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 50 operating hours
Change the oil in machine and gearbox.

Every 50 operating hours
Check the valve clearance and adjust, if necessary.

Every 100 operating hours
Change the oil in the engine.

Every 200 operating hours
Change the oil in the gearbox.

For further maintenance work
see chapter on “Care and maintenance”.

AGRIA

MODEL 2700 D
with Ruggerini four-stroke Diesel engine RD 901

OPERATING INSTRUCTIONS

AGRIA-WERKE GMBH 7108 MOECKMUEHL
GERMANY
Telephone (06298) 311 – Telex 0466 791

X. 74
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.

We have purposely chosen this “Pocket Book Size” to enable you to carry these instructions with you when working.

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 instructions 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 always prove reliable and 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. Clean and lubricate the machine and the attachments at short intervals and tighten loose screws and nuts.

2. Check oil level in gearbox and engine and ensure that the oil level always corresponds with the mark on the oil dipstick (ill. 15, page 8 and ill. 17, page 7).

3. Check the air filter regularly (ill. 7, page 6). If dirty clean it as described on page 33. Ensure that there is sufficient oil to correspond with the mark on the oil container.

4. Check the amount of fuel in the tank. Use only recognized brands of fuel. Capacity of tank 8.5 litres = 1.9 imp. gallons. Check that the tank cap is clean, to ensure that the fuel tank is correctly vented and no stoppages occur in the fuel flow.

5. Check the brakes. Have the brakes on machine and trailer checked regularly, even if they still function correctly. The brake system, however, should be stripped and cleaned at least every 6 months. This is best done by the responsible AGRIA representative.
Designation of main parts

1. Holes for handlebar adjustment (Hexagon screw with nut)
2. Steering column
3. Bolt
4. Data plate
5. Hood
6. Weight bracket
7. Oil bath air filter
8. Support, lowered

9. Notched sleeve with bolt for locking the support
10. Fuel stage filter
11. Oil drain screw for gear oil
12. Shift lever for fast and slow gear stage and for reverse
13. Machine number
15. Eyebolt with cap nut
16. Implement coupling
17. Oil filler with dipstick
18. Support raised
19. Mounting screw for front weight

1. Exhaust
2. Hood clamp
3. Fuel tank
4. Spring lock
5. Shift lever
6. Oil plug for oil filler
7. Oil plug with dipstick
8. Top p.t.o. shaft
9. Bottom p.t.o. shaft
10. Multi-track hub, left
11. Operating lever for differential
12. Brake lever
13. Brake pull rod with wing nut
14. Brake rod
15. Engine clutch lever
16. Starting crank
17. Oil filler with dipstick
18. Support raised
19. Mounting screw for front weight
1. Handlebar
2. Operating lever for differential
3. Brake lever, left
4. Brake lever, right
5. Tool box
6. Lever for handlebar adjustment
7. Wing nut
8. Throttle lever
9. Hand brake lever
10. Adjusting screw for brake cable
11. Shift lever for slow and fast gear stage and for reverse
12. Top p.t.o. shaft (motor depending p.t.o.)
13. Bottom p.t.o. shaft (ground depending p.t.o.)
14. Inlet screw with oil dipstick
15. Inlet screw for oil filler
16. Gear shift lever (grease nipple for Bowden cable)
17. Gear shift lever bearing
18. Adjusting nut for clutch cable
19. Operating lever for engine clutch

1. Oil filler
2. Turning knob for decompression
3. Grease nipple
4. Screw plug for brake disk
5. Chain wheel with crank connection
6. Pinion
7. Roller chain
8. Ratchet disk
9. Crank support
Normal position of p.t.o.

A  Shift lever. When reversing, the gear independent p.t.o. disengages automatically.

B  Limit stop

C  Position of p.t.o. shift lever if gear independent p.t.o. is to continue running when reversing.

1  Fan housing
2  Air intake screen
3  Not mounted on Model 2700
4  Data plate
5  Nozzle holder with injection nozzle
6  Overflow pipe
7  Cylinder head cover
8  Connecting flange for exhaust muffler
9  Pressure line (injection pump-nozzle holder)
10  Cooling baffle
11  Connection for fuel line
12  Injection pump
13  Hexagon screw for oil filter insert
14  Oil dipstick
15  Engine Number
Description of the main parts

Engine
The power unit is an air cooled, four-stroke Diesel engine, Ruggerini Model RD 901 (Pages 11 and 12).
Output 14 HP at 3000 r.p.m.

Lubrication
The engine is lubricated by an excentric gear wheel pump. The oil flows through a screen filter into the oil sump, is drawn in by the pump and forced through the lubricating-oil filter into the lubricating ducts.

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.

Filter maintenance is described on page 40.

Important:
The surrounding temperature is decisive for the oil quality to be used:

for temperatures below $+15^\circ$ C HD-oil SAE 10
for temperatures between $+15^\circ$ C and $25^\circ$ C HD-oil SAE 20 W/20
for temperatures above $+25^\circ$ C HD-oil SAE 30

If too viscous lubrication oils are used at low temperatures, starting difficulties may arise due to too much friction on pistons and bearings.
The oil consumption of an engine may amount to 0,2 liters (about 1/3 pint) for 10 hours of operation. The oil consumption of a new engine may be higher, but this 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.

The use of a multi-range oil is recommended, as for example ESSO EXTRA Motor Oil 10 W-30 since this makes you independent from the surrounding temperature and only one sort of oil need be obtained.

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 while filling it into the fuel tank.

