AGRIA
MODEL 2400
with four-stroke engine
model 65

OPERATOR'S MANUAL
Special attention!

Check daily
1. Oil level in crankcase of engine.
2. Oil bath air cleaner as well as oil level according to mark on oil pot.
3. Air pressure of tractor and trailer tyres.
4. All screws and nuts, especially at the wheels.

After the first 25 hours of operation
1. Change oil in the gear casing and in the engine.
2. Check valve setting and adjust, if necessary.

Every 50 hours of operation
2. Check valve setting and adjust, if necessary.

Further maintenance
as described in chapter "Service and Maintenance".

AGRIA-WERKE GMBH 7108 MOECKMUEHL
Telephone (06298) 311 – Telex 0466 791
II. 67
Printed in Germany  Karle, Mölmühl
Dear AGRIA owner!

Before operating your machine please have at first everything explained and demonstrated by the representative who sold it to you.

Afterwards you should carefully go through this manual, making yourself thoroughly familiar with its contents.

We chose the "pocket book" size so that you can carry along the manual with you for any work.

Damages due to non-observance of our advices are to be paid by yourself. Thorough perusal of this booklet may therefore be quite useful.

Exact knowledge of this manual will enable you to operate the machine very easily in every work, thus giving you pleasure.

AGRIA-WERKE MOECKMUEHL
General

The AGRIA All Purpose Tractor will always prove reliable and ready for use, if serviced, operated and treated with care.

This booklet will give the necessary indications. Careful examinations and inquiries addressed to your AGRIA Service save annoyance, time and money.

Do not pay attention to the friendly advice of people who are not familiar with AGRIA machines.

Never use violence. It cannot compensate practical knowledge or suitable tools.

Do not try to repair the machine yourself, if a damage cannot be certainly recognized or repaired.

Take the machine to the AGRIA Service or have an expert come. He will be able to repair damages quickly and at low cost owing to his knowledge as well as his appropriately equipped workshop.

Routine Checks

1. Clean and lubricate the machine and the attachments time and again. Tighten loose screws and nuts.

2. Check *oil level* in casing. Always keep oil level at dipstick mark (ill. 7, page 8).

3. Check, whether enough motor oil is filled in the crankcase of the engine according to mark on the oil dipstick at the oil inlet screw (ill. 13, page 8, respectively ill. 7, page 9). Especially when working on slopes, care should be taken that the motor oil is filled in up to the upper mark on the oil dipstick. On pages 14 and 30 detailed information concerning the sort of oil is given.
4. Regularly examine air cleaner (ill. 6, page 7). If dirty, clean it as described on page 15.

Take care that enough oil is filled in according to mark on oil pot.

5. Check fuel tank contents. Use standard brand fuel only, but no super. Note that the machine has a four-stroke engine which must be driven with gasoline only.

Check cleanliness of cover so that the fuel tank is correctly vented and troubles in the fuel flow can be prevented.

6. Check brakes of trailer (if you own one). Have the brakes overhauled regularly, even if they are still working properly. The brake device should be disassembled and cleaned by the local AGRIA representative at least every 6 months.

Main Components

1 Level for swivelling handlebar
2 Bowden cable for gear shifting
3 Plug socket f. lighting installation
4 Fuel cock
5 Fuel tank
6 Oil bath air cleaner
7 Type plate
8 Engine — recoil starter
9 Lubricating oil pipes to filter for secondary oil circulation
10 Machine number
11 Clutch lever
12 Wheel hub, right
13 Step bearing, right
14 External lever, right
15 Rear cover
16 Lever for p. t. o. shaft
1. Filter f. secondary oil circulation
2. Steering handle
3. Bowden cable f. driving direction
4. Coupling device
5. Plug with safety chain and safety spring
6. Eye bolt with cap nut
7. Oil inlet screw with oil dipstick
8. Power take-off shaft
9. Step bearing, left
10. Wheel hub, left
11. Oil drain screw for machine
12. Oil drain screw for engine
13. Oil inlet screw with oil dipstick
14. Short circuit button
15. Support
16. Exhaust

1. Cylinder head cover
2. Connection flange for vent hose-pipe
3. Carburettor
4. Air path
5. Hand starter
6. Connection flange for exhaust
7. Oil inlet screw with oil dipstick
8. Porcelain insulator for lighting installation
9. Short circuit button
10 Tickler on carburettor
11 Connection flange for fuel pipe
12 Air regulating screw
13 Adjusting screw for gas slide valve
14 Plug
15 Grease pipe
   Connections for filter for secondary oil circulation
   (ill. 2, pag. 31)
16 Crankcase
17 Embossed engine number
18 Oil drain screw
19 Crank shaft (driven side)
20 Cylinder with cylinder head
21 Spark plug with suppressor plug

1 Handlebar
2 Tool box
3 Hexagon screw with nut
4 Lever for swivelling of handlebar
5 Reflector arm, right (driving position)
6 Wing nut
7 Throttle
8 Gear shift lever
9 Support for gear lever
10 Grease nipple for Bowden cables
11 Lever for driving direction (forward — reverse)
12 Support for driving direction lever
13 Reflector arm, left (working position)
14 Adjusting screw for clutch cable
15 Clutch lever
Description of main parts

Engine (ill. on pages 9/10)

An air-cooled two-cylinder four-stroke carburettor engine is built on. No motor oil may be added to the fuel! Use standard brand fuel only, no super!

The crank gear is running on friction bearings and drives the cam shaft as well as the oil pump by means of helical cogwheels.

The valves are suspended in the cylinder head and are regulated by the cam shaft via stem and rocker.

The lubrication is effected by the oil pump. It sucks in oil from the crankcase through a sieve and presses it through oil passages via the axle to the main bearings and the connecting-rod bearing. Cam shaft and drag lever are also lubricated by the oil pump. The oil being slipped away from the connecting-rod bearing lubricates the piston runaway. The lubrication of the valve mechanism in the cylinder head is effected by the slipped oil and oil fume.

The lubricating oil is continuously cleaned by the filter for the secondary oil circulation. The filter is exchanged as described in chapter “Service and Maintenance” page 31.

