor dimensions

(Assuming that the rear tyres are 11 - 32 AS, Front tyres 6.50 - 16 ASF, and with normal front axle.)

Length	134 ins (3400 mm)
Width over rear mudguard	59.4 ins (1510 mm)
Height above steering wheel	62.3 ins (1582 mm)
Height above bonnet	56.3 ins (1430 mm)
Ground clearance under front axle	19.3 ins (490 mm)
Wheelbase	81.6 ins (2072 mm)
Turning circle diameter	262.6 ins (6670 mm)
Tread width front (extension axle)	49.2 ins - 68.9 ins (1250 - 1750 mm)
for field	72.8 ins (1850 mm)
Tread width rear with reversible rims (multiple tread width adjustment, see opposite)	53.2 ins and 59 ins (1350 and 1500 mm)
Trailer tow coupling Height above ground	32.2" (820 mm)
Front hitch height above ground	22.4 ins (570 mm)

On request other tyres can be supplied from the price list by the dealer.

* The permissible load and tow-coupling depends on the load capacity of the tyres and the weight-registered in the log book up to 1764 lbs (800 kgs).
In this case extra weights must be placed on the front of the tractor.

Tank capacities

Engine oil (with filter)	approx.	1.25 imp gals (5.7 litres)
Coolant	approx.	2,5 imp gals (10.9 litres)
Fuel	approx.	13,75 imp gals (63.0 litres)
Gear oil	approx.	6,75 imp gals (31 litres)
Hydraulic oil	approx.	2,25 imp gals (10 litres)
Oil bath air filter	approx.	0,25 imp gals (1 litre)
Belt drive	approx.	0,125 imp gals (0.55 litres)

Rear wheel multiple track width adjustment:

Assuming that the overall width of the rear axle between the axle flanges is 55.6 ins (1415 mm); the track widths obtainable, using tyres 9-36, 11-28 or 11-32 are as follows:

50.2" (1275) - 54.1" (1375) - 58.0" (1475) - 62.0" (1575) - 65.9" (1675) - 69.9" (1775)

and with tyres 13-28

54.1" (1375) - 58.0" (1475) - 62.0" (1575) - 65.9" (1675) - 69.9" (1775)

with axle length 63.0" (1600 mm):

49.6" (1260) - 53.5" (1360) - 57.5" (1460) - 61.4" (1560) - 65.4" (1660) - 69.3" (1760) - 73.2" (1860) and 77.2" (1960). (With tyres 13-28 the tread width 49.6" (1260) is eliminated).

See page 20.

Please Observe That:

When travelling on the public highway the maximum permissible tractor tread width is indicated in the Ministry of transport Regulations for Road Vehicles. This tread width must not be exceeded.
This applies only to tractors going faster than 12.4 miles/hr. (20Km/hr).

(Specifications and design subject to change without notice.)

Controls and Instruments

Before putting your tractor into operation for the first time, make yourself conversant with the positions and functions of the various controls and instruments with the help of the illustrations in this operator's manual. Numbers in parenthesis indicate page with detailed information.

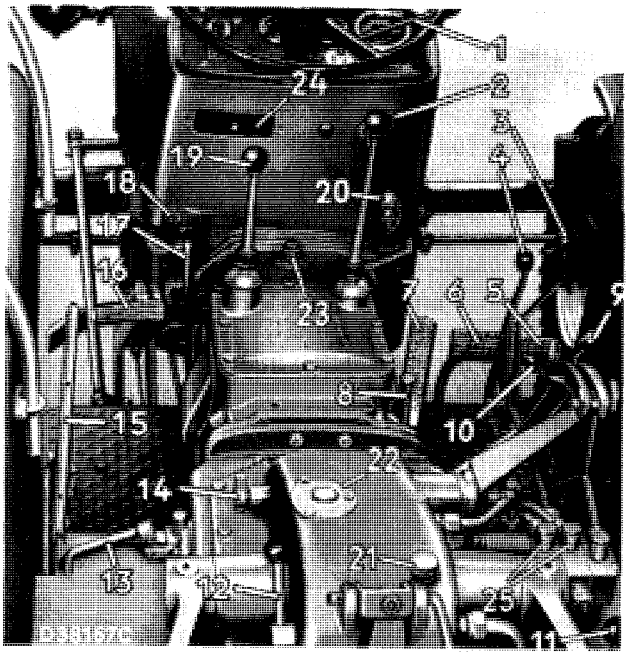


Fig. 3: Driver's controls

1. Hand throttle (8)
2. Gear lever (14)
3. Control lever for mower, lift etc. (29)
4. Control lever for front loader etc. (29)
5. R.H. Brake pedal (15)
6. L.H. Brake pedal (15)
7. Foot throttle (8)
8. Rear power take off engagement lever (24)
9. Control lever for lifting and lowering the links (27)
10. Automatic "System" selector lever (26)
11. Levelling crank for rear lower links (32)
12. Lift arm locking lever (for trailer bar) (29)
13. Differential lock actuating lever (15)
14. Rate of flow hydraulic control valve in transport position. (28)
15. Hand brake lever (16)
16. Dual clutch pedal (14)
17. Front power take off engagement lever (mower drive) (24)
18. Engine stop knob (9)
19. Gear range selector lever (14)
20. Connecting point for cold starting aid (9)
21. Dipstick and filler opening for hydraulic oil (58)
22. Cover for hydraulic oil filter (63)
23. Gear box oil - filler opening (63)
24. Fuse box (73)
25. Auxiliary control valves (29)

