AGRIA
MODEL 1700

Operator's Manual

AGRIA-WERKE GMBH 7108 MOECKMUEHL / WUERTT.
GERMANY

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MÖECKMUEHL

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<td></td>
<td>3</td>
</tr>
</tbody>
</table>
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 lack of practical knowledge nor deficient tools.

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

Take the machine to the AGRIA Service or have an expert come. He will be able to repair damages quickly and at a low cost owing to his knowledge and experience 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.

Check oil level in gear box. Fill up to and keep always at dipstick mark (p. 8 no. 8).

3. Regularly examine air cleaner. If dirty, clean it as described on page 11, second paragraph.
4. Check fuel tank contents. Use standard brand fuel only. Keep always to correct ratio of mixture (see Chapter „Engine“, page 10).

5. See that crankcase valve (p. 7 no. 8) of the engine is closed. An open valve causes the same damages as dirty oil cleaner.

6. Check brakes of tractor and trailer. Have them overhauled regularly, even when they are still working impeccably. Every 6 months have the brake device disassembled and cleaned by your AGRIA Service.

Main Components

1 Fuel cock
2 Air intake
3 Fuel tank
4 Air cleaner
5 Short circuit button
6 Recoil starter
7 Name plate
8 Crankcase valve
9 Carburettor
10 Oil drainage plug
11 Wheel hubs
12 Machine number
13 Power take-off lever
14 Brake adjusting nut
f handlebar

1 Coupling control
2 Setscrew for clutch Bowden cable
3 Steering handle
4 Tool kit
5 Steering column
6 Elastic stop nut
7 Setscrew for Bowden cable
8 Gear lever support
9 Wheel clutch control
10 Setscrew for Bowden cable
11 Brake control
12 Ratchet for brake lever
13 Throttle control
14 Gear shift rod
15 Hand wheel with fixing spindle
16 Lever for lateral adjustment of handlebar
17 Ratchet for wheel clutches
**DESCRIPTION**

**Engine** (p. 8 no. 11)

Specification see page 13/14.

Troublefree running of the AGRIA in first place depends upon condition and operating of engine. Therefore it is recommended to get regular information as to operation and servicing and to become acquainted with the remedies to troubles (see Chapter „Troubles“, pages 30 and 31).

While running in the engine (about 20 hours) avoid high revolution rates. The fuel mixture for the gasoline driven engine should be at the ratio of 20 : 1, i.e. 20 pints of petrol are mixed with 1 pint of a good 2-stroke oil. Use only a standard brand oil of a S. A. E. 40 viscosity and a standard brand fuel. After the running-in period use a 25 : 1 mixture. It is, however, recommended not to run the engine at full throttle opening in the beginning.

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

**Cooling** is effected by a fan. The grids of the casing and the cooling ribs of the cylinder are therefore to be kept clean always.

The carburettor type and its operation are described in Chapter „Specification“ on page 13.

**Air cleaner** (p. 7 no. 4)

The cyclone air cleaner is located under the fuel tank (p. 7 no. 3). The air intake (p. 7 no. 2) is fitted in. The air cleaner has to clean the air drawn in from its dust contents. A neglected cleaner will not work efficiently and thus cause wear and higher fuel consumption of the engine. Proper maintenance of the air cleaner is, therefore, most important.

**Please observe carefully:**

1. Always keep air intake openings (bottom side of intake p. 7 no. 2) clean, i.e. remove leaves, grass, straw, dirt etc. which might choke them.

2. Clean air cleaner in short intervals, if necessary every day depending on accumulated dust quantity. This is done as follows:

   a) Clean outside of air cleaner and environments, particularly tank top, carburettor side and opposite side where turbulence chamber openings are located. Pay special attention to these two small slots for dust outlet.

   b) Open locks and remove spring hooks (first above, then below).

   c) Raise locking cap, pull out cleaner body.

   d) Thoroughly wash cleaner in petroleum or a non-corrosive detergent, shake and let dry.

   e) Dip cleaner into motor oil and let drip off.

   f) Refit cleaner body.

   g) Put on locking cap.
h) Replace lower and upper spring hooks and shift locking lever.
   \small{(Attention: If no tension is felt, hooks are not correctly placed!)}

3. See to good fitting and tight seal of cleaner body to air intake!

**Ignition and lighting system**

For specification of ignition see page 13. We advise to have necessary checks made by experts only.

Current for lighting installation of trailer is taken from built-in socket (p. 8 no. 2).

**Recoil starter** (p. 8 no. 11)

Serves for starting the engine. Needs no special attention and no lubrication, its inner parts being already embedded in a very consistent and cold resisting corrosion preventive oil.

Should troubles occur nevertheless, please apply to your AGRIA Service as the repairing of recoil starters requires special equipment.

**Weight attachment device**

Serves for attaching front weight No. 2728. At the same time it protects the engine from damages caused by shocks and jolts.

