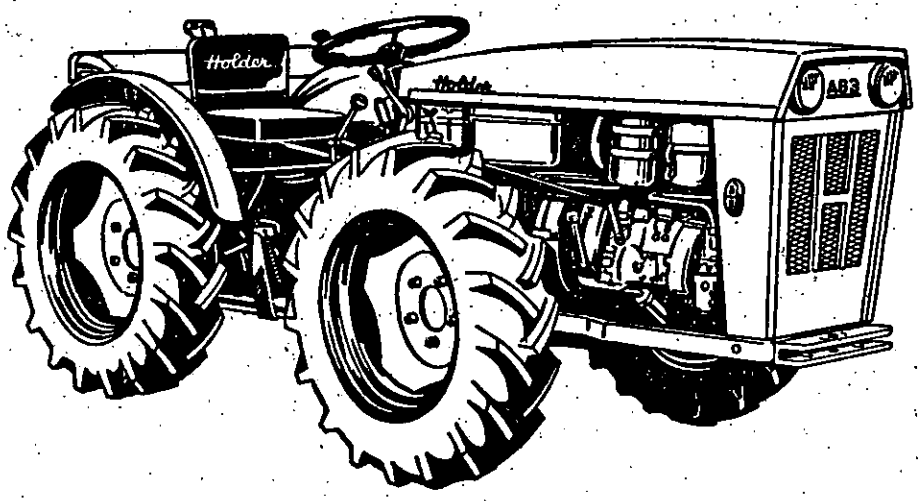
Holder
1888

# AM 2
# AG 3

**4083.7-11**
**4007-1**
**4005-3**




## Betriebsanleitung
## Operating Instructions
## Notice d'emploi
## Instrucciones de servicio

**1970**

Gebrüder Holder Maschinenfabrik

VERKAUF AUSLAND: STAMMHAUS
**7418 METZINGEN/WÜRTT.**
Metzingen (0 71 23) 20 36* 07 245 319 Holder Metzingen/Württ.

VERKAUF INLAND: WERK GRUNBACH
**7067 GRUNBACH BEI STUTTGART**
Postfach 40 (0 71 51) 7 10 23*

# I) Engine and Tractor

## A) Description

More than 80 years of experience and the latest knowledge in design and construction are incorporated in your new HOLDER AM 2 or AG 3 tractor. The economy, comfort and efficiency of these machines make them suitable for application in any kind of cultivation.

Your tractor will be always ready for work if you study this manual carefully and if you follow its instructions for proper maintenance and correct handling. The Operating Instruction Manual belongs in the hands of the tractor driver, not in an office file.

With all enquiries please state the following:

a) Type of machine: . . . . . e. g. AG 3
b) Engine serial number: . . . . . e. g. D 3 10100
c) Tractor serial number: . . . . . e. g. 3 30100
d) Date of sale: . . . . . e. g. 10/5/1966 and, where applying, date of reclamation
e) Tractormeter reading: . . . . . e. g. 150 operating hours

**Main differences** between AM 2 and AG 3 Four-wheel Drive Tractors:

| AM 2 | | AG 3 | |
|---|---|---|---|
| **Engine:** | Type HD 2 – 20 bhp (23 SAE HP) | **Engine:** | Type HD 3 – 30 bhp (34 SAE HP) |
| **Tyres:** | 7.00–16 AS (4 ply rating) | **Tyres:** | 7.50–18 AS (4 ply rating)<br>Additional epicyclic gearing |
| **Brake:** | 150x35 mm ($5^{29}/_{32}$"x$1^{3}/_{8}$")<br>on wheel hub | **Brake:** | 180x30 mm ($7^{3}/_{32}$"x$1^{13}/_{16}$")<br>on layshaft |
| **Bonnet:** | short | **Bonnet:** | long |

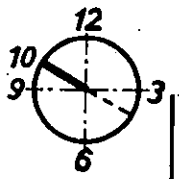
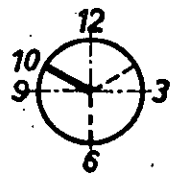
## B) Technical Data

### 1. Engine

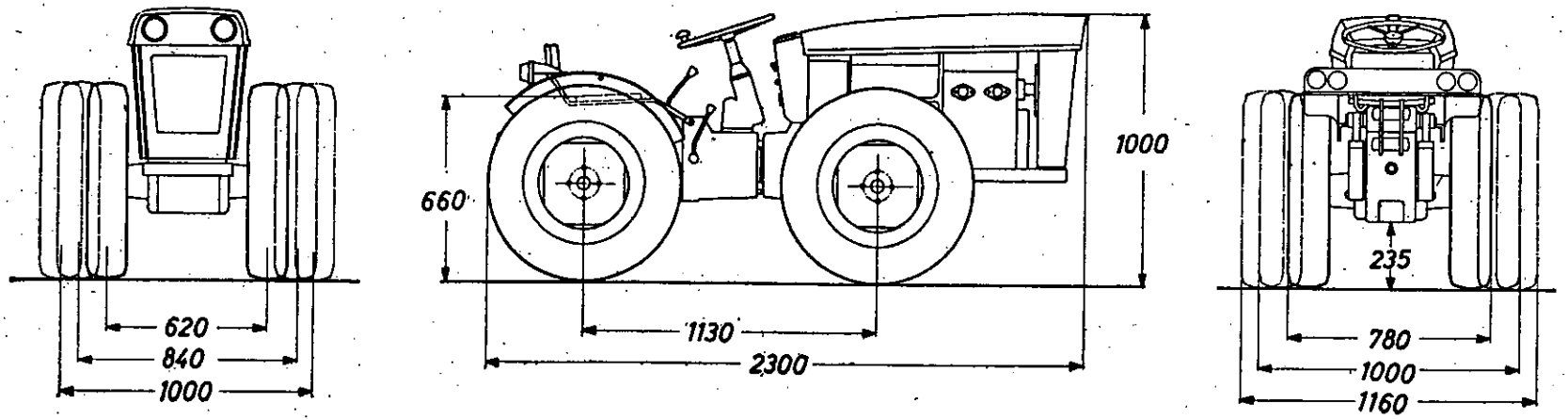
| | | AM 2 | AG 3 |
|---|---|---|---|
| a) | Manufacturers: | Gebrüder Holder Maschinenfabrik, 7418 Metzingen-Württ. | |
| b) | Type | HD 2 | HD 3 |
| c) | Design: | In-line vertical engine | In-line vertical engine |
| d) | Mode of operation: | Two-stroke | Two-stroke |
| e) | Combustion: | Direct fuel injection | Direct fuel injection |
| f) | Lubrication: | Fresh-oil lubrication | Fresh-oil lubrication |
| g) | Cooling: | Water-cooling with thermostatically controlled pump | Water-cooling with thermostatically controlled pump |
| h) | Cooling water filling: | 6,5 ltr. (1,4 gal.) | 8,7 ltr. (1,7 gal.) |
| | (Anti-freeze mixture "Glysantin" up to –20° C (–68° F) contained ex works all the year round) | 2,2 ltr. (0,5 gal.) | 2,9 ltr. (0,6 gal.) |
| i) | Number of cylinders: | 2 | 3 |
| j) | Cylinder bore: | 84 mm (3.3") | 84 mm (3.3") |
| k) | Stroke: | 90 mm (3.54") | 90 mm (3.54") |
| l) | Cylinder capacity: | 1000 cc | 1500 cc |
| m) | Engine capacity: | 20 bhp (per DIN 70020) | 30 bhp (per DIN 70020) |
| n) | Revs.: | 2300 rpm | 2300 rpm |
| o) | Fuel consumption: | 195 gr/HPh (7 oz HPh) | 195 gr/HPh (7 oz HPh) |
| p) | Oil supply in oil tank: | 2,6 ltr. (0,5 gal.) HD-B-diesel engine oil | 2,6 ltr. (0,5 gal.) HD-B-diesel engine oil |
| r) | Oil supply in gear box for auxiliary pumps: | 0,22 ltr. (approx. ½ pt.) SAE 80 gear oil. | 0,22 ltr. (approx. ½ pt.) SAE 80 gear oil. |
| s) | Commencement of delivery of fuel injection pump: | 38° from top dead centre | 38° from top dead centre |

