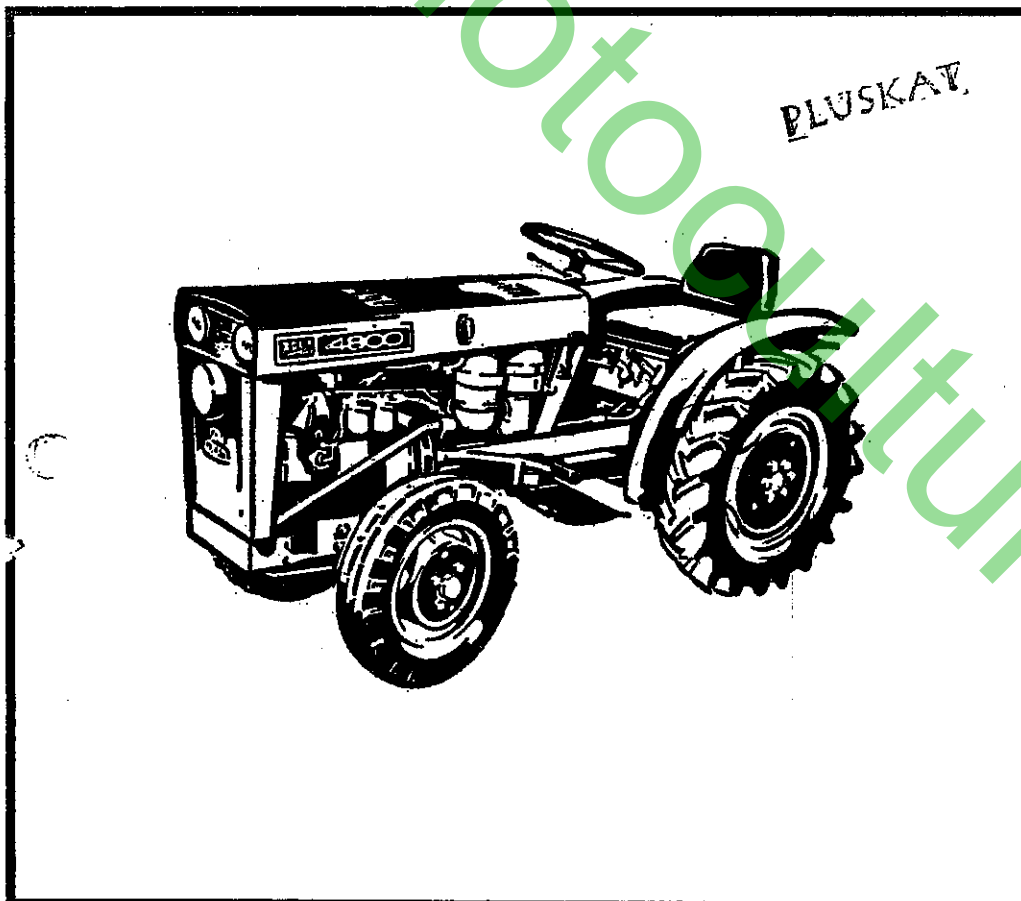


agria

PLUSKAT.

MODEL 4800

with Ruggerini engine CRD 100



Points requiring special attention !

Check daily:

1. Oil level in crankcase of engine
2. Oil-bath air filter and oil level according to mark on oil container
3. Air pressure of pneumatic tyres of tractor and trailer
4. All screws and nuts, especially on wheels

After the first 25 hours of operation:

1. Change oil in machine and engine
2. Check valve clearance and adjust, if necessary

After every 50 hours of operation:

1. Change motor oil
2. Check valve clearance and adjust, if necessary

For further maintenance work

see chapter „Maintenance and Service“



Instruction Book

MODEL 4800

with Ruggerini engine CRD 100

480/6

Agria-Werke GmbH 7108 Möckmühl / Württ.

Telephone 06298/5061

W-Germany

Telex 0466791

Dear AGRIA owner!

Before working with your new tractor, let the representative who sold it to you explain and demonstrate the machine.

You should then carefully study this manual, making yourself thoroughly familiar with its contents.

Any damage arising due to non-observance of our instructions, is not covered by guarantee. It will, therefore, pay to read this manual carefully.

Exact knowledge of this instruction book will make it easier for you to operate the tractor efficiently and will make your work a pleasure.

AGRIA-WERKE Moeckmuehl

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General hints

The AGRIA Universal Small Tractor will always prove reliable und ready for operation, if serviced, operated and treated with care.

This booklet will provide the necessary information. Careful study of it and — if necessary — inquiries addressed to your AGRIA Service will save annoyance, time and money. Do not follow the well-meant advice of people who are not familiar with AGRIA-machines.

Never use force. It is no substitute for practical knowledge or suitable tools. Do not try to repair the tractor yourself, if a fault cannot be recognized or remedied with certainty.

Take the machine to the AGRIA agent or have him come to you. With his knowledge and experience and his well equipped workshop he will be able to effect repairs quickly and therefore inexpensively.

Routine Checks:

1. Check **oil level** in the crankcase of the engine and top up if necessary with the **same brand of motor oil** as used on the last oil change. The oil level should reach the mark on the oil dipstick (ill. 22, page 10)!

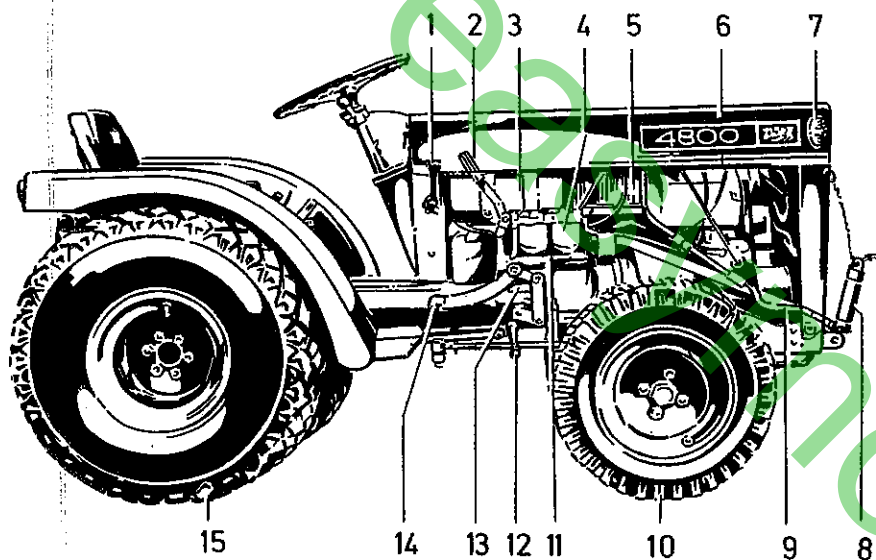
Do not mix oils of different brands, nor different kinds of oil manufactured by the same firm!

Use motor oils of HD-quality only!

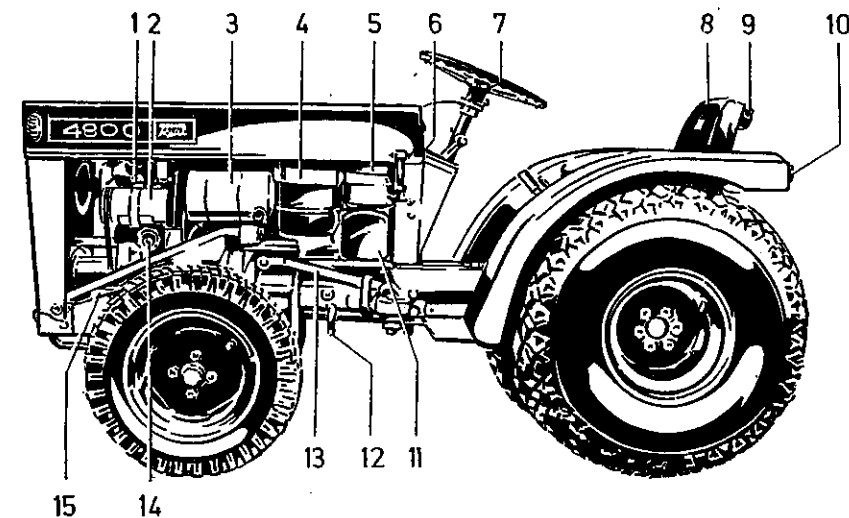
2. Check **oil level** in tractor casing. The oil level should always reach the mark on the oil dipstick (ill. 5, page 8).
3. Check **air filter** (ill. 4, page 7) frequently and ensure that sufficient clean oil is added up to the mark on the oil container. See page 31 for cleaning instructions.
4. Check that there is **sufficient fuel in the tank**. The tank should never be completely emptied, to prevent air entering the pipes. If this should happen in spite of all precautions, follow our instructions on page 26.
5. Check the **oil container** for the hydraulic system (ill. 5, page 7). When the oil filter screw is removed, the oil level should be visible. Top up only with the same brand of oil as before. (See page 19).
6. Clean and lubricate or grease the tractor and the attachments regularly and tighten loose screws and nuts. The lubricating points are mentioned in the chapter "Care and maintenance" on page 31.

7. Check the **brakes** and adjust them if necessary. See illustration and description on page 24 and 35.
8. Check the **lighting system**. If you do not use the tractor regularly or have not used it for a longer period, the battery may need recharging. (See page 15 and page 36).
9. For further instructions on maintenance and service, see pages 31 – 36.

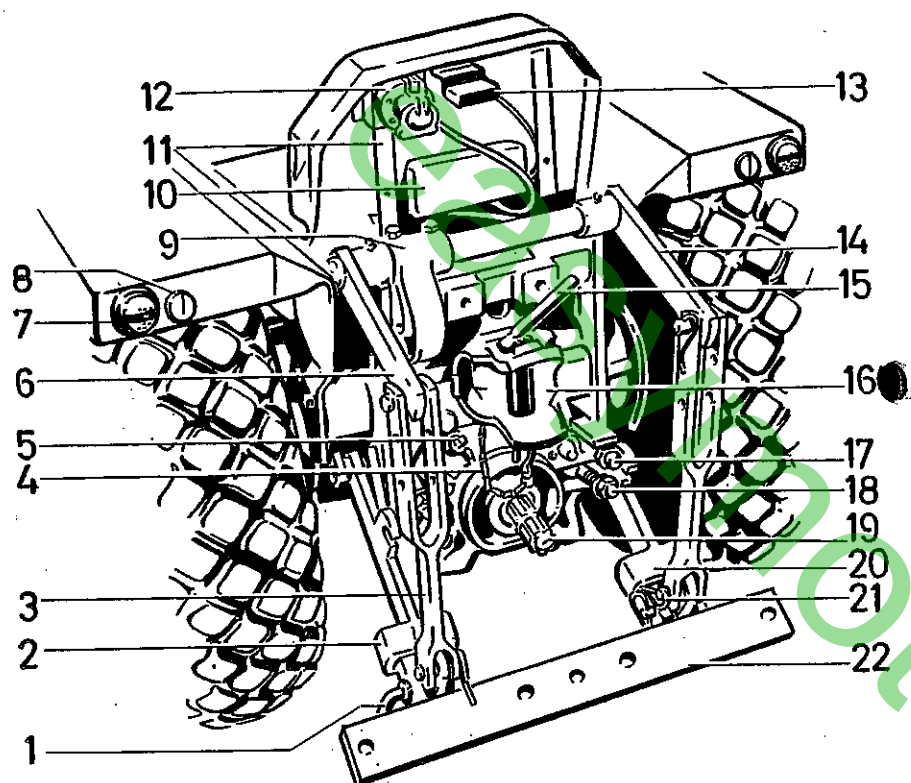
Designation of main components



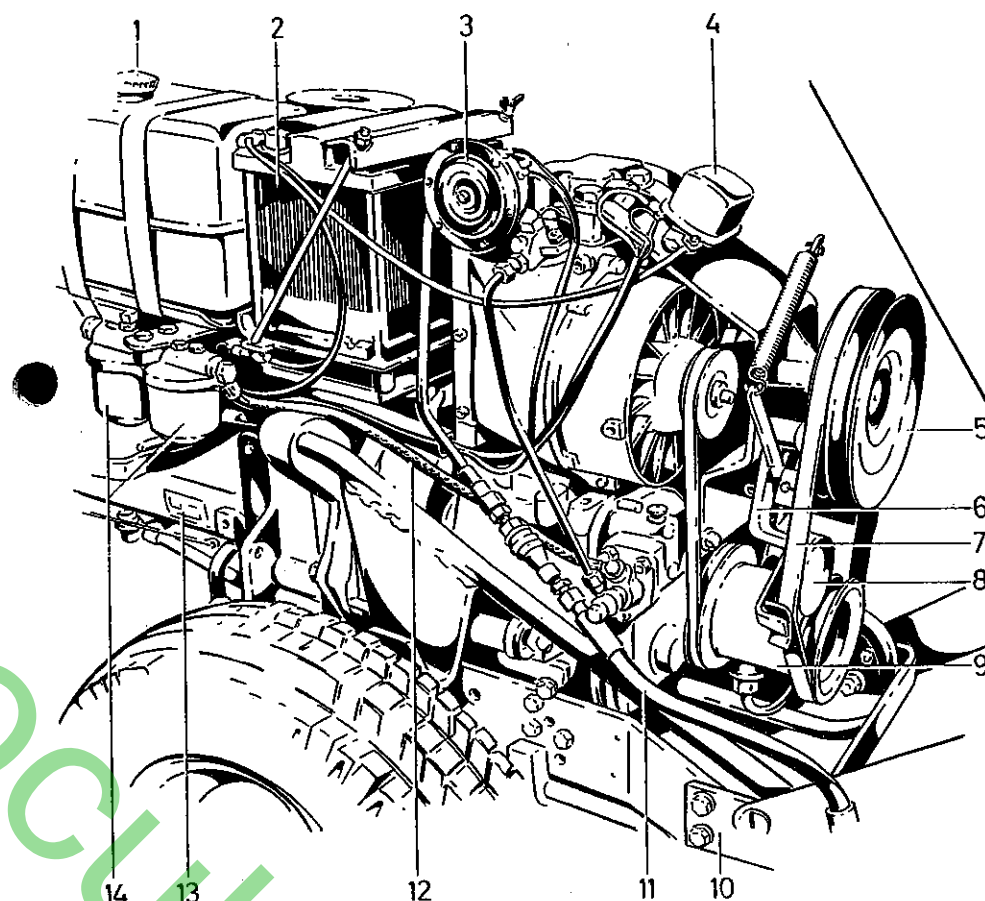
- 1 Locking handle for bonnet
- 2 Operating lever for front driven implements
- 3 Fuel tank
- 4 Fuel stage filter
- 5 Battery
- 6 Bonnet
- 7 Blinker, right
- 8 Working cylinder for hydraulic lift, front
- 9 High pressure hose for hydraulic lift, front
- 10 Front wheel with tyre 6 x 12 AS (B 3), or 4.00 x 12 AM
- 11 Starter
- 12 Bracket
- 13 Tractor No.
- 14 Brake pedal
- 15 Rear wheel with tyre 10.00 x 12 AM, or 7.50 x 16 AS



- 1 Oil filter
- 2 Light generator
- 3 Exhaust
- 4 Oil-bath air filter
- 5 Oil tank
- 6 Dash-board
- 7 Steering wheel
- 8 Driver's seat
- 9 El. socket
- 10 Combined blinker/tail lamp
- 11 Tool box
- 12 Bracket
- 13 Clutch pedal
- 14 Handwheel for engine speed adjustment
- 15 Hydraulic pump for hydraulic system