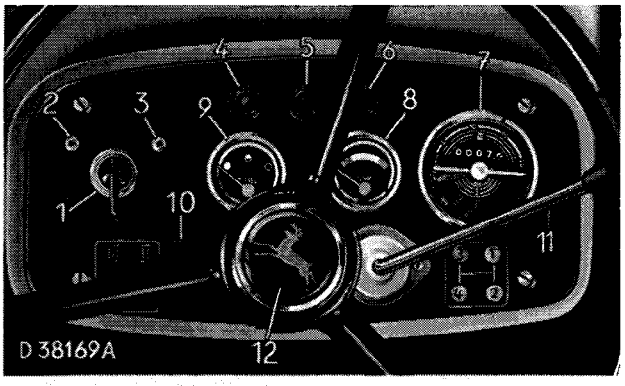


Fig. 4: Instrument panel

1. Trafficator switch with indicator light for tractor (13)
2. Indicator light for trafficator lights on Trailer I (13)
3. Indicator light for trafficator lights on Trailer II (13)
4. Green oil pressure warning light (11)
5. Red warning light (rate of charge from dynamo) (11)
6. Blue indicator light for high beam on headlights (13)
7. Tractormeter (12)
8. Water temperature gauge (11)
9. Fuel gauge (12)
10. Socket for inspection lamp (and wiper)
11. Hand throttle (8)
12. Horn button

Fig. 5: Engine, left side

1. Fuel injection pump
2. Exhaust manifold
3. Battery, left (53)
4. Fuel tank (43)
5. Engine stop knob
6. Steering drop arm
7. Steering drag link
8. Crank case ventilation tube (67)
9. Muffler
10. Exhaust pipe
11. Cylinder block

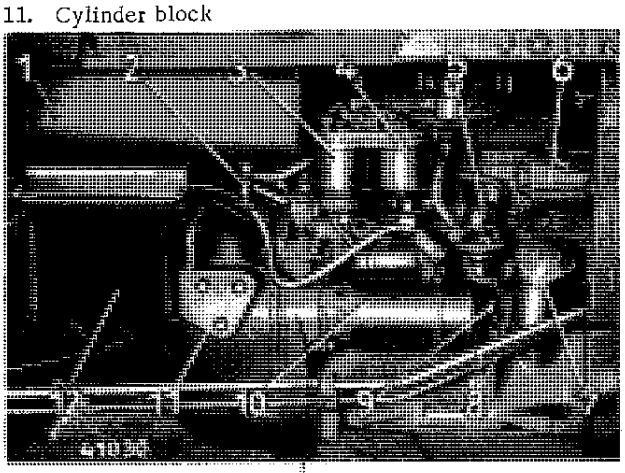


Fig. 6: Engine, right side

1. Fuel tank (43)
2. Fuel shut-off tap (7)
3. Fuel filter, second stage (64)
4. Fuel filter, first stage (64)
5. Fuel pump with sight-glass (65)
6. Dynamo (72)
7. Engine oil filter (58)
8. Hydraulic lines
9. Oil dipstick (51)
10. Starter (72)
11. Clutch housing and center frame
12. Battery, right (53)

Running-in Period

The running-in period is decisive in determining the length of life of the tractor.

After the first run with the tractor check, and if necessary, tighten the bolts on the front and rear wheels and on the extensible front axle, to make sure they are tight.

During the first 100 hours of running, the engine should run at high speed under medium load.

After the first 20, 250 and 750 running hours, as shown by your tractormeter, you must, without fail, have your dealer carry out the following inspecrions at his workshop.

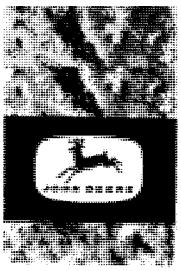
1. Inspection - after the first 20 operating hours:
   a) Change engine oil, change oil filter (page 58)
   b) Clean the hydraulic oil filter (page 63)
   c) Test and adjust the front wheel bearings (page 67)

2. Inspection - after the first 250 operating hours as above but in addition:
   d) Clean the oil-bath air-cleaner (page 59)
   e) Adjust the valves (page 65)
   f) Check and adjust fan belt tension (page 62)
   g) Change the gear-box oil (page 70)
   h) Test and adjust the brakes (page 60)
   i) Test and adjust the clutch (page 61)

3. Inspection - after the first 750 operating hours, as above and in addition:
   k) Test the injection nozzles (page 69)
   l) Drain and refill the cooling system (page 68)
   m) Change the hydraulic oil (page 71)

Periodic maintenance work should be carried out by yourself as described and at time intervals as shown on pages 47 - 50.

We recommend that you take your tractor for testing and adjustment at regular intervals to an accredited John Deere dealer.



Engine Operation

a) Before starting up for the first time:

Do not run the engine in a closed garage.
(Exhaust fumes are poisonous!)

1. Check that there is enough oil in the engine sump (page 51)
2. Check liquid level in radiator (page 51)
3. Check the oil in the air cleaner (page 52)
4. If there is a dust trap in front of the air cleaner check this and if necessary empty (page 52/80)
5. See if there is any dirt or water in the fuel pump sight-glass and, if necessary, empty this out (page 53)
6. Check the sediment bowl of the first fuel filter (page 53)
7. Grease or oil all the lubrication points on the tractor (pages 55 and 59).

b) Starting up the engine:

1. Use cold-start aid if the engine has to be started up in cold weather. (page 10).

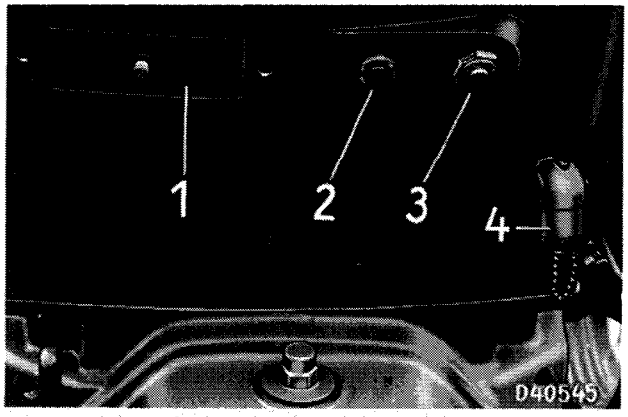


Fig. 7: 1. Fuse box
2. Starter button
3. Starter circuit and light switch key
4. Connection for cold starter