The injection pressure is 2,631 p.s.i. This should be checked every 100 operating hours. (See also page 41).

Fuel filters

On its way from the fuel tank to the injection pump the fuel is cleaned by a fuel stage filter with an ante-filter and a fine filter (ill. 10, page 6).

The maintenance of the filter is described on page 34.

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 reduction of the output.

All recognized Diesel fuels on the market with a specific weight of 0,83–0,84 kg/l (abt. 1.83–1.85 lbs/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 or gasoline should be added to the fuel in the following mixing proportions:

<table>
<thead>
<tr>
<th>Outside temperature</th>
<th>Diesel techn. kerosine</th>
<th>Diesel gasoline</th>
</tr>
</thead>
<tbody>
<tr>
<td>down to −20° C</td>
<td>75:25</td>
<td>80:20</td>
</tr>
<tr>
<td>down to −25° C</td>
<td>60:40</td>
<td>70:30</td>
</tr>
<tr>
<td>down to −30° C</td>
<td>45:55</td>
<td>60:40</td>
</tr>
</tbody>
</table>

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 revolutions of the engine set by the position of the throttle (ill. 8, page 8) 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 obtain 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 sucked-in air. The special air circulation in the oil container 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 33).

**Electrical system**

The **lighting installation**, item No. 2779 513, is comprised of:

- Dynamo 6 V 30 W, rectifier, battery 6 V 16 Ah, light switch, horn with button, 2 headlamps each with 2 bulbs 6 V/ 18/5 W and 6 V 2 W, electric socket and connecting cables.

**Lighting controls**

The lighting on the machine is switched on by the pull-push lighting switch.

The parking lights are switched on by pulling out the switch to the first notch.

The main beam (driving lights) is switched on by pulling out the switch to the second notch.

The lighting current for the trailer may be taken from the relevant socket.
Technical Details

A) Machine

Dimensions:
- Overall length: approx. 2320 mms (7'6"
- Width: approx. 670-915 mms (2'2"-3'0"
- Height: approx. 1150 mms (3'9"
- Weight empty, but with additional weights: approx. 340 kgs (750 lbs)
- Front weight: 11 kgs (24 lbs)
- Wheel weights: 58 kgs (128 lbs)
- Tyres: 6.00-16 AS or 6.12 AS
- Tyre pressure: 1.5 atü (21.3 p.s.i.)
- Fuel tank: approx. 8.5 ltrs. (1.9 imp. gals.)

B) Engine

RD 90I
- Design: Diesel 4-stroke
- Cylinder: 1 (upright)
- Volume: 540 cm³ (33 cu. ins.)
- Bore: 90 mms (3.54 ins.)
- Stroke: 85 mms (3.35 ins.)
- Compression ratio: 17.8:1
- Output: 14 HP
### Speeds

<table>
<thead>
<tr>
<th>Gear speed</th>
<th>Slow</th>
<th></th>
<th></th>
<th>High</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
</tr>
<tr>
<td>Gear</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With tyres 6.00–16 AS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forwards: km/h</td>
<td>1.20</td>
<td>2.65</td>
<td>5.40</td>
<td>4.15</td>
<td>9.00</td>
<td>18.00</td>
</tr>
<tr>
<td>mph</td>
<td>0.75</td>
<td>1.65</td>
<td>3.35</td>
<td>2.6</td>
<td>5.6</td>
<td>11.2</td>
</tr>
<tr>
<td>Reverse: km/h</td>
<td>1.20</td>
<td>2.65</td>
<td>5.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mph</td>
<td>0.75</td>
<td>1.65</td>
<td>3.35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tyres 6–12 AS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forwards: km/h</td>
<td>0.94</td>
<td>2.05</td>
<td>4.20</td>
<td>3.20</td>
<td>7.00</td>
<td>14.00</td>
</tr>
<tr>
<td>mph</td>
<td>0.58</td>
<td>1.27</td>
<td>2.61</td>
<td>1.99</td>
<td>4.35</td>
<td>8.7</td>
</tr>
<tr>
<td>Reverse: km/h</td>
<td>0.94</td>
<td>2.05</td>
<td>4.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mph</td>
<td>0.58</td>
<td>1.27</td>
<td>2.61</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Mounting the drive wheels with pneumatics
**No. 2790313 and 2791013**

For this purpose **multi-track hubs** are required, which are screwed to the wheel hubs of the machine. With the aid of these multitrack hubs, the rubber tyred drive wheels can be mounted in 4 different track widths:

### Tyres 6-16 AS

<table>
<thead>
<tr>
<th></th>
<th>Track width</th>
<th>Outside width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve outward</td>
<td>505 (19.9 ins.)</td>
<td>670 (26 ins.)</td>
</tr>
<tr>
<td>Valve inward</td>
<td>575 (22.6 ins.)</td>
<td>740 (29 ins.)</td>
</tr>
<tr>
<td>Valve outward</td>
<td>681 (26.8 ins.)</td>
<td>846 (33 ins.)</td>
</tr>
<tr>
<td>Valve inward</td>
<td>751 (29.8 ins.)</td>
<td>917 (36 ins.)</td>
</tr>
</tbody>
</table>

### Tyres 6-12 AS

<table>
<thead>
<tr>
<th></th>
<th>Track width</th>
<th>Outside width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve outward</td>
<td>550 (21.6 ins.)</td>
<td>715 (28 ins.)</td>
</tr>
<tr>
<td>Valve inward</td>
<td>620 (24.4 ins.)</td>
<td>785 (31 ins.)</td>
</tr>
<tr>
<td>Valve outward</td>
<td>625 (24.6 ins.)</td>
<td>790 (31 ins.)</td>
</tr>
<tr>
<td>Valve inward</td>
<td>695 (27.4 ins.)</td>
<td>860 (34 ins.)</td>
</tr>
</tbody>
</table>

In general the wheels are mounted with the tread points towards the driving direction. This is only then really necessary if full traction in rough terrain is required.