- 1 Connecting pin
- 2 Pull bar, left
- 3 Lifting bar
- 4 Retaining chain for plug
- 5 Oil dipstick, oil inlet for gear oil
- 6 Lifting arm, left
- 7 Combined blinker/tail lamp
- 8 Reflector
- 9 Bent crank
- 10 Protective cover on cable connector
- 11 Holder for number plate
- 12 El. socket
- 13 Number plate lighting
- 14 Lifting arm, right
- 15 Coupling bolt
- 16 Implement coupling
- 17 Eyebolt with cap nut for fastening the lifting arms
- 18 Eyebolt with hex. nut for mounting the attachments
- 19 Power take-off shaft
- 20 Pull bar, right
- 21 Clip
- 22 Implement bar

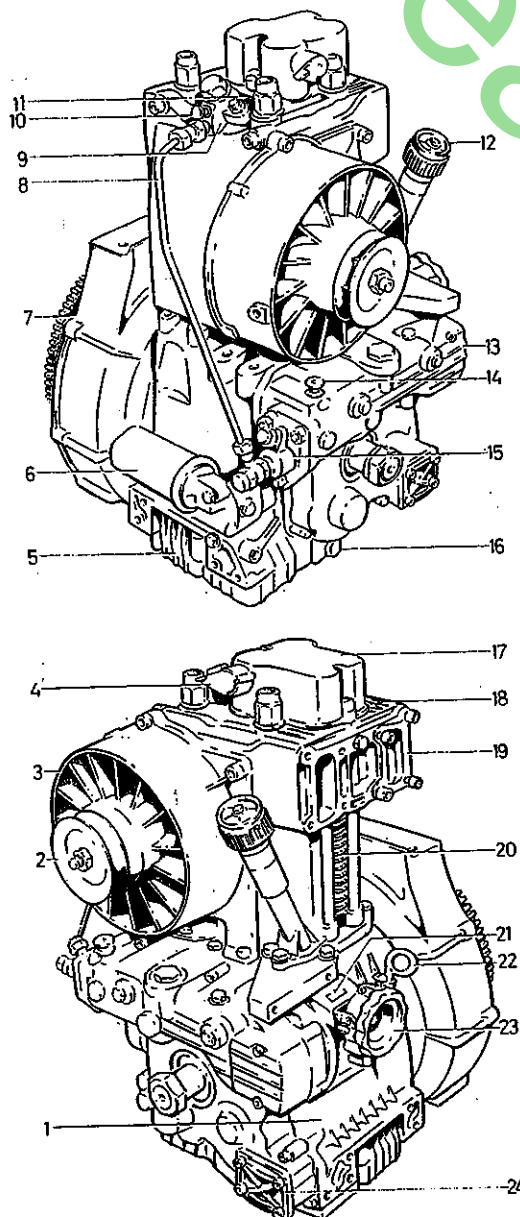


- 1 Fuel inlet
- 2 Battery
- 3 Horn
- 4 Regulator switch
- 5 V-belt pulley of p.t.o. for front driven implements
- 6 V-belt tensioner
- 7 V-belt
- 8 Tensioner
- 9 V-belt pulley (driven from engine)
- 10 Front carrier
- 11 High pressure hose for hydraulic lift, front
- 12 Fuel hose between fuel stage filter and injection pump
- 13 Tractor No.
- 14 Fuel stage filter

Description of main components

1) Engine

Ruggerini Engine CRD 100



- 1 Crankcase
- 2 V-Belt pulley for fan
- 3 Fan casing
- 4 Decompression lever
- 5 Oil sump
- 6 Lubrication oil filter
- 7 Engine flange
- 8 Pressure pipe
- 9 Nozzle holder with injection nozzle
- 10 Connection for overflow hose
- 11 Plug for starting aid
- 12 Oil inlet with vent
- 13 Governor casing
- 14 Starter button
- 15 Injection pump
- 16 Oil drain screw
- 17 Valve housing lid
- 18 Cylinder head
- 19 Connecting flange for exhaust muffler
- 20 Ribbed cylinder
- 21 Engine No.
- 22 Oil dipstick
- 23 Handwheel for engine speed adjustment (with setting screws)
- 24 Connection for hydraulic pump

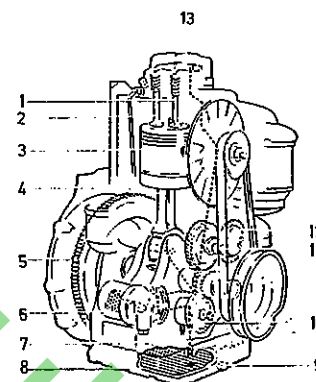
Method of operating and design

The built-on Diesel engine works on the four-stroke principle. The crankcase contains the crankshaft, the cam shaft, all regulating and control parts, and the injection pump.

The engine is cooled by an axial blower. The cooling air is led through air cowlings which enclose the cylinder and cylinder head. The blower is driven by the starting pulley on the crank shaft by an endless V-belt.

The cylinder head with cast-in turbulence chamber and shrunk valve seat rings contains the nozzle holder with injector, the rockers and the valves, as well as the decompression lever and the priming vent.

Lubrication



- 1 Valve tappet, intake
- 2 Valve tappet, outlet
- 3 Piston
- 4 Piston rod
- 5 Starter gear wheel
- 6 Lubrication oil filter
- 7 Strainer
- 8 Oil sump
- 9 Drain plug
- 10 Eccentric geared pump
- 11 Cam gear
- 12 Governor drive
- 13 Rockers

The engine is lubricated by means of the eccentric geared pump. The oil passes the strainer in the oil sump, it is drawn up by the pump and delivered, via the lubrication oil filter (ill. 6, page 10) to the various lubricating channels.

Lubrication of the engine is extremely important. The oil level should be checked daily. Use only recognized motor oils with HD-addition. Keep to the same type of oil, see filter maintenance instructions on page 37.

Important:	The surrounding temperature is decisive for the oil quality to be used:		
	for temperatures below	+15° C	HD-oil SAE 10
	for temperatures between	+15° C and +25° C	HD-oil SAE 20 W/20
	for temperatures above	+25° C	HD-oil SAE 30

If too viscous lubrication oils are used at low temperatures, starting troubles may arise due to too much friction at pistons and bearings.

The oil consumption of an engine may amount to 0,2 liters for 10 hours of operation. The oil consumption of a new engine may be higher, but this is not irregular. Even in this case, there is no objection to the engine being used, provided that the oil level is checked daily. After appr. 100 to 200 hours of operation the oil consumption will return to normal.

We recommend the use of multi-range oils, such as **ESSO EXTRA MOTOR OIL 10 W-30** in order to be independent of outside temperatures and because only one kind of oil is required.

Injection system

The durability of the injection pump and the injection nozzle primarily depends on the purity of the fuel. The greatest cleanliness is therefore essential while storing the fuel and filling it into the fuel tank.

The injection pressure should be 200 atü (atmospheric excess pressure). This should be checked every 100 working hours. See hints on page 38.

Fuel filters

On its way from the fuel tank to the injection pump, the fuel is cleaned by a fuel stage filter with ante and fine filter (ill. 4, page 6).

Care should be taken to ensure that the connections of the inflow and the off-flow are correct and that the sealing rings fit tightly in the depressions on both sides. Sealing rings which are too big may result in starting difficulties and possibly even in a loss of power.

The maintenance of the filter is described on page 32.

All recognized Diesel fuels on the market with a specific weight of 0,83—0,84 kg/l may be used for operating the engine. The fuel must be free of sand and water, so that no dirt can enter the injection pump and the nozzle, in order to prevent early wear and tear and faults. Only well filtered fuel should be used.

For filling the fuel into the tank a funnel with strainer and chamois leather filter should be used, if possible.

Diesel fuels are available on the market for summer and winter operation. In order to ensure trouble-free operation of the engine, summer fuel should be used for temperatures down to 0° C and winter fuel for temperatures down to -15° C.

At temperatures below these values, i.e. 0° C for summer fuel and -15° C for winter fuel, paraffin is formed which has negative effects on pipes, pump and nozzle. To prevent this, kerosene respectively gasoline should be added to the fuel according to the following mixing proportions:

Outside temperature	Diesel techn. petroleum	Diesel gasoline
down to -20° C	75 : 25	80 : 20
down to -25° C	60 : 40	70 : 30
down to -30° C	45 : 55	60 : 40

It should be taken into consideration, however, that these mixed fuels are more inflammable than pure Diesel fuel.

Speed control

Due to the built-in regulator, the number of rotations of the engine set by the position of the throttle (ill. 15, page 29) remains constant within the usual permissible limits at any load.

The engine should not exceed the r.p.m. quoted on the data plate, when under load. The precision speed regulator is correctly set by the manufacturer. Any unauthorized alteration of the regulator setting to reach a higher engine speed endangers the engine and automatically renders any guarantee claims invalid.

Air filter

The low wear and tear and the long durability of the engine depend — to a high degree — on the purity of the intake air. The special air circulation in the oil pot guarantees continuous circulation of the oil, above all in the lower filter cartridge, thus continuously rinsing the filter filling clear of dust deposit. Output, reliability and economy of operation and durability of the engine decisively depend on the full efficiency of the air filter. Careful maintenance of the oil-bath air filter is therefore of particular importance.

Cleaning should be done at short intervals, or even daily, if dust deposits are high. Whenever the output of the engine drops, check and clean the filter first!

(Detailed description of the cleaning process on page 31).

II) Frame

The frame connects the engine with the gearbox. It contains engine clutch, engine pinion, front axle, steering device, operating levers, dashboard, foot rest and pedals.

III) Gearbox

The gearbox contains all necessary devices for the operations described in chapter VIII. It contains or has mounted on it rear axle, implement coupling, p. f. o. shaft, driver's seat with mudguards and the hydraulic lift.

IV) Rubber drive wheels

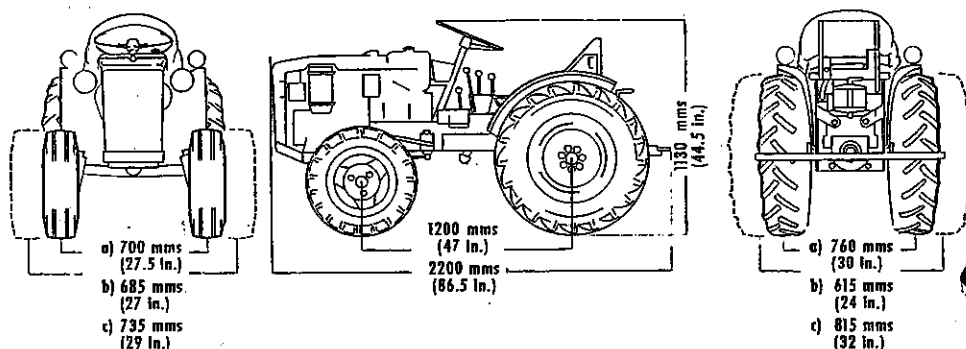
We supply the tractor with the following standard tyres:

1. 6 x 12 AS (B 3) front, 10.00 x 12 AM rear = for one-sided use.
2. 4.00 x 12 AM front, 7.50 x 16 AS rear = for use on both sides.

With these the following wheel tracks are obtainable (from wheel centre to wheel centre):

- | | |
|--------------------|----------------------------|
| a) 6 x 12 AS (B 3) | front = 700 mms (27.5 in.) |
| 10.00 x 12 AM | rear = 760 mms (30 in.) |
| b) 4.00 x 12 AM | front = 685 mms (27 in.) |
| 7.50 x 16 AS | rear = 615 mms (24 in.) |
| c) 4.00 x 12 AM | front = 735 mms (29 in.) |
| 7.50 x 16 AS | rear = 815 mms (32 in.) |

In normal position a) and b) the valves for the air tubes point outwards, in position c) inwards towards the machine



The tyre pressure should be:

Front wheels	4.00 x 12 AM Front	=	1.5 atü (21.3 p. s. i.)
"	6 x 12 AS (B 3)	=	1.5 atü (21.3 p. s. i.)
Rear wheels	7.50 x 16 AS	=	1.5 atü (21.3 p. s. i.)
"	10.00 x 12 AM	=	1.0 atü (14.2 p. s. i.)

Check tyre pressure frequently!

For increased traction, wheel weights are available for the front wheels 4.00 x 12 AM front and for the rear wheels 7.50 x 16 AS. These are fitted in the threaded holes provided in the wheel rims.

It is also possible to increase the weight still further by filling the rear tyres with water after installing a suitable valve.

V) Lighting and signalling system

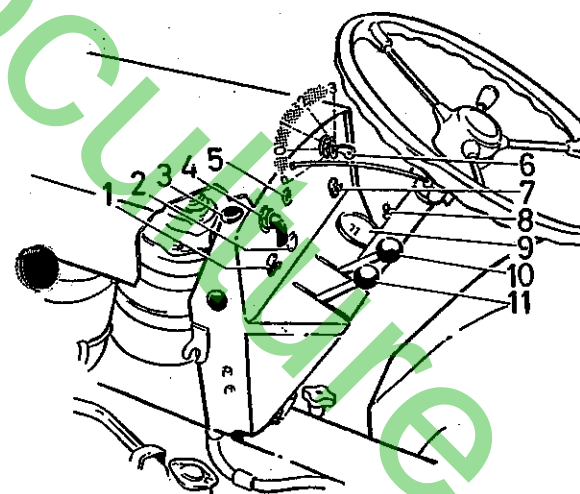
A 12 Volt system is installed. Current is generated by the Bosch generator 0 101 209 031 (ill. 2, page 7). A Varta battery 12 V, 44 Ah, 210 A is used (ill. 5, page 6).

Both headlamps contain one 15 Watt and one 4 Watt bulb each. The blinkers (ill. 7, page 6/ill. 10, page 7) contain 18 Watt strip lamps, the rear lights (ill. 7, page 8) and the number plate light strip lamps (ill. 13, page 8) of 5 Watts each.

The switchbox for the whole system is mounted on the dashboard (ill. 6, page 7). The main parts are:

- the fuse box with 4 fuses 8 Amp.
- the charging indicator lamp
- the control lamp for the blinkers
- the light/ignition switch Bosch 0 342 202 001
- the blinker unit Bosch 0 336 200 033
- the blinker switch Bosch 0 341 301 001 with control lamp (one 2 Watt bulb)
- the starter button
- the button for the horn
- the hour meter VDO 331 87/1/16

An electric horn is provided as a signalling device (ill. 3, page 9) which is operated by pressing the button (ill. 1).



- 1 Button for horn
- 2 Charging indicator lamp
- 3 Rubber buffer for bonnet
- 4 Blinker switch with control lamp
- 5 Control lamp for the blinkers on trailer
- 6 Light/ignition switch with ignition key.
Position 0: ignition key can be inserted or withdrawn.
Position 1: electric circuit is switched on, starter can be operated
Position 2: parking lights
Position 3: headlights
Position P: ignition key can be withdrawn, parking lights remain on
- 7 Starter button
- 8 Lubricating nipple for steering column
- 9 Hour meter
- 10 Operating lever for hydraulic lift, front
- 11 Operating lever for hydraulic lift, rear

Working principles of the electrical system indicated in illustration on page 15:

The **ignition key** can only be inserted and withdrawn at positions "0" and "P".

It should also be noted that before switching to position "P" and before switching back from position "3", the ignition key must be pressed in further.

Position P = Parking lights. Both parking lights, both tail lights and the number plate light are on (as in position 2).

In **Position 1** the control lamp lights up (ill. 2, page 15). The machine can now be started by pressing the starter button (ill. 7, page 15).

As soon as the engine starts the control lamp goes out. The current from the dynamo recharges the battery.

In **Position 2** the parking lights are switched on. Both parking lights, both tail lights and the number plate light are on.

In **Position 3** both headlights are switched on. At the same time both parking lights, both tail lights and the number plate light are on.

Press home the ignition key before turning it back towards "0".

The **blinker lights** are operated by means of the blinker switch (ill. 4, page 15), which is swiveled to the left to operate the left blinker, and to the right to operate the right blinker.

At the same time the red lamp in the switch blinks in the same rhythm. The control lamp (ill. 5, page 15) only lights up when the trailer is attached. When necessary, the control lamp in the switch can be replaced by pulling it out of its socket.