**Instructions for the mechanic: see Workshop Manual.**

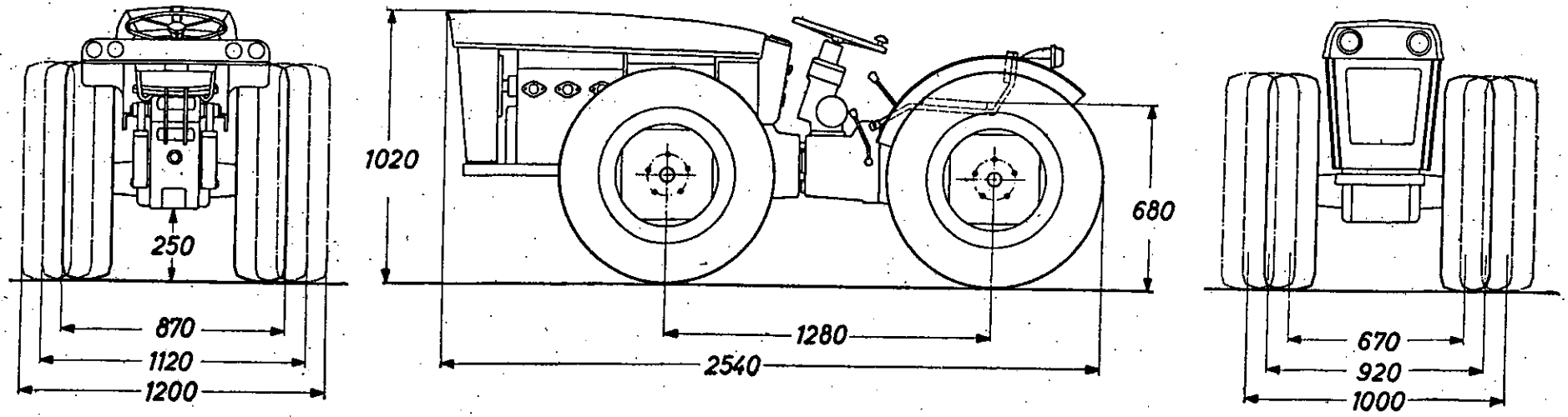
(Direction of rotation as viewed from flywheel end anti-clockwise)

| | | AM 2 | AG 3 |
|---|---|---|---|
| Fuel injection pump: | Position of notch on front side of drive shaft: |  |  |
| Insertion of Fuel Injection Pump: | | **10 o'clock** | **10 o'clock** |
| Coarse adjustment in 1st cylinder (front) | | 15 mm (0.58") from top dead centre | 7–8 mm (0.27–.031") from top dead centre |
| Adjustment of commencement of delivery of fuel injection pump: | | overflow method | overflow method |
| Fine adjustment in 1st cylinder (front) | | 11,8 mm (0.46") from top dead centre | 11,8 mm (0.46") from top dead centre |
| t) | Fuel injection pump: | Bosch No. 0400 462 036 | Bosch No. 0400 463 076 |
| u) | Injection pressure: | 175 kg/cm² (2489 lb/sq. in.) | 175 kg/cm² (2489 lb/sq. in.) |
| v) | Thermostat responds at: | 83° C (181° F) | 83° C (181° F) |
| w) | Air filter: | Oilbath air filter, upon request with cyclone preselector | |
| x) | Temperature pilot lamp 110° ±3° | | Temperature pilot lamp 110° ±3° |

AM 2, Maße in mm . Dimensions in mm (4 ins = 100 mm approx.)




AG 3, Maße in mm Dimensions in mm (4 ins = 100 mm approx.)



## 2. Transmission:

a) **Clutch:** Single plate dry clutch

b) **Transmission:** 6 forward gears (0.5–20 km/h – 0.25–12.4 mph) and 3 reverse gears. Drive from engine is taken by splined propeller shaft and universal joints through gearbox to rear differential, returning to front axle via twin propeller shaft. Pedal-operated front wheel diff-lock.

c) **Speeds** at max. revs (2300 rpm)

| | | **AM 2** (with tyres 7.00 – 16 AS) | | | **AG 3** (with tyres 7.50 – 18 AS) | |
|---|---|---|---|---|---|---|
| | | km/h | mph | | km/h | mph |
| forward: | 1st gear | 1,30 | 0,81 | 1st gear | 1,30 | 0,81 |
| | 2nd gear | 2,09 | 1,30 | 2nd gear | 2,09 | 1,30 |
| | 3rd gear | 4,00 | 2,48 | 3rd gear | 4,00 | 2,48 |
| | 4th gear | 6,25 | 3,88 | 4th gear | 6,25 | 3,88 |
| | 5th gear | 10,00 | 6,20 | 5th gear | 10,00 | 6,20 |
| | 6th gear | 19,50 | 12,12 | 6th gear | 19,50 | 12,12 |
| reverse: | 1st gear | 1,30 | 0,81 | 1st gear | 1,30 | 0,81 |
| | 2nd gear | 2,09 | 1,30 | 2nd gear | 2,09 | 1,30 |
| | 3rd gear | 4,00 | 2,48 | 3rd gear | 4,00 | 2,48 |

d) **Tractormeter:** (58 Ill. 10) registers ground speed, engine and p.t.o. rpm, and hours.

e) **Diff-lock:** for front wheel, pedal-operated.

f) **P.T.O.:** standard splined shaft with 540 rpm at 2100 engine rpm; or 590 rpm at 2300 engine rpm; independent of transmission.

g) **Steering:** Pivotal steering, effective on all four wheels, ZF-Gemmer system with backlash eliminator.
AG 3 optionally available with hydraulic steering

h) **Min. inner turning circle:**

| | |
|---|---|
| AM 2 | 95 cm (37") |
| AG 3 | 110 cm (43") |

i) **Brakes:** Foot pedal operates rear wheel brakes. Hand ratchet lever operates front wheel brakes for parking. Both brakes act independently on all four wheels through the transmission.

j) **Trailer hitch:** adjustable for height and revolving.

k) **Hydraulics:** Holder two-cylinder hydraulics with Bosch pump 8 ltr./min. (1,7 gal./min.). Lifts with transmission disengaged.
Max. lifting capacity on lower linkage arm 1400 kg (3080 lbs.) Additional outlet on control valve. (see ill. 24).

l) **Implement linkage:** Holder three-point linkage (giving vertical lift) with safety lock in transport position. Implements for standard 3-point linkage cannot be fitted without modification. This requires the advice of your Holder dealer.

m) **Electrical Equipment:** – 12 Volt system
Bosch dynamo (Bosch part No. LJ/GEH 90/12/1800 FR 15)
Bosch starter (Bosch part No. 0 001 307 022)
Battery (56 Ah)
2 Headlights (dim light and parking light)
2 Front traffic indicators
2 Rear traffic indicators
Blinker system
2 Rear reflectors
2 Brake lights with switch
1 Licence plate light
1 Horn
1 Glower plug for each cylinder
1 Fuse box
1 Socket (65 Ill. 11) 7-pole, (for 2 trailer lights and traffic indicator)
1 Temperature pilot lamp (109 Ill. 10)

n) **Weight:** without three-point linkage

| | AM 2 | AG 3 | |
|---|---|---|---|
| Total weight: | 780 kg – 1717 lbs. | 990 kg – 2179 lbs. | |
| Front axle pressure: | 515 kg – 1133 lbs. | 655 kg – 1442 lbs. | |
| Rear axle pressure: | 265 kg – 584 lbs. | 335 kg – 737 lbs. | |
| Permissible load on rear axle | 650 kg – 1430 lbs. | 1050 kg – 2310 lbs. | The permissible loads on axles apply to driving on roads only. |
| Permissible load on front axle | 650 kg – 1430 lbs. | 1050 kg – 2310 lbs. | |
| Permissible load on trailer hitch | 225 kg – 495 lbs. | 600 kg – 1320 lbs. | |

## C) Preparations for taking tractor into service

### 1. Engine:

a) Check oil level, with engine shut off. Open oil tank (E 1 Ill. 1) and top-up with **HD-B-diesel engine oil** to upper mark on dipstick.
For temperatures below zero SAE 10 HD-B-Oil
0—+30° C (0—+86° F): SAE 20 HD-B-Oil
over +30° C (+86° F): SAE 30 HD-B-Oil

Use only HD-B-Oils for diesel engines. HD-B-oils are high-graded engine oils for diesel engines in conformity with the specifications "MIL-L 2104 B". Please ask your local agents for their advice. List of recommended oils for Germany see page 18.

To avoid damage through inferior lubrication oils, always use high-grade branded oils of the same brand. Consumed oil must be continuously refilled. The oil level must be kept at upper dipstick mark. Never let oil sink below bottom dipstick mark (Ill. 6).

b) **Oil bath air filter (3 Ill. 1)**
Take out oil basin (23 Ill. 2) and fill up to mark with the same brand of oil as used for engine.

c) **Cooling water**
If possible, check when engine is cold. Be careful when checking cooling water straight after shutting engine off. In this case steam escapes with excess pressure. Lift radiator cap (1 Ill. 1) slowly and let excess pressure escape before removing it completely.