Cooling is effected by a fan wheel which is fastened at the magnet wheel of the fly-wheel magneto and runs at the same speed as the crank shaft. The cooling air is led from the fan wheel through the air path to the cylinder and circulates around it.

The ignition is effected by a fly-wheel magneto. It is equipped with a contact breaker and an automatic spark control as starting aid. The flywheel is placed on the crank shaft axle. The light coil supplies 6 V 16 W alternating current.

The carburettor type and its operation are described in chapter “Technical data” on page 17.

Take care that the idling position of the engine is set correctly. Even at low speed the engine should run smoothly, when the throttle is at the stop in idling position. It can be regulated by means of the adjusting screw for the gas slide valve (ill. 13, page 10). This should be done, while the engine is still warm.

Troublefree running of the AGRIA in first place depends on condition and operating of the engine. Therefore, it is recommended to get regular information concerning operation and servicing and to become acquainted with the remedies to troubles (see chapter “Troubles” pages 35/36).

During the first 20 hours of operation (running-in time) high speeds should be avoided.

Then change oil. This should be done, while the engine is still warm. Screw out oil drain screw (ill. 12, page 8, respectively ill. 18, page 10) and oil inlet screw (ill. 13, page 8, respectively ill. 7, page 9). Let oil flow out by inclining the machine. Put in oil drain screw again and take care that the screw is fastened tightly!
Fill 1.5 liters new motor oil SAE 20 HD into the opening (ill. 13, page 8). The use of a multirange oil is recommended, as this makes you more independent from the outside temperature and will prevent starting troubles due to too thick oil. Further hints are given in chapter “Maintenance and Service” on page 30.

Use only standard brand motor oil with HD-addition, as for example ESSO Extra-Motor-Oil 10 W-30. Keep to the once chosen sort of oil!

But even after the running-in time it should be observed that the throttle never should be opened more than just necessary for the respective work.

High speeds, in the long run, will damage any engine and substantially shorten its durability, particularly if raced when running idle!

Technical data see page 17.

Air cleaner (ill. 6, page 7)

The oil bath air cleaner has to clean the intake air from the dust contained in it. It is constructed in such a manner that the filtering effect is not reduced when dirty.

Clean air cleaner in short intervals, if necessary even daily, depending on the accumulated dust quantity. If the engine output decreases, clean filter first!

This is done as follows:

a) Clean outside of air cleaner and environments;

b) Open lock, take off oil container, remove used oil and clean oil container;

c) Fill motor oil into oil container up to the lower oil level mark (not more) and put on oil container again;

d) See to good fitting and tight seal of the cleaner body.

Please note: After changing oil several times or if excessive dust has accumulated, screw off filter, remove oil container. Thoroughly clean filter by dipping it into Diesel fuel several times, then let the fluid drip off, screw on filter again and fill in oil as described above. (Never use gasoline, water, lyes or hot fluids for cleaning the filter).
**Lighting system**

Current for the lighting system of the trailer is taken from the built-in socket (ill. 3, page 7).

**Recoil starter** (ill. 8, page 7)

Serves for starting the engine.

It needs no special attention and lubrication, its inner parts already being embedded in a very consistent and cold resisting corrosion preventing oil.

Should troubles occur nevertheless, apply to your AGRIA Service, as special equipment is necessary for the repairing of recoil starters.

**Weight attachment device** (ill. 15, page 8)

Serves for attaching the front weight. At the same time it is a protection for the engine against damages due to impact and collision.

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**Technical data**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td>65</td>
</tr>
<tr>
<td><strong>Design</strong></td>
<td>4-stroke</td>
</tr>
<tr>
<td><strong>Capacity</strong></td>
<td>175 ccm</td>
</tr>
<tr>
<td><strong>Stroke</strong></td>
<td>58 mms</td>
</tr>
<tr>
<td><strong>Bore</strong></td>
<td>62 mms</td>
</tr>
<tr>
<td><strong>Compression ratio</strong></td>
<td>7.8 : 1</td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td>7 HP at 4600 r. p. m.</td>
</tr>
<tr>
<td><strong>Ignition type and brand</strong></td>
<td>Flywheel magneto type Bosch 0 212 414 005</td>
</tr>
<tr>
<td><strong>Contact breaker gap</strong></td>
<td>0.35–0.40 mms</td>
</tr>
<tr>
<td><strong>Ignition point before top dead centre</strong></td>
<td>7.3 mms</td>
</tr>
<tr>
<td><strong>Distance between magnet end and pole piece at the moment of ignition</strong></td>
<td>7–11 mms</td>
</tr>
<tr>
<td><strong>Sparking plug</strong></td>
<td>Bosch W 225 T 1 or Beru 225/14</td>
</tr>
<tr>
<td><strong>Electrode gap of sparking plug</strong></td>
<td>0.5–0.6 mms</td>
</tr>
<tr>
<td><strong>Air cleaner</strong></td>
<td>Oil-bath air cleaner</td>
</tr>
<tr>
<td><strong>Carburettor</strong></td>
<td>Bing 1/20/56</td>
</tr>
<tr>
<td><strong>Main jet</strong></td>
<td>Size 110</td>
</tr>
<tr>
<td><strong>Needle jet</strong></td>
<td>Size 1408</td>
</tr>
<tr>
<td><strong>Idling jet</strong></td>
<td>Size 35</td>
</tr>
<tr>
<td><strong>Needle position</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Air regulation screw</strong></td>
<td>opening 2 1/2 turns</td>
</tr>
<tr>
<td><strong>Valve setting:</strong></td>
<td></td>
</tr>
<tr>
<td>inlet opens</td>
<td>21° before top dead centre</td>
</tr>
<tr>
<td>outlet opens</td>
<td>63° before bottom dead centre</td>
</tr>
<tr>
<td>outlet closes</td>
<td>20° after top dead centre</td>
</tr>
<tr>
<td><strong>Valve clearance:</strong></td>
<td></td>
</tr>
<tr>
<td>outlet</td>
<td>0.1 mms</td>
</tr>
<tr>
<td>(with cold engine) inlet</td>
<td>0.1 mms</td>
</tr>
<tr>
<td><strong>Fuel tank capacity</strong></td>
<td>9 litres</td>
</tr>
<tr>
<td><strong>Max. length of machine</strong></td>
<td></td>
</tr>
<tr>
<td>without attachments</td>
<td>1450 mms</td>
</tr>
<tr>
<td><strong>Max. width (with wheel hubs)</strong></td>
<td>716 mms</td>
</tr>
<tr>
<td><strong>Max. height</strong></td>
<td>1150 mms</td>
</tr>
<tr>
<td><strong>Ground clearance</strong></td>
<td>100 mms</td>
</tr>
<tr>
<td><strong>Weight (without wheels and wheel hubs)</strong></td>
<td>72 kg's</td>
</tr>
</tbody>
</table>
### Speeds of model 2400/2400 L