Behind the driver's seat a seven pole **electric socket** is provided (ill. 12, page 8) for attachments. The combined blinker/tail lights of these can be connected up by a connecting cable.

If faults occur in the electrical system, please observe the following:

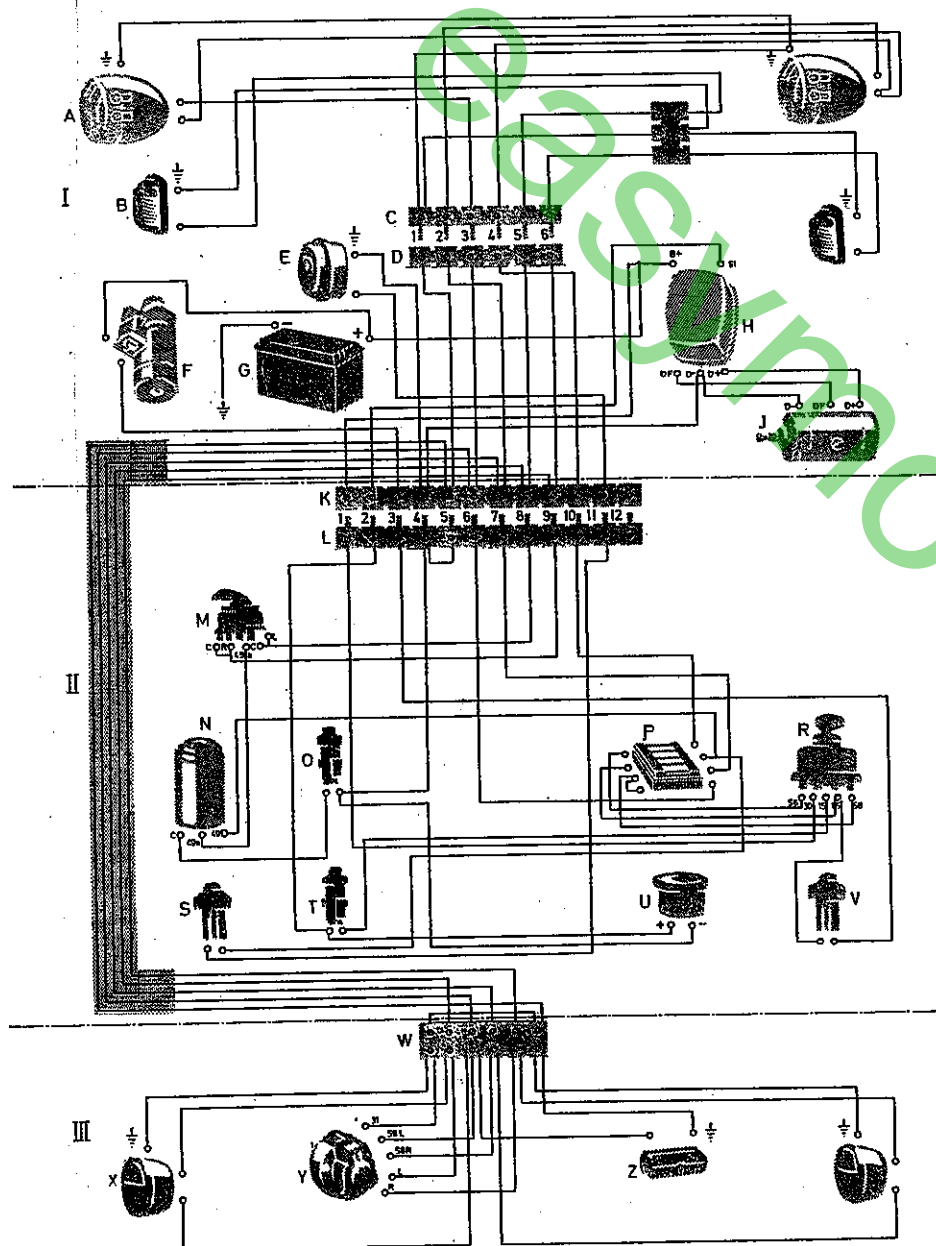
1. Unscrew the earth cable from the battery (ill. 5, page 6) and protect it with insulating tape to prevent short circuits when searching for faults.
2. Release bonnet locking handles (ill. 1, page 6) and raise engine bonnet (ill. 6, page 6).
3. With the aid of a screwdriver remove plug connector "K" from coupling strip "L", which is screwed to the underside on the tank base. Do not pull out the plug connector by the cables.
4. Release clamping screw on hand wheel (ill. 14, page 7) and pull out throttle cable.
5. Pull off knobs from both operating levers for the hydraulics (ill. 10/11, page 15).
6. Lift dashboard until it contacts the steering wheel. Support it well so that both hands are left free when searching for the fault.

All controlling elements are now easily accessible.

When reassembling, take care

- a) not to pinch the cable, as this may cause a short circuit
- b) to rescrew the throttle cable on to the hand wheel for setting the engine speed (ill. 14, page 7) by means of the clamping screw. Ensure that the throttle cable is in the same position as before disassembly.

Wiring diagram for the electrical system



For key to letters in diagram see page 19

Key to letters in wiring diagram on page 18:

- | | |
|------------------------------------|--|
| I Front of tractor | N. Blinker unit |
| A Headlights | O Control lamp for blinkers |
| B Blinkers | P Fuse box with 4 fuses |
| C Plug connector (6 sectional) | R Combined light and ignition switch |
| D Coupling strip (6 sectional) | S Button for horn |
| E Horn | T Control lamp for battery charging indicator lamp |
| F Starter | U Hour meter |
| G Battery | V Starter button |
| H Regulator | |
| J Light generator | |
| II Dashboard | III Rear of tractor |
| K Plug connector (12 sectional) | W Cable connector |
| L Coupling strip (12 sectional) | X Combined blinker/tail lights |
| M Blinker switch with control lamp | Y 7 pole socket |
| | Z Number plate light |

VI) Hydraulic lift

The front-mounted hydraulic lift has a maximum lifting capacity of approx. 400 kgs and the rear-mounted hydraulic lift a maximum lifting capacity of approx. 500 kgs. The system comprises the following main components:

- Hydraulic pump (ill. 15, page 7)
- Oil tank with filter (ill. 5, page 7)
Filling: 2 litres motor oil SAE 20 HD such as, for instance **ESSO EXTRA MOTOR OIL 10 W-30**
- Control unit in dashboard with one each operating lever (ill. 10/11, page 15) for front and rear hydraulics
- One each lifting cylinder with piston for front and rear hydraulics
- Connecting pipes.

The **hydraulic pump** is a geared pump. The oil is conveyed from the suction side to the delivery side in the tooth spaces at the circumference of the two mating cog wheels and is forced into the pressure line.

The filter built into the **oil container** has the task of removing dirt particles from the returning oil. This function is very important, since all parts of the hydraulic unit must be protected against dirt in the oil. A good filter makes the unit reliable in operation and prevents early wear and tear.

(For hints on solving service problems, see page 33).

The container contains 2 litres of motor oil with HD addition. The use of a multi-range oil, as for example **ESSO EXTRA MOTOR OIL 10 W-30**, is recommended, since the efficiency of the hydraulic system is influenced by the surrounding temperature. **Keep to the same type of oil!** The oil in the container must not be mixed with kerosene or another lighter oil to reduce the viscosity!

For equalizing the pressure and for filtering the intake air, there is an **air filter** installed at the side of the oil container. The built-in wire gauze ring prevents the entrance of dirt. A ball with a stop jacket ensures that no oil is lost.

The **control unit** has the task of regulating the oil flow in the system. It is provided with one or two operating levers, depending on whether a front hydraulic system is mounted in addition to a rear system. Depending on the position of the operating lever, the relevant piston in the lifting cylinder is either operated or checked. A relief valve is installed to protect the pump from overload.

The piston in the **lifting cylinder** is moved by oil delivered by the pump and performs — via the piston rod — the work required of the system.

Mode of operation:

1. If the lever (ill. 10/11, page 15) is shifted to the front, the implements connected to the hydraulic lifting device are lowered, i. e. brought into working position. The hydraulic lifting device is not inflexible, but adapts itself to the movement of the implements in the soil. This means that the working depth is not regulated by the hydraulic lifting device, but by varying the adjustment on the implements.
2. If the lever is shifted to the rear, the implements in working position are lifted.
3. If the lever is brought into vertical position, the hydraulic lifting device is locked. This position of the lever is the correct one for transporting the attached implements by road.

Before putting the unit into operation, please note:

With the engine running at low speed (idling), the pump must not be put under load. The bearings of the pump would suffer a higher degree of wear and tear and might seize.

With the load suspended, the lever on the control unit must not be switched suddenly into the lifting or lowering position as this may give rise to sudden shocks of pressure in the system, possibly causing sealings to leak, high pressure hoses to burst or rods to be damaged.

The relief valve installed in the control unit protects the unit against overload. This valve must therefore not be adjusted!

VII) Technical data

A) Tractor

Dimensions:	max. length	2200 mms (86.5 in.)
	width	1020 mms (40.2 in.)
	height	1130 mms (44.5 in.)
	wheel base	1270 mms (50.0 in.)
	ground clearance, front axle	230 mms (9.0 in.)
	ground clearance, rear axle	280 mms (11.0 in.)
	ground clearance of trailer coupling	550 mms (21.6 in.)
	toe in	2—4 mms (0.08-0.16 in.)
	tracking wheels	4400 mms (173.2 in.)

Tyres:	front wheels	4.00 x 12 AM Front or 6 x 12 AS (B 3)
	rear wheels	7.50 x 16 AS or 10.00 x 12 AM

Tyre pressure:	front wheels 4.00x12 AM Front	1.5 atü (21.3 p.s.i.)
	6 x 12 AS (B 3)	1.5 atü (21.3 p.s.i.)
	rear wheels 7.50 x 16 AS	1.5 atü (21.3 p.s.i.)
	10.00 x 12 AM	1.0 atü (14.2 p.s.i.)
	rear wheels 10.00 x 12 AM for special work on lawns	0.8 atü (11.4 p.s.i.)

Weights:	gross weight	650 kgs
	permissible gross weight	1200 kgs
	permissible axle load, front	540 kgs
	rear	900 kgs
	permissible trailed load without brake	350 kgs
	permissible trailed load with brake	2000 kgs
	load resting on coupling device	250 kgs

Fuel tank capacity, approx.	8.5 litres (1.8 gals)
-------------------------------------	-----------------------

B) Engine

Design	four-stroke Diesel engine
Cylinder	1 (upright)
Piston displacement	741 cm ³
Bore	100 mms (3.94 in.)
Stroke	95 mms (3.74 in.)
Compression ratio	1:18
Output	16 HP (DIN) — 19 HP (SAE)

Speeds and p.t.o. shaft rotations per minute

Gear stage		Slow			Fast		
Gear		1st	2nd	3rd	1st	2nd	3rd
Speeds (km/h) with tyres 7.50 x 16 AS		1,26	2,7	10,0	2,06	4,6	17,0
with tyres 10.00 x 12 AM		1,14	2,55	9,42	1,95	4,35	16,02
p.t.o. shaft r.p.m. rear	r.p.m.	63	140	512	106	237	870
	dependent on gear	forwards: clockwise rotation reverse: anticlockwise rotation					always facing the p.t.o. shaft
	r.p.m.	825					
independent of gear		forwards: clockwise rotation reverse: anticlockwise rotation					

The speeds and rotations per minute quoted are the same for forward and reverse, only the direction of rotation of the p.t.o. shaft changes.

Front drive: speed of V-belt pulley 2000 r.p.m.
clockwise rotation
independent of driving direction
and gear engaged.

The same data applies for a standard p.t.o. shaft, if installed.

VIII) Description of the most important functions

Differential gear

The built-in differential gear can be locked, in order to increase the tractive capacity under difficult conditions. The relevant operating lever is situated on the right in front of the driver's seat (ill. 18, page 29). The lever can and must not be locked.

If the differential gear has to be locked, the lever must be pushed down and kept in this position as long as necessary. As soon as the load lessens, the spring loaded lever snaps back automatically into its original position, thus releasing the lock of the differential gear. This safety device prevents damage to the gears due to incorrect use of the differential lock.

Transmission gear

The tractor is equipped with a three-speed reversing gear which, by means of an intermediate drive, can be switched to two different speed stages, so that 6 different speeds are available for forward and reverse.

Lever (ill. 22, page 29) is for switching into forward or reverse direction.

If this lever is pushed downwards, the gear is switched to "forward", if it is pulled upwards, the gear is switched to "reverse" (see direction plate provided). Neutral is between these 2 positions.

Slow and high speed stage

The two speed stages are selected by means of the lever (ill. 23, page 29).

If this lever is pushed **downwards**, the **slow speed** stage is switched on, if it is pulled **upwards**, the **fast speed** stage is switched on.

Between these two switching positions is the idling position.

Special attention should be paid to the correct operation of this lever, otherwise the machine may not move in spite of the gears being engaged.

For speeds see table on page 22.

Clutch

A single-plate dry clutch is installed. It is operated by the pedal (ill. 4, page 29) on the left side of the tractor. The movement of the pedal is limited by an adjustable stop.

The pedal should have a play of 15—20 mms. If, after longer use, the play can no longer be regulated by adjusting the stop, the complete pedal must be reset one cog.

Gear shifting is the same as with any motor car; depress clutch pedal, engage gear and slowly release clutch while opening throttle.

If a gear cannot be engaged in spite of the clutch pedal being depressed, briefly release clutch pedal. If the pedal is again depressed, the gear will engage. **Do not use force, but operate the gears gently as in a motor car.**

Gear change

The gears I - II - III are changed by means of the gear shift lever (ill. 20, page 29) as marked on direction plate:

1st gear: gear shift lever to be pulled upwards to its limit

2nd gear: gear shift lever to be pushed downwards to the middle

3rd gear: gear shift lever to be pushed downwards to its limit

The idling position between each gear is clearly noticeable.

Brakes

The tractor is equipped with a brake which operates evenly on both rear wheels. It is operated by means of the brake pedal (ill. 14, page 29) on the right side of the tractor.

Care should be taken to ensure that the braking effect is uniform on both wheels. Brake adjusting screws are provided on either side of the tractor.

For parking, operate the hand brake lever with press-button release catch (ill. 19, page 29). Pull brake upwards to apply, push down to release. It is possible to release the brake only after depressing the button at the top of the hand brake lever.

Turning aid

By operating the individual wheel brakes a smaller turning circle is achieved.

The steering brakes are operated by the pedals, left and right (ill. 1 and 17, page 29).

CAUTION! If the differential is locked, never operate the individual wheel brakes, as this will damage the gearing.

Power take-off shaft

The power take-off shaft (ill. 19, page 8) provided at the rear end of the tractor can be operated dependent on or independent of gear (position W = p.t.o. shaft dependent on gear), (see direction plate).

The power take-off shaft is switched on or off by means of the operating lever (ill. 21, page 29) with yellow knob ("Z").

If this lever is pulled **upwards**, the power take-off shaft works **independent of gear**, i.e. the number of revolutions remains constant, independent of the gear engaged.

If the lever is pushed **downwards** (position "W"), the power take-off shaft works **dependent on gear**, i.e. the number of revolutions changes according to the gear selected (see table on page 22).

At the centre position the power take-off shaft is switched off.

For **stationary drive purpose**, the p.t.o. shaft can be used only in the "independent-of-gear" position.

By operating the lever (ill. 22, page 29) for forward and reverse, the required direction of rotation is determined.

If this lever is pushed **downwards**, the p.t.o. shaft rotates **clockwise**, if it is pulled **upwards**, the p.t.o. shaft rotates **anti-clockwise**.

As a power take off for **front driven implements** a V-belt pulley (ill. 5, page 9) can be mounted at the front of the engine, which is driven by the crankshaft of the engine via V-belts and an adjustable tension device. Speed and direction of rotation remain constant, i.e. independent of driving direction and the gear engaged. Speed: 2000 r.p.m.