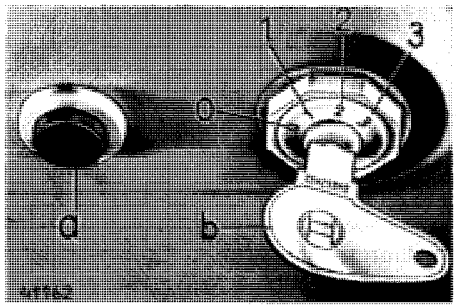


Fig. 8: a) Starter button
b) Starter and light circuit key

2. Insert the key:
The positions are as follows:
Position 0. Fig. 8 Connects all circuits for daylight operation (without lights).
Position 1. Brings in parking lights and tail lights with number plate light.
Position 2. Brings in dipped headlights, parking lights and tail light.
Position 3. Brings in main beam headlights, parking lights and taillights and the blue warning light.

When shifting starter switch from position 2 to 1 push key slightly before turning towards left. Use only original ignition keys.
When removing key from position 1 parking light stays on.

3. In position 0 (fig. 8) the red warning light for the dynamo lights up and also the green warning light indicating the oil pressure (if bulbs or fuses have burnt out they should be replaced immediately.
4. In position 0 (fig. 8) the fuel gauge shows the level of fuel in the tank, and the thermometer shows the cooling water temperature.
Even if the key is turned, these indications remain. The amount of fuel should now be checked on the fuel gauge (fig. 18) to make sure that there is enough fuel in the tank. (If the tank was completely drained and then refilled, the fuel system must be bled of air as described on page 72).

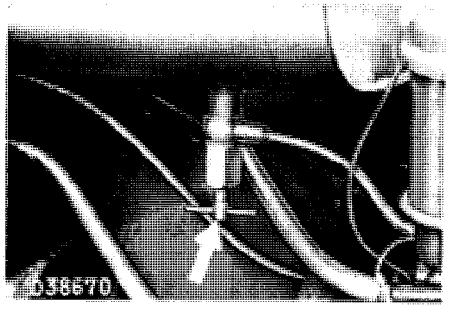


Fig. 9: Fuel shut off tap

5. The fuel stop cock (fig. 9) must be wide open. This cock should only be shut for cleaning the fuel filter or when the tractor is out of operation for several days.
6. Now adjust the hand throttle (fig. 10) to full engine speed (position 2, fig. 10) for tractors with Roto Diesel Pumps; for tractors with Bosch or Roosa Master Pump set hand throttle to medium engine speed. If equipped with lockable stop knob (to prevent unauthorized starting of engine), turn knob 1/4 turn to left and push it in.

7. The gear-selection lever must be set to neutral (fig. 25) and the power take-off shafts must be out of engagement (fig. 58 and 60).

8. With the switch key in the 0 position (fig. 8) push the starter button. The switch key should be set at 0 to avoid over-draining the batteries by switching on any other units which use electricity.

   As soon as the engine starts, immediately release the starter button.

   Both the red and the green warning lights should go out as soon as the engine runs at full speed. If this is not the case, switch the engine off again and investigate and eliminate the cause.

9. If the starter causes only a slow turning over of the engine due to cold, depress the clutch to its lowest position (that is to its stage 2 position) and continue until the engine starts.

   Allow the clutch pedal to come back slowly.

   The warning lights must go out when the engine is running.

10. Before repeating the starting sequence the engine must come to a complete stop. It is advisable to wait for one minute to allow the batteries to recover.

    Do not depress the starter button for more than 8 seconds at a time.

    Never press the starter button while the engine is running (damage to starter.)

    If the engine does not start this may be due to:-

    a) The batteries are down (recharge)
    b) Air in the fuel system (bleed, as described on page 72).
    c) The fuel filter is choked (clean according to page 64).

    For the elimination of maintenance faults see page 75).

11. When the engine has started up, the key should be left in as otherwise the electrical instruments are shut-off and there is no control of the engine.

After the engine has started regulate engine speed. If green warning lamp still lights when engine is running at high speed it is an indication that oil pressure is too low and damage to the engine may result. If red warning lamp continues to light it indicates that batteries are not being charged and that they are being depleted by electrical connections. Depleted batteries make starting difficult.

c) Warming up the engine

Before putting the engine under full load it must be warmed up to the correct operating temperature. Allow the engine to run for a few minutes at half speed.

Never leave tractor alone while engine is running.

d) Adjustment of engine speed:

For work in the field the hand throttle (fig. 10) is set immediately to the desired setting as shown on the tractormeter (fig. 19). When the accelerator pedal is released the engine speed will return to the speed set by the hand throttle. For travelling on the road the hand throttle should be set to the idling position and the tractor is controlled by the foot pedal.

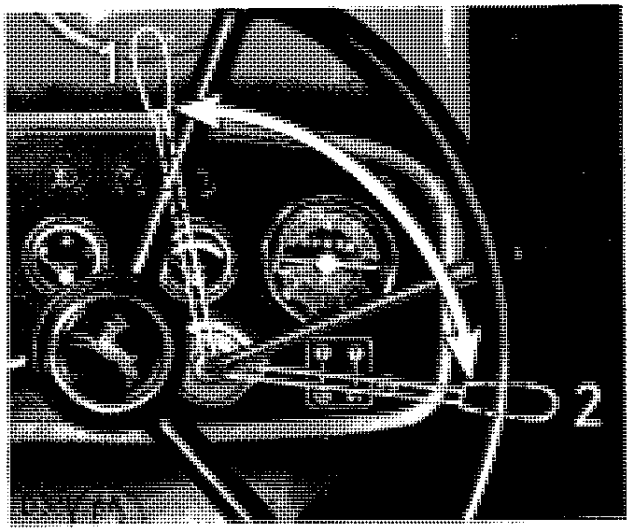


Fig. 10: Hand throttle 1. Low revs. 2. High revs.