Alterations to track width can be carried out on either side without both drive wheels having to be removed simultaneously.

The two shackles with threaded holes in the rims of the drive wheels No. 2791013 serve to screw on the **wheel weights**, No. 2721 113.

Check the wheel mounting at short intervals and tighten the flange bolts as necessary.
Engine clutch

The machine is provided with a single disc dry friction clutch which is operated by a lever (ill. 19, page 8) via a Bowdon cable. Adjustment is made by the adjusting nut (ill. 18, page 8) in the hand lever. The lever should have a clearance of approx. 5–10 mms. (0.2–0.4 ins.).

Gears

The machine is equipped with 3 gear stages, resulting in 6 different gear speeds (with the aid of an additional reduction gear).

3 different gear speeds are available in reverse.

Gears are changed by means of the gear lever (ill. 16, page 8).

As shown on the decal, the gear lever is operated as follows:

1st gear: gear lever to the rear
2nd gear: gear lever in centre
3rd gear: gear lever to the front

An idling notch is provided between each gear.

Slow and fast stage

With the aid of the right shift lever (ill. 11, page 8) both gear stages can be engaged: L = slow and S = fast.

As may be seen in the decal, the L-stage (snail) is engaged when the shift lever is in the centre position.

The fast gear stage (hare) is engaged when the lever is pulled right back to the rear.

Direction of travel

If the shift lever (ill. 11, page 8) is pushed right forward as shown on the decal, the 3 reverse gears can be engaged with the help of the gear lever (ill. 16, page 8).

Please note that the machine must always be brought to a halt before the gear lever (ill. 11, page 8) is shifted to reverse.

Differential gear

The machine is equipped with a differential gear which ensures high manoeuvrability.

To increase traction, the differential can be locked by means of the left shift lever (ill. 2, page 8).

If this shift lever is pulled upwards to its limit as shown in the decal, the differential is released and in full operation.

If the shift lever is pushed downwards, the differential is locked.

The lock should not be employed longer than necessary, as this makes steering difficult.
Brakes and turning brakes

The machine is equipped with a driving and parking brake operating on both drive wheels.

The machine is braked during operation by the hand brake lever (ill. 9, page 8).

The parking brake is operated by pushing down both brake levers (ill. 3 and 4, page 8).

If only one of these levers is depressed, the relevant wheel is braked and the machine turns to that particular side.

This device enables the machine to be turned easily and, when only partly operated, helps greatly in correcting the steering during operation.

P.t.o. shaft

2 p.t.o. shafts are provided at the rear end of the machine.

The top p.t.o. cannot be switched off, and only runs independent of gear in 2 stages of rotation, depending on whether the slow gear stage (L = snail) or the fast gear stage (S = hare) is switched on.

Direction for rotation facing the p.t.o.:
  forwards: anticlockwise
  reverse: clockwise

This p.t.o. is provided specially for the stationary operation of auxiliary implements.

The bottom p.t.o. can, depending on the position of the shift lever (ill. 14, page 6), be engaged dependent on or independent of gear.

If the shift lever (ill. 14, page 6) is shifted forwards, the p.t.o. runs independent of gear, if shifted to the rear it runs dependent on gear.

Between the two positions, the p.t.o. is switched off.

Direction of rotation facing the p.t.o.:
  forwards: clockwise
  reverse: anticlockwise

The shift lever (ill. 14, page 6) for the bottom p.t.o. is coupled with the shift lever position R (reverse) – see shift lever ill. 11, page 8 – so that in this position the drive for the p.t.o. independent of gear is switched off.

This is a safety precaution to prevent reverse gear or mounted implements, such as hoeing or tilling rotors, from being engaged unintentionally.

In order, however, to drive implements with the p.t.o. switched independent of gear when a reverse gear stage is engaged, – as, for instance, when working with the flail mower, a switch is provided on the rear housing which disengages this automatic safety device. Operations are then controlled by the grip lever shown on page 10).

If this grip lever, which is normally situated to the right of the limit stop, is shifted over the stop to the left, the reverse shift position can be used without the p.t.o. drive being switched off.
Special care should be taken to ensure that the grip lever is immediately swivelled back to its original position to the right of the stop after the particular operation is completed.

Swivelling the handlebars

The handlebars can be swivelled to left or right or be turned 180°.

Once the lever for the handlebar adjustment (ill. 6, page 8) is depressed, the bottom steering bar lifts and the handlebars can be swivelled to the side.

Joggle the lower steering bar into the relevant notch and turn up the lever for the handlebar adjustment.

If the handlebars complete with steering column are to be swivelled 180°, first remove the two gear shift lever bearings (ill. 17, page 8) for direction of travel and gear shift, after unscrewing the wing nut (ill. 7, page 8).

When swivelling the handlebars and steering column 180°, this must only be done to the left over the exhaust side.

After replacing the two gear shift lever bearings, care should be taken to ensure that the gear shift is on the right side and the shift for the direction of travel is on the left on the handlebar.

Height adjustment of the handlebars

By means of 2 hexagon screws and nuts in the holes bored at various heights in the handlebars and the steering column (ill. 1, page 6), the handlebars can be adjusted to the correct height.