**Attention!** The radiators of all machines shipped from the works contain always an anti-freeze mixture. (Frost-proof up to −20° C). When handing machine over to owner and before the frosty period sets in check cooling water concentration and if necessary add antifreeze mixture.
When draining the cooling concentration in summer an equally effective protection against corrosion must be added to the cooling water.

e) The V-belt (16 Ill. 3) has the right tension if you can press it with your fingers approx. 1 cm (0.3″) between the fan and dynamo pulleys (38 Ill. 3). To tighten V-belts slacken both screws (39 Ill. 3) of slotted bracket, and both screws (40 Ill. 3) of dynamo support bracket. Press dynamo outwards until V-belt has right tension.
Tighten screws.

f) **Filling fuel tank.** Use only scrupulously clean diesel oil. Dirty fuel causes premature wear of injection pump and nozzles. We recommend straining the fuel through a clean cloth. For venting fuel system see page 31, item F.

## D) Lubrication

**1. Engine:**

a) HD-B-Oil for diesel engines, depending on temperatures:
below zero SAE 10 HD-B-Oil
0°–+30° C (+86° F) SAE 20 HD-B-Oil
over +30° C (+86° F) SAE 30 HD-B-Oil

b) **Gear box for auxiliary pumps:** – 0,22 litres (under ½ pt.) SAE 80 gear oil. Filling plug – overflow control screw (E 4 Ill. 4).

c) **Oil circulation (Ill. 6)**
The engine oil is led from the oil tank (100) through the oil pipe (102) to the oil pump. The oil pump pumps the oil through the pressure pipes (D1-D4) to the crankshaft bearings. The new oil pumps (104) have three pressure connections in HD 2 and four pressure connections in HD 3 so that every crankshaft bearing can be fed through a separate oil connection.
Through the coarse filter (42) and the pipe (106) the oil pump sucks the return oil out of the oil sump leading it via the return flow pipe (107) to the precision filter (108) and from there back into the oil tank. The oil tank contains 2,6 ltrs.

**2. Transmission:**

a) **Front transmission:** AM 2 = 2,5 litres; AG 3 = 1,5 litres SAE 80 gear oil. (Overflow control screw U Ill. 18).

b) **Rear transmission:** AM 2 = 10 litres (2¼ gal.). AG 3 = 7,5 litres (under 2 gal.) SAE 80 gear oil.
Sight glass (K 2 Ill. 16).

c) **Hydraulic supply tank:** 2,5 litres (over ½ gal.) SAE 20 HD engine oil. (6 Ill. 1). AG 3 from serial No. 33 300 = 3,7 litres (under 1 gal.)

d) **Reduction gears** (epicyclic gearing of AG 3 only): 0,2 litres (½ pt.) SAE 80 gear oil. (EA Ill. 16).

e) **All lubrication points** (S) – Grease according to lubrication chart p.p. 34/35.
First remove protective coating of paint from grease nipples.

f) **Steering:** SAE 80 gear oil approx. 1,2 ltr. (over 2 pts.) – (on filler plug Y Ill. 23) AG 3 with hydraulic steering approx. 5,3 litres (1,1 gal.)

## E) Taking tractor into service

**1. Starting**

a) Shift gear lever (63 Ill. 11) to neutral.

b) Move throttle lever (12 Ill. 11) to approx. half revs.

c) Insert key (52 Ill. 10) into ignition (51 Ill. 10) so that red charging lamp (56 Ill. 10) lights up.

d) Pull out combined preglow/starter knob (53 Ill. 10) to first position (preglow). Hold for one minute, until glow-starter indicator (54 Ill. 10) lights up bright red. Pull preglow/starter knob further out to stop. Then starter will turn engine over. Release knob as soon as engine fires, when glow-starter control indicator should go out. If engine fails to fire repeat procedure after waiting 60 secs. for battery to recover. It is unnecessary to "preglow" when engine is warm or temperature is above 5° C (41° F).

e) Adjust throttle lever (12 Ill. 11) to desired engine revs.

**2. Driving**

Before using gear lever, throttle down to idling speed (12 Ill. 11). Depress clutch pedal (67 Ill. 11). Release hand brake (73 Ill. 12). Preselect desired gear range with preselect lever (64 Ill. 11). Engage gear lever (63 Ill. 11). (Gear shift diagram see ill. 13-14-15)

If the selected gear proves difficult to engage, depress clutch pedal (67 Ill. 11) a second time (never use force), release clutch pedal (67) slowly. Control speed within selected gear range with throttle (12 Ill. 11).

When using heavy implements on the machine set on narrow track **utmost care must be taken** in sloping territory, particularly when turning the machine whilst driving downhill.

Security can be increased by using Holder wheel hubs or Holder wheel weights.

Ask your local distributors or dealers for their advice.
Never run engine in unventilated space!
(Carbon oxide is scentless and invisible).

**3. Driving on steep slopes**

Your particular attention is drawn to the fact that driving on extremely steep slopes, whether in line with the slope, or across the slope, is at your own risk!

**4. Stationary Operation of Tractor**

If the tractor is used stationary over longer periods, i. e. to drive a pump, or P.T.O. only, care must be taken that the machine stands on level ground.

**5. Braking**

The foot brake (74 Ill. 12) is used when the tractor is moving. The brakes have the advantage of acting at any time uniformly on all four wheels. A slight turn outward of the hand ratchet lever releases the hand brake (73 Ill. 12). When parking the tractor on rising ground, use suitable chocks, shut engine off, and engage low gear.
If the tractor is used with trailer attached, local traffic regulations must be observed!

Trailer lighting: German traffic regulations require that the distance between outer edge of headlamp beam and outer edge of trailer must not be more than 400 mm (15″).
Further the trailer must be equipped with rear reflectors, rear traffic and brake lights. The necessary 7-pole plug is available commercially, under DIN 72576.

**Always pay attention to your local safety and traffic regulations. The use of any trailed vehicle behind your tractor, particularly drive axle, or other trailers, is at your own risk!**

6. **Diff-lock**

The diff-lock rigidly locks the two front wheels to prevent either of them from slipping. To apply diff-lock press diff-lock foot pedal (13 Ill. 11). With differential locked the tractor must be steered straight ahead only.

7. **Track width adjustment**

To alter track width, change over both pairs of wheels from right to left. Make sure that arrow on tyre always points forward. Mudguards of AM 2/AG 3 can be adjusted to suit track width. Tyres of all four wheels must be the same size. Adjustment possibilities see page 21. Tyre pressure 1,5 atm. (21 lb/sq. in.) Check wheel nuts from time to time, particularly after changing wheels. The steering angle must always remain as adjusted by the manufacturer. Larger sized tyres should not be fitted as they will interfere with the steering lock and may give higher road speeds than are permitted by local traffic regulations. Where hub spacers are used, the steering angle must be accordingly re-adjusted. Min. distance between tyres at max. steering angle approx. 80 mm (3 in.)

8. **Track widths** (as measured from wheel centre to wheel centre).

In order to avoid excessive load on the bearing points the max. track widths as fixed from the works must not be exceeded.

AM 2 max. track 1030 mm (39.5 in.) hub spacers type 091/1 (90 mm – 3.5″)
AG 3 max. track 1030 mm (39.5 in.) hub spacers type 572 (55 mm – 2.0″)

9. **Ballast weigths**

AM 2 – 30 kg (66 lbs.) per wheel – can be fitted front and rear.
AG 3 – 50 kg (110 lbs.) per wheel – can be fitted front and rear.

Wheel weights must be used in pairs.

If wheel ballast weights are used it is not permissible to fill the tyres in addition with water, or to use any other weights.

**10. Hydraulic Implement Lift:**

The lift arms (82 Ill. 21) are actuated through lever (61 Ill. 12) via control valve (72 Ill. 12) and lifting cylinders. The intermediate lever position (0) locks the implement in position. At the bottom of its travel the level is held and the implement is in its working (floating) position.

**Caution! When driving tractor with implements attached on the road, or when parking it unattended (even during working breaks), the implement should be secured with chain (81 Ill. 21).**
**If the tractor is idle and unattended for any long period of time implements should be lowered to avoid accidents and to save wear on hydraulic cylinders.**

**11. Stopping tractor**

Let engine run idle, throttle engine revs, disengage clutch, shift gear into neutral, put on hand brake.

**12. Shutting engine off**

Let machine run idle for a short while. Move throttle lever (12 Ill. 11) forward to "idle position". Pull cut-out lever (33 Ill. 12) till engine stops. Remove ignition key.

## F) Service and Maintenance

(Please see service chart on pages 34 and 35).

**1. Engine:**

a) **Oil change** – In case of hard operating conditions after every 100–120 hours, otherwise after every 200–250 operating hours: Oil level should always reach top dip-stick mark. Never let oil level sink below bottom dip-stick mark.

**Use only high-grade branded HD-B-oil for diesel engines!**

See page 18 and 33.

Open hollow screw (103 Ill. 6) of fuel pipe and drain oil tank entirely. Refill oil tank with 2,6 ltr. HD-B-oil and tighten hollow screw (103) only after oil comes out without bubbles. (Attention: copper gaskets must be used on both ends of the hollow screw.)

Unscrew oil drain screw (42) on oil sump, drain oil. At this occasion clean oil drain screw, possibly in diesel oil, and blow through from inside to outside, then tighten.