A standard p.t.o. shaft can be installed in the V-belt pulley.

The p.t.o. shaft is switched on and off with the aid of the lever (ill. 2, page 6) on the right hand side of the tractor. If this lever is pulled **back**, the drive is switched **on**, if pushed to the **front**, the drive is switched **off**.

Steering

The tractor is **steered** by means of the steering wheel (ill. 7, page 7). Its movements are transmitted via toothed segment and track rod to the two front wheels. Adjustments possible on both sides.

The steering pinion at the lower end of the steering column and the toothed segment run in a 1:1 mixture of pinion grease and gear oil, for example **ESSO pinion grease** and **ESSO gear oil ST 80**, quantity approximately 1500 grams. It is not necessary to change this mixture.

Ensure that both rubber drive wheels have the same air pressure, as this noticeably influences the steering.

IX) Putting the tractor into operation

Please note that the durability and efficiency of the engine of the **new tractor** mainly depend on the running-in period. During the first 50 working hours the engine should not exceed about half of its maximum load, which means that the tractor should be driven with the engine speed regulator lever not more than half open. The cold engine should first be run at idling speed for about 10 minutes to let it warm up.

After 50—100 working hours the load can be increased to approx. $\frac{3}{4}$ of the maximum output.

Ensure that the filters are maintained properly, and that oil of sufficiently good quality and clean fuel is used.

Before the tractor is put into operation, i. e. before the engine is started, check whether:

- sufficient fuel is in the tank (ill. 3, page 6),
- sufficient motor oil is in the engine, according to mark on the oil dipstick (ill. 22, page 10),
- sufficient motor oil is in the oil container for the hydraulic system (ill. 5, page 7),
- sufficient oil is in the container of the oilbath air filter corresponding to the mark on the container (ill. 4, page 7).

Moreover check, whether

- the control lever for direction of travel (F. R.) (ill. 22, page 29) is in neutral,
- the handbrake (ill. 19, page 29) is applied and engaged.

Before first starting the engine, after major repairs and after every interruption of the fuel supply, it is absolutely necessary to vent the pipes.

Care should therefore be taken not to empty the tank completely.

All pipes are vented when the tractor leaves our factory, and the tank contains a small amount of fuel. If, for any reason, venting becomes necessary, proceed as follows:

- Fill fuel tank
- Unscrew vent screw (marked with yellow) on fuel stage filter (ill. 6, page 32) and screw in again, as soon as fuel emerges free of bubbles.
- Loosen hollow screw for the fuel pipe on the injection pump and tighten again, as soon as fuel emerges free of bubbles.
- Unscrew retaining nut for fuel pipe at the nozzle holder, let the engine turn over until fuel emerges, then retighten nut.

Starting the engine

I. With cold engine

- Open throttle (ill. 15, page 29) completely.
- Pull up extra fuel button (ill. 14, page 10).
- Insert ignition key into ignition switch (ill. 6, page 15) and turn to the right to position 1. Red lamp (ill. 2, page 15) must light up.
- Open bonnet and press down decompression lever (ill. 4, page 107) with one hand,
with the other hand operate the starter (push-button, ill. 7, page 15),
let the engine turn over for a few revolutions and then release the decompression lever; the engine starts.

As soon as the engine has started, regulate throttle (ill. 15, page 29). The red control lamp (ill. 2, page 15) must go out. Should this not be the case, there must be a fault in the electrical system which must be remedied at once.

If the engine does not start within the first ten seconds, the starting process may be repeated after resting the battery at least for the same period.

Take care when starting the engine in a closed room! Ensure that there is good ventilation and that the exhaust gases are quickly drawn off! They contain invisible, odorless but highly poisonous carbon monoxide gas.

II. With warm engine

As described under I. It is not necessary to operate the starter button or the decompression lever.

Starting at low temperatures

Provided that the motor oil suitable for the time of the year, as described on page 11, is used, the following additional starting aids may be used at low surrounding temperatures:

1. Filling fuel into the air intake pipe

Clean area around inlet plug (ill. 11, page 10). Remove screw and fill 2–3 cm³ (approx. 15–20 drops) light motor oil SAE 10 into the opening. Replace plug and start the engine at once.

2. Using "start-pilot"

Start-pilot is a liquid supplied in aerosol bottles. It increases the ignitability of the fuel at low temperatures. If used according to the instructions on the bottle, the contents is sufficient for approximately 80–100 starts.

The liquid is sprayed for about 1–2 seconds – shortly before or during the start – directly into the intake of the oil-bath air filter (ill. 4, page 7).

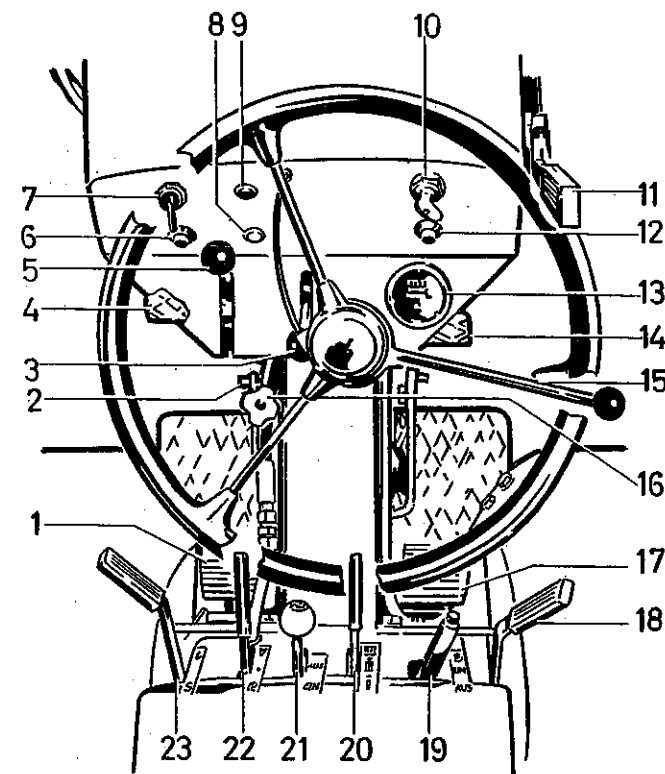
Stopping the engine

It is advisable to let the engine run at increased idling speed for approx. 5–10 minutes before stopping it, to allow it to cool down.

This prevents carbonizing of the injection nozzle and ensures its reliable operation. The engine is stopped by pushing back the throttle lever to its limit (ill. 15, page 29).

Then turn the handwheel for engine speed adjustment clockwise (ill. 23, page 10), until the stop is reached and hold it here until the engine stops. As soon as the engine stops, the lamp (ill. 2, page 15) lights up. Turn the ignition key to the left position "0", and the red lamp will go out.

Never use the decompression lever (ill. 4, page 10) to stop the engine as this may cause damage to valves and piston rings.



- | | |
|--|--|
| 1 Pedal for single wheel brake, left | 12 Button for starter |
| 2 Lifting arm, left | 13 Hour meter |
| 3 Operating lever for hydraulic lift, front | 14 Footbrake pedal |
| 4 Pedal for engine clutch | 15 Throttle lever |
| 5 Operating lever for hydraulic lift, rear | 16 Adjusting screw |
| 6 Button for horn | 17 Pedal for single wheel brake, right |
| 7 Blinker switch with control lamp | 18 Operating lever for differential lock |
| 8 Charging indicator lamp | 19 Lever for hand brake |
| 9 Control lamp for blinker on trailer | 20 Gear shift lever I–II–III |
| 10 Light/Ignition switch with key | 21 Lever for p.t.o. shaft |
| 11 Operating lever for front-driven implements | 22 Operating lever for direction of travel (F. R.) |
| | 23 Operating lever for gear stage "Slow – Fast" |

4. Check fuel filters (ill. 4, page 6)

A fuel stage filter with ante and fine filter is installed for **cleaning the Diesel fuel**. The smaller has a **felt-tube** insert, the larger or fine filter a **micronic** filter element.

If the engine output drops, check the fuel supply from the fuel tank, and then check whether the felt-tube insert of the smaller filter is dirty. If necessary, it should be cleaned as follows:

- Drain fuel tank.
- Take out felt-tube insert and seal both ends with a cork.
- Scrape off dirt from the outside, then brush with a non-metallic brush in Diesel fuel, petroleum or, if this is not sufficient, in benzene (phenyl hydride).

Take care that the corks fit tightly and that no cleaning fluid enters the interior of the felt-tube insert.

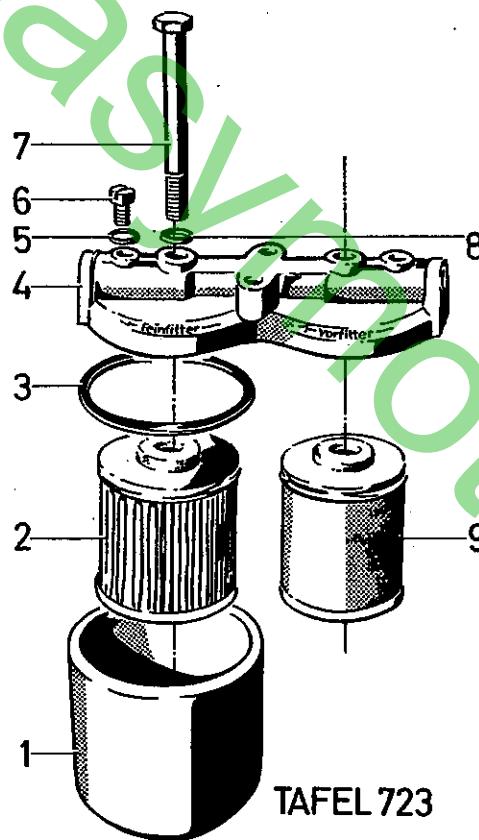
- After this external cleaning soak the filter insert in clean Diesel fuel or petroleum.
- Remove one of the corks and blow in compressed air. Foam should then form all over the surface.

Should this not be the case, because the dirt contains asphalt, benzene (phenyl hydride) must be used as cleaning fluid.

Soak the filter insert in the fluid again, then blow out as described above.

This procedure should be repeated four to five times, depending on the degree of fouling.

It is imperative to use clean Diesel fuel for the last washing process!



- Housing for ante- and fine filter
- Micro insert for fine filter
- Ring seal for cover
- Cover
- Washer
- Vent screw
- Hexagon screw for filter housing
- Washer
- Felt insert for ante filter

If no compressed air is available, the filter insert may be blown out with the mouth after fitting a suitable hose.

- Important!** The filter may normally be cleaned up to three times as described above, **but then a new felt-tube insert must be used!**

If this is not done, grooves may form between the inside and outside (clean and dirty side) through which unfiltered fuel may reach the injection pump. Expensive repairs could result.

- The micronic filter element in the second largest fuel filter should be renewed only after approximately 200 hours of operation, if the smaller fuel filter with the felt-tube insert has always been serviced correctly.

Please note, however, that this filter insert must be not washed, but must under all circumstances be replaced!

- After the filter has been cleaned the whole pipe as far as the injection pump must be vented as described on page 26.

5. Hydraulic unit

a) General

Principally, no unions may be slackened off or tightened while the unit is under pressure. If there are leakages at unions, joints or locking screws of pump, filter or cylinder, the load must be lowered and the engine stopped.

Damaged pipes or hoses must be replaced at once. For safety reasons, only genuine spare parts should be used!

Before unscrewing unions their surroundings should be cleaned thoroughly. Close all openings immediately with rubber plugs, so that no oil is lost and no dirt may enter the unit.

b) Oil change

After purchasing the tractor, the oil should be changed after, at the latest, 50 hours of operation (= running time of the engine). Further oil changes will be necessary after approx. every 500 hours of operation, depending on the operating conditions, but at least once a year.

2 liters of motor oil with HD addition for example **ESSO EXTRA MOTOR OIL 10 W-30** are required. **Keep to the same type of oil!**

c) Venting of the hydraulic unit

Let the engine run slowly for several minutes. Then, while the engine is running at high speed, shift the lever on the control unit several times alternately from medium position into both end positions, until the piston in the working cylinder is fully extended or retracted.

The unit is usually vented after the engine has run about 10-15 minutes. As venting is possible at the oil container, no further venting is necessary there.

Characteristics of correct venting are:

No oil foam in oil container

No abnormal noises in the system

No jerky motions of the piston rod in the working cylinder.

d) **Cleaning of the filter in the oil tank** (ill. 5, page 7)

The filter in the oil container should be cleaned after appr. 200 hours of operation, but at least every 3 months. This is done as follows:

1. Clean oil container externally.
2. Screw off four cover screws.
3. Remove filter cover.
4. Pull out filter insert.
5. Clean out filter pot with a clean, non-fibrous cloth.
6. Clean the filter insert in gasoline with a soft brush, then block center hole from below and blow in air from above, so that the filter insert is cleaned outwards from the inside.
7. Clean all sealings and check for tightness; renew, if necessary.
8. Reassemble in reverse order.

Put in filter insert correctly. Only one end fits into the shoulder in the filter cover. Take care that the felt gaskets fit around the connecting piece of the filter insert on top and around the socket in the filter pot below.

Slightly oil the rubber seal for the filter cover before replacing it again. Put on filter cover, turning it slightly.

e) **Cleaning of the air filter on oil tank**

When carrying out the cleaning process for the oil cleaner as described under d), the air filter on the side of the oil tank must be cleaned as well.

Before screwing off the filter, clean the surrounding area. The air filter should be thoroughly washed in gasoline and blown out. Then dip the filter into motor oil and let it drip. This will net the built-in wire gauze with oil and bind the dust better. Before screwing in the sealing, check that it seals correctly!

6. Take care that the **engine is cooled** efficiently. The relevant devices should be serviced correctly so that they always work efficiently.
See description on page 11.

7. Check **exhaust** after every 200 hours of operation for carbonisation. Decarbonize and clean, if necessary.

8. Generally keep the tractor clean, especially those parts which are most important for its correct operation.

9. Lubricate or grease all movable parts from time to time, as for example the various levers, the throttle, the grease nipples on the wheel hubs, the front axle journals, the hydraulic lifting arms, the pivot point of the front axle, steering column, brake shaft, coupling device.

10. Check **air pressure** of the drive wheels with pneumatic tyres.

This should be 21.3 p.s.i. for tyre size 7.50x16 AS, 4.00 x 12 AM Front and 6x12 AS (B 3) and for tyre size 10.00 x 12 AM 14.2 p.s.i.

Special care should be taken to keep the tyre pressure equal in both wheels, as this ensures trouble-free driving.

11. Check **brake system** for the driving brake, the hand brake and the single wheel brakes.

Have the brake system overhauled regularly, even if it is still working properly. At least every 6 months the brake system should be stripped and cleaned. This is best done by the local AGRIA Service Station.

12. **Do not garage the tractor**

in damp rooms,
rooms where fertilizer is stored, or stables or adjacent rooms,
as this will cause severe corrosion.

13. **If the tractor is not to be used for some time, the following instructions should be observed:**

- a) Thoroughly clean the tractor, check all parts and replace, if necessary.
- b) Jack up tractor, so that the pneumatic tyres do not touch the ground. Pneumatic tyres become unserviceable in a very short time if left under load without air.

14. After a longer rest, especially in spring, when the work on the fields begins, the gear oil and motor oil should be changed,

all movable parts should be greased or lubricated,

fuel tank with all pipes, as well as those to fuel filter and injection pump should be checked and cleaned, if necessary; do not forget finally to vent the fuel pipes up to the injection nozzle.

check and recharge battery,

check lighting, signalling and blinker installation,

check air pressure of tyres,

check tension of the V-belts for generator and cooling fan (see pointers on page 38).