Implement coupling

The implement coupling (ill. 16, page 6) can swing sideways and is locked when not in use with the bolt (ill. 3, page 6) provided. If implements are to be connected up, they are secured with the same bolt which is then inserted in the hole at the side. The spring locking pin (ill. 4, page 7) is inserted in the hole in the bolt to prevent it coming loose.

Weight bracket with support

The weight bracket (ill. 6, page 6) not only serves to protect the engine against blows and shocks but also serves as a mounting bracket for the front weight No. 2728 113, which can be secured with the hexagon screw (ill. 19, page 7).

On the weight bracket a folding support is mounted (ill. 8, page 6) for parking the machine when no implements are attached. On the right side of the machine a spring mounted notched bolt is provided (ill. 9, page 6) which secures the support in raised position as shown in ill. 18, page 7, and in lowered position as shown in ill. 8, page 6.
Putting the machine into operation

Before putting the machine into operation, i.e. before starting the engine, check whether

a) sufficient fuel is in the tank (ill. 3, page 7),

b) there is sufficient oil in the engine corresponding to the mark on the oil dipstick (ill. 17, page 7),

c) oil is filled to the mark on the oil container of the oil bath air filter (ill. 7, page 6),

d) the gear lever (ill. 16, page 8) is in neutral,

e) both brake levers (ill. 3 and 4, page 8) are in the down position.

Care should be taken to ensure that the pipes are vented before starting the engine for the first time, after major repairs and after each interruption of the fuel flow.

Always ensure that the fuel in the tank is not used up completely.

At the factory, all pipes are vented and a small amount of fuel is left in the tank. If, however, the pipes must be vented again for any reason, proceed as follows:

1. Fill the fuel tank.

2. Remove vent screw (ill. 6, page 35) from the fuel stage filter and screw it in again as soon as the fuel emerges free of bubbles.

3. Slacken off the hollow screw for the fuel pipe on the injection pump and tighten it again as soon as the fuel emerges free of bubbles.

4. Unscrew cap nut for the fuel line on the nozzle holder. Turn the engine until the fuel emerges free of bubbles and then retighten cap nut.
Starting the engine

1. Open the throttle (ill. 8, page 8) completely.

2. Pull extra fuel button (ill. 18, page 12) upwards.

3. Insert starter crank through guide hole in engine hood and into crank connection of chain wheel (ill. 5, page 9).

4. Turn the decompression knob (ill. 2, page 9) to the right until it clicks and the engine can be turned easily with the aid of the crank. Turn the crank at increasing speed until the automatic decompression switches off and the engine starts. The extra fuel button snaps back automatically as soon as the regulator works.

If the engine does not start immediately, repeat the starting procedure described above.

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.

5. After the engine starts, let it run at medium speed for about 10 minutes to ensure good lubrication.

Starting at low temperatures

Provided that the motor oil filled in is suitable for the season of the year, in accordance with the description on page 13, one of the following additional starting aids may be used at low outside temperatures.

1. **Filling motor oil into the air intake duct**

   Clean area around inlet screw plug (ill. 23, page 12). Remove screw plug and pour approx. 2 teaspoons of light motor oil SAE 10 into the opening.

   Replace the screw plug and start the engine with the crank as described.

2. **Using “start-pilot”**

   Start-pilot is a liquid supplied in aerosol bottles. It increases ignitability of the fuel at low temperatures. If used according to the instructions on the bottle, the contents are 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 port of the oilbath filter (ill. 7, page 6).
Stopping the engine

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

The measure prevents carbonising of the injection nozzle and ensures its reliable operation.

The engine is stopped by closing the throttle and pressing the speed regulating lever (ill. 26, page 12) against the left stop.

Never stop the engine by turning the decompression knob (ill. 22, page 12) as this may damage the valves.

Running-in period

The life and reliability of the engine depend mainly on the running-in period. During the first 50 operating hours, the engine should run only up to approx. 50% of its maximum load, which means that in operation the throttle should only be opened halfway. If the engine is cold, let it first warm up for approx. 10 minutes and then for a further 5 minutes without load and with the throttle lever opened halfway.

After 50–100 operating hours the load can be increased to about 3/4 of fuel output.

Care and maintenance

A) Machine

Apart from following the instructions for the machine and the engine, it is of equal importance to pay special attention to the following instructions for service and maintenance.

Good performance depends on good service!

The following should therefore be closely observed:

1. Before each operation check the oil level in
   a) the gearbox (oil dipstick ill. 14, page 8)
   b) in the engine (oil dipstick ill. 17, page 7)
   c) in the oil bath air filter (ill. 7, page 6)

2. Change the oil promptly. Keep the oil inlet and outlet screws and the surrounding areas absolutely clean, so that no dirt penetrates into the interior of the machine.

The gear oil should be changed after the first 50 hours of operation, thereafter every 200 operating hours.

8 litres of light gear oil SAE 80 are necessary, as, for instance, ESSO GEAR OIL ST 80. The oil should be changed while the engine is still warm. The oil drain screw is situated on the underside of the gearbox. (ill. 11, page 6).

See instructions on pages 13 and 39 for changing the oil in the engine.

3. Clean oil bath air filter. Proceed as follows:
   a) Clean air filter and surrounding area on the outside.
   b) Open locking clamps, take off oil container, remove used oil and clean oil container.
c) Check air inlet ports at the intake tube and clean.

d) Fill air container with motor oil up to the oil mark (not higher!) and replace container.

e) Ensure that the filter fits tightly.