<table>
<thead>
<tr>
<th>Gear</th>
<th>Steel Wheels</th>
<th>Pneumatic Tyres</th>
<th>3,50-8 AM km/h</th>
<th>4,00-12 AS tractor type km/h</th>
<th>4,50-14 AS tractor type km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>360 Ø km/h</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>1</td>
<td>2.4</td>
<td>2.7</td>
<td>1.8</td>
<td>3.5</td>
<td>2.3</td>
</tr>
<tr>
<td>2</td>
<td>4.1</td>
<td>4.5</td>
<td>3.0</td>
<td>5.8</td>
<td>3.8</td>
</tr>
<tr>
<td>3</td>
<td>-</td>
<td>12.5</td>
<td>8.3</td>
<td>16.0</td>
<td>10.7</td>
</tr>
</tbody>
</table>

The **p.t.o. shaft** is independent from gear and rotates — seen to the rear — **anti-clockwise while driving forward** and **clockwise while driving reverse**. The number of revolutions is 860 r.p.m.

If the handlebar is swivelled by 180°, so that the engine is in the rear — seen in driving direction —, the p.t.o. shaft rotates — seen to the rear — **clockwise while driving forward** and **anti-clockwise while driving reverse**.

### Gears

The machine has a 3-speed reversing gear, i.e. it can be driven forward and reverse in all three speeds. The hardened cogwheels are running in full oil bath.

The gearing is shifted from forward to reverse and vice versa by means of the lever (ill. 11, page 11) at the left side of the steering handle.

The different shifting positions are shown on the label gummed to the support for the driving direction lever (ill. 12, page 11).

If the lever is pulled **backwards**, the gear is shifted to **forward**; if it is pushed **forward**, the gear is shifted to **reverse**.

If the lever is placed between these two positions, the gearing is switched out; drive wheels and p.t.o. shaft are in rest position.

This applies to the normal case, i.e. **the engine in front** — seen in driving direction —; if the handlebar is swivelled by 180°, so that **the engine is in the rear** — seen in driving direction —, the following has to be noted:

a) The lever for the driving direction is now placed at the right side of the handlebar.

b) If the lever is pushed **forward**, the gearing is switched to **forward**; if it is pulled **backwards**, the gearing is switched to **reverse**. (See label gummed to the support for the driving direction lever (ill. 12, page 11).
Gear shifting

The gears 1 — 2 — 3 are shifted by means of the hand lever at the right side of the handlebar (ill. 8, page 11) as shown on the label gummed to the support of the gear lever (ill. 9, page 11), i.e. as follows:

1. speed: Pull back lever completely;
2. speed: Push lever forward completely;
3. speed: Pull back lever to medium position.

Between the different speeds an idling notch can be felt (marked "0").

This also applies, if the handlebar is swivelled, but the gear lever in this case is on the left side of the handlebar.

It should be noted that the machine, inspite of a shifted gear, is moving only, if at the same time the lever for the driving direction (ill. 11, page 11) is put either to "V" = forward or "R" = reverse.

P.t.o. shaft

The p.t.o. shaft (ill. 8, page 8) is placed on the rear side of the machine. It can only be used independent from gear.

It can be switched on and off by means of the respective lever (ill. 16, page 7).

If this hand lever is swivelled in direction of the engine, the p.t.o. shaft is switched on, in opposite direction, it is switched out.

Number of rotations and direction of rotation can be taken from table on page 18.

The direction of rotation of the p. t. o. shaft is influenced by the driving direction.

If the engine is in front of the machine — seen in driving direction — and if the lever (ill. 11, page 11) is put into position "V" = forward, the p.t.o. shaft rotates anti-clockwise; if it is in position "R" = reverse, the p.t.o. shaft rotates clockwise.

If the engine is in the rear — seen in driving direction — and if the lever (ill. 11, page 11) is put into position "V" = forward, the p.t.o. shaft rotates clockwise; if the lever is in position "R" = reverse, the p.t.o. shaft rotates anti-clockwise.

The quoted directions of rotation apply to the p.t.o. shaft.

If the p.t.o. shaft should be switched to stationary operation, the gear shifting lever (ill. 8, page 11) must be in idling position, on "0" position, and the lever for driving direction (ill. 11, page 11) either in position "V" = forward or "R" = reverse, according to the required direction of rotation.
Swivelling of handlebar

The complete handlebar may be swung out to the left and right side and may be swivelled by 180°.

If the lever for swivelling the handlebar (ill. 4, page 11) is pushed forward — seen in driving direction —, the lower handlebar is lifted and may be swung laterally as required.

Put lower handlebar into the respective notch; it snaps into the correct position.

If the handlebar is to be swivelled by 180°, the two supports (ill. 9 and 12, page 11) have to be taken off first after loosening the wing nut (ill. 6, page 11). **Swivelling can be effected only via the exhaust side.**

After screwing on again the two supports (ill. 9 and 12, page 11) it should be noted, that the gear shifting lever is now on the left side and the lever for driving direction on the right side of the handlebar — seen in driving direction.

Mounting of drive wheels

All drive wheels, whether steel wheels or wheels with pneumatic tyres, are fastened to the wheel flanges of the basic machine or — if available — to the multitrack hubs (item 2419.013). The collar nuts resp. the collar screws should be checked in short intervals and refastened, if necessary.