15. Access to battery

- Raise bonnet (ill. 6, page 6) after releasing bonnet locking handles (ill. 1, page 6).
- Detach plus and minus cables from battery.
- Screw off both wing nuts on angle iron. Remove angle iron.
- Take out battery.
- To replace, follow these instructions in reverse order.

B) Engine

Regular maintenance

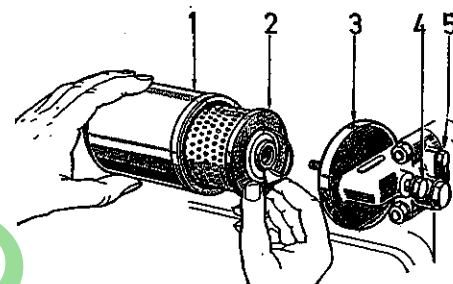
1. Oil change

With new engines the oil should be changed after the first 25 hours of operation and then after every 50 hours of operation.

Use only recognized motor oils with HD addition, as for example **ESSO EXTRA MOTOR OIL 10 W - 30** of ESSO AG, see hints on page 11. Quantity to be filled: 2,2 ltr.

Change oil only when engine is still warm.

Remove oil outlet screw (ill. 16, page 10) and drain oil.



- Filter housing
- Filter insert
- Housing cover
- Retaining screw for filter housing
- Connection for pressure gauge

After a certain time, dirt accumulates on the inside walls of the crankcase, especially if the oil is not changed regularly or if the oil used is of inferior quality.

The crankcase should therefore be washed in Diesel fuel once a year. After unscrewing the oil sump (ill. 5, page 10) the crankcase can be cleaned and checked.

Before screwing up the oil sump again, check sealing and replace if necessary.

Fill in approx. 2.2 ltrs. new motor oil up to upper mark on oil dipstick (ill. 22, page 10). (see description on page 11).

Remove the insert of the lubrication oil filter (see illustration) and clean it thoroughly with kerosene or Diesel fuel.

After every 200 hours of operation the oil sump of the engine (ill. 5, page 10) must be removed and cleaned with kerosene or Diesel fuel. Also clean strainer situated above it.

Before cleaning, check the sealing.

The filter insert in the lubrication oil filter must also be renewed after this period.

2. Check valve clearance after every 50 hours of operation and adjust, if necessary.

Checking and adjusting of the valves should be done only when engine is cold.

With engine in the compression phase, i. e. when both valves are closed, the valve clearance should be: inlet valve 0.3 mm, outlet valve 0.2 mm.

3. Fuel injection

After every 100 hours of operation check the injection pressure. The right pressure should be 200 atü.

If the injection is too late, the thickness of the washers placed under the connection flange of the injection pump should be decreased, if the injection is too early, it must be increased.

4. Fan drive

Check tension of V-belt. If necessary, the tension can be increased by removing one of the washers between the pulley disks (ill. 2, page 10).

XI) Faults and how to remedy them

- I. Faults in the machine or engine which require a major repair should be dealt with by an AGRIA Service Station or by a competent and qualified workshop which has the necessary tools at its disposal.
Unskilled workmanship will only cause damage.

- II. Faults in the injection system should be remedied only by an approved Bosch Service workshop. If such a workshop is not available in the vicinity, a complete nozzle holder with injection nozzle should be held in reserve in order to save time.

In order to determine whether the fault is in the injection system or in the engine, screw out nozzle holder with nozzle. The injection pipe should be slackened off only until the nozzle holder can be swiveled to the side. Then tighten injection pipe again, shift control lever to full throttle and crank the engine. If the nozzle atomizes the fuel correctly without dripping, the fault is to be sought in the engine.

Caution! Never come too close to the atomizing cone of the nozzle with hand or finger. Considerable injuries may be caused by the high pressure of the fuel.

III. Engine will not start

Having determined that the fault is not in the injection pump or the injection nozzle, try again to start the engine, while carefully observing all starting instructions given on page 27 (for starting at low temperatures refer to page 28).

Possible cause	Remedy
1. Fuel supply insufficient	
a) Fuel tank empty	Fill in fuel Vent injection system (see description on page 26)
b) Air in injection system	Fill in fuel Vent injection system (see description on page 26)
c) Fuel filter blocked. This is the case if no fuel runs out when the fuel pipe is detached from the injection pump	Replace fuel filter insert (see description on page 32) Fill in fuel Vent injection system (see description on page 26)
2. Engine is difficult to turn	Drain oil and fill in HD-oil SAE 10 (see instructions on page 11) Start as described on page 27

Possible cause

Remedy

3. Engine has no compression

- a) No valve clearance Check and adjust valve clearance as described on page 38
- b) Cylinder head sealing faulty Remove cylinder head, renew sealing

4. Engine fires, but does not start

- a) Pull extra fuel button (ill. 14 page 10) before starting
- b) Drain oil and fill in HD-oil SAE 10 (see instructions on page 11)
- c) Vent injection system as described on page 26

IV. Smoke from exhaust

The engine may also lack power (speed drops). Fault does not lie with the injection pump.

1. Air filter blocked Clean air filter as described on page 31
2. Valve clearance incorrect Adjust valve clearance as described on page 38
3. Injection nozzle defective Replace injection nozzle as described on page 41

V. Engine lacks power (speed drops), no smoke from exhaust

1. Too much oil in crankcase Drain oil to normal level according to mark on dipstick (ill. 22, page 10)
2. Air in injection system Fill up with fuel, vent injection system (see description on page 26)
3. Fuel filter dirty Replace or clean fuel filter insert as described on page 32
Fill up with fuel
Vent injection system

VI. Engine overheats

1. Lack of cooling air Clean cooling air inlet, clean cooling ribs
2. Fan belt too slack Adjust fan belt tension as described on page 38

Possible cause

Remedy

3. Too much oil in crankcase

Drain oil to normal level according to mark on dipstick (ill. 22, page 10)

4. Engine overloaded

Determine cause and remedy

VII. Engine stops suddenly**Fuel supply faulty**

- a) Fuel tank empty Fill in fuel
Vent injection system (see description on page 26)
- b) Fuel filter blocked. This is the case if no fuel runs out when the fuel pipe is detached from the injection pump. Replace or clean fuel filter insert as described on page 32
Fill in fuel
Vent injection system as described on page 26.

VIII. Replacement of injection nozzle

1. Screw off pressure pipe (ill. 8, page 10) and overflow pipe (ill. 10, page 10).
2. Screw off hexagon nuts on nozzle holder (ill. 9, page 10) and take out nozzle holder with injection nozzle.
- Notes:** Do not lose washer and heat protection plate. Should these come off with nozzle holder, replace them at once.
3. Install replacement nozzle holder, tighten hexagon nuts uniformly and reconnect pipes.

The replacement of the injection nozzle alone can be carried out only by a recognized Bosch service station as they have the necessary tools and adjusting devices.

CAUTION !

When checking the function of the new injection nozzle, take care not to come too close to the opening of the nozzle with hand or finger, as the high pressure of the fuel jet may cause considerable injuries!

XII) Main methods of application

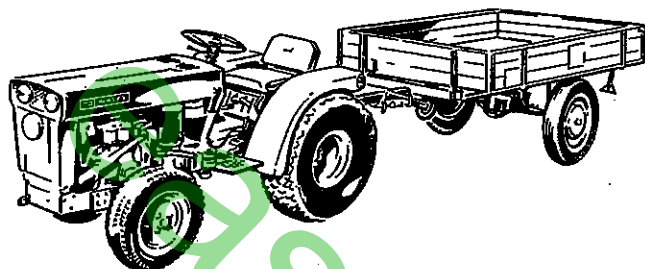
for the tractor.

The description of the different operations is based on the assumption that the tractor is already fitted with front and rear hydraulic lifts, items No. 4839 015 with item 4839 115 and 4840 015, and also item 4839 215, and that suitable tyres have already been mounted on the tractor.

Driving

Necessary attachments:

- 1 two-wheel trailer No. 4888015, if necessary, 1 pair of wheel weights for front and rear wheels



Mounting

1. Lock lifting bracket (ill. 2 and 20, page 8) by swiveling in the eye-bolts and tightening the cap nuts (ill. 17, page 8).
2. Take off the two lifting bars (ill. 3, page 8) (for better mobility of the trailer pole).
3. Insert trailer pole into the coupling device of tractor, secure bolt (ill. 15, page 8) by means of clip.
4. After removing pin (ill. 10, page 45) bring supporting wheel (ill. 11, page 45) in a position parallel to the pole and lock by pushing pin into the socket (ill. 4, page 45).
5. Insert connection cable for the lighting installation of the trailer into the sockets at the rear of the driver's seat (ill. 12, page 8) and at the front wall of the trailer (ill. 15, page 45).
6. Check rear lights and blinkers.
7. Mount wheel weights, if necessary, for increasing the tractive power.

Driving

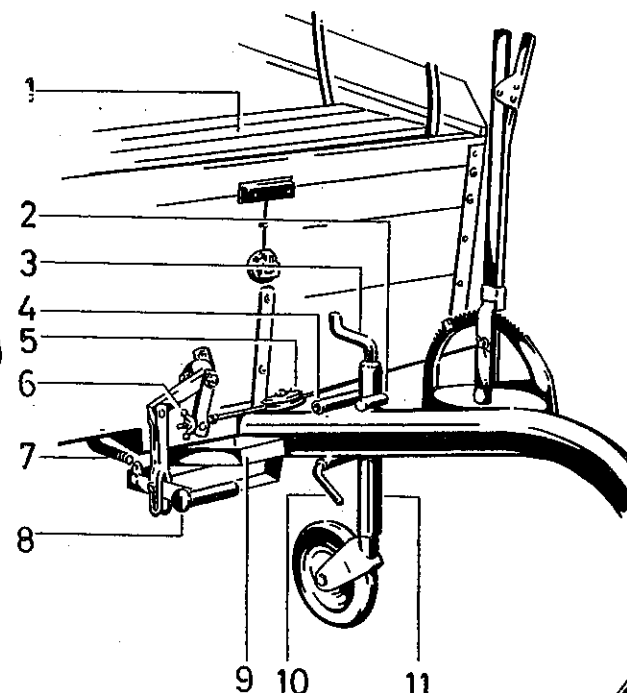
1. Check whether the hand brake of the tractor and the trailer is applied, and that no gear is engaged.
2. Start engine as described on page 27.
3. Depress clutch pedal, engage required gear, check controls for direction of travel, release hand brake of trailer first and then of tractor, slowly release clutch pedal while opening throttle. Change the other gears as with any motor car or tractor.
4. Change down with care, as the gearing is not synchronised as in modern motor cars.

Take care that the permissible load of the trailer is not exceeded. Overload not only affects the trailer, but the tractor as well. Remember that for trailers with a permissible gross weight of more than 750 kgs at least one wedge for the wheels must always accompany the trailer.

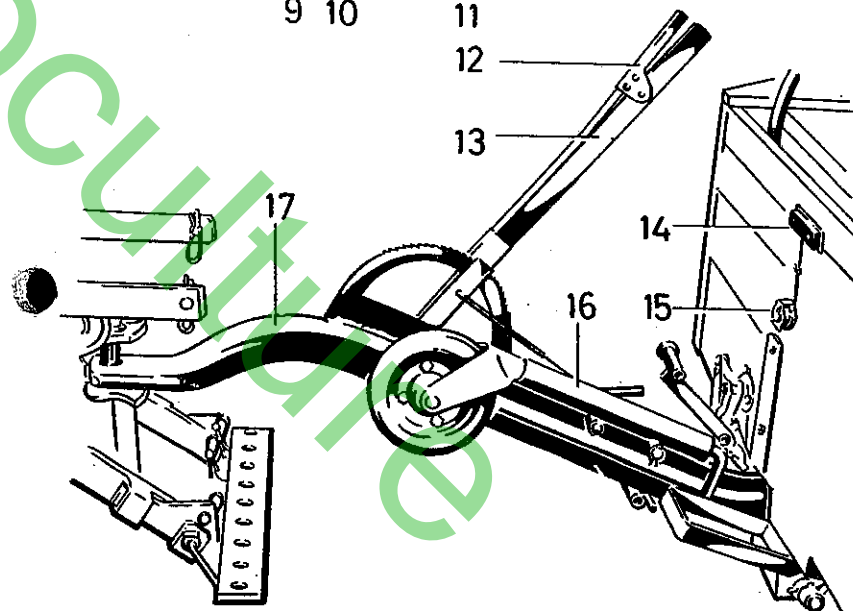
It is advisable to secure this wedge with a chain, so that it is always available.

Tyre pressure on trailer: 2,5 atü (35 lbs./in.²).

Never drive downhill in neutral!



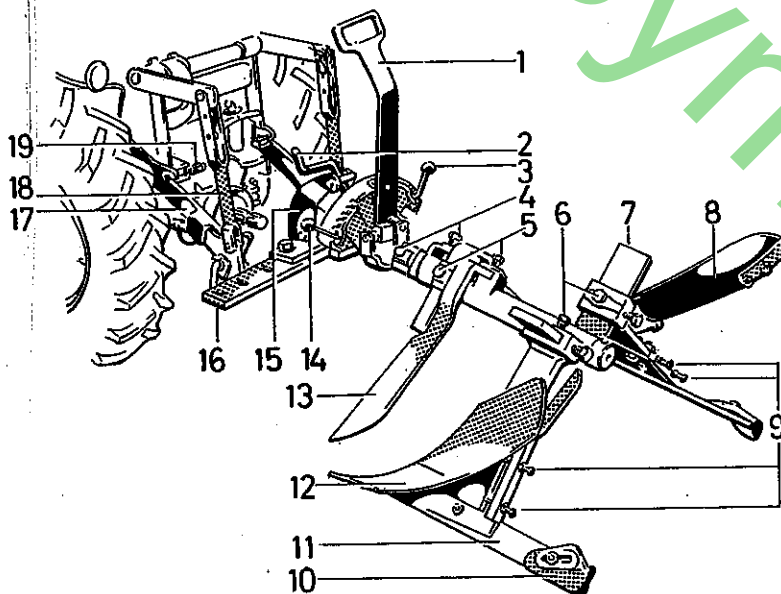
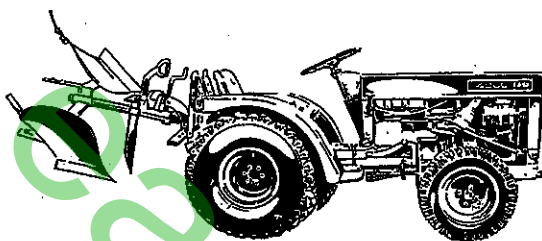
- 1 Seat
- 2 Swivel bolt for support
- 3 Adjusting spindle for supporting wheel
- 4 Pin socket
- 5 Cable reel
- 6 Adjusting nut for brake cable
- 7 Return spring
- 8 Brake pedal
- 9 Foot rest
- 10 Pin with clip
- 11 Supporting wheel (working position)
- 12 Locking ratchet
- 13 Lever for hand brake
- 14 Junction box
- 15 El. socket
- 16 Supporting wheel (resting position)
- 17 Pole



Ploughing

Necessary attachments:

- a) 1 reversible plough No. 4844015
- b) 1 adjustable coupling No. 4840115
- c) 1 set of front wheel weights No. 4821015
- d) 1 set of coulter No. 4844115 if required



- | | |
|---|------------------------------------|
| 1 Turning lever for plough body | 11 Plough bar |
| 2 Adjusting spindle | 12 Plough body, left |
| 3 Stop lever, right | 13 Knife coulter, left |
| 4 Connecting point for coulter | 14 Stop lever, left |
| 5 Connecting point for knife coulter | 15 Adjustable coupling No. 4840115 |
| 6 Clamping screw for plough body holder | 16 Implement bar |
| 7 Holding rail for plough body | 17 Pull bar |
| 8 Plough body, right | 18 Lifting bar |
| 9 Adjusting screws with lock nuts for the plough bodies | 19 Eyebolt with cap nut, |
| 10 Brake shoe | |

Mounting the attachments

1. Disconnect fastening of the two pull bars (ill. 17, page 46). Swivel both eyebolts to rear and tighten cap nut.
2. Fit implement bar with adjustable coupling (ill. 15, page 46) into the two pull bars and fasten together with the lifting bars (ill. 18, page 46) by means of bolts and clips.
3. Insert reversible plough into the coupling device (ill. 15, page 46) and secure with bolt.
4. Attach wheel weights to the front wheels and fasten with screws supplied.
5. If coulter No. 4844115 are used, they should be inserted in the coulter sockets (ill. 4, page 46).
6. Start engine as described on page 27.
7. Push back operating lever (ill. 11, page 15) on the dashboard. The reversible plough is lifted and brought into transport position. Shift operating lever into medium position, to lock the hydraulic lift.