**Please note:**
After several oil changes or after excessive fouling, screw off filter, remove oil container, thoroughly clean filter by dipping it into Diesel fuel several times, then dry it and screw it on again. Fill in oil as described above. *(Under no circumstances use gasoline, water, lyes or hot liquids for washing the filters!)*

4. **Check oil filters** (ill. 10, page 6)

There is a fuel stage filter provided, with an ante and fine filter for cleaning the Diesel fuel.

The ante filter is provided with a felt-tube insert and the fine filter with a micronic filter insert (see page 35 for details).

If the engine output drops, check the fuel supply from the tank, and then check whether the felt-tube insert in the ante filter is dirty. If necessary, clean as follows:

a) Close fuel cock on fuel tank.

b) Take out felt-tube insert and seal both ends with a cork.

c) Scrape off dirt from the outside, then brush off with a non-metallic brush in Diesel fuel, petroleum or, if this is not sufficient, in benzene (phenyl hydride).

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

d) After this external cleaning, soak the filter insert in clean Diesel fuel or petroleum.

e) Remove one of the corks and blow in compressed air. Foam should then form over the whole 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 4 or 5 times, depending on the degree of fouling.

*It is imperative to use clean Diesel fuel for the last washing process!*
9. Check the tyre **pressure** of the drive wheels.

This should be 21.3 p.s.i.

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

10. Check that the **brake system** for the driving and parking brakes on machine and trailer function correctly.

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

11. Ensure that the **implement coupling** on the machine is not fouled, so that the coupling bolt (ill. 3, page 6) can be inserted correctly. Do not forget to lock the bolt with the aid of the spring lock provided.

12. Do not garage the machine

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

---

**f) Note:**

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 the outside (clean and dirty side) through which unfiltered fuel may reach the injection pump. Expensive repairs could result.

**g) The micronic insert in the fine filter needs renewing only after approx. 200 hours of operation, if the felt-tube insert in the ante filter has always been serviced correctly.**

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

**h) After the filter has been cleaned, the fuel cock must be opened and the whole pipe as far as the injection pump must be vented as described on page 28.**

---

5. Ensure that the **engine is cooled efficiently**. The relevant devices should always be kept in good working order.

6. Check the **exhaust** after every 500 hours of operation for carbonisation and fouling. Clean if necessary.

7. Generally keep the **machine clean**; especially those parts which are most important for its correct operation. Tighten loose screws and nuts.

8. At short intervals oil the **roller chain** of the crank starter (ill. 7, page 9) and from time to time oil or grease all mowing parts and Bowden cables. (Let some oil run into the cable spiral).
13. If the machine is not to be used for some time:

a) thoroughly clean the machine, check all parts and replace, if necessary.

b) jack up the machine 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 long rest, especially in spring, when the work in the fields begins, change the gear oil and the motor oil, oil or grease all moving parts.

Check fuel tank with all pipes, as well as fuel filter and injection pump and clean, if necessary. Finally, do not forget to vent the fuel pipes up to the injection nozzle.

Check the air pressure in the tyres!

B) Engine

Regular maintenance

1. Oil change:

With new engines the oil should be changed after the first 50 hours of operation and all further oil changes after 100 hours of operation.

Use only recognized motor oils with HD additive.

The use of a multigrade oil is recommended, such as ESSO EXTRA-MOTOR OIL 10 W-30. See instructions on page 13!

Change the oil only when the engine is warm!

Remove the oil drain screw (ill. 16, page 12) and drain off the old oil.

In the course of time dirt deposits collect on the inner walls of the crank case, especially if the oil is not changed regularly, or poor oils are used.

For this reason, rinse out the crank case once a year in Diesel fuel. After unscrewing the cover at the bottom of the crank case (ill. 28, page 12) cleaning can be carried out and checked easily.

Before tightening up the cover, renew the gasket.

The oil filler is situated on the right side of the engine (ill. 24, page 12).
Fill in approx. 2 litres of new motor oil up to the upper mark on the oil dipstick (ill. 17, page 7). See also description on page 13.

When changing the oil, clean the oil filter insert also.

For this purpose, remove the hexagon screw (ill. 13, page 11). Clean the screw and the area around it thoroughly, to ensure that no dirt penetrates into the engine. Remove the filter insert, clean it carefully in petroleum or Diesel fuel and replace it.

Screw in the hexagon screw and check the correct sealing of the gasket.

**Every 200 operating hours** the oil sump on the engine (ill. 28, page 12) must be screwed off and washed out with Diesel oil or petroleum. At the same time, clean the strainer filter above it.

Check the gaskets before assembly.

2. **Check the valve clearance** about every 50 operating hours and adjust if necessary.

**Checking and adjusting should be carried out only when the engine is cold!**

If the engine is turned until compression resistance is felt, i.e. both valves are closed. The valve clearance of the inlet valve should be 0.3 mms. and that of the outlet valve 0.2 mms.

3. **Fuel injection**

Check the injection pressure every 100 operating hours. This should be 2,631 p.s.i.

If injection is retarded, the thickness of the disks under the pump connecting flange should be decreased, and increased if injection is advanced.
Faults and how to remedy them

I. Faults in the machine or engine which necessitate complex repairs should always be remedied by an AGRIA Service Station or a recognized, efficient workshop having the necessary equipment at their disposal. Amateur repairs may cause further damage.

II. Faults in the injection system should be remedied only by a recognized Bosch Service Station. If not available in the vicinity, a spare nozzle holder with injection nozzle should be held in reserve to save time.