Replace micro-mesh filter cartridge of lubrication oil (108 Ill. 6) after every 200–250 operation hours. (The micro-mesh filter cartridge cannot be cleaned.) Clean ventilation filter of the fuel injection pump (22 Ill. 2) after every 200–250 operating hours with diesel oil.

**Advice for the mechanic:**

**If the oil tank is empty:** Refill tank first with HD-B-engine oil. Then open hollow screw (103 Ill. 6) till oil comes out free from bubbles. Tighten hollow screw.

**After repairs:** Fill oil pipes with HD-B-oil.

Take care when dismantling or cleaning oil sump. In new machines a small magneto disc lies in the oil sump. Where applicable clean magneto disc and put back into oil sump.

After a repair on the engine has been carried out, i. e. after cleaning the oil sump, after blowing out all oil pipes, and after replacing the micro-mesh filter, the oil sump (up to the level of the suction pipe), the pipes, and the precision filter itself, take up an additional oil quantity of 0,5 ltr. (1 pt.) in HD 2 to 0,75 ltr. (1 1/2 pt.) in HD 3 engine.

**Attention:**

b) **After every 250 operation hours clean outlet ports of cylinder and exhaust system. Dismantle and clean exhaust (see Ill. 9 page 82). Remove exhaust manifold (casting) from cylinder and clean. Remove oil carbon deposits on outlet ports and cylinder with a wooden stick. Thereby place relevant piston in front of the outlet port which is to be cleaned in order to avoid oil carbon entering the way of the piston.**

c) **Oilbath air filter:**
Cleaning depends on dust conditions. **If necessary clean daily.** Take off oil basin (23 Ill. 7) and remove filter gauze (43 Ill. 7) and clean with diesel oil. Let the gauze dry off well and fill oil basin up to mark with fresh engine oil.

d) **Gear box for auxiliary pumps:**
**Change oil after every 450–500 operating hours.**
Open oil drain plug (A 4 Ill. 3) and drain oil. The filling plug (E 4 Ill. 3) serves at the same time to control oil level. Oil quantity: 0,22 litres (approx. 1/2 pt.) SAE 80 gear oil.

e) **Cooling system:**
Check water level in radiator, preferably when engine is cold. Extreme care must be taken when engine is still hot! Lift radiator cap (1 Ill. 1) only slowly to release pressure. Then open completely. If the temperature pilot lamp lights up red shut the engine off at once. An over-heating of the cooling water may have the following reasons: dirty cooling water, insufficient cooling water, defective water pump, thermostat does not respond, loose or broken V-belt, exhaust ports coked.
When frost is expected add anti-freeze mixture or have cooling water concentrate checked.

**Cleaning of radiator:** Remove insects and dirt deposits by blowing from engine side trough radiator shutter with compressed air.

f) **Draining radiator:**
Open drain plug (Aw III. 4) on bottom of radiator. Open drain plugs (31 III. 2) and (36 III. 3) on engine.

g) **Governor – injection pump (29 III. 2)**
Drain excess oil on plug (30 III. 2) after every 200–250 operating hours.
Have Bosch Service check injection pump, injection nozzles, and governor after every 2500 operating hours.
Have oil in governor renewed.

h) **Hydraulic oil** (container 20 III. 24a) Change for the first time after 450–500 operating hours, thereafter every 2500 hours. HD SAE 20 engine oil: AM 2 approx. 2,5 ltr. (over ½ gal.), AG 3 approx. 3,7 ltr. (under 1 gal.), AG 3 with hydraulic steering 5,3 ltr. (1,1 gal.).
Clean air vent filter of hydraulic supply tank (7 III. 1) after every 450–500 operating hours in diesel oil.
Renew filter cartridge in hydraulic tank after 2500 operating hours.
The filter cartridge (85 III. 24a) of the large hydraulic tank (III. 24a) fitted in AG 3 tractor from serial No. 33 300 can be cleaned in diesel oil. An additional hydraulic connection is available.

i) **Standard Steering**
Check oil level after every 200–250 operation hours. Oil change after 2500 operation hours.

k) **Steering – ZF Hydromatic Steering** (Optional equipment of AG 3 tractor)
In order to obtain utmost steering accuracy and safety even under extremely bad soil conditions, the AG 3 can be equipped with a ZF spindle-type hydromatic steering. The steering is only then hydraulically assisted when the oil pump for the steering works, i. e. if the engine runs. Driving need not be interrupted if the hydraulic steering assistance fails.
The hydraulic oil supply tank (24a) contains sufficient oil for hydraulic assistance of the steering and for the hydraulic implement lift.
**Hydraulic oil supply tank** (20 III. 24a). Change oil for the first time after 450–500, then after every 2500 operation hours.
**Draining oil:**
1. Press hydraulic lift arms (82 III. 21) completely down.
2. Open drain plug on steering and turn steering wheel left and right as far as stop.
3. Drain oil on suction socket of hydraulic oil supply tank (III. 2).

**Filling and ventilating oil supply tank** (total oil quantity 5,5 ltr. – 1,2 gal. – SAE 20 engine oil.
1. Measure out 5,3 ltr. (1,1 gal.) SAE 20 engine oil – open cover of hydraulic oil supply tank (III. 24 a) and fill in approx. 3 ltr. (over half a gal.) and refit cover.
2. Start engine and let run in idle revs. Turn steering wheel several times from right to left steering lock. **In this procedure the oil tank should not be sucked empty by the pump.** Ventilation through ventilation filter on hydraulic tank.

3. Top-up with hydraulic oil.
4. Lift and lower hydraulic several times under load.
5. Shut engine off and fill in the rest of the oil. If the total oil quantity cannot be filled in repeat procedures described under 2—4.
6. Rechek oil level after a few working hours. If the system has been correctly ventilated the oil level should be approx. 1,5 cm below the upper edge of container, or with hydraulic cylinders lifted at max. mark of diprod (7 Ill. 24 a).

l) **Ventilation of fuel system**

Fuel system must be ventilated

a) before starting engine for the first time if fuel tank is empty

b) when fuel filter is replaced, or when fuel pipes are disconnected, i. e. if air has entered pipes or intake part of injection pump (e. g. if the tractor has run out of fuel). Open air vent screw (28 Ill. 2) on injection pump. The fuel must come out free of bubbles. Close air vent screw.

m) **Replacing fuel filter (9 Ill. 1)**

Do not clean fuel filter!

Depending on dirt deposit, the fuel filter (9 Ill. 1), built into fuel tank (8 Ill. 1), must be replaced after approximately every 450—500 operating hours.

n) **Battery maintenance**

The battery (11 Ill. 1) must be checked every four weeks. In tropical countries every 2 weeks. Acid level should be 10—12 mm (0.3—0.4 in.) above upper edge (mark). Use only distilled water! Grease connecting terminals lightly with acid-free Vaseline. Battery must be filled with pure battery acid with a consistency of 1,28 = 32° Bé at 20° C. (In tropical countries 1,23 = 27° Bé). When charging battery filling caps must be unscrewed.

2. **Transmission:**

a) Grease all nipples (S) after every 200—250 operating hours (monthly). If molybdenum lubricants are available, we recommend their use, particularly for grease points on the upper and lower drive shafts (3 each). These points are readily accessible if the steering is turned on full lock.

b) **Front transmission:**

First oil change after 450—500 operating hours, then every 2500 hours.

The front transmission casing contains SAE 80 gear oil; 2,5 ltr. in AM 2; 1,5 ltr. in AG 3. Oil drain plug (A 2 Ill. 18), control screw (U Ill. 18), oil filling plug (E 2 Ill. 18).

c) **Rear transmission:**

First oil change after 450—500 operating hours, then after every 2500 hours.

The rear gear box contains AM 2 = 10 litres (2¼ gal.) AG 3 = 7,5 litres (under 2 gal.) SAE 80 gear oil.

With tractor in horizontal position, oil level should be visible on centre of sight glass ($K_2$ III. 16).
Drain screw (A 3 III. 16), filling plug (E 3 III. 18).

If the tractor is used stationary over long periods, e. g. to drive a pump, it should stand on level ground, and oil level of rear gearbox should be increased by approx. 2 ltrs. (4 pts.)

3. **Brakes and Lighting System**

Brakes, clutch and lighting system should be checked from time to time, at least once a year by a competent mechanic, particularly if the tractor is frequently driven on public roads.

All moving parts, such as clutch drive shaft, brake pedal bearings, etc. should be given a few drops of oil every week. If the tractor is taken out of use for a period of time, first clean it thoroughly, and then lubricate well.