It is now possible to drive to work.

Working

1. Bring reversible plough into working position by operating the turning lever (ill. 1, page 46). Lever should be pushed backwards and must snap into the relevant notch. Lateral stop levers (ill. 3 and 14, page 46) are to be adjusted according to the ground conditions.
2. Push operating lever (ill. 11, page 15) on the dashboard forward to bring the plough into working position.
3. Shift into the gear most suitable for the conditions of soil and surface. Adjust depth of ploughing by means of the spindle (ill. 2, page 46) after the first few yards.
4. Lift plough at the end of furrow, turn by using the single wheel brakes, swivel plough and let it down again.

The plough which swings free, adapts itself automatically to the shape of the soil and guarantees correct ploughing if the plough is set correctly.

If the ploughing depths of the two ploughs are not the same – this may happen after having hit a stone or roots – the plough must be reset.

Both plough share tips must be equidistant from the plough beam. Check by resting plough on a level surface as illustrated. Adjust by means of both adjusting screws (ill. 9, page 46).

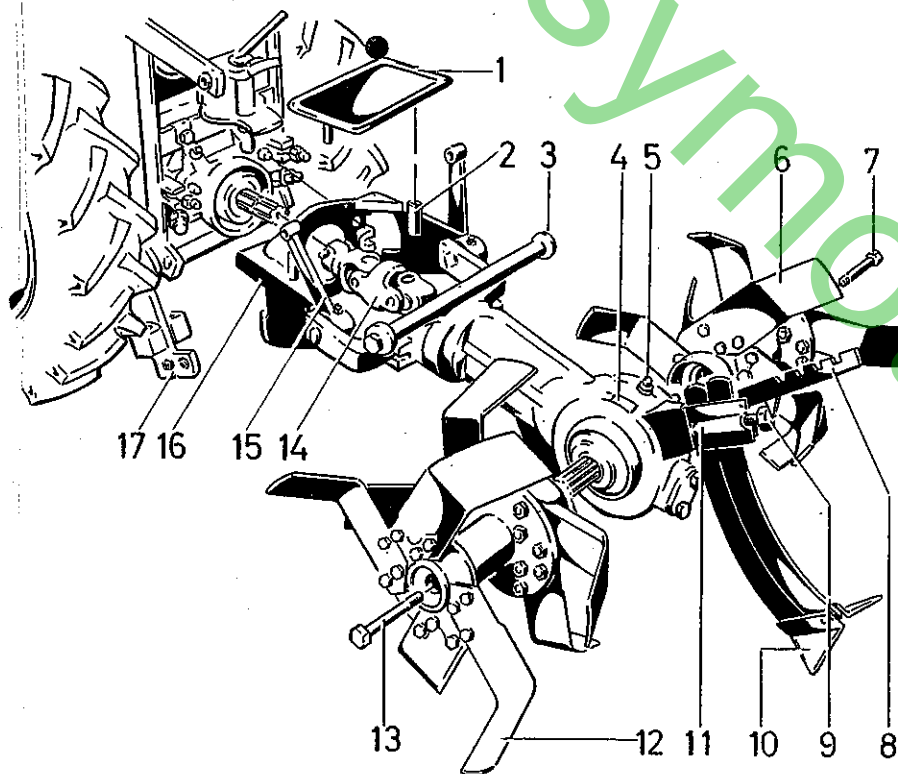
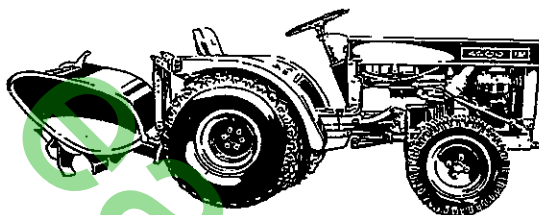
After ploughing is finished

After ploughing, the plough should be cleaned and all movable parts lubricated. The plough and the coupling device can be disconnected and should be stored where they are protected against the weather.

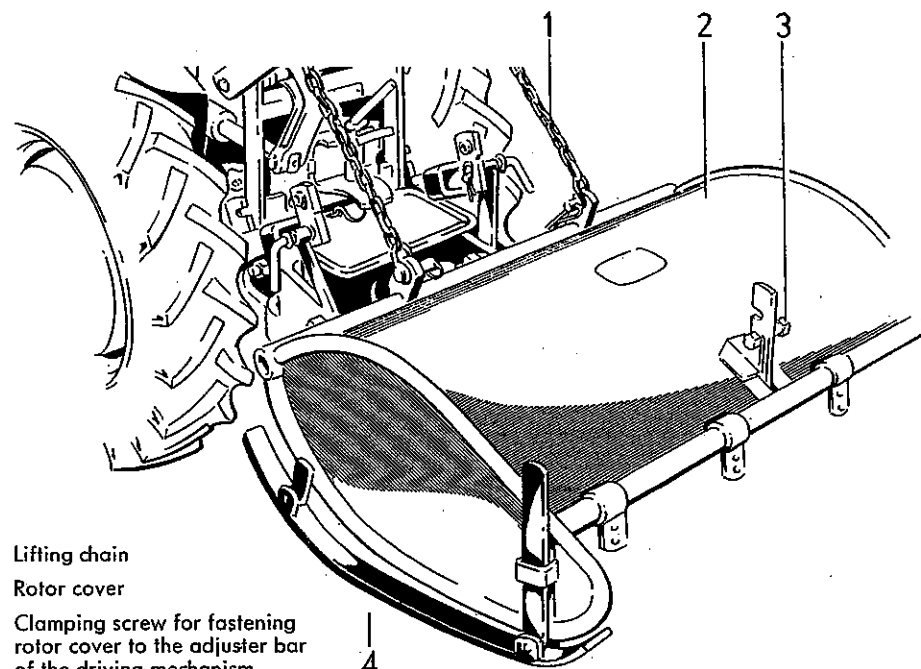
Hoeing

Necessary attachments:

- 1 Drive mechanism for rotary hoes No. 4801 015
- 1 Double universal joint with drive shaft protector No. 4840 215
- 1 Hoeing attachment No. 4810015 for a working width of 80 cms (31.5 in.)
- 1 Set of wheel weights for the front wheels No. 4821 015



- | | |
|---------------------------------|---------------------------|
| 1 Cover (drive shaft protector) | 10 Hoeing spur |
| 2 Plug-in socket for cover | 11 Hoeing tail |
| 3 Rotor cover carrier | 12 Hoeing rotors, left |
| 4 Number of the drive mechanism | 13 Clamping bolt, left |
| 5 Oil inlet screw | 14 Double universal joint |
| 6 Hoeing rotors, right | 15 Support |
| 7 Clamping bolt, right | 16 Connecting flange |
| 8 Rotor cover adjuster bar | 17 Pull bar |
| 9 Locking bolt for hoeing spur | |



- 1 Lifting chain
- 2 Rotor cover
- 3 Clamping screw for fastening rotor cover to the adjuster bar of the driving mechanism
Hoeing depth adjustment
- 4 Skid

Mounting the hoeing attachments

1. Remove implement bar (ill. 22, page 8) and lifting bars (ill. 3, page 8).
2. Remove protective cover of p.t.o. shaft, clean connecting surfaces on tractor and hoeing attachment.
3. Grease p.t.o. shaft and the drive shaft end of the drive mechanism.
4. Place double universal joint on to the drive shaft end of drive mechanism.
5. Attach drive mechanism to tractor, at the same time slide double universal joint on to the p.t.o. shaft until the locking bolt snaps home. Insert eyebolts and tighten hexagon nuts evenly.
6. Fasten the 2 pull arms (ill. 17, page 48) to the support eyes (ill. 15, page 48) by means of plugs and clips. (See illustration above).
7. Replace cover (ill. 1, page 48).
8. Attach hoeing rotors to the hoeing shaft ends ensuring they are mounted correctly. Take care that the cutting edges of the hoeing tines point in the direction of travel.
Screw in clamping bolts and tighten properly.

Note: The clamping bolt on the right side has a left hand thread. The one on the left side has a right hand thread. The clamping bolt with left hand thread is marked by a groove on the hexagonal head of the bolt.

9. Put on rotor cover (ill. 2, page 49), at the same time push adjuster bar (ill. 8, page 48) on driving mechanism through slot in cover and let it snap into the notch suitable for the required hoeing depth (ill. 3, page 49).
10. Screw rotor cover to both front sides of the carrier of the driving mechanism (ill. 3, page 48).
11. Connect lifting chains (ill. 1, page 49) to the brackets on the rotor cover and fit into both lifting arms (see illustration on page 49).
12. Attach wheel weights to the front wheels and screw tight.
13. Start engine (described on page 27).
Pull back operating lever (ill. 11, page 15) on dashboard (ill. 6, page 7). This lifts the driving mechanism and brings it into transport position. Shift operating lever into medium position to lock the hydraulic lift.

It is now possible to drive to work.

Working

1. Push forward operating lever (ill. 11, page 15) on dashboard and lower hoeing attachment.
2. Set required hoeing depth at rotor cover, at skids (ill. 4, page 49) and at hoeing spur (ill. on page 48).
3. Bring p.t.o. shaft into "independent of gear" position (as described on page 25).
4. Shift into required gear, depending on the required tilth.
5. **Always switch off p.t.o. shaft and lift hoeing attachment at the end of a furrow.**
Turn by using the single wheel brakes.

For safety reasons stop the engine whenever it proves necessary during operation to carry out work on the driving mechanism!

After hoeing

After the hoeing is finished, big clods of soil, particles jammed into the rotors and weed wound onto them should be removed, to ensure that these parts cannot dry and stick fast to the rotors, and to prevent possible faults during the next use.

The complete hoeing attachment may be removed after releasing the connection to the hydraulic lift of the tractor, which greatly facilitates the next operation.

Merely unhook the lifting chains from both lifting arms.

Disconnect both pull bars from support of drive mechanism. Remove cover.

Slacken off hexagon nuts until the eyebolts can be swiveled outwards.

Press in locking pin on double universal joint. The whole drive mechanism including the hoeing attachment can now be slid off.

Replace protective cover of p.t.o. shaft on tractor.

The double universal joint on the drive mechanism must be protected from damage and dirt.

Maintenance of the driving mechanism for the hoeing rotors

Apart from the external cleaning and a check of the complete driving mechanism, care should be taken that there is always enough oil in the gearbox. Always check on traces of oil and have causes of oil leakage remedied at once.

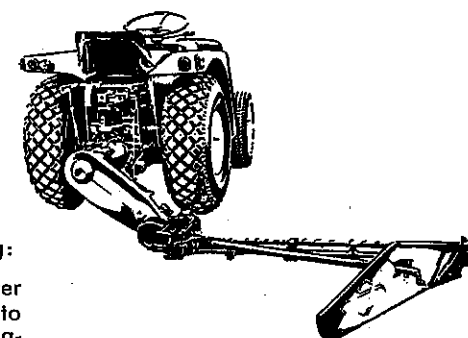
The gear oil should be renewed at least once a year. This is best done in spring, before hoeing starts.

The old oil can be drained after unscrewing the cover under the hoeing tail (ill. 11, page 48) at the rear of the driving mechanism. When closing the lid again, ensure that the sealing is in order. The new gear oil is filled in from above (ill. 5, page 48). 1 liter gear oil SAE 80, for example **ESSO GEAR OIL ST 80**, should be filled in.

Mowing

Necessary attachments:

- 1 special mowing attachment with double knife cutterbar of 120cms (4 ft. 7 in.) working width, to be used laterally,
No. 4846 015



Mounting the mowing attachments

a) Prepare mowing attachment for mounting:

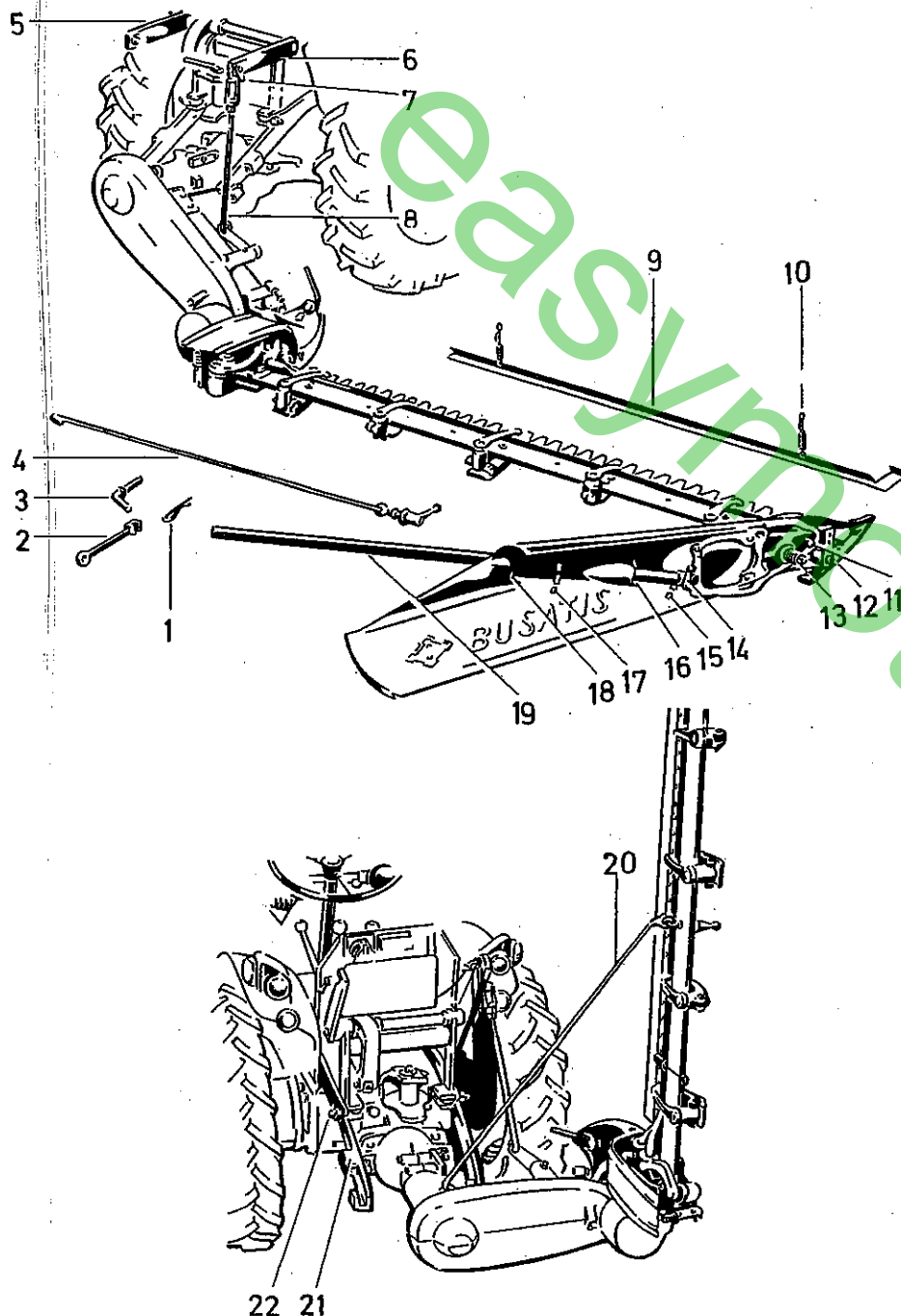
1. Fit swathe board on to stud at the outer shoe (ill. 11, page 52) and press into place with the slot behind the spring-loaded ball-shaped latch (ill. 13, p. 52).
2. Take off holding ring (ill. 14, page 52) from the swathe rod (ill. 19, page 52) after removing the carriage bolt.