**Support** (p. 8 no. 10)

Serves for parking the machine after work. It also permits easy changing of attached implements.

\[ \begin{array}{ll}
\text{SPECIFICATION} & \\
\text{2-stroke gasoline engine} & \\
\hline
\text{Engine} & \text{Hirth} \\
\text{Model} & \text{81 M 1} \\
\text{Design} & \text{Single cylinder, two-stroke, gasoline} \\
\text{Capacity} & \text{246 cc} \\
\text{Stroke} & \text{64 mms} \\
\text{Bore} & \text{70 mms} \\
\text{Compression ratio} & \text{6,75 : 1} \\
\text{Output} & \text{6/7 HP} \\
\text{Ignition type and brand} & \text{Flywheel magneto type Bosch LM / USB 1 / 143 / 16 / 7} \\
\text{Contact breaker gap} & \text{0,45 ± 0,15 mms} \\
\text{Ignition point} & \text{2,6 mms} \\
\text{Sparking plug} & \text{Bosch M 175 T 1 or Beru 175 / 18 u 2 resp. u 2 S} \\
\text{Electrode gap of sparking plug} & \text{0,5 mms} \\
\text{Air cleaner} & \text{Oil-wetted type cyclone air cleaner LZN 5 / 20} \\
\text{Carburettor} & \text{OBA 26 / 24 ZA 1} \\
\text{Main jet} & \text{120} \\
\text{Idling jet} & \text{0,54 air regulating screw opening 1/2 turns} \\
\text{Fuel tank capacity} & \text{4,5 ltrs.} \\
\text{Maximum length of machine without attachments} & \text{1700 mms} \\
\text{Maximum width} & \text{720 mms} \\
\text{Maximum height} & \text{1200 mms} \\
\text{Ground clearance} & \text{200 mms (on rubber tyred wheels 4.50-14)} \\
\text{Weight without wheels} & \text{113 kgs} \\
\end{array} \]
**SPECIFICATION**

*4-stroke Diesel engine*

- **Engine**: Hatz
- **Model**: E 75
- **Design**: Single cylinder, 4-stroke Diesel
- **Capacity**: 353 cc
- **Stroke**: 80 mms
- **Bore**: 75 mms
- **Compression ratio**: 1 : 23
- **Output**: 6/7 HP
- **Ignition type and brand**: Bosch PFR 1 K 55 / 228 / 2
- **Ignition nozzle**: Bosch DN OSD 21
- **Ignition pressure**: 135—140 atm.
- **Nozzle holder**: Bosch KBA 38 SD 22/4
- **Lubricating oil quantity**: Abt. 1,2 ltrs.
- **Valve clearance (cold engine)**: 0,05—0,1 mms
- **Air cleaner**: Oil bath air filter M & H 31 014 74 101
- **Fuel tank capacity**: 9,5 ltrs.
- **Maximum length of machine without attachments**: 1980 mms
- **Maximum width**: 870 mms
- **Maximum height**: 1250 mms
- **Ground clearance**: 200 mms (on rubber-tired wheels 4.50-14)
- **Weight without wheels**: 158 kgs

---

### Speeds of Model 1700

**A) Handlebar normal position, engine in front**

(seen in driving direction)

<table>
<thead>
<tr>
<th>Gear</th>
<th>Pneumatic tires 4.50 - 14</th>
<th>Steel wheels 15(\frac{3}{4}) in. dia.</th>
<th>Steel wheels 14 in. dia.</th>
<th>R. P. M. of P. T. O. Shafts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>km/h</td>
<td>m. p. h</td>
<td>km/h</td>
<td>m. p. h</td>
</tr>
<tr>
<td>1</td>
<td>3.8</td>
<td>2.4</td>
<td>2.7</td>
<td>1.7</td>
</tr>
<tr>
<td>2</td>
<td>7.2</td>
<td>4.6</td>
<td>5.0</td>
<td>3.1</td>
</tr>
<tr>
<td>3</td>
<td>15.5</td>
<td>9.6</td>
<td>9.6</td>
<td>6.0</td>
</tr>
<tr>
<td>R</td>
<td>3.6</td>
<td>2.2</td>
<td>2.5</td>
<td>1.6</td>
</tr>
</tbody>
</table>

**Crawling speed only with Crawling speed gear No. 1755-dl**

|               | 1.65 | 1.0 | 1.1 | 0.7 | 1.0 | 0.6 | 725 left | – |

**B) Handlebar swiveled, engine behind**

(seen in driving direction)

<table>
<thead>
<tr>
<th>Gear</th>
<th>Pneumatic tires 4.50 - 14</th>
<th>Steel wheels 15(\frac{3}{4}) in. dia.</th>
<th>Steel wheels 14 in. dia.</th>
<th>R. P. M. of P. T. O. Shafts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>km/h</td>
<td>m. p. h</td>
<td>km/h</td>
<td>m. p. h</td>
</tr>
<tr>
<td>1</td>
<td>3.6</td>
<td>2.2</td>
<td>2.5</td>
<td>1.6</td>
</tr>
<tr>
<td>2</td>
<td>6.7</td>
<td>5.5</td>
<td>4.7</td>
<td>3.1</td>
</tr>
<tr>
<td>R</td>
<td>3.8</td>
<td>2.4</td>
<td>2.7</td>
<td>1.7</td>
</tr>
</tbody>
</table>

**Crawling speed only with Crawling speed gear No. 1755-dl**

|               | 1.5 | 0.9 | 1.05 | 0.7 | 0.95 | 0.6 | 675 left | – |
Gear shifting

The position of the different speeds has been stamped on the gate.

Gear shifting is the same as with a motor car: pull clutch, shift, slowly release clutch while opening throttle.

If a speed cannot be shifted, shortly engage and disengage; this will enable you to shift silently.

**Gear position 0** means idling between first and second.

*Wheels and lower p. t. o. shaft are out of gear; upper p. t. o. shaft* however is still driven.

This position may be used for stopping the machine provided that no attached implements are driven by one of the p. t. o. shafts or that p. t. o. drive is switched off.

This position is required when the *crawling speed gear No. 1755 d* is used.

**Gear position X** means idling between first and reverse gear.

*Wheels* and both *p. t. o. shafts* are out of gear.