The engine speed can be adjusted between 650 and 2400 rev/min. by hand throttle and foot pedal.

Fig. 11: Operation of the accelerator pedal

When the tractor is stationary with the engine running the hand throttle should be set to low engine speed. When the tractor is pulling a heavy load on soft ground or sand and the rear wheels begin to slip, do not increase the engine speed. The correct procedure is to change

down to a lower gear and then begin by pulling at low engine speed, which is gradually increased. (For action against slip see page 16). Because of the favourable torque characteristics of the engine, high tractive power is assured even down to 1500 revs/min. However, to prolong the life of the tractor it is advisable to operate at full throttle for heavy work.

e) Idling:

Do not run the engine for long periods in neutral gear at high revolutions.

Do not run the engine in neutral gear unnecessarily. If the engine will not work for some time, stop it altogether. This practice lengthens the life of the engine.

f) Stopping the engine:

Before stopping the engine allow it to run without load for a few minutes at low speed.

Fig. 12: Stopping the engine.

To stop the engine first move the hand throttle lever to idling speed and then pull out the engine stop knob (fig. 12) and hold it until the engine has stopped. Push the knob in. If equipped with lockable stop knob turn the knob in pulled out position 1/4 turn to the right to prevent unauthorized starting of engine. When stopping the engine during the day the tractor key should be in "O" position, but at night, on the open road, in Position "1". The key should be withdrawn so as to leave the parking lights "on" (fig. 8).

g) Operation in winter:

1. Fuel:

In conditions of severe cold, and if the tractor was not kept in a warm building over night, morning starting may be made difficult by the paraffin products which separated in the diesel fuel.

Paraffin separation can occur in summer grade fuel (Solidifying point 23°F (-5°C) to 14°F (-10°C) at a temperature of 32°F (0°C) whereas this trouble does not occur with winter grade, diesel fuel (solidifying point +5°F (-15°C) until 17.6°F (-8°C) is reached.

To avoid trouble with the injector pump and nozzle, do not use stored summer grade fuel in cold weather.

2. Batteries:

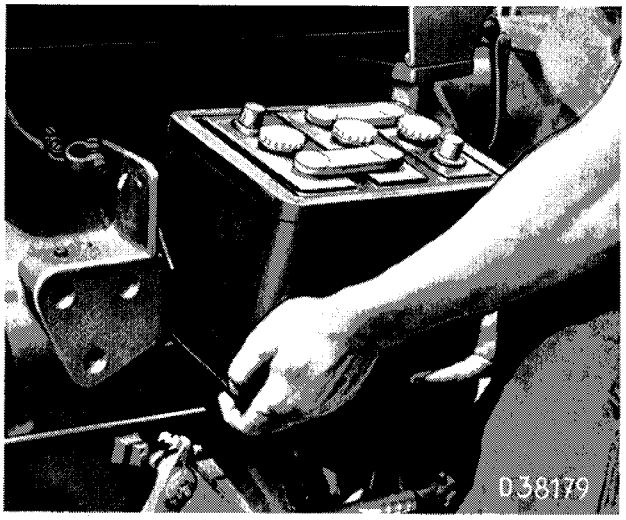


Fig. 13: Removing the battery

The capacity of every battery decreases when it gets cold. If the tractor cannot be kept in a warm place overnight during cold weather it is advisable to remove the batteries (fig. 13) and keep them in a warm room until morning. In this way it will start quickly next morning. (For reconnecting of batteries see fig. 134/135).

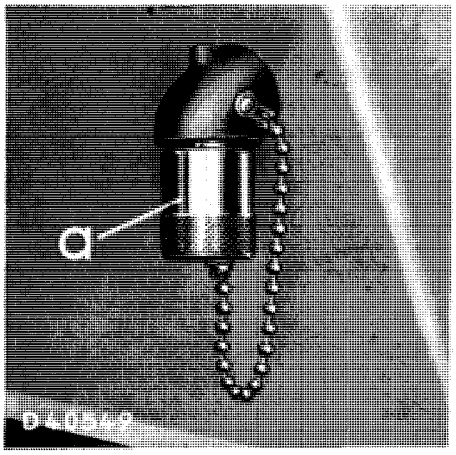


Fig. 14: Connection for the cold starting pressure can.

This cold starting device is used for temperatures from +32° to -22°F (0° -30°C). It facilitates starting by injecting a starting aid. This liquid is stored in pressure cans and is stocked by your dealer (order AR-27814-R- as (Fig. 15). Handle and store carefully: - inflammable: Do not smoke. Do not use or store near an open flame. Use the starter for one turn of the engine before injecting the starting fluid.

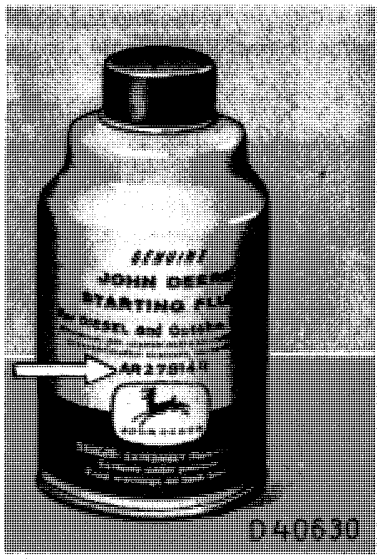


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Fig. 15: Pressure can for cold starting, arrow = order number

Then remove safety cap and nozzle off the pressure cannister. Remove the cap (marked "a" on Fig. 14) from the connecting point on the tractor. Fit the pressure can in position (see fig. 16) and press gently upwards until it fits.