Insert swathe rod – depending on the height of the mowing material – into one of the two holes (ill. 16 or 18, page 52) in the swathe board, push on holding ring again and fasten swathe rod in one of the three square holes (ill. 15 or 17, page 52), depending on the position required.

b) Mounting the mowing attachment on to the tractor:

1. Take off draw bar (ill. 22, page 8) and both lifting bars (ill. 3, page 8).
Lock both pull bars (ill. 2/20, page 8) by means of the two eyebolts (ill. 17, page 8). The two lifting arms (ill. 6/14, page 8) must be completely depressed by hand. Before doing this, push the lever for the hydraulic system (ill. 11, page 15) forward, so that the lifting arms can be moved.
2. Check the connecting surfaces on tractor and mowing attachment for cleanliness; slightly grease p.t.o. shaft and its counterpart on the mowing attachment. Push the tapered coupling sleeve, which is enclosed separately, on to the p.t.o. shaft of the tractor.
3. Lay the mowing attachment at a right angle behind the tractor. Lift the driving mechanism of the mowing attachment and connect it to the tractor; fasten by inserting the eyebolts and tightening the hexagon nut.
4. Screw out eye nut on the draw rod of the mowing attachment (ill. 8, page 52) until the thread is flush with the end of the rod. Insert chain hook (ill. 7, page 52) into the eye and fasten to the right lifting arm (ill. 6, page 52) of the tractor.
5. Start engine (as described on page 27) so that the hydraulic lift can be used.
6. Pull the lever for the hydraulic lift (ill. 11, page 15) to rear, lifting the mowing attachment together with the cutterbar. In its final position the cutterbar must stand vertically.
The position may be corrected slightly by turning the eye nut on the draw rod of the mowing attachment (ill. 8, page 52).
If this is not sufficient, the two lifting arms were either not depressed completely before mounting, according to b) 1. or the two lifting arms were disaligned while carrying out other work.

Both lifting arms can be swung outwards after unscrewing the two hexagon screws on the bent crank, their position can then be changed by turning them. When replacing the hexagon screws, take care that they fit into the slot of the two profiled ends.



- | | |
|---------------------------|---|
| 1 Clip | 13 Carriage bolt with ball-shaped latch, pressure spring and castle nut |
| 2 Special spanner | 14 Holding ring |
| 3 Plug | 15 Front square holes for adjusting the swathe rod |
| 4 Stay with adjusting nut | 16 Front mounting hole for the swathe rod |
| 5 Lifting arm, left | 17 Rear square holes for adjusting the swathe rod |
| 6 Lifting arm, right | 18 Rear mounting hole for the swathe rod |
| 7 Chain hook | 19 Swathe rod |
| 8 Draw rod with eye nut | 20 Stay (ill. 4) |
| 9 Knife guard | 21 Pull bar bracket, left |
| 10 Retaining spring | 22 Eyebolt with cap nut |
| 11 Stud | |
| 12 Outer shoe sole | |

7. Connect up stay and eye and insert threaded part into the third hole in the cutterbar from below and screw tight.
8. Do not forget to check whether the knife guard (9) is mounted.
The mowing attachment is now in transport position and you can drive to work.

Immediately before mowing:

1. Unscrew stay (20) from the cutterbar and detach.
2. Remove knife guard (9) from cutterbar.
3. A certain cutting height is set by adjusting the soles on the inner and outer shoe (adjusting clip ill. 12).
4. Since the number of revolutions of the p.t.o. shaft remains constant during the mowing process, the quality of the mowing is influenced by the gear speed selected.

If the mowing quality is not good, the tractor speed is too great; change down to the next lower gear.

Under normal conditions the second gear of the faster speed stage is correct for mowing (see details on speeds given on page 22).

Slopes with gradients of up to 20° or an incline of up to 45° can be mowed with the tractor driving on a level surface, provided that the cutting width of the cutterbar is sufficient.

Special care should be taken, however, to ensure that the inner and outer guide arms for the mowing blades have the correct pressure (see description on page 59, No. VI).

Mowing

1. Start engine (as described on page 27).
2. Lower cutterbar by pushing forward the lever for the hydraulic system (ill. 11, page 15) on the dashboard.
3. Depress clutch pedal (ill. 4, page 29),
switch gears to fast speed stage (as described on page 23),
shift to second gear,
pull back lever for the p.t.o. shaft (ill. 21, page 29) upwards, so that the p.t.o. shaft works independent of gear (as described on page 25),
slowly release clutch while opening throttle (ill. 15, page 29).

Caution! Tractor moves forward, and cutterbar operates.

4. After finishing work, or if the cutterbar is choked, slightly lift the cutterbar, so that it shakes itself clean.
5. Always switch off p.t.o. shaft and lift cutterbar (vertical position) when driving without mowing!

Caution! If it is necessary to carry out work of any kind on the cutterbar while mowing, the engine should be stopped beforehand for safety reasons.

After mowing for appr. half an hour, check all screws and nuts on the mowing attachment and the cutterbar and tighten, if necessary.

Exception: The nuts on the back of the cutterbar (ill. 10, page 55) must not be tightened, as this will alter the pressure of the upper blade guide arms! (See description on page 59, V).

After appr. every 8 hours of operation the lubricating points (ill. 19, 23–25, pages 56) should be greased with a grease gun and the mowing blades oiled.

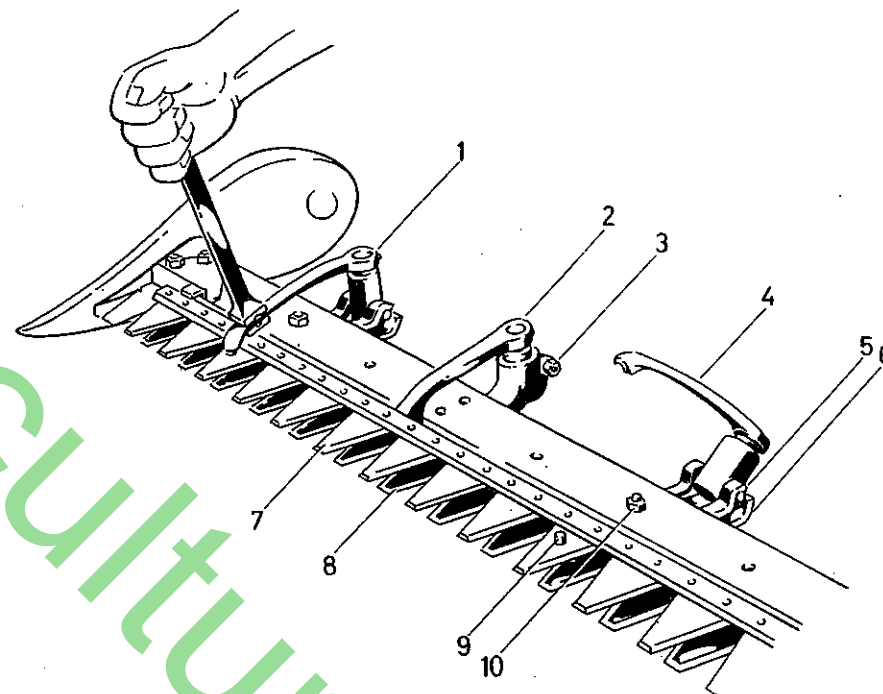
Since all the parts coming into contact with the plant juices tend to stick, all sliding parts must be oiled frequently and well in order to guarantee smooth operation of the blades.

After finishing mowing, the cutterbar is arrested again by means of the stay (ill. 4, page 52). Refit knife guard (ill. 9, page 52)!

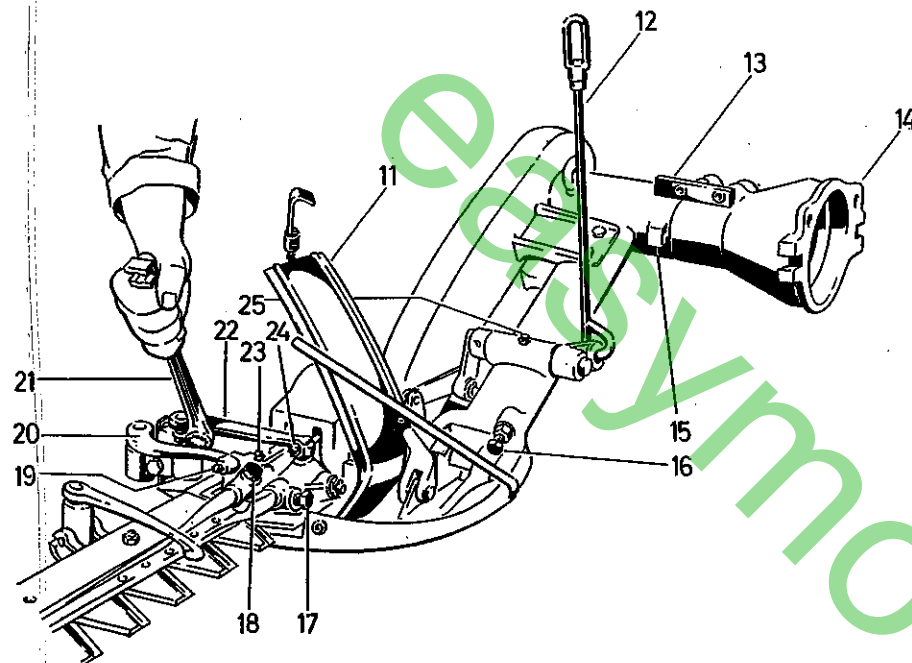
If the mowing attachment is detached from the tractor, do not forget the tapered coupling sleeve on the p.t.o. shaft. It is advisable to tie it to the mowing attachment, so that it is readily available for the next operation with the mowing attachment.

Replacement of mowing knives

1. Open protective cover (ill. 11, page 56) after disconnecting the locking piece and arrest it.
2. Bring the two mowing knives into medium position by shifting the inner and outer guide arms (ill. 20/22, page 56) with the special spanner (ill. 21, page 56) (blades are nearly superjacent as shown in the following illustration).
3. Loosen the clamping screws for both knives (ill. 17/18, page 56).
4. Swivel back the upper blade guide arms (1) by means of the special spanner (as shown on illustration 1/4).



- | | |
|--|--------------------------|
| 1 Upper blade guide arm | 6 Lower spring |
| 2 Lower blade guide arm | 7 Upper knife |
| 3 Holder with hexagon screw and nut | 8 Lower knife |
| 4 Upper blade guide arm (swivelled back) | 9 Knife blade with pin |
| 5 Upper spring with pin | 10 Stud with hexagon nut |



- | | |
|---|-----------------------------------|
| 11 Protective cover with tension spring and locking piece | 18 Clamping screw for lower knife |
| 12 Draw rod with eye nut | 19 Grease nipple |
| 13 Stop | 20 Outer guide arm |
| 14 Flange jacket | 21 Special spanner |
| 15 Stop pin | 22 Inner guide arm |
| 16 Stop screw | 23 Grease nipple |
| 17 Clamping screw for upper knife | 24 Grease nipple |
| | 25 Grease nipple |

5. Push the upper knife to the side until the cutter head is exposed, then lift off knife.
6. Slightly lift the lower knife until the pins have left the lower guide arms, then push the knife outwards, until the cutter head is exposed and lift off the knife.
7. New mowing knives should be oiled slightly, before inserting them, also oil the sliding surfaces in the inner shoe and the holes on the blade guide arms for the pins on the blades. To insert a new knife, proceed in reverse order as described above for removing the knife. Take care that the head plate at the cutter head end lies below the guide plate in the inner shoe.

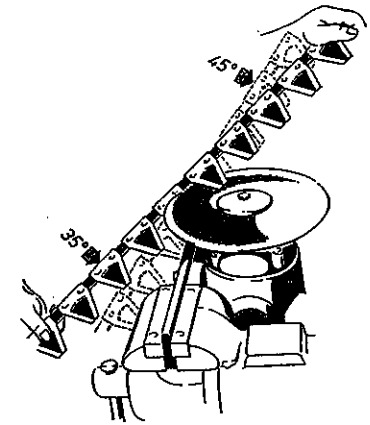
Hints for grinding mowing knives

With new knives the angle at the cutting edge of the different mowing blades is 40°. This corresponds to a width of appr. 4 mms.

For stony or sandy soils the angle of the mowing blades can be ground to 45° = 3,5 mms. width or even more. Generally, however, the angle of the cutting edge is not decisive, but the sharpness of the cutting edges.

Do not burn knife blades while grinding and do not round off the edges. Sometimes it is sufficient to run over the cutting edges with a coarse grinding stone.

Do not grind the blades more often than necessary. If both knives are blunt, it is advisable to grind only one knife, this means, a blunt upper knife with a ground lower knife or vice versa. Grinding methods are shown in the illustration.

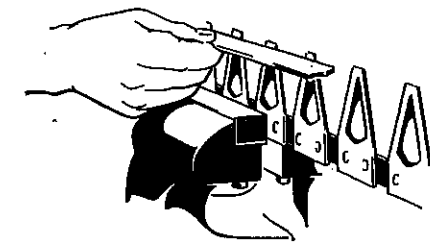
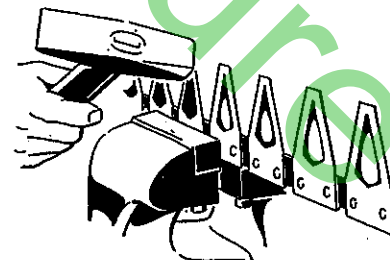


Maintenance and service

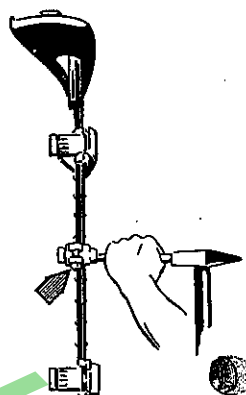
I. Cleaning

Thoroughly clean and oil mowing attachment after **every** mowing in order to prevent dust combined with plant juices sticking the movable parts together. Grease lubrication points by means of a grease gun (grease nipples ill. 19, 23-25, page 56).

II. The condition of both mowing knives should be checked appr. every 2-3 days, if used for any length of time. The mowing knives should always be straight and the different mowing blades in perfect alignment. Adjustment must be carried out very carefully. Check with a ruler!



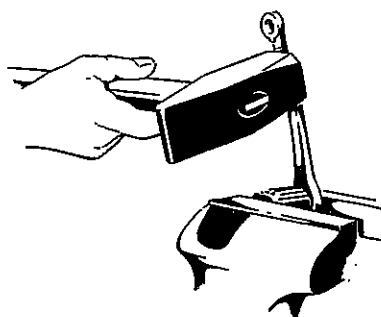
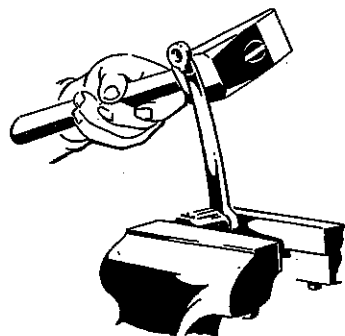
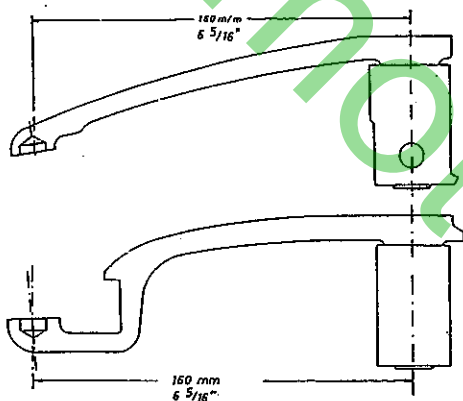
- III. Check position of mowing knives when mounted. The position in height depends on the outer and inner shoe plates. Both knives must run parallel with the cutterbar back. Their position may be adjusted at the holder of the lower blade guide arm (ill. 2, page 55). After loosening the hexagon screw (arrow), the blade guide arm can be knocked upward. Then retighten hexagon screw. The blade guide plate can be reset in the slotted hole. Distance between headplate at the knife and blade guide plate is 0,5 mms.



