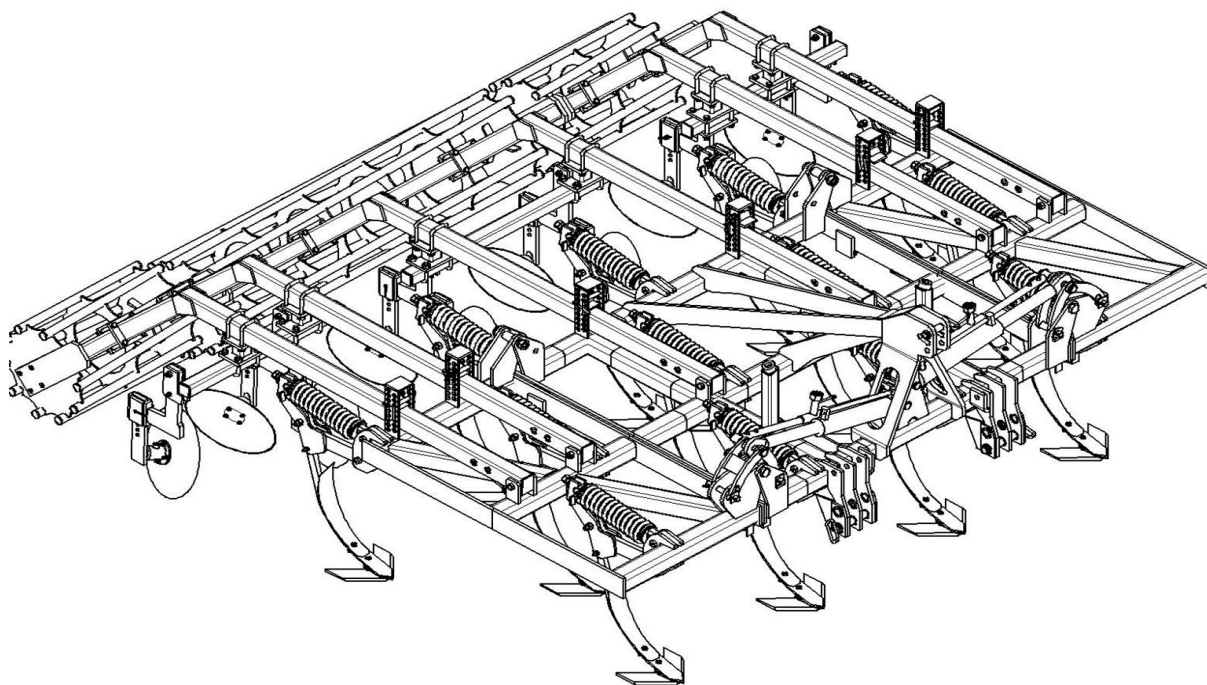




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OPERATION MANUAL

TOP cultivator



Revision III
Gliwice 2023



EC DECLARATION OF CONFORMITY



FOR THE MACHINE

Pursuant to the Ordinance of the Minister of Economy of 21 October 2008 (Journal of Laws No. 199, item 1228) and the Directive of the European Union 2006/42/EC of 17 May 2006

MANDAM Sp. z o.o.

ul. Toruńska 14

44 -100 Gliwice

declares with full responsibility that the machine:

TOP CULTIVATOR

type/model

serial No.

year of production

under this declaration, complies with:

Ordinance of the Ministry of Economy of October 21, 2008 on the essential requirements for machines (Journal of Laws No. 199, item 1228) and **Directive** of the European Union 2006/42/EC of 17 May 2006

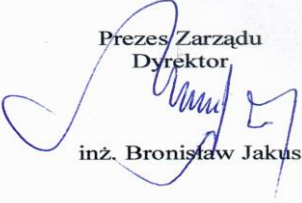
Persons responsible for the technical documentation of the machine: Jarosław Kudlek, Łukasz Jakus

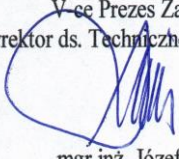
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The following standards were also used to assess compliance:

- PN-EN ISO 13857:2010,
- PN-EN ISO 4254-1:2016-02,
- PN-EN ISO 12100-1:2005/A1:2012
- PN-EN ISO 12100-2:2005/A1:2012
- PN-EN 982+A1:2008

This EC declaration of conformity loses its validity, if the machine is changed or converted without the manufacturer's consent.

Prezes Zarządu
Dyrektor

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Place and date of issue

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Surname, first name, position
and signature of the authorized person

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1. Introduction

Congratulations on your purchase of the TOP cultivator.

This manual provides information on hazards that may occur when using and working with the cultivator, technical data and the most important indications and recommendations, the knowledge and application of which is a prerequisite for proper operation. Keep this manual for future use. If you do not understand any of the provisions of this manual, please contact the manufacturer.

Notes that are important for safety reasons are marked with the sign:



The machine has a data plate located on the main frame. The plate contains basic data to identify the machine:



The guarantee for the cultivator is valid for 12 months from the date of sale.

The warranty card is an integral part of the machine.

Please always quote the serial number when making enquiries about spare parts. Information on spare parts can be found:

- on the web site: <http://mandam.com.pl/parts/>
- or at the phone number: +48 668 662 239
- E-mail: parts@mandam.com.pl

1.1. Safety signs and inscriptions






NOTE! When using the machine, special care must be taken in areas marked with special information and warning signs (yellow stickers).