**Swivel steering column** and reverse gear shift bar only in this gear position. If frictionless shifting cannot be done (especially from second to third), immediate clutching is required.

---

Swiveling of steering column

The whole steering column with handlebar can be swiveled for both working directions of the machine as follows:

a) Put gearshift bar in position X.

b) Release steering column setscrew (1).

**Attention:** Release so little only (about 2 turns) that steering column can just be turned, so as to maintain the effect of the stop and Bowden cables are not twisted or damaged.

c) Take out locking clip (2), pull out and push back gearshift bar (3).

d) Swivel steering column.

Swiveling by 180° must be made over the carburettor side of the machine so as to avoid twisting and damage of the Bowden cables.

e) Tighten steering column setscrew (1).

f) Put gearshift bar in position X of the new side and secure it (2).
Adjusting of handlebar for appropriate op-erational height
1. Release fixing spindle (A) by turning hand wheel to the left until handlebar can be swiveled up and down.
2. Adjust for height desired (locking holes).
3. Tighten fixing spindle.

Laterally swinging out handlebar
1. Unlock hook screw by pressing adjusting lever (B).
2. Adjust handlebar.
3. Lock hook screw by loosening the lever.
For working underneath low trees and bushes, steering column is swiveled to the left by 2 teeth. Further swiveling, if required, is made by turning handlebar.

Couplings
For smooth pulling up and gear shifting, AGRIA model 1700 is fitted with a dry friction disc clutch. Operation by coupling control (p. 9 no. 1) at handlebar over Bowden cable (can be readjusted at coupling control).
Couplings must never be allowed to slip and have to be readjusted in time. Coupling control must show clearance of about 4—6 mm (9/32 in. to 1/4 in.) from stop to pressure point.
As if driving a car, avoid running the engine for some time at shifted gear and pulled clutches. This would speed up wear. So always put gearshift bar at idling position 0 or X and release clutch lever.

Gears
Model 1700 is equipped with several forward and reverse speeds. The hardened and ground gear wheels are running in full oil bath. Considering the various working processes they permit the following speeds:

a) Handlebar normal position, engine in front (e. g. for driving, hoeing, deep hoeing, ploughing): 3 forward speeds, 1 reverse speed.
b) Handlebar swiveled, engine behind (e. g. for mowing): 2 forward speeds, 1 reverse speed.
c) The crawling speed gear No. 1755 d permits crawling speed, as necessary for deep hoeing etc., in both driving directions.
   Speeds see table on page 15.

Power take-off shafts
Two power take-off shafts are located at the side opposite to the engine. Coupling of attachment drive is effected by means of power take-off control. Revolution rates and sense of rotation of the power take-off shafts vary according shifted gear and driving direction of the machine.
Revolution rates see table on page 15.
Before mounting an attachment, carefully oil gear shift sleeves and power take-off shafts.
Brakes

Model 1700 is fitted with expanding brakes; brake effect on both drive wheels at the same time. Operations by means of brake control (p. 9 no. 11) at handlebar. Brake control can be locked by securing pawl. Readjusting by means of brake adjusting nut (p. 7 no. 14). Both brakes should operate equally which can be best achieved as follows:

1. Pull both wheel clutch controls.
2. Pull brake control, lock it with pawl.
3. Draw machine alternately over left and right wheel. Readjust brake adjusting bolts until both wheels show brake effect required.
4. Control whether radius of brake adjusting nuts sits correctly and does not stand on its edges.

Wheel clutch

The machine is equipped with a wheel clutch, i.e. each drive wheel may separately be disengaged from the engine. This is of special importance when turning. Operation by means of both wheel clutch controls (p. 9 no. 9).

a) If both controls are released, both wheels are driven.

b) If both controls are pulled, wheels run idle. This position is recommended for stationary drive of attachments over one of the power take-off shafts.

c) Engine in front and left control pulled: machine turns to the left; right control pulled: to the right.

d) Engine behind, left control pulled: machine turns to the right; right control pulled: to the left. (This is caused by swiveled handlebar).

Note for c) and d): If reverse speed is shifted, machine turns in the direction opposite to the above mentioned.

A short training will make you acquainted with the operation of this device.

Correct readjusting of wheel clutch Bowden cables

1. Release both wheel clutch levers.

2. While slowly pulling one lever, watch if the corresponding wheel runs idle about 1 mm (3/64 in.) before the lever engages. This can be checked by a slight backward and forward moving of the machine.

3. If the wheel is not released at that moment, loosen the setscrew of that Bowden cable as far as necessary, then lock it again.

4. If, however, the wheel is released earlier, that is at a distance larger than 1 mm (3/64 in.) from the point at which the lever engages, the setscrew has to be tightened.

5. Proceed in the same way with the other wheel clutch lever.
6. Careless adjustments of wheel clutch Bowden cables cause difficulties during work. It is urgently recommended therefore to follow these instructions carefully.

Servicing and Maintenance

Besides following the instructions referring to the engine, it is as much convenient to pay the necessary attention to our advice about servicing and maintenance.

Good performance depends upon good servicing!

1. Check oil level before starting the engine.

2. Change oil in time. Keep oil filling plug, oil drainage plug and environment scrupulously clean so that no dirt may get into the interior of the machine.

   Oil must be changed after the first 30 hours, then after every 100 working hours.

   3 liters (5 1/4 pints) of a light gear oil SAE 80 such as ESSO GEAR OIL ST. 80 of the ESSO Co. are required. Oil has to be changed immediately after running the machine, engine being warm.