[Diagram]

1 Collar nut
2 Multitrack hub
3 Drive wheel with pneumatic tyres
4 Collar screw

Adjusting of handlebar for appropriate operational height

The handlebar (ill. 1, page 11) may be adjusted in height after loosening the hexagon nut (ill. 3, page 11). Before tightening the hexagon nut again, take care that the cogs do not meet each other.
### Multitrack hubs

In order to operate the machine more easily, **multitrack hubs item 2419 013** are necessary, when using bigger rubber drive wheels, for example 4,00-12 tractor type or 4,50-14 tractor type.

With this special equipment the drive of each rubber drive wheel may be separately switched on and off.

The illustration shows how the two multitrack hubs are mounted.

If the switching finger is put to the inner lower side of the switching gate (ill. 3) by means of the switching lever (ill. 2), the drive of the rubber wheel is switched out, if it is put to the upper outward side, it is switched on.

If one wishes to turn to the left, the left wheel must be switched out, if one wishes to turn to the right, the right wheel must be switched out.

If the handlebar is swivelled by 180°, so that the engine is in the rear – seen in driving direction – (for example for mowing), the two switching levers (ill. 2) must be turned as well. This can be done by loosening the hexagon screw (ill. 5).

Do not forget to lubricate the multitrack hubs at the grease nipples (ill. 1 and 7), when cleaning the machine weekly.

### The air pressure for pneumatic tyres should be 1,5—2 atue.

Take care that there is equal air pressure in both tyres, as otherwise the machine moves to one side.
Coupling device

All trailed implements are fed into the coupling device and locked by a plug.

In order to prevent that the plug gets loose during operation, it is secured by a spring clip, see illustration "working position".

If implements are to be flanged to the rear without using the coupling device, this device must be locked, so that it cannot rotate on its own, see illustration "rest position".

Putting the machine into operation

Before the machine is put into operation, respectively before the engine is started, check whether:

1. sufficient fuel is in the fuel tank (ill. 5, page 7).
2. sufficient motor oil is in the engine according to the mark on the oil dipstick (ill. 13, page 8).
3. oil is in the oil container of the oilbath air cleaner (ill. 6, page 7) acc. to the mark.
4. the lever for gear shifting (ill. 8, page 11) is in idling position.

Starting with cold engine

5. Open fuel cock (ill. 4, page 7), open throttle (ill. 7, page 11) about 1/2.
6. Press tickler (ill. 10, page 10) on carburettor, until fuel overflows.
7. Pull tackle of recoil starter (ill. 8, page 7) until resistance is to be felt, then pull briskly and carry it back to its support.

Do not let the rope snap back!

8. If the engine does not start, repeat starting process, but do not press the tickler on the carburettor again!
9. Irregular running of the engine may be caused by air entering the pipes due to lack of fuel. In this case stop the engine, fill in fuel, press tickler on carburettor, until fuel overflows and start as described under 7 and 8.

Starting with warm engine

1. Open fuel cock.

2. Put throttle into idling position (ill. 7, page 11), i.e. close it completely.

3. Do not press tickler on carburettor, this would flood carburettor.

4. Pull tackle of recoil starter (ill. 8, page 7), until resistance is to be felt, then pull briskly and carry it back to its support.

   Do not let the rope snap back!

Pay attention when starting the engine in closed rooms! Exhaust gases contain the invisible and inodorous, but very poisonous carbon monoxide gas, therefore take care for good ventilation and quick discharge of the exhaust gases!

Stopping the engine

1. Pull clutch lever (ill. 15, page 11) and put gear shift lever (ill. 8, page 11) into idling position.

2. Put throttle (ill. 7, page 11) into idling position, i.e. close it completely.

   Let engine run idle for abt. half a minute, so that it cools. This helps to protect the engine and to increase its durability.

3. Close fuel cock (vane position horizontal, letter "Z" visible from above).

4. Press short circuit button, until engine stops.

5. In case engine has to be put out of operation for some time, do not stop engine as described under 4, but let it run, until the fuel in the carburettor is used up and the engine stops by itself.

   Bring engine into compression position by means of the recoil starter, so that the valves are closed.
Maintenance and Service

Besides following the instructions referring to the engine it is of equal importance to follow the further instructions concerning maintenance and service.

Good performance depends on good servicing!

Therefore, pay special attention to the following points:

1. **Check oil level** before starting the engine.
   - Oil dipstick of machine (ill. 7, page 8), of engine (ill. 13, page 8).

2. **Change oil in machine and engine** in time. Keep oil inlet and drain screws and surrounding area perfectly clean so that no dirt may get into the interior of the machine.

   Change oil, while the engine is still warm.

   It is necessary to change oil after the first 25 hours of operation, then after every 100 hours of operation (motor oil after 50 hours of operation), but at least twice a year! This especially applies to machines which are not used very often.

   2 liters of a light gear oil SAE 80 as **ESSO GEAR OIL ST 80** of the ESSO AG. are required for the **machine**.

   1,5 liters motor oil SAE 20 HD are necessary for the **engine**.

   It is recommended to use a multi-range oil as **ESSO EXTRA-MOTOR-OIL 10 W–30** of the ESSO AG., since this makes you more independent from the surrounding temperature and starting difficulties due to too viscous oil may be prevented.

   Use only standard brand motor oil with HD addition. Keep to the once chosen sort of oil.

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The filter for secondary oil circulation (ill. 2) should be replaced after about 250 hours of operation, but at least once a year. The filter must be thrown away and its function should not be prolonged by washing it!

It is replaced as follows:

1. Close fuel cock (1), take off fuel pipe.

2. Screw off fastening screws of the fuel tank on the **right** side (3/5).

3. Tilt fuel tank to the left side, as shown on the illustration.

4. Screw off filter for secondary oil circulation (2).

5. Clean connecting surface, slightly lubricate sealing ring of the new oil filter, screw on new oil filter.

   See to good sealing!

6. Swivel fuel tank back into its normal position and screw it on; reconnect fuel pipe to fuel cock.

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3. Check **valve setting** after the first 25 hours of operation and after every 50 hours of operation later on and adjust it, if necessary.