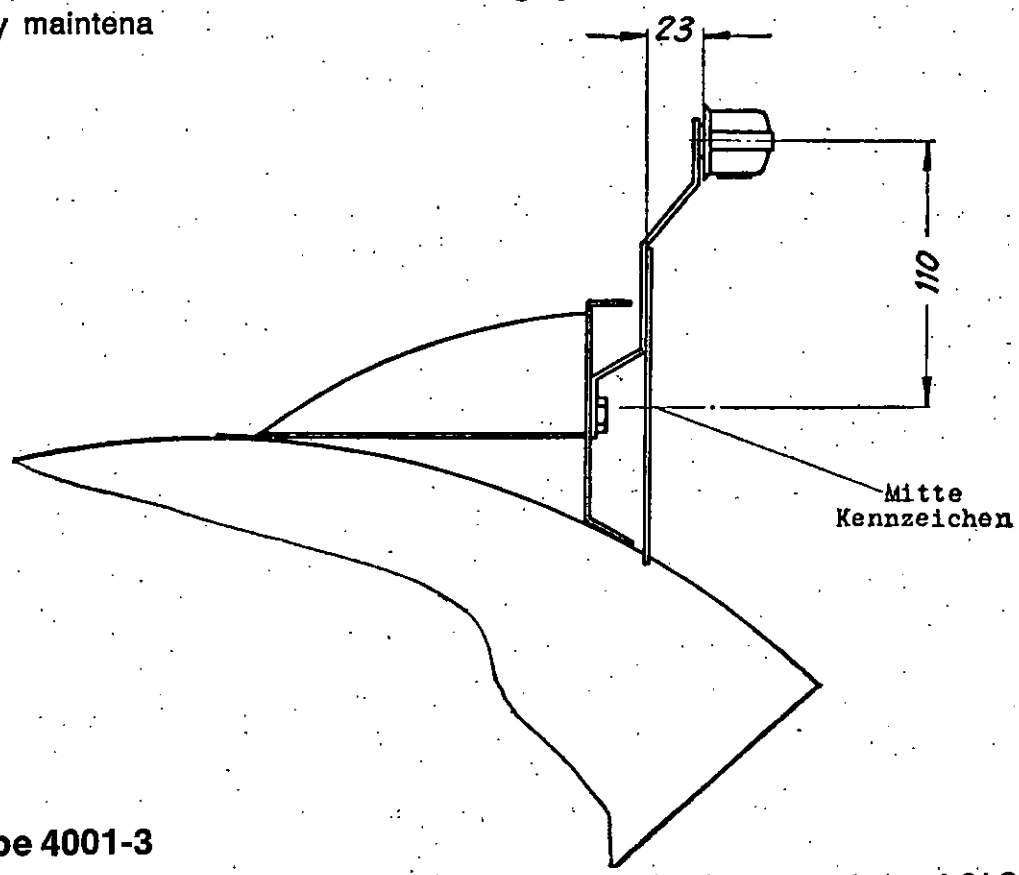
Ask a skilled mechanic about correct battery maintena

4. **Washing tractor**

Before using water on tractor to wash it, disconnect battery, or preferably, remove it. Protect fuel injection pump from a direct contact with water.

## G) Position of rear licence plate on AM 2 and AG 3

Traffic regulations in Germany prescribe for agricultural and forestry machines with a speed not exceeding 30 km/h (18.6 mph) a licence plate of the size 240x130 mm (9″x5″). In order to be correctly lighted by the licence plate lamp, the plate must be fitted to the tractor as shown on sketch.




## H) Transporting Persons

Safety regulations prohibit the transportation of persons on a tractor if no suitable seat has been provided.

## I) Holder Special Three-point linkage Type 4001-3

The Holder implements can be fitted direct to the three-point linkage. If linkage-mounted implements of the A 21 S tractor are used, the implement frame type 4001-1 can be fitted to the three-point linkage. In view of the greater traction, specially of the AG 3, the very much stronger AG 3 implements are recommended (see price list).

## K) Holder Three-point linkage Type 4001-7 for Cat. I Implements (See Ill. 19)

The three-point linkage type 4001-7 will accept most Cat. I implements with the exception of ploughs. In the choice of ploughs for use with the Holder AM 2 and AG 3 four-wheel drive tractors, we recommend following the advice of your local agents.

## L) How to value a tractor

A motorcar is generally valued according to driven kilometers and age.

A tractor is best valued according to operation hours and age, with the following guiding principles:

| | | |
|---|---|---|
| 1 operation hour | = | 75 driven km |
| **10** operation hours | = | **750** driven km |
| **250** operation hours | = | **18 750** driven km |
| **500** operation hours | = | **37 500** driven km |
| 1 000 operation hours | = | 75 000 driven km |
| 2 000 operation hours | = | 150 000 driven km |
| **2 500** operation hours | = | **187 500** driven km |

## M) HD-B-Oils

The oils which are to be used must be in conformity with the American Military Specification

**MIL-L 2104 B**

The brands of oil as stipulated on the recommendation list of page 18 comply with the above specification and are recommended by us in Germany.

Our general agents abroad are requested to check whether the brands of oil as recommended so far, or used by the customers hitherto, are in conformity with our guide-lines. This means that the different Mineral Oil Companies should confirm that the oils recommended by them comply with the American Military Specification MIL-L 2104 B.

# M) Service Chart AM 2 – AG 3

| | 1st Service | | |
|---|---|---|---|
| **A**<br>**Immediately upon receipt and before taking machine into operation, the agent must observe the following:** | **B**<br>**When handing tractor over to client.**<br>Wherever possible service and explanations should be given in the presence of the future owner, or his authorized person, and the tractor driver. | **C**<br>**After every 8–10 operation hours (daily)** | **D**<br>**After every 100 operation ho** |
| **1.** Grease all lubrication nipples with lubricant.<br>**2.** Check oil level in engine and gearbox.<br>**a) Engine:** max. oil level uppermost dipstick mark.<br>Use only clean HD-B-diesel engine oil. For temperatures: below zero HD-B-SAE 10 up to +30° C HD-B-SAE 20 over +30° C HD-B-SAE 30. Ex works the machines are always filled with SAE 20 oil.<br>**b)** Check oil filling of gearbox for auxiliary pumps on sight glass.<br>**c)** Rear gearbox: Correct oil level middle of sight glass. SAE 80 gear oil.<br>**d)** Front gearbox: AM 2 – AG 3. Check oil level on control plug. SAE 80 gear oil.<br>**e)** Epicyclic gearing: (Reduction gears) AG 3: Check oil level on control plug. SAE 80 gear oil.<br>**f)** Steering AM 2 – AG 3: Check oil level. SAE 80 gear oil.<br>**3.** Re-tighten all bolts and screws, particularly wheel nuts.<br>**4.** Check oil level air filter, where necessary top-up with engine oil.<br>**5.** Check cooling water level. When frost sets in check cooling water concentration.<br>**6.** Check hydraulic oil. (SAE 20 HD-B-engine oil.)<br>**7.** Check tyre pressure, 1.5 atm. –<br>**8.** Trial run engine, check function of tractor and hydraulic system.<br>**9.** Instruction: What are HD-B-engine oils? List of recommendation for Germany see page 18. In foreign countries the recommendations of the general agents should be followed.<br>**Replacement Engine:**<br>Before taking tractor into operation ventilate ("bleed") suction pipe. | **1.** Make sure that machine is complete. Check tools.<br>**2.** Give instructions in accordance with operation manual.<br>**3.** Before taking tractor into operation, and in presence of client:<br>**a)** Check oil level in engine. Explain lubrication system and oil change. Explain cleaning of filter and change of micro-mesh filter cartridge.<br>**b)** Explain cooling system. When frost sets in check cooling water concentration.<br>**c)** Check V-belt tension.<br>**d)** Rear gearbox – point out oil level sight glass and explain oil change.<br>**e)** Front gearbox AM 2 – AG 3: Point out overflow control screw and explain oil change.<br>**f)** Epicyclic gearing AG 3: Point out overflow control screw.<br>**g)** Point out lubrication nipples, oil control plugs and lubrication points.<br>**h)** Explain lubrication of air vent filter of hydraulic tank.<br>**i)** Explain fuel filter and ventilation of fuel pipe.<br>**k)** Check oil level of air filter and explain cleaning.<br>**l)** Steering AM 2 – AG 3: Check oil level and point out control plug.<br>**m)** Explain battery maintenance.<br>**n)** Explain outlet ports and cleaning of exhaust.<br>**o)** Point out stop bolts AM 2 – AG 3 – AG 35 and explain their function.<br>**4.** Check tyre pressure. 1.5 atm. – 21 lb/sq. in.<br>**5.** Check function of engine-transmission-diff. lock-Demonstrate hydraulics. Point out: Favourable position of tractor, discharge of hydraulics, lowering of implements. (Danger of accidents.)<br>**6.** Check electrical system. Explain fuse box and give instructions for battery maintenance.<br>**7.** Give practical field demonstration with purchased implements.<br>**8.** Explain maintenance of implements in accordance with operation manual.<br>**9.** Make out service booklet and fill in 1st cheque.<br>**10.** Fill in warranty file card and return it to Messrs. Holder.<br>**11.** Pay attention to local traffic regulations. | **1.** Check oil level in engine. Top-up daily to max. mark. For oil quality see column A – 2 a.<br>**2.** Clean air filter, depending on dust development, and top-up with fresh engine oil.<br>**3. a)** Check cooling water level. When frost sets in check cooling water concentration.<br>**b)** If conditions require it, check radiator grille and if necessary clean.<br>**4.** Check stop bolts AM 2 – AG 3. Replace broken stop bolts. | **1.** Check oil level of gearbox for auxiliary pump on oil sight gla or control plu If necessary to up with SAE 80 gear oil.<br>**2.** Check oil level of rear gearbo on oil sight glass.<br>**3.** Front gearbox AM 2, AG 3. Check oil level on lateral contr plug. If necessary top-up wit SAE 80 gear oi |