3. Use only standard trade-marked fuels in the correct mixture ratio!

4. Do not neglect air cleaner (see page 11.)

5. Provide for efficient cooling of the engine. Always keep necessary devices in good order.

6. Check exhaust every 200 working hours; decarbonize and clean if necessary.

7. Always keep clean fuel tank, fuel pipe, carburettor and strainer of fuel cock.

8. Tighten loose screws and bolts.

9. From time to time oil Bowden cable cores (let some oil drip in Bowden spiral).

10. Check tire pressure of drive wheels with pneumatic tires. It should be about 1—1.25 atm. (14—18 p. s. i.) for the tires used (4.50-14).

   Special attention is to be paid to equal pressure of both wheels in order to provide easy driving straight ahead.

11. Do not forget to check and service brakes of machine and trailer (see also instructions on page 6, paragraph 6).

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 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,

      using nitrocellulose lacquer. Check Bowden cables, couplings, ignition, sparking plug. Immediately replace damaged parts. Clean air cleaner. Replace fuel and air hoses if brittle.

      Clean air filter and cooling ribs of cylinder under the cowling. Decarbonize exhaust slots and muffler.

   2. Empty fuel tank. Clean tank, carburettor, fuel pipe. If this is not done, there is danger of oil and petrol separating and thickening in tank and carburettor owing to long rest which may cause difficulties when starting again.
3. **Slush engine.**

Modern fuels tend to leave destructive gum in engines which may cause heavy corrosion of bearings if machine is not used for some time. Engines of small total operation periods are particularly susceptible. For engine conservation proceed as follows: Unscrew sparking plug. Place piston at bottom dead center by putting screw driver into sparking plug hole down to piston bottom and rotating engine until deepest position of piston is obtained. Incline engine backward, fill in 15 cc of slushing oil, then incline engine forward and again fill in 15 cc of slushing oil. After that rotate engine several times by hand, put in sparking plug.

We recommend as a slushing oil RUST BAN 337 of ESSO Co. or an equivalent type.

Before putting engine into operation again, the slushing oil filled in must be allowed to drip out through crankcase valve. Rotate engine several times.

4. Jack up machine so that pneumatic tires do not touch the ground. Pneumatic tires become unserviceable in a very short time if left without air under load.

5. Drain gear oil and, if possible, wash gear in petroleum. Fill in 3 liters (5 1/4 pints) of fresh gear oil such as ESSO GEAR OIL ST. 80 of ESSO Co.

---

**Fitting of Steel Drive**

**Wheels No. 1711–1714:**

Wheels are directly attached to wheel hubs (p. 7 no. 11) and screwed. Application of the various types is mentioned where working processes and attachments are described.

The two thread holes in Wheels No. 1714 are provided for the mounting of **Wheel Weights No. 1721.**

<table>
<thead>
<tr>
<th>Steel Drive Wheels No.</th>
<th>Track mm</th>
<th>Track in.</th>
<th>Distance between external wheel edges mm</th>
<th>Distance between external wheel edges in.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1711 (1st side)</td>
<td>215</td>
<td>8 7/16</td>
<td>275</td>
<td>10 13/16</td>
</tr>
<tr>
<td>1711 (2nd side)</td>
<td>275</td>
<td>10 13/16</td>
<td>335</td>
<td>13 3/16</td>
</tr>
<tr>
<td>1712</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1713</td>
<td>320</td>
<td>12 8/16</td>
<td>420</td>
<td>16 9/16</td>
</tr>
<tr>
<td>1714</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fitting of Drive Wheels with Pneumatic Tires
(No. 1790)

Multi-track hubs which are screwed on to wheel hubs of machine permit drive wheels to be fitted to obtain 4 different tracks, as follows:

<table>
<thead>
<tr>
<th>Track</th>
<th>Outside Wheel Distance</th>
<th>Track</th>
<th>Outside Wheel Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Wheel valve inward on inner grade (B)</td>
<td>426 17</td>
<td>546 21 1/2</td>
<td></td>
</tr>
<tr>
<td>b) &quot; &quot; &quot; &quot; outer (A)</td>
<td>496 19</td>
<td>616 24</td>
<td></td>
</tr>
<tr>
<td>c) &quot; &quot; outward inner (B)</td>
<td>570 22 1/2</td>
<td>690 27</td>
<td></td>
</tr>
<tr>
<td>d) &quot; &quot; &quot; &quot; outer (A)</td>
<td>640 25</td>
<td>760 30</td>
<td></td>
</tr>
</tbody>
</table>

Wheels are generally mounted so as to run in the direction of tread bars. This is, however, absolutely necessary only if full tractive power on the ground is required.

Track changes can therefore be effected separately on either side; simultaneous removal of both drive wheels is not necessary.

Two flaps with tread holes in the rims serve for screwing on additional wheel weights.
8. Irregular running of engine may as well be caused by air entering into pipes owing to lack of fuel. Remedy: See paragraph 7.

II. Warm engine:

Procedure generally is the same, except for following points:

1. Open throttle not more than by one fourth.

2. Do not press tickler; this would flood carburettor.

In case engine does not start after three pulls of the rope, **crankcase valve** (p. 7 no. 8) has to be opened. If engine runs, close valve again.

**Stopping the engine**

1. Pull coupling control.

2. Put gearshift bar to X.

3. Put throttle lever to idling position.


5. Stop engine by pressing short circuit button.

In case engine has to be put out of operation for some time, keep engine running after closing fuel cock until fuel in carburettor is consumed.
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
   Tickler of carburettor pressed too slightly
   Tickler pressed too much (sparking plug wetted), engine flooded
   Sparking plug fouled or sooted; electrode contact by dirt
   Sparking plug has wrong thermal value
   Electrode gap incorrect
   Sparking plug defective
   Ignition cable loose or defective
   Carburettor contains water
   Nozzle choked
   Short circuit button sticks
   Ignition disturbed.