   According to the details given on page 17, the valve clearance should be 0,1 mm with the **cold** engine.
The clearance is checked and adjusted as follows:
1. Screw off cover of cylinder head (screws SW 10).
2. Turn engine with the aid of the recoil starter until compression resistance is to be felt.
3. Loosen hexagon nut SW 14 below the valve rocker.
4. Insert slip gauge 0.1 mm between valve rocker and ball piece.
5. Turn ball pin clockwise by means of the spanner SW 10 or a screw-driver, until the slip gauge can just be moved to and fro a bit.
6. Tighten hexagon nut SW 14 again.
7. Now it should be easy to turn the two push-rods by hand.
8. Before putting on the cylinder head cover again, take care that the loop-ring sealing fits properly.
9. Fuel: Use only standard brand gasoline, but no super! Keep cover lid of fuel tank clean, in order to provide sufficient ventilation and to prevent troubles in the fuel flow.
10. Do not forget to service the filter (as described on page 15).
11. Provide for efficient cooling of the engine. Always keep the respective devices in good order and free of sucked-in parts.
12. Check exhaust every 200 hours of operation, clean and decarbonize, if necessary.

8. Always keep fuel tank, fuel pipe, carburettor and strainer of fuel cock clean.
9. Tighten loose screws and nuts.
10. Oil Bowden cable cores from time to time, as well as the hand lever and the throttle. (Let some oil drip into Bowden spiral).
11. Check tyre pressure of drive wheels with pneumatic tyres. See remark on page 24. Special attention is to be paid to equal pressure of both wheels, in order to provide easy driving straight ahead.
12. Do not forget to check and service brakes of machine and trailer.

The following points are of special importance:
A) Do not garage machine in moist rooms, in rooms where fertilizer is stored, in stables or adjacent rooms, as this would cause severe corrosion.

B) If the machine is not used for some time, it is necessary to slush the engine.

This is done as follows:
1. Thoroughly clean machine. Remove rust from bright parts, grease carefully, repair damages of paint if necessary, check Bowden cables, couplings, ignition and spark plug.
Immediately replace damaged parts. Clean air filter. Replace fuel and air hoses, if brittle. Clean cooling ribs of cylinder under the cowling. Decarbonize exhaust slots and muffler.

2. Drain gear oil. It is advisable to rinse with kerosene (warm up engine before). Then fill in 2 liters new gear oil SAE 80 as ESSO GEAR OIL ST 80 of ESSO AG.

   a) Drain motor oil and fill in 1.5 liters slushing oil as slushing oil RUST BAN 337 of ESSO AG.
   b) Start engine and let it run for about 1/2 minute at an increased no-load speed, then close fuel cock. As soon as the carburettor is empty and the engine stops, bring engine into compression position by hand, so that the valves are closed.
   c) Before putting into operation again, drain slushing oil and fill in motor oil (as described under section 2, page 30).

4. Slowly rotate engine several times during the rest, appr. every 4–6 weeks.

4. Screw out spark plug, in order to prevent the formation of condensed water in the crankcase and the cylinder. Cover spark plug opening with a clean cloth or a piece of fine-mesh filter gauze.

5. Drain fuel, clean fuel tank, carburettor and fuel pipe.

6. Cover air filter and exhaust muffler, so that no dirt and humidity may enter.

7. If pneumatic tyres are mounted:
   Jack up machine so that the pneumatic tyres do not touch the ground. Pneumatic tyres become unserviceable in a very short time, if left without air under load.

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Causes of troubles

1. Engine does not start:
   Fuel tank empty
   Fuel cock closed
   Fuel cock or pipe choked
   Float on float pin displaced
   Float pin sticks
   Water in carburettor
   Tickler of carburettor pressed too slightly
   Tickler pressed too much (spark plug wet), engine flooded
   Nozzle choked
   Spark plug fouled or sooted; electrode contact by dirt
   Electrode gap incorrect (see details on page 17)
   Spark plug defective
   Ignition cable loose or defective
   Short circuit button sticks
   Ignition disturbed

2. Engine is difficult to start
   Wrong mixture; not enough fuel
   Idle nozzle choked
   Electrode gap of spark plug too wide (see details on page 17)

3. Engine starts, but stops again
   Causes see paragraph 1.

4. Engine starts, but backfires, when throttle is opened
   Engine very cold
   Lean fuel mixture
   Nozzles choked
   Suction pipe leaking
   Exhaust carbonized.
5. **Carburettor overflows**
   - Dirt between float pin seating and pin
   - Float leaks
   - Float pin released from float

6. **Insufficient tractive power**
   - Exhaust slot choked
   - Air cleaner dirty
   - Oil sealing rings of crankshaft defective
   - Friction coupling slips
   - Piston leaks due to wear of cylinder or piston
   - Piston rings sticking, worn out or broken
   - Suction pipe leaks
   - Brakes of trailer too much tightened
   - Spark plug with wrong thermal value
   - Ignition wrongly timed
   - Mechanical drag in machine

7. **Machine**
   - If clutch does not release, adjust Bowden cable (see description on page 18).
   - If oil emerges from the casing, check first, whether the vent nipple under the handlebar fastening at the casing is free.

8. **Indications for wrong valve clearance**
   a) **with valve clearance too small**
      - the engine does not start;
      - or, if it starts, there is no output,
      - in a critical case the valves burn out
      - or fire in the carburettor may arise
   b) **with valve clearance too large**
      - more or less strong rattling noises become noticeable.

The most important possibilities of application of the machine are described on the following sides.
Driving with trailer

Necessary attachments:

a) 1 set of multi-track hubs
   No. 2419 013

b) 1 set of drive wheels with
   pneumatic tyres 4.00-12 tractor type No. 2491 013

c) 1 set of mudguards No. 2424 013

d) 1 trailer with pneumatic tyres and lighting installation
   No. 2481 013 with No. 2579 013

e) 1 set of wheel weights No. 2421 013

Mounting

1. Screw on multi-track hubs (as described on page 25).
2. Attach drive wheels (as described on page 23).
3. Mount wheel weights to drive wheels and fasten.
4. Attach mudguards.
5. Couple trailer to machine, push in bolts and secure with spring
6. Connect cable for the lighting system to the machine
   (ill. 3, page 7).

Driving

1. Put gear shift lever (ill. 8, page 11) to idling position.
2. Start engine (as described on page 27) and wait until running warm.

3. **Shifting**
   a) Pull clutch lever, regulate throttle.
   b) Shift gear (position of different gears as described on page 20).
   c) Slowly release clutch while opening throttle.