- IV. The upper and lower blade guide arms (ill. 1/2, page 55) must not touch the backs of the knives. They must also not press the knives forwards or backwards. If necessary, the blade guide arms must be reset (see illustrations).



The blades of the upper knife should be in line with those of the lower knife. If they jut out more than 2 mms over the blades of the lower knife, the upper blade guide arms must be readjusted, or bent to shape accordingly (see illustrations).



- V. The pressure of the upper knife guide arms (ill. 1, page 55) is set to appr. 12 kgs (26.5 lbs) at the factory. If the mowing conditions are extremely difficult (for example, if the grass is very tough and fine), the pressure may be increased by slightly turning the hexagon nuts (ill. 10, page 55) below the upper blade guide arms to the right. A half turn of the hexagon nut means appr. 4 kgs (9 lbs) more pressure. The pressure can be checked on a spring tension scale. For this purpose the guide arm is placed beside the pin and the spring tension scale positioned at the front.

For mowing peas or other climbing plants, a pressure of appr. 8 kgs (18 lbs) is sufficient. Loosen hexagon nuts accordingly.

Note: Whenever the pressure is changed, the position of the two mowing knives to each other must be checked, in order to guarantee even cutting and to prevent breaking of the knives.

Normally, it is not necessary to alter the pressure. It is advisable not to carry out unnecessary experiments in this respect.

Normal pressure – sharp knives should be the principle, since high pressure and blunt knives not only result in bad mowing, but also damage the driving parts.

- VI. The pressure of the inner and outer guide arms (ill. 20 and 22, page 56) for the knife movements amounts to 12–14 kgs (26.5–31 lbs) for the straight guide arm (ill. 22, page 56) for the upper knife, but only to appr. 7–8 kgs (15–18 lbs) for the curved guide arm (ill. 20, page 56) for the lower knife. (Pressure can be checked by means of a spring tension scale).

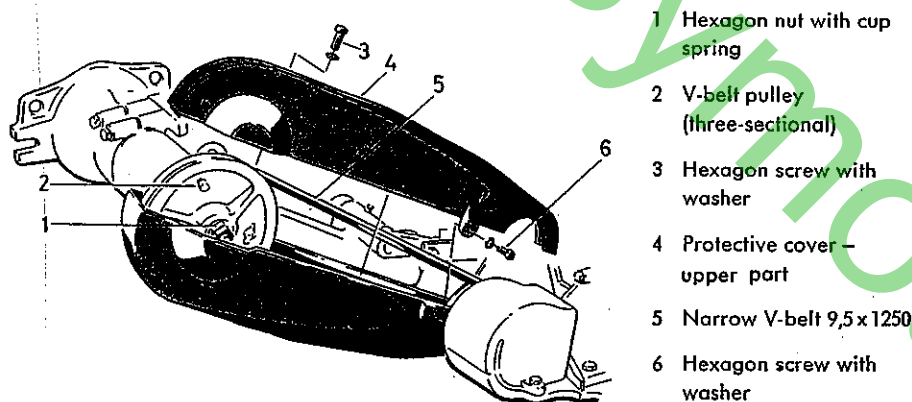
After the two mowing knives have been brought into medium position, the pressure may be corrected by shifting the two guide arms up or down. This is done as follows:

- Loosen clamping screw (to be seen below the guide arm on ill. 20, page 56).
- Press both guide arms (ill. 20 and 22, page 56) into the holders until they flush, fit over the pins of the connecting pieces without prestress.
- Slightly tighten clamping screw, then knock down the upper guide arm 2–2,5 mms and the lower guide arm 1,5 mms.
- Tighten up clamping screw.
- Check function: The sliding surface of the rear connecting piece should rest completely on the sliding plate of the inner shoe and the sliding surface of the front connecting piece should rest completely on the upper cutterhead plate.

Moreover, the headplate of the upper knife must lie flush on the headplate of the lower knife and the whole surface of this again should lie flush on the inner shoe plate. If this is not the case, one or both knife guide arms are bent. They may be reset as shown in illustration in section IV.

If the pins do not slide freely in the holes when pressing down the guide arms, i.e. if the connecting pieces are pushed forwards or backwards, it may become necessary so stretch or shorten the guide arms as well as resetting them.

If this advice is not followed, the knife may break or damage to the driving parts may result.



- 1 Hexagon nut with cup spring
- 2 V-belt pulley (three-sectional)
- 3 Hexagon screw with washer
- 4 Protective cover — upper part
- 5 Narrow V-belt 9,5 x 1250
- 6 Hexagon screw with washer

VII. Check tension of V-belts. For this purpose screw off upper part of protective cover (4). Tension of both V-belts should permit them to be depressed appr. 1 cm.

If they have to be tightened, proceed as follows:

- a) Loosen outer hexagon nut (ill. 1).
- b) Tighten inner hexagon nut while turning V-belt pulley, ensuring that the V-belts are not jammed in.

Place a screwdriver under the centering pin (2) as a counterhold.

- c) Tighten outer hexagon nut again and screw on upper part of protective cover.

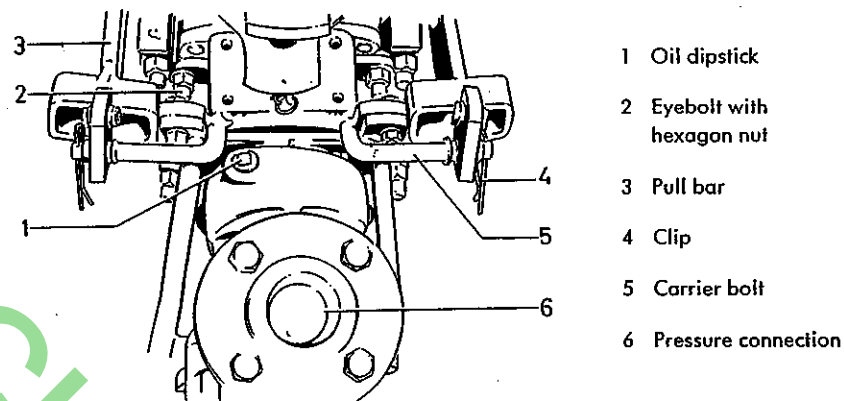
Irrigation

Necessary accessories:

- 1 irrigation pump, item 4892 015
- 1 suction hose with strainer, item 1592 113

Mounting the pump:

1. Detach implement bar and lifting bar (ill. 22/3, page 8).
2. Remove protective cap from p.t.o. shaft.
3. Ensure connecting surfaces on machine and pump are clean and burr free.
4. Grease profile end of tractor p.t.o. shaft and mount coupling sleeve on to p.t.o. shaft. Clean profile and toothing of coupling sleeve beforehand.
5. Shift p.t.o. shaft control lever to neutral (see description page 25), to facilitate mounting the pump.



- 1 Oil dipstick
- 2 Eyebolt with hexagon nut
- 3 Pull bar
- 4 Clip
- 5 Carrier bolt
- 6 Pressure connection

6. Flange pump on to tractor and tighten hexagon nuts on both eyebolts (2) uniformly.
7. Mount pull bars (3) on to carrier bolts (5) of the connection casing and secure with clips (4).

8. Remove cork stoppers from pressure and suction connections, screwing off both flanges beforehand.

Note: Pump is filled with water. If this is not the case, however, fill up the pump before connecting up the pipes to it.

9. Connect the suction and pressure hose tension-free up to the pump, not forgetting the gasket. The weight of the hose should not be borne by the pump and the hose should therefore be suitably supported.

The suction hose can be laid out as desired, as the pump can suck "over the hill". Avoid sharp bends in the hose.

Before connecting up the suction hose, check the function of the bottom valve by moving it up and down in water. The diameter of the hose must not be smaller than the hose connection on the pump. The valve in the suction basket must lie approx. 20 cm (8 in.) above the suction ground. In ponds or pits, the suction basket should be submerged in a wickerbasket. The suction height should not exceed 8 m (26 ft.).

Operation:

1. Shift gear to neutral as per description on page 24.
2. Switch to direction of rotation required for the pumping work (see description page 25).
3. Start engine according to description on page 27.
4. Depress engine clutch pedal, switch on p.t.o. shaft, release clutch pedal carefully and at the same time accelerate.

The pump will now be driven and will begin to operate.

Depending on the performance required, open speed control lever until the engine runs smoothly.

After work is finished:

1. Depress engine clutch pedal, switch off p.t.o. shaft, lift the suction hose out of the water and let the water drain out of the hose line. Screw off pressure and suction connections.

The pump must remain filled with water to prevent it from rusting. Close pressure and suction openings with corks.

2. Detach pump.

Description of pump:**a) General:**

The pump concerned is a slow running, selfpriming centrifugal pump. The housing is of high quality machine casting, the shaft of rustless steel, the packing of the stuffing box consists of numerous asbestos-graphite rings. The impellers and bearing bushes are of special bronze. The ground shaft is lubricated by the fluid conveyed.

Aggressive fluids, such as acids, seawater, brine, wine etc., and fluids with temperatures exceeding 50° must not be conveyed. Care must also be taken to ensure that no foreign matter or hard, gritty substances enter into the pump.

As the water passing through acts at the same time as a lubricant and cooling agent for the bearings, the pump must never be dry-operated, as the rotating parts will jam in a short time. In operation, the stuffing box should drip a little. If it leaks strongly, however, tighten the box nuts slightly. If these are tightened too strongly and unevenly, the pump will run warm, the power consumption will increase and the shaft will be subjected to excessive wear.

The direction of rotation of the pump is marked by cast-in arrows on the pressure and suction housing and the pressure and suction connections are marked on the round connecting flanges by arrows pointing upwards and downwards.

The pump is filled with fluid before leaving the factory to prevent rust forming inside.

Pressure and suction connections are sealed by corks.

b) Suction height:

The internal diameter of the suction line must not be smaller than the pump connection. If longer suction lines are laid, their diameter should be selected large enough to reduce friction resistance. Good performance can still be obtained at a metrical vacuum height of suction of 7 mtrs. (23 ft.) and a water temperature of 25° C.

With increased suction height the performance drops. The drop in performance at 8 mtrs. (26 ft.) is 20% and at 8½ mtrs. (27 ft.) already 40%. The suction height is reduced with increasing temperature. In consideration of this drop in performance and also of the operating safety a metrical vacuum height of 8 mtrs. (26 ft.) should not be exceeded. Water with a temperature of over 90° C must flow to the pump.

c) Height of water:

For heights of water of more than 10 m (33 ft.) and long lines, a return valve must be installed in the pressure line in order to protect the pump and the valve in the suction strainer from sudden shocks when the water is cut off abruptly.

The pressure line should be selected to suit existing conditions under consideration of the power of the pump. It should be noted that the diameter of the pressure line must be at least as large as the pressure connections of the pump. When long lines are employed, the diameter should be correspondingly larger to avoid excessive loss of pressure through friction.

d) Performance of pump:

Diameter of pipe connection 50 mm (1.97 in.)

Normal speed of the pump approx. 1425 r.p.m.

Metrical vacuum suction height up to 7 m (23 ft.)

Delivery height mtrs.	Power required DIN HP.	Conveying capacity Litres per min.	Conveying capacity Litres per hour
80	10.6	175	10 500
69	9.4	200	12 000
48	7.4	250	15 000
29	5.8	300	18 000

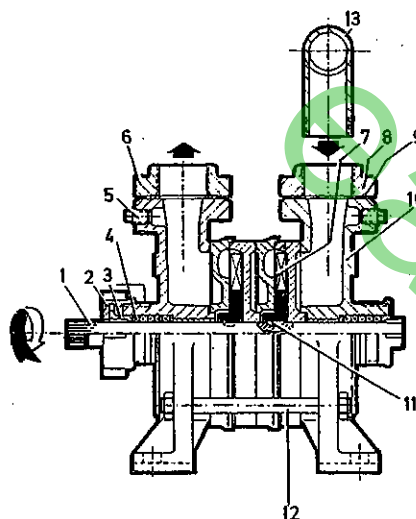
The total manometric lift is calculated from the fluid level in metre-head of water (suction height + pressure height + loss through friction). The power requirement given in DIN HP is measured at the pump shaft at a specific weight of the conveyed fluid of 1 and a viscosity of 1° Engler. The engine power must be approx. 10% higher than the HP values.

This performance data of the pump applies only for straight and clean pipe lines. For crusted pipe lines increases must be made, which may under circumstances amount to 100%. Elbows, junctions, cocks, all cause losses in manometric lift which must be taken into consideration. An elbow or junction corresponds to a resistance of approx. 5 mtrs. of straight pipe, a cutoff valve a resistance of approx. 10 mtrs. of straight pipe of the same nominal dia. All these losses in metres-head of water calculated together with the losses in the suction line and the total differences in height must be deducted from the manometric lift in order to arrive at the pressure available at the end of the line, i.e., either at the exit point or at a spraying nozzle mounted at the end.

Care and Maintenance:

Apart from general care of the pump and adherence to the directions mentioned above, the pump requires no maintenance.

Should individual rings in the packing of the stuffing box, however, require replacing, this is simple to arrange by screwing off the cap nut (2) and pulling back the stuffing



- 1 Pump shaft
- 2 Cap nut
- 3 Stuffing box
- 4 Packing ring
- 5 Plug
- 6 Threaded flange for pressure housing
- 7 Impeller
- 8 Threaded flange for suction housing
- 9 Flange gasket
- 10 Suction housing
- 11 Disc spring
- 12 Connecting bolt
- 13 Pipe elbow

box(3). The asbestos-graphite rings are cut through at an angle so that they can be pushed over the pump shaft from outside without dismantling the flanged-on intermediate gear. Care should be taken, when replacing a number of asbestos-graphite rings, that the cut sections do not lie above each other but that they overlap.

0.4 ltrs. transmission oil SAE 80 have been filled into the intermediate gear. This oil should be changed once a year. The filling point for the oil is at the oil dipstick (ill. 1, page 61).

The pump must be kept filled with water to prevent rust. In winter, the pump must be so stored that the water in it cannot freeze or it must be mixed with an antifreeze solution.

Should the pump rust in spite of this; however, do not put it into operation! Instead, fill it with hot soda water and turn the pump by hand by means of a pipe wrench to make it useable again.

Faults and their remedies:

If the pump conveys no water this may be due to the following reasons:

- suction line and pump not correctly filled
- suction line leaks or contains an air pocket
- stuffing box leaks
- suction height is excessive
- delivery height exceeds the manometric delivery height of the pump.

If the pump does not convey sufficient water

- the cause is usually a stoppage which may be found in the suction basket, the pump itself or in the pressure line
- it may also be due to the suction basket of the pump not being suspended deep enough in the water so that air is sucked in also.

If the power requirement is too great, i.e. the engine lacks power, the stuffing box may be too tight, which is apparent if the neck of the stuffing box becomes hot.

If the faults cannot be remedied, please contact your nearest AGRIA service station.

Notes for personal use

My tractor bears the designation

4800

and the number

(this can be determined according to Ill. 13, page 9)

The engine is made by Messrs.

Ruggerini

and bears the designation

CRD 100

and the number

(this can be determined according to Ill. 21, page 10)

Lighting/ignition switch and ignition key

bear the designation

The tractor was bought on

from Messrs.

The guarantee period begins on

and ends on