# Service Chart AM 2 – AG 3

| 2nd Service | 3rd Service | 4th Service |
|---|---|---|
| **E**<br>**After every 200–250 operation hours (monthly).** Wherever possible- service and explanations should be given in the presence of the future owner, or his authorized person, and the tractor driver. | **F**<br>**After every 450–500 operations hours.** Latest 6 months after taking tractor into service. Wherever possible, service and explanations should be given in the presence of the future owner, or his authorized person, and the tractor driver. | **G**<br>**After every 2500 operation hours (yearly)** |
| **1.** Engine<br>**a)** Change engine oil, oil quality see column A 2a. Clean oil filter of oil sump and change filter cartridge of micro-mesh filter.<br>**b)** Check oil level of injection pump regulator housing. Drain excessive oil on drain plug.<br>**c)** If necessary clean oil bath air filter and top-up with fresh oil.<br>**d)** Check V-belt tension.<br>**e)** If necessary clean cooling fins with compressed air. When frost sets in check cooling water concentration.<br>**f)** Clean air vent filter of injection pump.<br>**g)** Remove oil carbon deposits on outlet ports of cylinder block, exhaust manifold and exhaust.<br>**2.** Grease all lubrication nipples with lubricant. (Particularly universal shafts.)<br>**3.** Check complete electrical system and battery. Check temperature pilot lamp. (Checking temperature 110° ±3° C).<br>**4.** Check clutch play, if necessary readjust.<br>**5.** Check brakes, if necessary readjust.<br>**6.** Re-tighten all screws and bolts.<br>**7.** Check tyre pressure. 1.5 atm. (21 lb/sq. in.).<br>**8.** Trial run tractor and if necessary explain implements once more in practical operation.<br>**9.** Fill in 2nd Service Cheque. | **1.** Engine<br>**a)** Renew oil in gearbox for auxiliary pumps. 0,22 ltr. SAE 80 gear oil.<br>**b)** Check both screws of oil suction pipe (engine) for tight fitting.<br>**c)** Check nozzle holder for tight fitting.<br>**2.** Renew fuel filter in tank. Do not clean.<br>**3.** Hydraulic oil<br>**a)** With implement lift lowered check oil level of hydraulic tank (approx. 2 cm below container edge).<br>**b)** Change hydraulic oil now for the first time, then after every 2500 operation hours. (HD-B-SAE 20 engine oil.) AM 2 – 2,5 ltr. (over ½ gal.), AG 3 – 3,7 ltr. (under 1 gal.), AG 3 with hydromatic steering 5,3 ltr. – 1,1 gal. (Ventilation see operation manual.)<br>**c)** Clean hydraulic ventilation filter in diesel oil.<br>**4.** Change oil in gearbox now for the 1st time, then after every 2500 operation hours – SAE 80 gear oil. Front gearbox: AG 3 = 1,5 ltr., AM 2 = 2,5 ltr. Rear gearbox: AM 2 = 10,0 ltr., AG 3 = 7,5 ltr.<br>**5.** Check oil level of epicyclic gearing (reduction gears) – if necessary top-up to filler screw with SAE 80 gear oil.<br>**6.** Steering<br>**a)** Check oil level in mechanic steering box AM 2, AG 3.<br>**b)** Change oil in steering AM 2, AG 3 now for the first time, then every 2500 operation hours. SAE 80 gear oil – for quantities see column G – 5 a / 5 b.<br>**c)** Check steering play and if necessary readjust.<br>**d)** Check steering angle and stop bolt.<br>**7.** Fill in 3rd Service Cheque. | We recommend to have the following service carried out by an authorized HOLDER Service Station:<br>**1.** Engine:<br>**a)** Check compression pressure. If prescribed pressure is not obtained, proceed in accordance with operation manual.<br>**b)** Change engine oil, oil quality see column (A 2a). Change micro-mesh filter cartridge. Clean oil filter of oil sump, thereby unscrew oil sump and clean. Clean magneto in oil sump.<br>**c)** Clean lubrication pump in accordance with operation manual.<br>**2.** Check engine clutch.<br>**3.** Have injection pump with regulator checked by Bosch Service Station – have oil renewed.<br>**4.** Change gear oil.<br>**a)** Front gearbox AM 2 = 2,5 ltr. AG 3 = 1,5 ltr. SAE 80 gear oil.<br>**b)** Rear gearbox AM 2 = 10,0 ltr., AG 3 = 7,5 ltr. SAE 80 gear oil.<br>**c)** Reduction gears B 25 – AG 3, AG 35: Check oil level, if necessary top-up with SAE 80 gear oil.<br>**5.** Steering<br>**a)** AM 2 and AG 3 with mechanic steering 1,2 ltr. SAE 80 gear oil.<br>**b)** AG 3 with hydromatic steering 5,3 ltr. HD-B-SAE 20 engine oil for steering and hydraulic.<br>**6.** Change hydraulic oil. HD-B-SAE 20 engine oil – for quantities see column F – 3 b). Replace filter cartridge. From AG 3 serial No. 33300 wash filter cartridge!<br>**7.** Check silent block shock absorber and replace if necessary.<br>**8.** Retighten all screws and bolts.<br>**9.** Remove fuel tank and rinse.<br>**10.** Fill in 4th Service Cheque. |

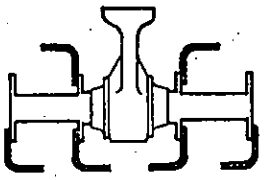
**SAE 80 gear oil:** Front gearbox, rear gearbox, gearbox for auxiliary pumps, reduction gears, steering box, (mechanical steering).
**HD-B-SAE 20, Engine Oil:** Hydraulic system.
**HD-B-SAE 10, HD-B-SAE 20, HD-B-SAE 30 Engine Oil:** According to outside temperatures, see column A – 2a: oil tank, air filter.
In case of extreme oil leakage look for cause.

# II) Implements for Soil Cultivation

## N) Holder Rotary Hoe Model 4083.7-11

Thanks to the unit construction system, working width can be increased or reduced by interchanging the hoeing tines. For working underneath branches etc., the hoe shaft can be offset to the right. Changing from central to offset position is very quick and easy as the shaft assemblies are held in position by means of one sturdy long bolt. The hood, with two adjustable side parts, can be adjusted for the relevant working width. The following diagram illustrates the parts necessary for working widths of 80–100–125 cm (31–39–48 in.).

## Type 4083-7 — 80 cm (31″)



### 4-blade hoeing set

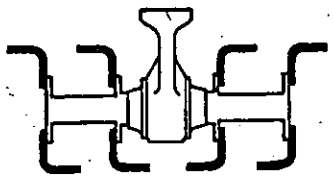
1 Inner hoeing tine ass., left with 4 right and 2 left hoe blades
1 Inner hoeing tine ass., right with 2 right and 2 left hoe blades

### 6-blade hoeing set

1 Inner hoeing tine ass., left with 6 right and 3 left hoe blades
1 Inner hoeing tine ass., right with 3 right and 6 left hoe blades

1 Long bolt 22 dia. 834 mm long
1 Castle nut M 22 x 2

## Type 4083-8 — 100 cm (39″)



### 4-blade hoeing set

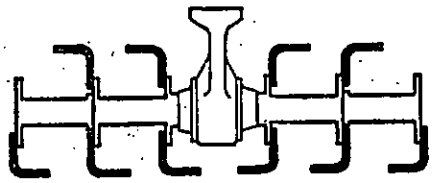
1 Inner hoeing tine ass., left with 4 right and 4 left hoe blades
1 Inner hoeing tine ass., right with 4 right and 4 left hoe blades

### 6-blade hoeing set

1 Inner hoeing tine ass., left with 6 right and 6 left hoe blades
1 Inner hoeing tine ass., right with 6 right and 6 left hoe blades

1 Long bolt 22 dia. 834 mm long
1 Castle nut M 22 x 2

## Type 4083-9 — 125 cm (48″)



### 4-blade hoeing set

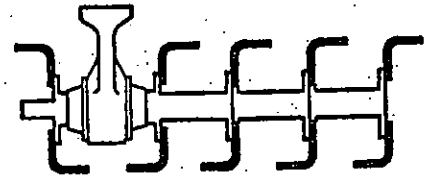
1 Inner hoeing tine ass., left with 4 right and 4 left hoe blades
1 Inner hoeing tine ass., right with 4 right and 4 left hoe blades
1 End hoeing tine ass., left with 2 right hoe blades
1 End hoeing tine ass., right with 2 left hoe blades