2. Engine is difficult to start
   Wrong mixture; not enough fuel
   Idle nozzle choked
   Electrode gap of sparking plug too wide.

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 leaks.

5. Carburettor overflows
   Dirt between float pin seating and pin
   Float leaks
   Float pin released from float.

6. Insufficient tractive power
   Exhaust slot choked by oil carbon
   Exhaust muffler choked
   Air cleaner or intake dirty
   Oil sealing rings of crankshaft defective
   Friction couplings slip
   Piston leaks owing to wear of cylinder or piston
   Piston ring sticking, fretted or broken
   Suction pipe leaks
   Brakes too much tightened
   Wrong fuel mixture (too much oil)
   Sparking plug with wrong thermal value
   Ignition wrongly timed
   Mechanical drag in machine.

The most important possibilities of application of the machine are described on the following pages.

For drawings of the various articles see appendix.
Driving with Trailer No. 1781

Necessary attachments:

a) Set of multi-track hubs No. 1719
b) Set of drive wheels with pneumatic tires 4.50-14 No. 1790
c) Trailer with pneumatic tires No. 1781
d) Lighting and signal installation No. 2579 (optional)
e) Set of mud guards No. 1724 (optional)
f) Set of wheel weights No. 1721 (if loading capacity is to be fully utilized).

Mounting

1. Handlebar normal position, engine in front (seen in driving direction).
2. Screw on multi-track hubs (see page 26).
3. Attach drive wheels to multi-track hubs; wheel track 496 mm = 19 in. (see page 26).
4. Push mud guards into holders and secure by screws.
5. Couple trailer to machine.
6. Join lighting cable to the machine,
7. Attach horn to handlebar.
8. Mount additional wheel weights (if available) to drive wheels and secure by screws. Bag opposite to valve notch serves for easier mounting.

Driving

1. Put gearshift bar into position X.

2. Start engine and wait until running warm.
3. Changing from first to third gear:
   a) Pull coupling control, regulate throttle.
   b) Shift gear.
   c) Slowly release coupling while opening throttle.
4. Changing from third to second gear:
   a) Pull coupling control, regulate throttle.
   b) Put gearshift bar into position 0.
   c) Release and pull coupling.
   d) Change to second gear.
   e) Slowly release coupling while opening throttle.
5. Changing from second to first gear:
   a) Pull coupling control, regulate throttle.
   b) Change to first gear.
   c) Slowly release coupling while opening throttle.
6. Stopping:
   a) Pull coupling control, regulate throttle.
   b) Put gearshift bar into position 0.
   c) Release coupling.
   d) Pull brake of trailer.

   It is recommended to use wedges additionally for safety reasons if trailer is under full load.

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

Air pressure of trailer wheels: 2 atm. (28 p. s. i.).

Never drive idle or with wheel clutch controls pulled!

After driving

Disassembly is made in inverse order.
Hoeing

Necessary attachments:

a) Driving mechanism No. 1701 for hoeing rotors
b) Set of rotary hoes according to operational width Nos. 1704—1710
c) Hoeing hood, central part, Nos. 1715—1717
d) Hoeing hood, side parts, No. 1718
e) Set of steel wheels Nos. 1711—1713

Mounting

1. Handlebar normal position, engine in front (seen in driving direction).
2. Screw on steel wheels (after removing multi-track hubs).
3. Remove rear cover.
4. Flange hoeing attachment.
   Contact surfaces have to be clean and turnbuckles must be tightened equally.
5. Screw on hoeing spur.
   Adjust for desired hoeing depth (fully pushed in = maximum depth).
6. Attach rotary hoes to both hoeing shaft ends and screw on. Attention: Left side right-hand thread, right side left-hand thread. Move p. t. o. shifting lever backward so as to put hoeing attachment into gear. Put gearshift bar into position 0.
7. Attach hood (after assembling side and central parts).
   Hoods may be adjusted for required operational width. Push in side parts so far that small boring (red mark) is still visible. Tighten setscrews. Hoeing depth is regulated at hood support from third notch downward (third notch = maximum hoeing depth).
8. Insert gearshift bar into holder on hood. Press ball cup into socket of p. t. o. shifting lever.

For hoeing at operational widths of 65 and 75 cms (26 in. and 30 in.), it is recommended to attach front weight No. 2728.

Operating

1. Put gearshift bar into position X.
2. Release both wheel clutch controls so that both wheels drive.
3. Start engine, wait until running warm.
4. Pull coupling control, change to first speed.
5. Slowly release coupling while simultaneously opening throttle. Attention: Machine moves forward, hoes rotate!
6. Hoe at first or second speed according to desired degree of crumbling.
7. For turning the machine, use wheel clutch controls (see pages 20 and 21). Always stop hoeing mechanism before turning!

After working

1. Disassemble in inverse order.
2. Screw rear cover to p. t. o. shaft end.

Be sure that enough gear oil is always filled into hoeing mechanism. Quantity required: 0,5 liters (1 pint) of gear oil S. A. E. 80 such as ESSO GEAR OIL ST. 80 of the ESSO Co. Checking is possible by setting hoeing mechanism on flange side so that oil level can be seen through opening after removal of oil dipstick.

For hoeing in row cultures, leaf protectors No. 1730 have been developed.
Ridging

Necessary attachments:

a) Prerequisite: hoeing attachment (see page 34).
b) Ridger No. 1753 with drawbar

Mounting

1.—8. See chapter „Hoeing“, page 34.
   10. Put ridger into holder and screw on so that rotors work deeply enough at ridging depth required.