In order to determine whether the fault lies with the injection system or the engine, screw out the nozzle holder and nozzle. The injection line should only be loosened until the nozzle holder can be swivelled off to the side. Then retighten the injection line, fully open the throttle and turn the engine. If the nozzle atomises without dripping, the fault must be sought in the engine.

Caution! Never put your hand or finger close to the nozzle opening as the high pressure of the fuel jet may cause considerable injuries.

III. Engine will not start

Having determined that the fault does not lie with the injection pump or the injection nozzle, try again to start the engine while carefully observing all starting instructions (see page 30), especially for starting at low temperatures (see page 31).

Possible cause   Remedy

1. Fuel supply faulty

   a) Fuel tank empty   Fill in fuel
                        Vent injection system
                        (see description on page 28)

   b) Air in injection system   Fill in fuel
                                Vent injection system
                                (see description on page 28)

   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 34)
       Fill in fuel. Vent injection system
       (see description on page 28)

2. Engine is difficult turn

   Drain oil and fill in HD-oil SAE 10
   start (see page 13) start as described on page 30.

3. Engine has no compression

   a) No valve clearance Check and adjust valve clearance
       as described on page 40.
<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Cylinder head gasket faulty</td>
<td>Remove cylinder head, renew gasket.</td>
</tr>
</tbody>
</table>

4. Engine fails, but does not start  

| a) | Pull extra fuel button (ill. 18, page 12) before starting. |
| b) | Drain oil and fill in HD oil SAE 10 (see instructions on page 13). |

IV. Black 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  
   (see description on page 33)

2. Valve clearance incorrect  
   Adjust valve clearance  
   (see description on page 40)

3. Injection nozzle defective  
   Replace injection nozzle  
   (see description on page 46)

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. 17, page 7)

2. Air in injection system  
   Fill up with fuel, vent injection system (see description on page 28).

VI. Engine overheats

1. Lack of cooling air  
   Clean cooling air inlet, clean cooling ribs.

2. Too much oil in crankcase  
   Drain oil to normal level according to mark on dipstick (ill. 17, page 7).

3. Engine overloaded  
   Find cause and remedy.

VII. Engine stops  
Fuel supply faulty.

| a) | Fuel tank empty  
   Fill in fuel  
   Vent injection system (see instructions on page 28). |
| b) | Fuel filter blocked  
   Replace or clean fuel filter insert as described on page 34  
   Fill up with fuel  
   Vent injection system (see instructions on page 28). |
VIII. Replace injection nozzle

1. Screw off pressure pipe (ill. 9, page 11) and overflow pipe (ill. 6, page 11).

2. Screw off hexagon nuts at nozzle holder (ill. 5, page 11) and take out nozzle holder with injection nozzle.

   **Note:** Do not lose washer. Should it come off with nozzle holder, replace it at once.

3. Fit replacement nozzle holder, tighten hexagon nuts evenly and reconnect pipes.

The injection nozzle alone can be replaced only by a recognized Bosch Service workshop, who have available the necessary tools and adjusting instruments.

**CAUTION!**

When checking the function of the newly inserted nozzle holder, take care never to put your hand or finger close to the opening of the nozzle, as the high pressure of the fuel jet may cause considerable injuries!

On the following pages the main methods of application for the tractor are described.

The articles listed are based on the assumption that the multi-track hubs, item 2719013, are already mounted on the machine.
Driving with trailer No. 2788013

Necessary accessories:

a) 1 pair drive wheels, any type
b) 1 trailer with pneumatic tyres, item 2788 013 (with lighting equipment)
c) 1 pair wheel weights, item 2721 113 for drive wheels, item 2791 013 (if loading capacity is to be fully utilized)
d) 1 front weight, item 2728 113

Mounting

1. Couple the trailer to the machine.
   Ensure that the retaining bolt (ill. 3, page 6) is correctly inserted and secured by the spring pin.

2. Connect lighting cable to the machine.

3. Mount the wheel weights (if provided) into the drive wheels and screw them tight.

Driving

1. Shift gear lever (ill. 16, page 8) to idling position (see description on page 22).

2. Switch to fast speed stage: pull back shift lever (ill. 11, page 8).

The slow speed stage is necessary only for heavy loads and difficult ground (Switch shift lever [ill. 11, page 8] to centre position).

3. Start the engine and let it warm up. (See description on page 30).

4. Pull the engine clutch lever (ill. 19, page 8) and engage gear (gear lever ill. 16, page 8).
   Under normal conditions the second gear can be employed for starting on the road.

5. Release brake on trailer and machine.

6. Slowly release engine clutch lever and at the same time open the throttle.

7. Changing up from 1st to 3rd gear:
   a) Pull engine clutch lever, regulate the throttle.
   b) Engage gear.
   c) Slowly release hand lever for engine clutch and at the same time open the throttle.

8. Changing down from 3rd to 1st gear:
   a) Pull engine clutch lever, regulate throttle and speed.
   b) Engage next lowest gear.
   c) Slowly release engine clutch lever and at the same time open the throttle.
9. Stopping:
   a) Pull engine clutch lever, regulate throttle.
   b) Shift gear lever (ill. 16, page 8) to idling position.
   c) Release engine clutch lever.
   d) Pull on brake on trailer and machine and secure.

Ensure that the specified load of the trailer is not exceeded.

Overload not only affects the trailer but the machine as well.

The type pressure of the trailer should be 2.5 atue (35 p.s.i.).

**Never drive downhill in neutral!**

Remember that for trailers with a gross weight of more than 750 kgs. (see data plate) at least one wheel wedge must always accompany the trailer.