Fig. 16: How to use the pressure can.

While starting: Immediately after pushing the starter button press the can upwards several times but only for short periods and only up to the moment when the engine has started. If the engine splutters, squeeze the can several times for a moment until the engine runs smoothly. Then remove pressure can. Shut it tightly and fit safety lid. The connection fixed to the tractor must be plugged as well, to avoid dust being sucked up into the engine.

The pressure can containing the starting liquid must be stored in a cool room (not in the sun or in a hot place). Bring it up to room temperature before using it the next time.

Please be careful - Inflammable.

The cold starting fluid contains ethyl ether - it must, therefore, be used in a well ventilated place. The fluid must no get into contact with your skin (use gloves). Do not set the can alight, do not perforate. Make sure it is stored out of children's reach.

Do not smoke or use an open flame near inflammables (Ether, fuel, grain, hay, etc.)

Be Safety Conscious

Observations During Running

a) Oil pressure warning light:

The green light 4 (Fig. 4) goes out if the required oil pressure has been reached.

The green light must come on when the ignition is switched on prior to starting the engine otherwise replace the burned-out bulb or fuse (page 73). If the green light does not go out after the engine has been started, the engine must be switched off again. Determine the cause and eliminate.

If the green light remains on continually, the engine must be switched off.

Check oil level in the engine crank case - top up if required (page 51).

b) Cooling system thermometer:

When the engine is cold the thermostat is closed and the cooling liquid does not flow through the radiator. Therefore, the engine quickly warms up to its operating temperature. As soon as the cooling liquid in the cylinder jacket has

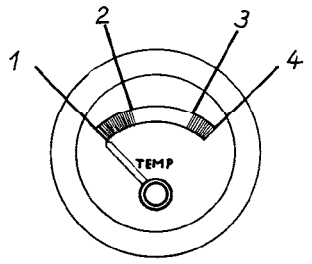


Fig. 17: Thermometer

Pointer indications:

1. 86°F (30°C) water temperature
2. 140°F (60°C) water temperature
3. 219°F (104°C) water temperature
4. 248°F (120°C) water temperature

reached approximate operating temperatures, the thermostat opens and allows the cooling water to flow through the radiator. When the tractor key is in position the electric temperature gauge shows the temperature of the cooling water (Fig. 8).

The optimum temperature = the white part of the dial.

If the temperature is too low, allow the engine to warm up before applying load (see page 8). If the temperature is too high, stop the engine immediately, determine the cause and eliminate.

Possible Causes of Trouble

Overheating:

1. Lack of cooling liquid. Check that the cooling system is not leaking. Fill up with water anti-freeze mixture (see page 51). If the engine is hot and the cooling system is empty, don't put in cold water. The sudden cooling may cause serious damage to the engine.
2. The fan belt is slack. Tighten it up (page 62)
3. The radiator is dirty. Clean it (page 68)
4. The thermostat does not open (defective - replace it).

Temperature too low.

1. There is only little load on the engine.
2. The thermostat is defective.

c) Red warning light for dynamo

The red warning light (5 in Fig. 4) indicates the correct functioning of the dynamo. If it does not light up when the tractor key is inserted and the engine is stationary, then the bulb is burnt out or the battery is down, or the electric circuit is interrupted.

When the engine is running the red warning light should go out, indicating that the dynamo and battery are functioning correctly.

When the tractor is operating the red warning light may flicker to some extent, particularly if the headlights or spotlight are being used. This is quite normal and the light will stop flickering in due course. But if the lamp flashes on and off, or if it becomes brighter with the engine running, there is a fault which must be found and eliminated.

Some possible causes are:

1. The batteries are too far discharged, or they are faulty. Recharge the batteries, or replace them.
2. The fan belt, which also drives the dynamo is slack or oily. Tighten up belt immediately, or clean it (page 62) to prevent damage to the dynamo.

3. A cable connection is loose or dirty, or a cable is broken, or there is a short circuit somewhere.
4. The carbon brushes in the dynamo are worn down or dirty, or they are not making proper contact with the commutator. Have the dynamo and regulator checked by the Bosch Service.

d) Fuel Gauge:

The electric fuel gauge (fig. 18) shows the amount of fuel in the tank as soon as the key is inserted. Keep a watch on your fuel level during operation, not only to avoid interruptions but also to prevent the fuel system from taking air.

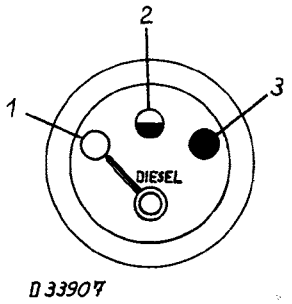


Fig. 18: Fuel gauge

1 = Empty, 2 = Half full approx. 7,0 imp.gals (31.5 litres)
3 = Full approx. 13,75 imp.gals (63 litres)

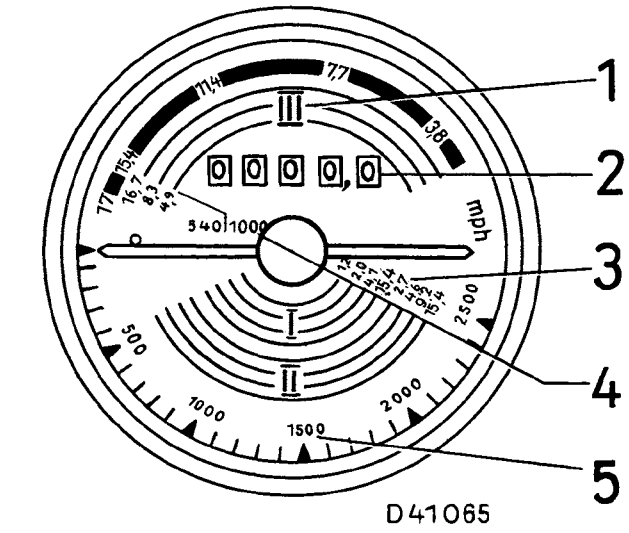
e) The tractormeter:

The tractormeter (Fig. 19) facilitates economic utilisation of the tractor under all operating conditions, The tractormeter allows you to choose correctly among the many possible gear ratios (see also page 14). For each kind of operation there is a choice of possible gear ratios together with the corresponding engine speed to give the desired travelling speed.