Working

1.—7. See chapter „Hoeing“, page 35.

It is recommended to hoe and ridge simultaneously, thus weeds being controlled and broken-up soil being heaped up.

After working

1. Disassemble in correspondingly inverse order.
2. Attach rear cover.

Deep Hoeing

Necessary attachments:

a) Hoeing and deep hoeing driving mechanism No. 1701
b) Crawling speed gear No. 1755 d

c) Set of deep hoeing rotors with hood and deep hoeing spur No. 1757
d) Set of steel wheels No. 1714
e) Set of additional wheel weights No. 1721
f) Front weight No. 2728

Mounting

1. Handlebar position see chapter „Hoeing“.
2. Attach steel wheels (after unscrewing multi-track hubs).
3. Attach additional wheel weights.
4. Attach front weight.
5. Take off rear cover.
6. Put gearshift bar into position 0.
7. Flange crawling speed gear.
   Be sure to push in pawl between upper p. t. o. gearshift sleeve and rectangular disk.
8. Flange deep hoeing mechanism to crawling speed gear.
9. Screw on deep hoeing spur.
10. Attach deep hoeing rotors and screw on while putting deep hoeing mechanism into gear.
11. Put on hood and lock in one of the two upper notches of hood support.
12. Insert gearshift bar into holder on hood; press ball cup into socket of p. t. o. shifting lever.

Working
1. Put gearshift bar into position X.
2. Start engine.
3. Pull coupling, put gearshift bar into position 0, put p. t. o. shifting lever into gear (if necessary, balance coupling until trip cams lock in).
4. Slowly release coupling while correspondingly opening throttle.

Attention: Machine drives forward; deep hoeing rotors move! Notice: p. t. o. shaft is put into gear (p. t. o. shifting lever swiveled backward), gearshift bar must not be operated.

After working
1. Pull coupling, disengage p. t. o. shafts.
2. It is now possible to change speeds as required.
3. Disassemble in correspondingly inverse order.
4. Put on rear cover.

Attention: Always check oil level in crawling speed gear before operating it!

Necessary quantity: 0,25 liter (71/2 pint) of gear oil S.A.E. 80 such as ESSO GEAR OIL ST. 80 of the ESSO Co.

Ploughing with single plough
Necessary attachments:
   a) Set of multi-track hubs No. 1719
   b) Set of drive wheels with pneumatic tires 4.50-14 No. 1790
   c) Set of additional wheel weights No. 1721
   d) Front weight No. 2728
   e) Single plough No. 1742 with special coupling device
   f) Bail with side stops No. 1740b

Mounting
1. Handlebar position see chapter „Deep Hoeing“.
2. Attach multi-track hubs.
3. Attach drive wheels to multi-track hubs; wheel track 640 mm (26 in.).
4. Attach and screw on additional wheel weights.
5. Attach front weight.
6. Take off rear cover.
7. Screw on bail with side stops.
8. Mount single plough.

Working
1. Put gearshift bar into position X.
2. Release both wheel clutch controls so that both wheels drive.
3. Start engine and wait until running warm.
4. Pull coupling control and change to first speed.
5. Slowly release coupling while opening throttle.
6. During first yds adjust ploughing depth and side stops.
7. For turning at the end of a furrow, use wheel clutch control (see pages 20 and 21).

After working
Disassemble in correspondingly inverse order.
Working

1.—6. See chapter „Ploughing with single plough“, page 39.
7. Use first speed on ploughing.
8. Turn machine at the end of a furrow as follows:
   a) Pull coupling control, put gearshift bar into position 0, pull and lock brake control.
   b) Swivel reversible plough.
   c) for lefthand ploughing pull right wheel clutch control.
   d) for righthand ploughing pull left wheel clutch control.
   e) Pull coupling control, change to reverse gear, regulate throttle so as not to stop engine when releasing coupling control.
   f) Support reversible plough by right hand, allow coupling control to take contact, move backwards with machine until it stands obliquely to furrow.
   g) Pull coupling control, put down plough, change to first speed, release pulled wheel clutch control, drive into furrow, pull other wheel clutch control.
   h) Support plough, release coupling, turn into furrow, put in plough, release pulled wheel clutch control and brake control.

After working

1. Disassemble in inverse order.
2. Attach rear cover.
Potato Lifting

Necessary attachments:

a) Set of multi-track hubs No. 1719
b) Set of drive wheels with pneumatic tires No. 1790
c) Set of additional wheel weights No. 1721
d) Front weight No. 2728
e) Potato lifter No. 1743
   Prerequisite: Reversible plough No. 1744 in order to attach potato lifter to plough frame.
f) Set of grip sections No. 1720a (according to soil conditions)

Mounting

1.—4. See chapters „Ploughing with single (or reversible plough“, pages 39/40.
5. Prepare potato lifting plough:
   a) Unscrew plough.
   b) Screw on lifter.

Working

1.—5. See chapter „Ploughing with single plough“, page 39.
6. During first yards, adjust potato lifter for necessary working position.

After working

1. Disassemble in accordingly inverse order.
2. Attach rear cover.

Cultivator

Necessary attachments:

a) Set of multi-track hubs No. 1719
b) Set of drive wheels with pneumatic tires No. 1790
c) Set of additional wheel weights No. 1721
d) Front weight No. 2728
e) Additional front weight No. 1728a
f) Adjustable coupling device No. 1740a
g) Bail with side stops No. 1740b
h) Cultivator No. 1772

Mounting

1.—6. See chapter „Ploughing with single plough“, page 39.
7. Attach adjustable coupling device.
8. Attach cultivator.