### 6-blade hoeing set

1 Inner hoeing tine ass., left with 6 right and 6 left hoe blades
1 Inner hoeing tine ass., right with 6 right and 6 left hoe blades
1 End hoeing tine ass., left with 3 right hoe blades
1 End hoeing tine ass., right with 3 left hoe blades

1 Long bolt 22 dia.
1310 mm long
1 Castle nut M 22 x 2

## Type 4083-11 laterally offset



### 4-blade hoeing set

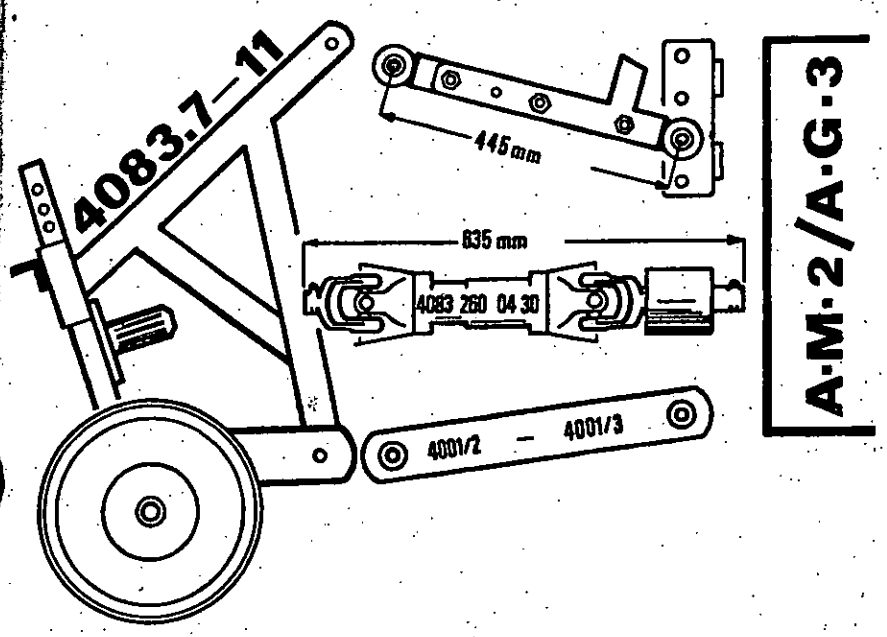
1 Inner hoeing tine ass., left short, with 2 right and 2 left hoe blades
1 Inner hoeing tine ass., right with 4 right and 4 left hoe blades
2 Outer hoeing tine ass., right with 4 right and 4 left hoe blades

### 6-blade hoeing set

1 Inner hoeing tine ass., left, short with 3 right and 3 left hoe blades
1 Inner hoeing tine ass., right with 6 right and 6 left hoe blades
2 Outer hoeing tine ass., right with 6 right and 6 left hoe blades

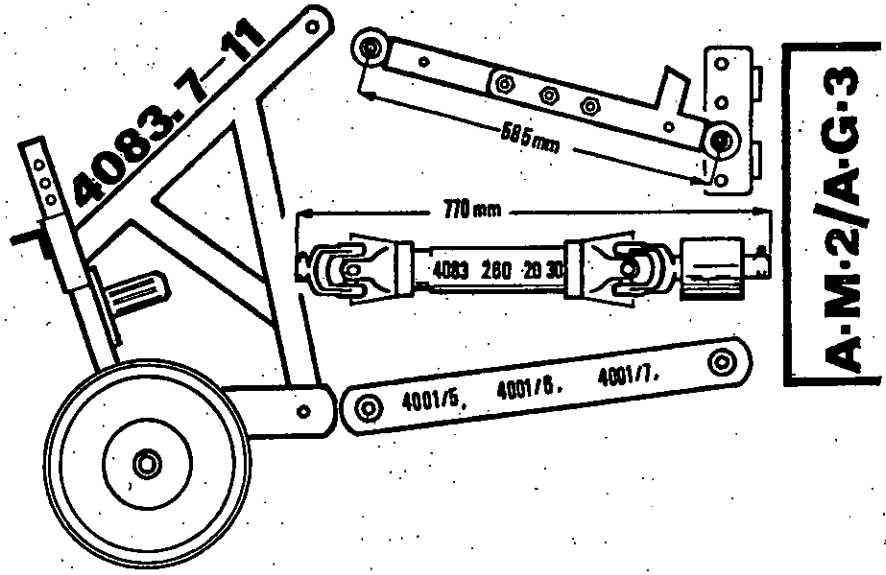
1 Long bolt 22 dia.
1172 mm long
1 Castle nut M 22 x 2

Attachment of rotary hoes 4083.7-11 in connection with special-type three-point linkage 4001-3 (for steep vertical lift) or three-point linkage type 4001-2. The upper linkage arm must be 445 mm long and the universal shaft 635 mm long (No. 4083 260 04 30).




III. 1

Attachment of rotary hoes 4083.7-11 on AM 2/AG 3 tractors in connection with three-point linkage types 4001-5, 4001-6, 4001-7. The upper linkage arm must be 585 mm long, and the universal shaft 770 mm long (No. 4083 260 20 30).




III. 2

**Installation of Rotary Hoe on Tractor:**

Fit top link arm in third hole (counted from top) of mounting bracket. This position of top link arm is always the same. See ill. 30.

Lower hydraulics. Fit both lower link arms and secure with locking pins. Take care that both lower link arms have the same height! Where necessary adjust connecting link.

Connect upper link arm to linkage frame of rotary hoe, using the hydraulic lift to raise hoe may assist.

**Note:** When fitting telescopic universal shaft with safety clutch care should be taken to see that the safety clutch is fitted to the tractor PTO shaft! **Attention!** With the three-point linkage **type 4001-7** the safety clutch must be fitted towards the side of the implement.

Secure guard chain but not tightly, or it will break!

Before fitting the standard telescopic universal shaft check position of journals.

Attention! Journals must lie in the same parallel position, as shown in upper part of ill. 31, and transfer picture on end guard of universal shaft.

Any other position, e. g. as shown in lower part of ill. 31, will result in a broken universal shaft!

Adjust check chains on lower link arms to give the hoe a lateral play of approx. 5 cm (1.9").

**Taking Rotary Hoe into operation:**

Depth is adjusted by means of the two depth control wheels. Recesses in both wheel adjusting beams guarantee an even height adjustment.

Adjust depth according to work required and soil conditions.

The rotary hoe is lowered and lifted through the hydraulics from driver's seat. Do not engage PTO drive before hoe is completely lowered. Disengage PTO drive before lifting hoe.

**Driving speed** depends on desired tilth of the soil.

We recommend:

1st speed: for fine tilth
2nd speed: for coarse tilth and high performance in large areas

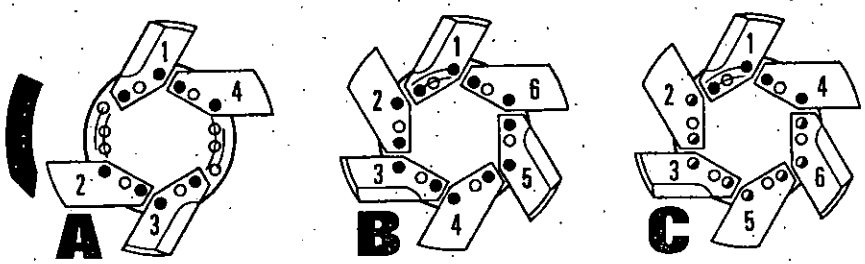
The hoe shaft assemblies are held together with a long bolt, and can be optionally fitted with 4 or 6 blades. The screwed on blades form at the same time the connection for the following hoeing tine.

Keep the carrier plate free from dirt so that the driving plate lies flush against it. The flange of every inner hoe shaft ass. has a safety ring (Ill. 3) to protect the sealing of the housing cover. Clean this ring from dirt and grease it after every 100 to 150 operation hours. In sandy soils more often. After the first 20 operating hours check, and where necessary, tighten, all nuts and bolts. Repeat this procedure from time to time.

Ill. 3

**Converting hoeing tine from 4 to 6 blades**

For coarse tilth 4-blade hoeing tines are recommended, and 6-blade hoeing tines will give a fine tilth. The special design of the flange allows a 4-blade hoeing tine to be converted into a 6-blade tine without difficulties. Illustrations A, B, and C show the arrangement of the hoe blades. A = 4-blade hoeing tine, B = 6-blade hoeing tine, C = conversion from 4-blade tine to 6-blade tine.