When the tractor is operated under heavy loads for example when ploughing, operating a harvester-binder, etc. the tractor will work best when the engine is turning at high speed in a low gear. On the other hand, when the work is light, the engine may be operated at medium speed (down to 1500 revs/min) to obtain a low fuel consumption. The desired travelling speed is obtained by selecting the appropriate gear ratio (page 14). When driving machinery from the power take-off shafts the gear ratio must be such that the machinery is driven at the correct speed with the engine running at full speed (see "Technical Data" on page 3).

The tractormeter (Fig. 19) indicates:

1. The engine speed, corresponding to the speed setting of the throttle.



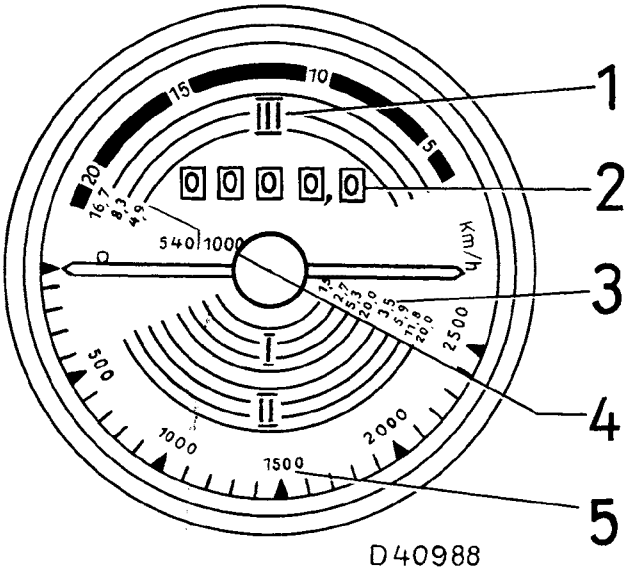


Fig. 19 : Tractormeter for tractors with top speed of 12.4 mph (20 km/hr).
1 - Gear group I - II - III
2 - Running hours
3 - Ground speed km/hr (mph) at rated speed
4 - Power take off shaft speeds revs/min
5 - Engine revs/min

2. The tractormeter also indicates the travelling speed of the tractor in the various gears. The travelling speeds for the Group I gears are shown by the left hand half of the instrument pointer on the yellow lines, and for the Group II gears on the green lines.
The travelling speeds for the Group III gears are shown on the white lines by the right hand half of the instrument pointer.
3. The speeds of the power take off shafts with the

engine running at full speed are indicated by the right hand half of the instrument pointer at 540 and 1000 revs/min. (See page 3).

4. The tractormeter indicates the number of running hours (in hours and tenths of an hour) in order to keep a check on the servicing periods (page 47).

f) Headlight and Blinker Lights:

1. Headlights:
   Inserting the tractor key activates the electric circuits, and the different lights are switched on and off by turning the key into the different positions.
   The positions, 1, 2, 3 switch the lights on according to Fig. 8. The blue warning light 6 (Fig. 4) lights up when the key is in position 3 (high beam headlights) and goes out when the key is switched over to position 2 (dipped) for the safety of other vehicles on the road.

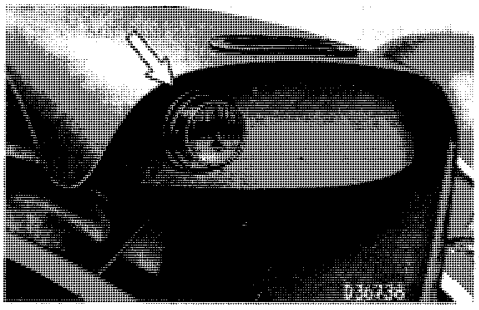


Fig. 20: Blinker and side light

For parking, the key is rotated into position 1 (Fig. 8) (parking lights). When the driver leaves the vehicle on a public highway he should withdraw the key in this position.

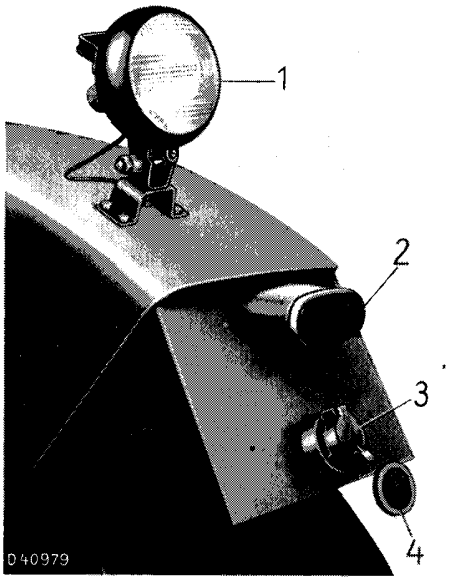


Fig. 21:
1. Headlights
2. Rear -, brake -, and blinker light (right)
3. 7-pole connection for trailer lighting system.
4. Reflector.

2. Trafficator lights:
   When operating with a trailer all the indicator lights are blinking (fig. 22). If one of the blinker lights fails, the corresponding indicator light goes out. When operating without a trailer the indicator light in the lever indicates the failure of a blinker light by staying on continuously.