Working

1.—5. See chapter „Ploughing with single plough“, page 39.
6. During first yards, adjust cultivator for necessary operational width and depth as well as for lateral deflections.

After working

1. Disassemble in correspondingly inverse order.
2. Attach rear cover.
Harrowing

Necessary attachments:

a) Set of multi-track hubs No. 1719
b) Set of drive wheels with pneumatic tires No. 1790
c) Set of additional wheel weights No. 1721
d) Front weight No. 2728
e) Adjustable coupling device No. 1740a
f) Bail with side stops No. 1740b
g) Tripartite harrow No. 1777
h) Set of grip sections No. 1720a (according to soil conditions)

Mounting

7. Attach adjustable coupling device.
8. Insert and lock harrow.
9. Mount grip sections (see chapter „Reversible plough“, page 40, paragraph 4).

Working

1. — 5. See chapter „Ploughing with single plough“, page 39.

After working

1. Disassemble in inverse order.
2. Attach rear cover.

Mowing

Necessary attachments:

a) Set of pneumatic tired wheels No. 1790
b) Mowing attachment No. 2746
c) Cutterbar No. 2747

d) Screw on cutter-bar to mowing attachment, tighten all 4 nuts equally
d) Screw on knife driver.

The crank block on the mowing attachment is placed between the 2 jaws of the knife driver. The grease nipple on the crank cube should be on top!

1. Shifting rod
2. Shifting rod support
3. Eye bolt with nut
4. Hex. screw with nut for protection hood
5. Front support for protection hood
6. Cutterbar
7. Protection hood
8. Grease nipple
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 (especially on cutterbar fastening, on knife driver and mowing attachment connection). — Grease crank block with grease gun and all sliding parts in knife every 2 hours. When doing this, stop engine for safety reasons.

Disassembling

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

2. Clean and oil mowing attachment and especially cutterbar at once.

3. Screw on cover of p. t. o. shaft.
Maintenance and service

Be sure that always enough gear oil is filled in mowing mechanism. Necessary quantity: 3/4 liters (1 1/3 pints) of gear oil SAE 80 such as ESSO GEAR OIL ST. 80 of ESSO Co.

Always clean and oil cutterbar after working.

Check tight fitting of all bolts and nuts, especially those of cutterbar.

Replacing of mowing blade

1. Cutterbar
2. Name plate
3. Blade carrier
4. Location holes for harvester attachment
5. Grass divider
6. Stop collar
7. Driving mechanism
8. Grease nipple
9. Hex. nuts
10. Mowing knife
11. Knife driver

a) Unscrew blade carrier.

b) Laterally pull out blade.

c) Correspondingly mount new blade.

Readjusting of blade guide

After some time the quality of mowing may be reduced by unequal wear of blade guides. This can be improved by readjusting which is made as follows:

Cutterbar back
2. Blade support
3. Hex. screw
4. Blade carrier
5. Mowing knife
6. Double finger

a) Clean and oil cutterbar so that blades can easily be moved.

b) Loosen hex. head screws of blade clamps.

c) According to wear, remove shim between blade clamp and friction blade.

d) Tighten hex. head screws just so much that wearing plate can be pushed forward by hand. See that wearing plate equally presses against guide edge of blade.

e) Tighten clamp bolt.

f) Repeat procedure with every blade clamp.

After this, check working of blade.

It must not work too rigidly nor be lifted off finger plates by pressure on grass distributor.
Mowing with harvester attachment

Necessary attachments:
a—c) See chapter „Mowing” page 45

d) Harvester attachment
   No. 2549 a—c
   according to width of cutterbar

e) Supporting wheel No. 1550 with adjustable holder

Mounting

1.—7. See chapter „Mowing”, page 45.

8. Mount harvester attachment on cutterbar.

I. Cutterbar:
a) Remove left swath board and grass distributor.
b) Unscrew upper part of right shoe and swath board.
c) 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 No. 1550 (if available) into one of the two outside holes (left side of cutterbar back).

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

IV. Back face (9):
a) Fasten connection angle (9) and deflector bar (3) in correct position.
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 (12) and screw on.

Support (14):
   Check. Metal sweep must slide easily (rotate by hand at eccentric). Position of support (14) must not be too deep as this would lift blade and prevent it from cutting.

1 Right sole
2 Metal sweep
3 Deflector bar
4 Supporting wheel
5 Clamp bolt
6 Setscrew for torpedo
7 Connection plate
8 Torpedo
9 Back face, connection angle
10 Deflector rod
11 Torpedo bag
12 Connection angle for sweep
13 Blade carrier
14 Support

50
VII. **Deflector rod (10):** Put into correct position.

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

**Working**

1.—7. See chapter „Mowing“, page 45.

**After working**

1. Disassemble in accordingly inverse order.

2. For driving on the road, swivel back handlebar (see page 17) and prepare machine as for driving with trailer (see page 32).

Mowing attachment can be left on the machine when driving.

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**Pest control**

Necessary attachments:

a) Set of multi-track hubs No. 1719
b) Set of drive wheels No. 1790

Double plunger pump No. 1735
or triple plunger pump No. 1736

**Mounting**

1. Handlebar position see chapter „Hoeing“, page 34.
2. Attach drive wheels; wheel track 496 mm (19 in.) see page 26.
3. Remove rear cover of p. t. o. shaft.
4. Flange pump.
5. Couple hoses (Nos. 1, 4, 5, page 54).