Illustrations A and C show that hoe blades 1 and 4 remain in the same position on the flange, whilst blades 2 and 3 are displaced by one section each. Blades 5 and 6 are added.

If the rear bore of the first hoe blade is matching one of the bores of the larger hole circle the sequence of attachment can be seen without difficulties.

**Service and maintenance:**

A regular service pays as it saves time and unnecessary costs. Observe our operation, maintenance and service instructions, and your implement will be ready for use at any time.

The telescopic universal shaft is subject to high stress and must be carefully serviced.

**Observe the following points carefully (Ill. 33)**

1. Grease locking pins every time before taking hoe into operation.
2. Grease journals after 8–10 operation hours (daily). If the rotary hoe is not constantly used it must be lubricated once a week. Operate grease gun until grease comes out at journal seals. Use ball bearing grease.
3. Grease ball bearings of end guards after 8–10 operating hours (daily).
4. If implement is under high stress and exposed to dirt, clean and grease end guards after 8–10 operating hours (daily).
5. Lubricate profile of square shaft inside end guard after 8–10 operating hours (daily).
6. The safety clutch is adjusted to a torque of 80 kpm (576 ft/lb). Readjustment of the clutch to this torque should be left to an accredited workshop. For lubrication use SAE 80 gear oil. Check oil level after every 200–250 operating hours. If necessary top-up, with the telescopic universal shaft in a vertical position. Secure screw cap with a wire.

**Hoeing tines:**

The cutting edges of the hoeing tines must always point in the direction of revolution. Replace damaged or worn hoe blades. Take care that driving plates and carrier plates of adjacent hoeing tools fit exactly into each other. If the carrier plate is dirty, the hoe shaft assemblies cannot be held properly together with the long bolt. Insert the bolt through hoe shaft from the right – as viewed from driving direction – this prevents slackening of the bolt nut.

Tighten bolt nut well with special spanner supplied with hoe, and check from time to time for tightness.

**Lubrication of transmission:**

The gearbox of the rotary hoe contains approx. 2 ltr. (4 pts.) of SAE 80 gear oil. The oil level is checked with the dipstick. In horizontal position of hoe oil level should be between top and bottom dipstick mark.

**Change oil** for the first time after 10 operating hours, then after every 450–500 operating hours.

The depth control wheels of the rotary hoe run in a plastic bush. In spite of this, they will run smoother when a grease gun is regularly applied to the nipples on the hubs.

## O) Holder Two-bottom plough type 4007-1

a) **Installation on tractor** (see Ill. 35) for steep vertical lift (approx. 70°).

The Holder two-bottom plough is attached to the Holder three-point linkage type 4001-3 of the tractor.

Fit top link bracket (100) to the two bottom holes with U-bolt (101) so that the arm points diagonally downwards. Secure U-bolt (101) with locking pin (102). Fit hitch mounting bracket (103) to the two top bores. The hitch mounting bracket (103) limits the lift of the plough. Attach lower linkage arms (104) to the hitch pins on either side of the plough and secure with the locking pins (105). Attach top link (106) to plough and secure with locking pin (107).

Proceed like this also when using the Holder reversible plough in connection with the implement frame type 4001-1.

b) **Vertical lift (90°)**

In case of 90° lift of the plough, the hitch mounting bracket (103) must be removed.

**Attention — Caution!** — In maximum raised position the plough can swing toward the driver's back.

c) **Ploughing**

The best ploughing job is achieved with a plough body that has been "polished by use". From the factory, the plough has a protective coating of paint which should be removed from the cutting edges, particularly when ploughing in wet ground. Once the plough has been "polished by use", we recommend protecting it from corrosion with a rust preventive, oil or grease.

When ploughing heavily overgrown soil, or when ploughing manure into the soil, either the disc coulter type 415-1, or the manure under-furrow distributor, type 314, can be attached. When using the under-furrow manure distributor, the knife coulter remains on the plough. This ensures an accurate furrow edge.

The ploughing depth can be controlled with the top link (106).

The vertical position or "tilt" of the plough bodies is controlled with the adjustable connecting arm (108).

The necessary horizontal play is adjusted by means of a check chain with lock (109) on the lower linkage arms.

Under normal ploughing conditions, the horizontal axis of the plough should be parallel to the soil surface. The position is controlled with the adjustable connecting arm (108).

After the first furrow has been made, the right hand front and rear tractor wheels run inside the furrow. Therefore, the lateral axis of the machine is tilted according to ploughing depth. The position of the plough must be consequently corrected so that the plough bodies are level.

As mentioned, ploughing depth is adjusted with the top link arm (106). After the first or second furrows have been made, the desired ploughing depth can be maintained by the control wheel which should be adjusted so that under normal ploughing conditions it causes only slight pressure on the ground.

When ploughing, the hydraulic lift must be in floating position, i. e. the hydraulic lever must be in "position T" (Ill. 12).

We recommend using plough weight type 044-4 on the rear plough body (see Ill. 34) in order to achieve a quicker and better "bite" into the soil at the beginning of a furrow, in dry and hard, or in heavy and overgrown soil.

The "cutting position" of the plough is better when using a plough weight, as this helps to maintain the parallel position of the plough frame to the surface of the soil.

When the plough is in the ground do not turn the tractor more than allowed by the play in the three-point linkage. Otherwise, the linkage arms will bend out of shape or fracture.

**Prevention of accidents:**

When interrupting work for any length of time, lower the implement (plough – implement carrier frame etc.) to the ground (see Ill. 34 and 36).

For transport secure the locking chain to bolt (111). When fitting the chain, take care that the implement has only little play.

## P) Implement Carrier Frame Type 4005-3 with Side Beam Type 4005-4

Different tools can be fitted to the universal implement carrier frame. For ploughing towards and away from vines etc. a combination of clearing plough, and right and left plough bodies, is recommended (see Ill. 36). For soil cultivation the plough bodies can be replaced by grubbing shares.

**Attachment and adjustment** (see Ill. 37) are the same as with the two-furrow plough.

The centre beams (120) can be steplessly adjusted with the tool lock (122). Adjustment of depth and rake and location on frame are achieved by means of hexagon nuts (123) and 2 set screws on the inside of the tool lock. Adjust the cutting angle by means of the 2 set screws (124).

## Q) Posthole Digger – Model Klein, Pfeddersheim

**Description and application:**

Owing to the availability of different auger sizes, the unit can be used for a number of digging jobs. Recommended for posthole digging in forestry, vineyards and orchards. The digger arm swings out to the side to allow corrections to the line of holes. The digger arm can be locked for one-man operation. The telescopic universal shaft has a safety clutch.

**Installation on tractor** (see Ill. 40)

1. Fit frame of digger with U-bolt (131) in two bottom bores of vertical mounting bracket and secure U-bolt with locking pin.
2. Tighten screw (132). Slacken two screws (133) as far as stop and secure with lock nut.
3. Press locking plate (134) backwards and slide telescopic universal shaft on tractor PTO shaft till it locks on the pin. Fix guard ring with chain (135).
4. Fit lifting chains (136) to hydraulic arms with pins (137).
5. Attach auger and secure with screw (140).
6. Adjust lifting chains by means of pin (137).

**Attention!**

Leave lifting chains as long as possible, otherwise there is risk of damage to the telescopic universal shafts.

**Technical data:**

Auger sizes: 110 – 160 – 240 – 350 – 400 mm (4 – 6 – 9 – 13 – 15 in.)
Speed of auger: 180 rpm
Length/width/height: 175/45/75 cm (68/17/29 in.)
Oil capacity of gearbox: 0,3 litre (under 1 pt.) – SAE 80 gear oil.

**Adjustment:** (See Ill. 39 and 41)

1. Adjust set screw (141). The digger must have a rearward inclination of 5°–10°. Vertical digging will require resetting according to soil condition.
2. Adjust limit stop arm (142) according to desired depth.
3. For one-man operation lock the digger arm (143) by means of pin (138). If the operator has an assistant, the lateral direction of digging can be corrected with arm (144).
4. On sloping ground tilt can be corrected by means of screws (150).

**Operation:**

Engage PTO and adjust engine revs according to soil conditions. Lower hydraulics. The auger penetrates the soil, is supported by the limit stop arm (142) and works itself clear in the process of digging.

**Attention!**

Do not raise unit before limit stop arm (142) rests on ground, and auger has worked itself clear.

**Prevention of accidents:**

Keep clear of working radius of digger.
When interrupting work lower digger to the ground. When cleaning auger shut-off engine and PTO. For transport lace auger in guard sleeve (145).

**Service and maintenance** (See Ill. 41)

| | |
|---|---|
| **Daily, or after 8—10 operation hours:** | Grease telescopic universal shaft (grease nipple S). |
| **After 200—250 operation hours:** | Check oil level on oil control plug (K), and if necessary top-up. |
| **For the first time after 450—500 operation hours, then every 2500 operation hours:** | Change oil in gearbox: 0,3 litre (under 1 pt.) SAE 80 gear oil. |