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

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**Trailer lighting**

**Equipment required:**

1. **Lighting equipment item 2779 513** on the machine (see page 17 for details).

2. **Lighting and signalling equipment, item 2779 013**, for trailer, item 2788 013 comprising:

   - switchbox, fuse box with 3 fuses, pull switch, warning light switch, blinker switch, indicator lamp for blinkers, blinker unit 2 side lamps, 2 combined blinker/tail lights with 2 each strip lamps 6 V 18 W and 6 V 3 W, electric plugs and connecting cables.

**Caution!**

If you should connect up an existing trailer with a lighting system that has been powered by a 16 Watt generator, the rectifier in the trailer switchbox must be removed and the loose cable connections (rectifier input – rectifier output) connected to each other. The correct wiring arrangement may be seen in the wiring plan on page 18.
Positions of the lighting pull switch

Position I  (switch pushed in to limit)
all lights off; only the battery being charged.

Position II (switch pulled out to first notch)
parking light switched on.
The left headlamps/sidelight and the tail light
are lit.

Position III (switch pulled out to second notch)
all lights lit: both headlamps/sidelights and
both tail lights.

Using the blinker switch

If the switch, facing driving direction, is pushed to the left,
the left blinker operates, if to the right, the right blinker.

Using the warning lights

The warning lights are operated by the push/pull button
of the warning light switch, which causes all blinkers and
also the bulb in the push/pull button to blink in rhythm.

The wiring plan for the trailer lighting is to be found on
page 18.
Hoeing and tilling

Necessary attachments:

a) 1 pair drive wheels (recommended: item 2790 313)
b) 1 drive mechanism No. 2701 013
c) 1 hoeing attachment consisting of:
   1 pair hoeing rotors No. 2709 013 or 2710 013
   1 rotor cover No. 2715 083 or 2715 113 and
   1 pair clamp bolts.
d) 1 front weight No. 2728 113.

Mounting

1. Flange on drive mechanism
   Ensure that the contact surfaces are clean and that the clamp bolts are tightened evenly.

2. Adjust duck foot.
   a) Unscrew clamping bolt.
   b) Pull back duck foot until it snaps into required notch (bottom notch = maximum hoeing depth, top notch = minimum hoeing depth).
   c) Screw in clamping bolt loosely.
   d) Adjust cutting angle of blades: for light sandy soil press down rear arm as far as possible, so that it is just held by the clamping bolt. The heavier the soil, the further the rear arm must be pushed in.
   e) Tighten clamping bolt.

3. Fit hoeing tools on hoeing shaft ends and screw them tight.
   (Note: On the left side the screws have right-hand threads; on the right side, left-hand threads. The head of the clamping bolt with left-hand thread is marked “L”).

4. Screw on hood. For wet soil and greater hoeing depth: top notch. For dry soil and lesser hoeing depth: bottom notch.

5. Mount and screw on front weight as required. Deep hoeing and tilling should be carried out without a front weight.

Working

1. Shift the gear lever (ill. 16, page 8) and the lever for the p.t.o. (ill. 14, page 6) to neutral.

2. Start the engine and let it warm up.
   (See description on page 30).

3. Pull engine clutch lever, switch p.t.o. to independent-of-gear, i.e. push the p.t.o. lever (ill. 14, page 6) forwards (see description on page 25) and engage 2nd or 3rd gear. The 2nd gear for tilling (fine tilth), the 3rd gear for hoeing (coarse tilth).

4. Switch to slow speed stage (shift lever ill. 11, page 8 to centre position).
5. Slowly release engine clutch lever while opening throttle.
   **Caution:** Do not step under hood flap! The machine is now in forward motion and the hoeing rotors are turning.

6. To turn, shift to 1st gear and operate brakes as described on page 24.

   **Before turning and before engaging reverse gear switch off the power take-off shaft!**

Ensure that the engine is switched off before carrying out work of any kind on the hoeing rotors. If possible, cleaning should not be done by hand but with a suitable object.

**Caution:** For safety reasons it is imperative to switch off the power take-off shaft, if it should be necessary to engage reverse gear while the hoeing attachment is mounted!

**After hoeing is finished**

1. Detach the implements in reverse order.

2. The hoeing gear must always contain sufficient oil.
   
   Quantity required: 0.3 ltrs. (0.19 pints) gear oil SAE 80, such as **ESSO GEAR OIL ST 80**.

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**Ploughing with reversible plough**

**Necessary attachments:**

a) 1 pair drive wheels No. 2791 013

b) 1 pair wheel weights No. 2721 113

c) 1 adjustable coupling No. 2740 113

d) 1 bail with side stops No. 2740 213

e) 1 front weight No. 2728 113

f) 1 reversible plough No. 2744 013

**Mounting**

1. Set drive wheels to correct track width, i.e. on level ground to the widest track width. When ploughing across slope, the furrow being turned uphill – one stage narrower.

2. Mount wheel weights and screw tight.

3. Screw bail with side stops, item 2740 213, to rear of machine and insert stop plugs into bail. In the middle of the bail there must be two free holes between the two plugs.

4. Connect adjustable coupling device No. 2740 113 to machine.

5. Reverse the machine and couple up reversible plough.

6. Mount front weight and screw tight.
Working

1. Put gear shift lever into idling position.
2. Start engine and let it warm up.
3. Pull engine clutch lever, engage 1st gear and switch to "fast speed stage" (see description on page 22).
4. Slowly release engine clutch lever while opening throttle.
5. Lock differential (push down lever ill. 2, page 8).
6. During the first few metres regulate ploughing depth and cutting angle.