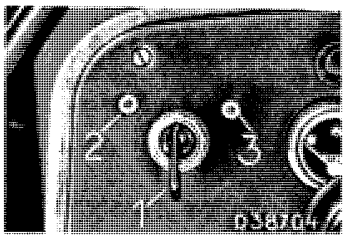
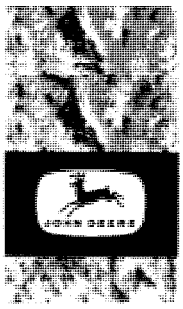


Fig. 22:
1. Blinker switch indicator lamp for tractor blinker lights.
2. Indicator lamp for blinker light on first trailer
3. Indicator lamp for blinker light on second trailer

Good Light - Good Sight



Operation of the Tractor

a) Clutch and Gears:

The double clutch system is actuated by the 2-stage clutch pedal. To declutch the engine push the pedal as far as the first stage, which can be felt with the foot. The tractor drive is now disengaged. This clutch position is used for changing gears 1-3 in each gear group. If the clutch pedal is depressed still further (second stage) the power take off shafts are disengaged. This is also the clutch position used for engaging the fourth gear (in each gear group) which gives the same travelling speed for all gear groups, that is to say irrespective of the position of the gear group lever.

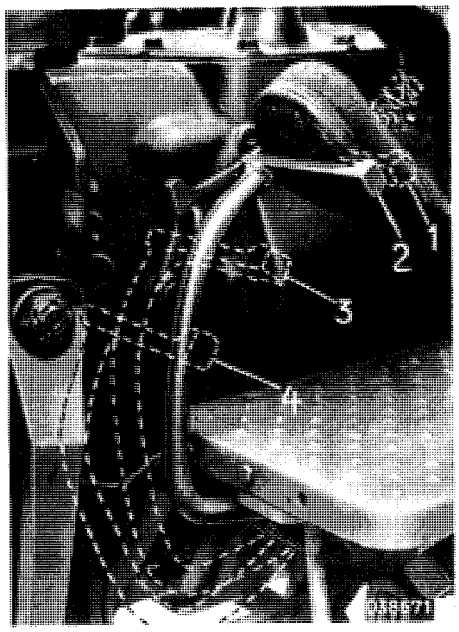


Fig. 23: Clutch pedal positions (double clutch system)

1. Rest position, clutch engaged
2. Beginning of disengagement for gears of all groups 1-3
3. Clutch 1-3 gear, tractor is at a standstill.
4. Power take off shafts disengaged, when fourth gear disengaged in each group, the tractor is also at a standstill.

When driving over rough roads or downhill or through curves reduce speed (Safety).

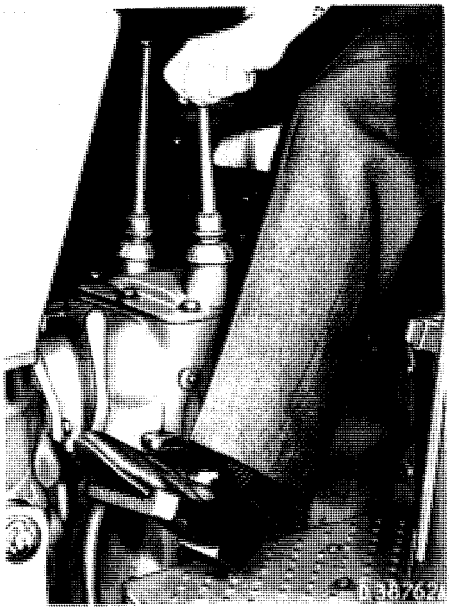


Fig. 24: Actuation of clutch pedal and gear-group lever.

Move both the gear levers, gently into the next position. Never force a gear lever.
Change the gear only with the clutch out. Change from forward to reverse only with the tractor at a standstill.

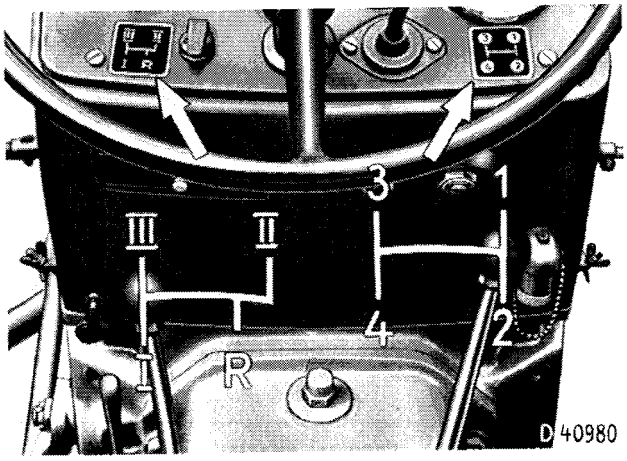


Fig. 25: Control lever positions for gear group and gear selection.

I) II) III) R) — gear groups

1 2 3 — gears in each group

Gear 4 = Top speed for each forward gear group I - III
R = Reverse gears

Do not slip the clutch any longer than is necessary to obtain a smooth start (clutch wear). Do not rest your foot on the clutch pedal while driving.
Never drive downhill with the clutch out or with the gears disengaged.

Before beginning a run downhill, engage the gear that you would use for climbing the same slope. For field work start out in the same gear as you would use for the work. The engine runs easier at high speed in a low gear, rather than at a low speed in a high gear.

When trailing a load along the road start out in low gear with the engine at full speed and then change up to increase your travelling speed (Fig. 25). In this way both the engine and the gears work easier.

When changing from a lower to a higher speed, first run with the engine turning fast, declutch, lower the engine speed, change to the higher gear, let the clutch in gently, and finally increase the engine speed.

To change silently from a higher to a lower speed, first let the speed pedal come back, then declutch, put the gear lever into neutral, engage the clutch for a moment while increasing the engine speed, declutch and move the gear lever to a lower gear. Engage the clutch again gently.