4. **Stopping**
   a) Pull clutch lever, while opening throttle.
   b) Put gear shift lever (ill. 8, page 12) to idling position.
   c) Release clutch lever.
   d) Pull brake of trailer.

**Shift into the respective gear, when driving downwards. Never drive idle!**

The built-on 4-stroke engine is a good braking aid.

The trailer No. 2481 013 has a solid and sufficiently dimensioned internal expanding brake which absolutely safe brakes vehicle and load, even when driving downwards.

Avoid **overloading** the trailer, it would be harmful not only to the trailer but also to the machine.

**Air pressure** of trailer wheels 2, 5 atms. exc. pressure.

Take special attention that both drive wheels of the machine have equal tyre pressure, in order to provide easy driving straight ahead.
Hoeing

Necessary attachments:

a) 1 set of steel wheels
   No. 1610013 or 1612013
   or
   1 set of drive wheels with
   pneumatic tyres 3,50-8 AM No. 2490013

b) 1 driving mechanism No. 2401013

c) 1 set of rotary hoes No. 2404013 – 2409013
   or 2404023 – 2409023
   according to required working width and sort of hoes

Mounting

1. Attach steel or pneumatic wheels.

2. Flange on driving mechanism for hoeing rotors.
   Contact surfaces must be clean and free of burrs. Tighten both cap nuts equally.

3. Attach hoeing rotors and screw on.

4. Attach hood and screw on according to required hoeing depth.

5. Insert gearshift bar for the driving mechanism into holder on hood and hang into lever for the p. t. o. shaft
   (ill. 16, page 7).

Working

1. Take care that the gearshift lever (ill. 8, page 11) is in idling position and that the driving mechanism is
   switched out.
2. Start engine (as described on page 27).

3. Check whether the correct driving direction is chosen, i.e. whether the lever (ill. 11, page 11) is in "V" = forward position.

4. Switch on driving mechanism, i.e. push shift lever forward (as described on page 20).

5. Pull clutch lever (ill. 15, page 11) shift into required gear, slowly release clutch while opening throttle.

   Attention! Machine runs forward and hoeing rotors rotate!

When working at the hoeing rotors, the engine has to be stopped. If possible, cleaning should not be done by hand, but with a suitable tool.

Attention: If, with built-on driving mechanism, it should become necessary to shift into a reverse gear, it is absolutely necessary to switch off the driving mechanism before for safety reasons.

Care should be taken that sufficient gear oil is always contained in the driving mechanism. 0,5 liter gear oil SAE 80, as ESSO GEAR OIL ST 80, is required. The oil level can be controlled by putting the driving mechanism on to the flange side. The oil level is then noticeable after removing the threaded plug.

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**Ploughing**

Necessary attachments:

a) 1 set of multi-track hubs
   No. 2419 013

b) 1 set of pneumatic wheels
   No. 2491 013
   or No. 1790 013

c) 1 set of wheel weights No. 2421 013 or No. 1721 013

d) 1 front weight No. 2428 013

e) 1 bail with side stops No. 2440 013

f) 1 reversible plough No. 2444 013

   if necessary for the soil conditions grip sections No. 2420 013 can be supplied additionally for the pneumatic wheels No. 2491 013 with wheel weights No. 2421 013.

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**Mounting**

1. Attach multi-track hubs (as described on page 25).

2. Attach drive wheels.

3. Attach and screw on wheel weights.

4. Attach front weight to the machine.

5. Flange on bail with side stops.

6. Insert reversible plough into coupling device and lock.
7. Push grip sections into wheel weights and fasten.

Attention: Use grip sections only when working in the fields, they must be taken off when driving on roads.

Working

1. Take care that the gear shift lever (ill. 8, page 11) is in idling position.

2. Start engine (as described on page 27).

3. Check whether the lever for the driving direction (ill. 11, page 11) is put to “V” = forward.

4. Pull clutch lever (ill. 15, page 11) shift to first gear, slowly release clutch while opening throttle.

5. Regulate ploughing depth and side stops after having worked a few meters.

6. Use the multi-track hub mechanism for turning at the end of a furrow (as described on page 25).

Mowing

Necessary attachments:

a) 1 set of wheels with pneumatic tyres 3,50-8 AM
   No. 2490013 or 4,00-12 tractor type No. 2491 013

b) 1 mowing attachment
   No. 2446 013

c) 1 cutterbar for example No. 2747 063

Mounting

1. Prepare mowing attachment:

The following operations have to be carried out only when the unit is new, since later on the mowing attachment is stored together with the cutterbar.

   a) Take off hood (ill. 6, page 46).

   b) Screw off flat collar nuts of cutterbar, insert adjusting plates (2), position according to the pneumatic drive wheels mounted on the machine.

When using pneumatic drive wheels 3,50-8 AM, the thick side of the adjusting plate should point to the front; when using pneumatic drive wheels 4,00-12 tractor type, it must point to the rear.

   c) Put mowing attachment to the 4 cutterbar screws at the cutterbar. Take care that the crank cube of the mowing attachment is placed between the two jaws of the knife driver. (Either by moving the knife or by turning the knife handle). The grease nipple on the crank cube should be on top. The 4 flat collar nuts should be screwed on equally and fastened tightly.
d) Screw on grass divider

2. Mount drive wheels.

3. Swivel handlebar so that engine is behind (seen in driving direction).

4. Flange on mowing attachment.

5. Press shifting lever (ill. 1), into the lever for the p. t. o. shaft (ill. 16, page 7) and into the shifting rod support.

6. Insert hood (ill. 6) to front holder and press into rear holder (ill. 3).

Working

Due to the swivelling of the handlebar by 180°, the gear shifting lever is now on the left and the lever for driving direction on the right side of the handlebar.

1. Check whether
   a) Gear shift lever is in idling position,
   b) Lever for driving direction is on "V" = forward,
   c) Lever for the p. t. o. shaft is switched out.

2. Start engine (as described on page 27).

3. Pull clutch lever, shift to first gear, switch on mowing attachment, i.e. pull shifting lever backwards (as described on page 20), slowly release clutch while opening throttle.

The machine moves forward and the knives in the cutterbar move.