The ploughing width at the track width stated is correct under normal circumstances. In special cases the cutting width may be altered by means of the lateral adjustment lever or by selecting a different track width. A greater track width results in a greater cutting width and a narrower track width in a narrower cutting width.

7. Turning at the end of a furrow:
   a) Raise plough from ground while driving, and switch off differential lock (ill. 2, page 8).
   b) Pull engine clutch lever, shift gear lever to idling position. Release engine clutch lever.
   c) Disengage plough so that it swings freely.
   d) Pull engine clutch lever, change into 1st gear, adjust throttle, slowly release engine clutch lever and turn the machine while driving the machine forwards, by using the left or right brake (see description on page 24).
   e) Pull engine clutch lever, shift gear lever into idling position, release engine clutch lever.
   f) Swing in plough with foot and let it snap into place.
   g) Pull engine clutch lever, change to 1st gear, drive off and lock differential gear.

After working

Detach implements in reverse order.
Potato lifting

 Necessary attachments:
 a) 1 pair drive wheels No. 2791 013
 b) 1 pair wheel weights No. 2721 113
 c) 1 potato lifter No. 1743 013
    It is assumed that a reversible plough No. 2744 013 is already available on the frame of which the potato lifter can be mounted.

 Mounting
 1. – 4. as for ploughing with the reversible plough (page 57)
 5. mount the potato lifter
    a) unscrew plough body
    b) screw on potato lifter

 Working
 1. – 4. as for ploughing with the reversible plough (page 58)
 5. for the first few metres adjust the potato lifter to the required working height.

 After working
 Detach in reverse order to mounting.

 Working with the cultivator

 Necessary accessories:
 a) 1 pair drive wheels No. 2791 013
 b) 1 pair wheel weights No. 2721 113
 c) 1 front weight No. 2728 113 (as required)
 d) 1 adjustable coupling No. 2740 113
 e) 1 bail with side stops No. 2740 213
 f) 1 cultivator 1772 013

 Mounting
 1. – 4. as for ploughing with the reversible plough (page 57)
 5. Insert the cultivator and secure.

 Working
 1. – 4. as for ploughing with the reversible plough (page 58)
 5. For the first few metres adjust the cultivator to the required working width and depth, and for side movement.

 After working
 Detach in reverse order to mounting.
Harrowing

Necessary accessories:
a) 1 pair drive wheels No. 2791 013
b) 1 pair wheel weights No. 2721 113
c) 1 front weight No. 2728 113 (as required)
d) 1 adjustable coupling No. 2740 113
e) 1 bail with side stops No. 2740 213
f) 1 harrow, 3-sectional, No. 1777 013

Mounting
1. – 4. as for ploughing with the reversible plough (page 57)
5. Insert the harrow and secure it.

Working
1. – 4. as for ploughing with the reversible plough (page 58)

After working
Detach in reverse order to mounting.

Mowing with the flail mower

Necessary accessories:
a) 1 pair drive wheels, No. 2790 313
b) 1 flail mower, No. 2756 213

Mounting
1. Swivel steering gear 180° (see description on page 26)
2. Set drive wheels to widest track (see description on page 21)
3. Flange flail mower on to p.t.o. connection.
   Ensure that contact surfaces are clean and that the clamp bolts are tightened evenly.
4. Set to required cutting height.
   Further adjustments possible in the holes provided at various heights in both support wheel forks.

Working
1. – 2. as for hoeing (page 55).
3. Switch shift lever to position “C” (see illustration on page 10)
   This prevents the p.t.o. being switched off automatically when the reverse gear is engaged.
4. Pull engine clutch lever, switch p.t.o. to independent-of-gear, i.e. pull back the shift lever for the p.t.o. (ill. 14, page 6) – seen in driving direction – engage 1st, 2nd or 3rd gear, depending on condition of area to be mown right of the handlebar.

**Caution!** The gear lever (ill. 16, page 8) is now on the right of the handlebar.

5. Push shift lever for driving direction (ill. 11, page 8) now on left of handlebar **forwards**.

6. Release engine clutch lever slowly and open the throttle at the same time.

7. For turning, shift to 1st gear and operate the turning device (see description on page 24).

When reversing with the flail mower, ensure that with the steering gear swivelled at 180° two speed stages for reverse (fast – slow) can be engaged, whereby, for safety reasons, only the slow speed stage should be selected (shift lever for driving direction ill. 11, page 8) to centre position.

Ensure that the engine is switched off before carrying out work of any kind on the blades of the flail mower. If possible, cleaning should not be done by hand but with a suitable object.

---

**After work**

Detach in reverse order to mounting.

Do not forget to switch the shift lever on the p.t.o. gear of the machine to position “A” (normal position) – see illustration on page 10.

Every 25 operating hours the grease nipples left and right on the driving shaft to the blades, and on the connecting flange, should be lubricated.

Ensure that there is always sufficient gear oil in the angle gear according to the marking on the oil dipstick. For replenishing, we recommend **ESSO GEAR OIL ST 80**.
Notes for personal use

My tractor

bears the designation . . . .

and the machine No. . . . .

for location see ill. 13, page 6)

The engine

is manufactured by . . . .

and bears the designation .

and the engine No. . . . .

for location see ill. 15, page 11)

The tractor was bought on .

from Messsr. . . . . . .

Care and maintenance

Last oil change on: ______________________

Air filter cleaned on: ____________________

...