**Working**

1. Hang suction hose and overflow hose into tank with spraying liquid. Check oil level in pump casing and make sure that grease cups (12) on the cylinders are filled with grease. Never allow pump to run dry as this would damage pistons owing to excessive temperature rise!

2. Put gearshift bar into position X.

3. Start engine and wait until running warm.

Engage p. t. o. drive.

5. Pull both wheel clutch controls so as to disengage drive wheels.

6. Discharge blow-off valve (6) by opening cocking lever (8).

7. Close shut-off valve (13) for high pressure hose.
11. Let pump run idle until even water jet flows out of overflow hose. Pump system is now ventilated.

12. Now adjust cocking lever for desired operational pressure:
   - **Top** notch = 30 to 40 atm. (430 to 570 p. s. i.)
   - **Middle** notch = 20 atm. (285 p. s. i.)
   - **Bottom** notch = 10 atm. (145 p. s. i.)

13. Watch pressure set at pressure gauge (9) and if necessary reset by means of blow-off valve (6).

14. Open shut-off valve for high pressure hose. This will cause a drop in pressure which must be compensated by accordingly opening throttle. Moreover a small surplus of liquid should flow off through overflow hose.

15. Machine is now ready for stationary operation. If it shall be used as a mobile unit, proceed as follows:
   a) Shut throttle.
   b) Pull coupling control.
   c) Release both wheel clutch controls.
   d) Slowly release coupling while correspondingly opening throttle.

   It is now possible to drive and spray simultaneously.

### After working

1. Thoroughly wash pump and hoses in water.
2. Open cocking lever at blow-off valve.
3. Disengage p. t. o. drive.
4. Disassemble in accordingly inverse order.
5. Screw on rear cover.
Output of pump

Double plunger pump No. 1735:
abt. 16—30 ltrs./min. (3 1/2—6 1/2 imp. gal./min.) depending on operational pressure.

Triple plunger pump No. 1736:
abt. 24—44 ltrs./min. (5 1/2—9 1/2 imp. gal./min.) depending on operational pressure. Maximal operational pressure 40 atm. (570 p. s. i.).

Hoses

We recommend to use following hoses with the pumps:

High pressure hose: Rubber Hose, inside width 10 mm (3/8 in.), thickness 5 mm (9/64 in.), natural rubber with 2 cord linings.

Suction hose: Rubber Hose, inside width 19 mm (5/8 in.), thickness 6 mm (1/4 in.), natural rubber with 2 braided linings.

Overflow hose: Rubber Hose, inside width 16 mm (5/8 in.), thickness 4 mm (5/32 in.), natural rubber with single lining.

Maintenance

The gear boxes of the pumps hold 0,4 liter (0,7 pint) of gear oil S. A. E. 80 such as ESSO GEAR OIL ST. 80 of ESSO Co. for the double plunger pump and 0,6 liter (1 pint) for the triple piston pump.

Oil level should be clearly visible in the filling hole (horizontal position of pump).

For normal use of the machine, oil filling should be renewed once a year. For grease cups (12) in pump cylinders we recommend some water-repellent high pressure grease such as ESSO MULTI PURPOSE GREASE H of ESSO Co.

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

After having finished spraying, always wash pump in fresh water so that no corrosive substances can remain. Open blow-off valve and clean valve balls if necessary.

Troubles

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

Improve by retightening pistons as follows:

1. Unscrew cylinder plug (1) 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).
4. Screw in cylinder plug (1) again.

Control whether suction sieve is not choked.

B) If piston cups have to be replaced, proceed as follows:

1. Remove nuts (3) and washers (4) on cylinder studs.
2. Take off cylinder head (5).
3. Pull off cylinder (11).
4. Turn off plunger-rod nut (7), disassemble parts.
5. Assemble in accordingly inverse order.
6. Observe exact order and position of all parts when assembling them (see drawing).

C) If valves do not close or stick to valve seating, dirt or grease may have penetrated. Cylinder misses, liquid flows jerkily out of overflow. Cylinder quickly gets hot.

Improve by proceeding as follows:
1. Unscrew pressure and suction chamber (Nos. 2, 10 on table 120, page 54.)
2. Ball valves are released. Check valve seatings. If bearing surface of ball valve is damaged, turn valve seating.
3. Assemble in correspondingly inverse order.
   **Observe correct order of assembly!**

**Irrigation**

Necessary attachments:
- Set of multi-track hubs No. 1719
- Set of drive wheels No. 1790
- Irrigation pump No. 1792
- Suction basket with hose No. 1592a

**Mounting**
1. Handlebar position see chapter „Hoeing“, page 39.
2. Attach drive wheels; wheel track 496 mm (19 in.).
3. Remove rear cover.
4. Flange irrigation pump.
5. Couple pressure pipe.

**Working**
1. Put gearshift into position X.
2. Hang suction basket into water, control whether bottom valve is working impeccably by moving hose up and down in water. Fill hose with water.
3. Couple suction hose.
   - Open filling funnel by turning to the left and fill in water until funnel remains filled. Close it by turning to the right.
4. Engage p. t. o. drive.
5. Start engine.
7. Pull both wheel clutch controls so as to disengage drive wheels.

8. Pull coupling control, change to third speed.

9. Slowly release coupling while correspondingly opening throttle. Irrigation pump is operating.

10. If filling funnel overflows, close by turning to the right.

**After working**

1. Pull coupling control, disengage irrigation pump, lift suction hose out of water hole, drain water in pipes.

2. Disassemble in correspondingly inverse order.

3. Attach rear cover.

**Output of irrigation pump**

About 15 cbm (3300 Imp. gallons) at 50 m (55 yards) discharge height.