4. For idling, change to second speed, if desired.

After finishing mowing or when cutterbar is choked, change to position "0". Machine stops, blade continues to run, cutterbar is shaking clean.

Attention! Before cleaning the cutterbar, stop engine for safety reasons!

Please note:

After working for appr. 1/2 hour, retighten all screws and nuts on mowing attachment and cutterbar (especially on cutterbar fastening, on knife driver and mowing attachment connection). Grease crank cube with grease gun and lubricate all sliding parts in knife every 2 hours.

Stopping the work

1. The mowing attachment is disassembled in reverse order. It is recommended not to dismount the cutterbar from the mowing attachment, in order to avoid unnecessary work.

2. Clean and oil mowing attachment, especially cutterbar at once.
Maintenance and service

A) Mowing attachment

I. Lubrication

Abt. 500 grams gear grease, as ESSO GEAR GREASE, should be filled into the gear of the mowing attachment.

This grease should be renewed once a year, this is best done before the new mowing season starts. The old grease is removed by washing the gear in kerosene or Diesel fuel. It is recommended to have this work done by the local AGRIA Service and to have the cutterbar checked at the same time. You can then be as sure as possible that your mowing attachment is working correctly during the next mowing season.

The mowing attachment has only one grease nipple. It should not be forgotten to check whether it is free for passage. It is placed on the crank cube (ill. 8, page 49). Lubrication is to be done by the grease gun which is supplied with the machine. Use ESSO MULTI-PURPOSE GREASE. (Confer also to details in chapter “Working”, on page 47).

II. Cleaning

Always clean mowing attachment, cutterbar and machine after working. Special attention should be paid to ensure that the air intake of the engine is free of sucked-in dirt respectively grass, weeds etc., so that the engine is always sufficiently cooled.

If the mowing attachment is used continuously, cleaning and lubricating should be repeated every 3-4 hours, if possible.

III. Maintenance

Check and retighten all screws and nuts regularly.

B) Cutterbar

As the parts getting in contact with the plants during the mowing process tend to get glued, all sliding parts should be lubricated regularly and sufficiently while mowing, so that a smooth running of the knife is guaranteed.

Of course, this also applies for the stopping of mowing respectively for the daily cleaning.

Replacing of mowing blade

1. Cutterbar
2. Type plate
3. Knife holder
4. Fastening holes for the harvester attachment
5. Grass divider
6. Collar sleeve
7. Drive head
8. Grease nipple on the crank cube
9. Flat collar nuts
10. Mowing blade
11. Knife driver

a) Stop engine!

b) Screw off knife driver (11) and grass divider (5).

c) Pull out mowing blade laterally.

Insert the hexagon spanner into the hole at the outside knife blade and pull out mowing blade.

d) Mount new blade in reverse order.

e) Check working of the new blade by turning the engine by hand; take care that all knife holders (3) are fitted correctly. See also description on page 50.
Readjusting of blade guide

After some time the quality of the mowing decreases due to unequal wear and tear of the blade guides.

This can be corrected by readjusting the blade guide.

This is done as follows:

1. Cutterbar ridge
2. Wearing plate
3. Hexagon screw
4. Knife holder
5. Mowing blade
6. Double finger

*a* Clean and lubricate cutterbar, so that the mowing blade moves smoothly.

*b* Unscrew hexagon screws (3) of the knife holders (4).

*c* According to the degree of wear remove spacing plates between knife holder and wearing plate (2).

*d* Fasten hexagon screws (3) slightly, so that the wearing plate (2) may just be pushed forward by hand. Take care that the wearing plate is equally pressed against guide edge of blade (5).

*e* Fasten hexagon screws (3) tightly.

*f* Repeat this procedure with all knife holders (4).

*g* Check run of the mowing blade after finishing this work. It should not run too hard nor should it be lifted off finger plates by pressure on grass divider.

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Mowing with harvester attachment

**Necessary attachments:**

*a-c* as for mowing (page 45)

*d* 1 harvester attachment No. 2549 013 or 2549 023 according to width of cutterbar

*e* 1 supporting wheel with adjustable holder No. 1550 013

**Mounting**

1–6. as for mowing (page 45).

7. Mount harvester attachment on cutterbar
I. Cutterbar:
   a) Remove left swath and grass distributor.
   b) Unscrew right shoe and swath board.
   c) Screw on lower part of shoe supplied together with harvester attachment.
   d) Put down right sole (1) until top edge of attachment collar is flush with top edge of bottom part of shoe.

II. Supporting wheel (4):
   Screw item No. 1550013 into one of the outside holes on the left side of the cutterbar back.

III. Torpedo (8):
   a) Insert left shoe point into bag (11).
   b) Slightly tighten setscrew (6).
   c) Tighten clamp bolt (5) and secure with counter nut, tighten setscrew (6).

IV. Back face (9):
   a) Fasten connection angle (9) and deflector bar (3).
   b) Fasten back face to cutterbar and screw onto cutterbar back and connection plate (7).

V. Metal sweep (2):
   a) Slightly screw on connection angle (12), put into correct position by trial fastening of metal sweep (2) and tighten.
   b) Put sweep (2) onto blade carrier (13) and connection angle and screw on.

VI. Support (14):
   Check. Metal sweep (2) must slide easily. Position of support (14) must not be too deep, as this would lift the blade and prevent it from cutting.

VII. Guide bar (10):
   Put into correct position.

VIII. Setscrews:
   Secure with wire at left shoe and connection plate. Check all bolts and nuts after some time and tighten, if necessary.

Working
Before starting the mowing, check where to start best with the work and to which side the harvested grain should be laid.

In order to achieve good results in mowing, pay attention that the harvested grain should not be laid against the wind, against the direction of inclination of the ears, against slopes.

If, for any reasons, these points cannot be observed, it is advisable to have a second person available to assist with a wooden fork (see illustration). The machine is operated as described in chapter “Mowing” on page 45.