The tractor has a sliding gear transmission with 4 gear groups (3 forwards and one reverse groups) each of which has 3 individual gears. There is also an extra high speed gear which can be engaged with the group gear lever in any of the 3 forward positions, without requiring the gear group lever to be moved (see fig. 25). To engage the high speed gear depress the clutch pedal right down to the second stage position. (For travelling speeds see the "Technical Data" on page 3).

When the gear group selector lever is moved into the reverse position, the high speed gear cannot be engaged. There are thus altogether 13 different gear ratios, 10 of which are for forward drive.

As all the gears can be used with the engine turning at any speed under load, a wide selection of travelling speeds is available and the driver can select the best speed appropriate to the required tractive effort, the nature of the ground and the type of work to be done. By suitable selection a high economy of operation can be obtained.

When changing from the field to a road surface the gear ratio can, if desired, be changed simply by moving the group gear lever to give a different gear ratio, without touching the gear selector lever.

When driving machinery through the power take off shafts, the engine speed can be adjusted to give the correct take off shaft speed.

The tractormeter (fig. 19) facilitates effective utilisation of the 10 gear system (see page 12). When the tractor is doing heavy work the engine speed should be observed on the tractormeter in order to avoid overloading the engine. If the engine speed falls below the value set by the speed lever, change down to a lower gear. Prolonged overloading of the engine is not only uneconomical but causes excessive wear.

CAUTION: Never pull tractor for a longer period; this may result in damage to transmission.

b) The differential lock:

If the differential is locked, the two driving wheels of the tractor rotate at the same speed, irrespective of the

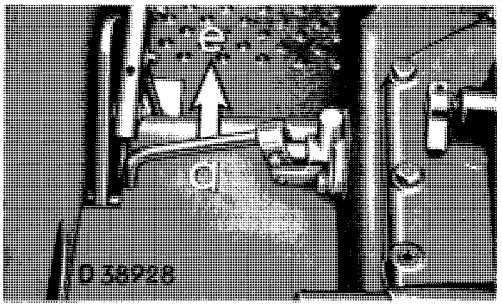


Fig. 26: Engaging the differential lock.
e = engaged
a = disengaged

ground. The wheel on one side cannot turn faster than the other one by slipping. This prevents a wheel from digging itself in by slipping on loose or muddy soil, and gives the tractor a better grip on an icy surface.

To lock the differential first declutch and then while starting up again slowly pull the lever upwards (fig. 26) until you can feel the lock engaging. Finally engage the lock completely by pulling the lever right up.

Do not use the differential lock on curves.

When the tractor has got a good grip on the ground again, put the clutch out, push the differential lock lever right down and engage the clutch again.

c) The tractor brakes:

To negotiate a tight curve to the left, actuate the left foot brake pedal and vice versa. The steering wheel should be turned first all the way around to

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its stop, and then the appropriate brake pedal is depressed enough to bring the tractor round the corner. Use the brakes for steering only while travelling slowly.

Fig. 27: Steering with brakes

If one wheel of the tractor begins slipping, apply the brake on the side of the wheel which is turning faster (or use the differential lock, see fig. 26).

When stopping the tractor actuate both brake pedals at the same time.

Fig. 28: Braking the tractor

When travelling on the road it is a safety requirement that the two brake pedals should be coupled together by pivoting over the lock plate (fig. 29) so that they must necessarily be actuated simultaneously. Do not apply the brakes suddenly. The hand brake lever (fig. 30) which can be locked in place is used for parking the tractor on a slope or driving machinery by belt.

When running down a hill with a trailer, apply the trailer brakes and move the engine speed hand lever to the slow speed position.

It is essential to safety that the brakes should always be kept in good condition. If the brakes are found to be loosing effectiveness, this should be remedied without delay (see page 60).

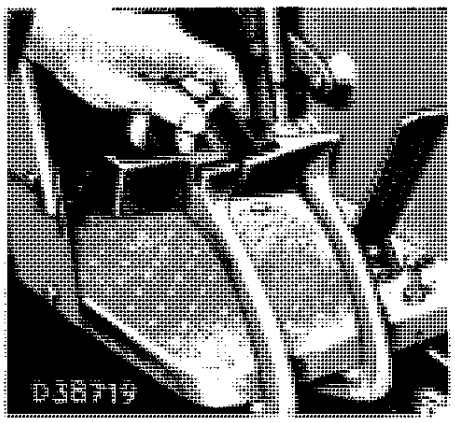

Fig. 29: Locking the brake pedals together

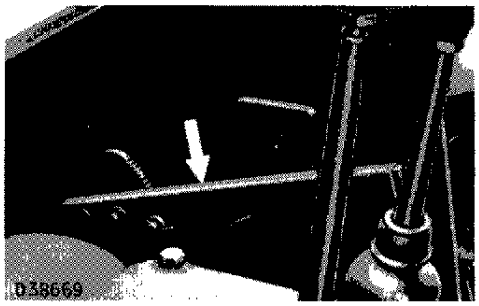

Fig. 30: Hand brake lever

d) Filling the rear tyres with water:

When the tractor has to pull a heavy trailer load (plough cultivator) or operate on unfavourable ground (slippery clay) or when pulling heavy trailers, the tractive effect can be increased by filling the rear tyres with water. This decreases wheel slip and helps to preserve the tyres.

1. Filling the tyre:
   Raise the rear end of the tractor with a car jack or with the lever jacks (page 40) to bring the rear tyres clear of the ground. Unscrew the valve cap and remove the nipple. Push the nipple on to the valve and other way round and screw out the valve insert, thus releasing the air from the tyres.

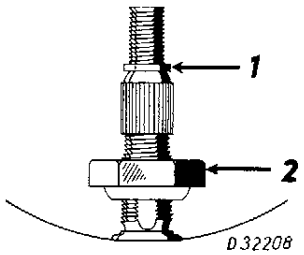

Fig. 31: Tyre valve
1 insert 2 valve nut