Stopping the work
1. Dissassemble in reverse order.
2. For driving on the road, swivel back handlebar (as described on page 22) and prepare machine as for driving with trailer (see description on page 38).
Pest control

Necessary attachments:
a) 1 double plunger pump No. 2435 013
b) for the machine 1 set of drive wheels
c) pressure-, suction- and overflow hoses
to be purchased locally according to recommendations on page 57

Mounting
1. Flange pump on to machine.
   Pay attention that the contact surfaces are clean and free of burrs; tighten cap nuts equally.
2. Connect suction-, pressure- and overflow hoses.
3. Check whether there is sufficient oil in the pump casing. Lubricate pistons, at grease nipples on the guide sleeves. Never let the pump run dry, otherwise the pistons may be damaged due to excessive heat.
4. Check, whether sufficient gear oil is in the casing of the machine (confer to page 30, chapter 2).
   If the machine is placed horizontally, the oil level should reach the upper mark of the oil dipstick (ill. 7, page 8).

Working
1. Check whether
   a) gear shift lever is in idling position = "0",
   b) lever for driving direction is in position "V" = forward and
   c) lever for p. t. o. shaft is switched out.

   TAFEL 120

1 Coupling for suction hose
2 Suction chamber
3 Relief cock
4 Coupling for pressure hose
5 Coupling for overflow hose
6 Blow-off valve
7 Air chamber
8 Cocking lever
9 Pressure gauge
10 Pressure chamber
11 Oil plug
12 Grease nipple (formerly grease cup)
13 Shut-off valve

2. Start engine (as described on page 27).
3. Hang suction hose and overflow hose into tank with spraying liquid.
4. Discharge blow-off valve (6) by opening cocking lever (8).
5. Close shut-off valve (13) for high-pressure hose.
6. Pull clutch lever, switch on p.t.o. shaft.

7. Slowly release clutch lever while opening throttle. Pump is operating.

8. Open relief cock (3) until liquid sprays out, then close again.

9. Let pump run idle until an even water jet flows out of the overflow hose. The pump system is now ventilated.

10. Adjust cocking lever (8) for the required operating pressure:
    - **Top notch** = 30–40 atms (430 to 570 p.s.i.)
    - **Middle notch** = 20 atms (285 p.s.i.)
    - **Bottom notch** = 10 atms (145 p.s.i.)

11. Watch pressure set at pressure gauge (9) and reset by means of blow-off valve, if necessary.

12. Open shut-off valve (13) for high pressure hose.
    This will cause a drop of pressure which must be compensated by opening throttle until the set pressure is reached again. Moreover, a small surplus of liquid should flow off through the overflow hose.

13. Machine is now ready for stationary operation.
    If it is to be used as mobile unit, proceed as follows:
    a) Close throttle.
    b) Pull clutch lever.
    c) Shift into first or second speed.
    d) Slowly release clutch while opening throttle.
    It is now possible to drive and spray simultaneously.

**Stopping the work**

1. Thoroughly wash pump and hoses in water.
2. Open cocking lever (8) at blow-off valve (6).
3. Disengage p.t.o. drive.
4. Disassemble in reverse order.

**Output of pump**

18—28 ltrs./min. depending on operating pressure.

**Maximal operating pressure for all high-pressure pumps**

40 atms (570 p.s.i.)

**Hoses**

We recommend to use the following hoses with the pumps:

**High-pressure hose:** Rubber hose, inside width 10 mms, thickness 5 mms, made from natural rubber with 2 cord linings.

**Suction hose:** Rubber hose, inside width 19 mms, thickness 6 mms, natural rubber with 2 braided linings.

**Overflow hose:** Rubber hose, inside width 16 mms, thickness 4 mms, natural rubber with single lining.
Maintenance

0.4 ltr. gear oil SAE 80, as ESSO GEAR OIL ST 80, are filled into the gear box of the pump.

The oil level should be clearly visible in the inlet opening (horizontal position of pump).

For normal use of the machine, the oil filling should be renewed once a year. For the lubrication of the pistons (grease nipples at the guide sleeves of the pump cylinders), we recommend ESSO Multi Purpose Grease.

Avoid spraying liquids which contain abrasive components. Never work without protection sieve on suction house.

After having finished spraying, always wash pump in fresh water, so that no corrosive substances can remain.

During this cleaning process operate blow-off valve (ill. 6, page 55) several times in order to guarantee the correct function of the valve ball and to ensure that it does not stick due to spraying agent remainders. If this is not observed, overpressure may arise in the air chamber (ill. 7, page 55), which may cause severe accidents!

Only when observing these advices, the pump will always be ready for operation and work satisfactorily.

Troubles

A) If piston cups no longer butt tightly against cylinder walls, the pump output decreases and liquid flows from outlet bores of cylinders.

Improve by retightening pistons as follows:
1. Unscrew cylinder plug (1) of cylinder heads (5) by means of spanner.
2. Insert smaller spanner into hole and put it on to plunger-rod nut (7).
3. By turning to the right, expander (9) forces up piston cup (10).
   Please pay attention to advice B 6.
4. Screw in cylinder plug (1) again.
   Check whether suction sieve is not choked.

B) If piston cups have to be replaced, this is to be done as follows:
1. Remove nuts (3) and washers (4) from cylinder studs.
2. Remove cylinder head (5).
3. Pull off cylinder (11).
4. Screw off plunger-rod nut (7), disassemble parts.
5. Assemble correspondingly in reverse order.
6. Observe exact order and position of all parts (see drawing on page 60).

Fasten plunger-rod nut (7) only so far that the piston cup (10) slightly butts against cylinder walls (11) and sucks. Do not press expander (9) too tightly into piston cup (10), in order to prevent premature wear of the cylinder walls.
C) If valves do not close or stick to valve seating, dirt or grease may have penetrated. As a consequence the cylinder misses and liquid flows jerkily out of overflow. Cylinder quickly gets hot.

Improve as follows:

1. Unscrew pressure and suction chamber.

2. Valve balls are released. Remove trouble.
   Check valve seatings. If bearing surface of valve ball is damaged, turn valve seating. If the same trouble occurs again, the valve seating has to be replaced.

3. Assemble correspondingly in reverse order.
   Observe correct order of assembly!

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Notes for personal use

My tractor

is of type ......... 2400 / 2400 L

machine number .........

(to be ascertained acc. to ill. 10, page 7)

The engine

is of type ......... 65

engine number .........

(to be ascertained acc. to ill. 17, page 10)

The tractor was bought on ...

from Messrs. .........