The signs and inscriptions on the machine are detailed below. Safety signs and inscriptions should be protected against loss and loss of legibility. Signs and inscriptions that are lost or illegible should be replaced with new ones.

Table 1 Information and warning signs.

Safety signs	Meaning of the safety sign	Location on the machine
	Read the operating instructions before use.	Frame near mounting of the upper fastener.
	Crushing of the toes or foot.	Frame near mounting of the upper fastener.
	Keep clear of the lift bars while controlling the lift.	Frame near mounting of the upper fastener.
	Keep a safe distance from foldable and moving parts of the machine	Front part of the mid frame near the side frames

Safety signs	Meaning of the safety sign	Location on the machine
	<p>Do not reach into the crushing area if parts may move</p>	<p>Mid frame near side frames</p>
	<p>Pressurised liquid jet - bodily harm</p>	<p>Cylinders</p>
	<p>Fixing point for transport belts</p>	<p>Upper part of the drawbar (upper fastener bolt) Rear frame part:</p> <ul style="list-style-type: none"> • rigid frame (adjacent to the roller depth adjustment) • foldable frame (adjacent to the upper fastener bolt on the mid frame)

2. General information

2.1. Construction of the TOP cultivator

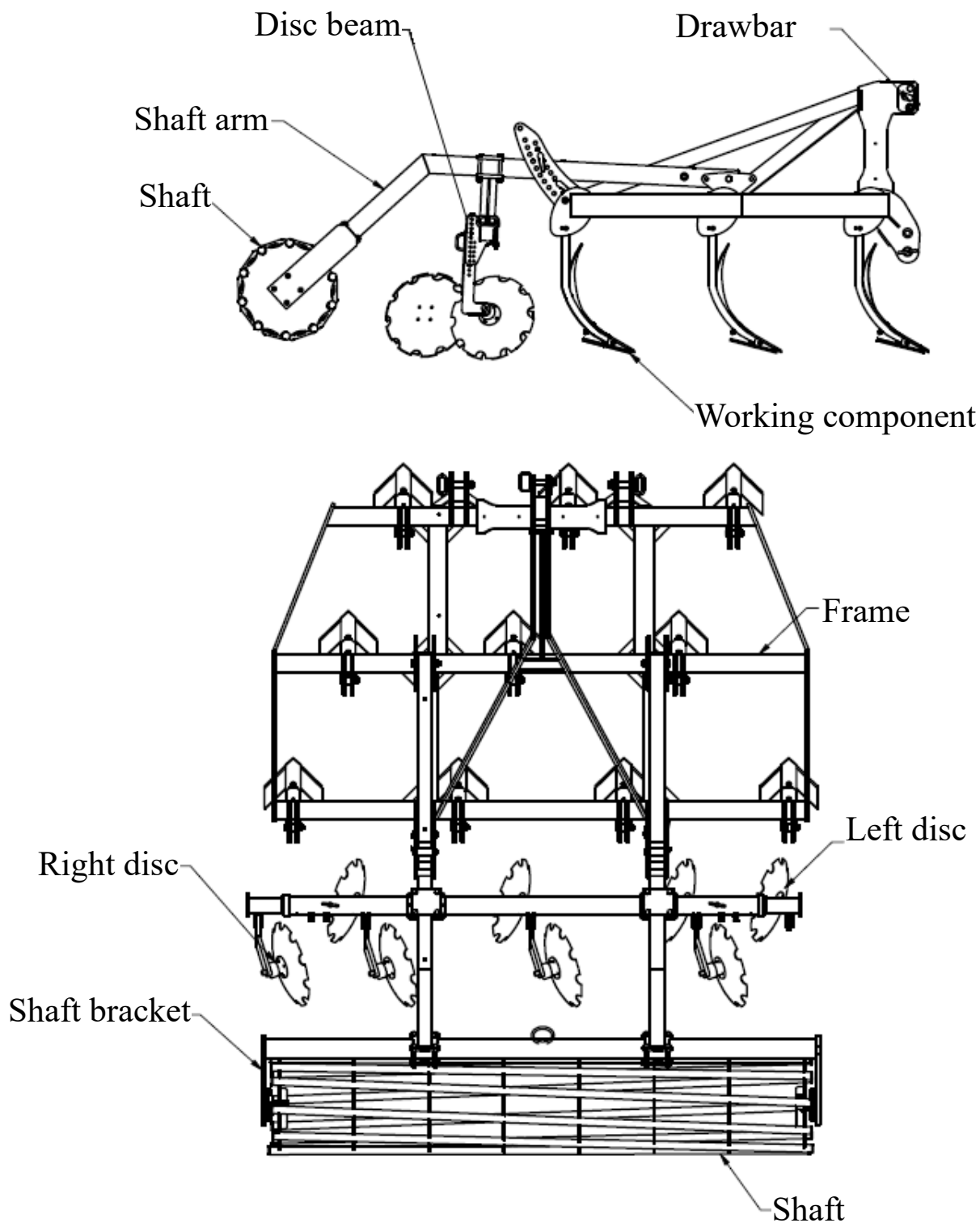


Fig. 1 Construction of the TOP unit: 1- Frame, 2- right side frame, 3- left side frame, 4- disc beam, 5- shaft, 6- shaft arm, 7- drawbar, 8- working component, 9- shaft bracket, 10- right disc, 11- left disc, 12- cylinder, 13- hydraulics mechanical lock, 14- bumper.

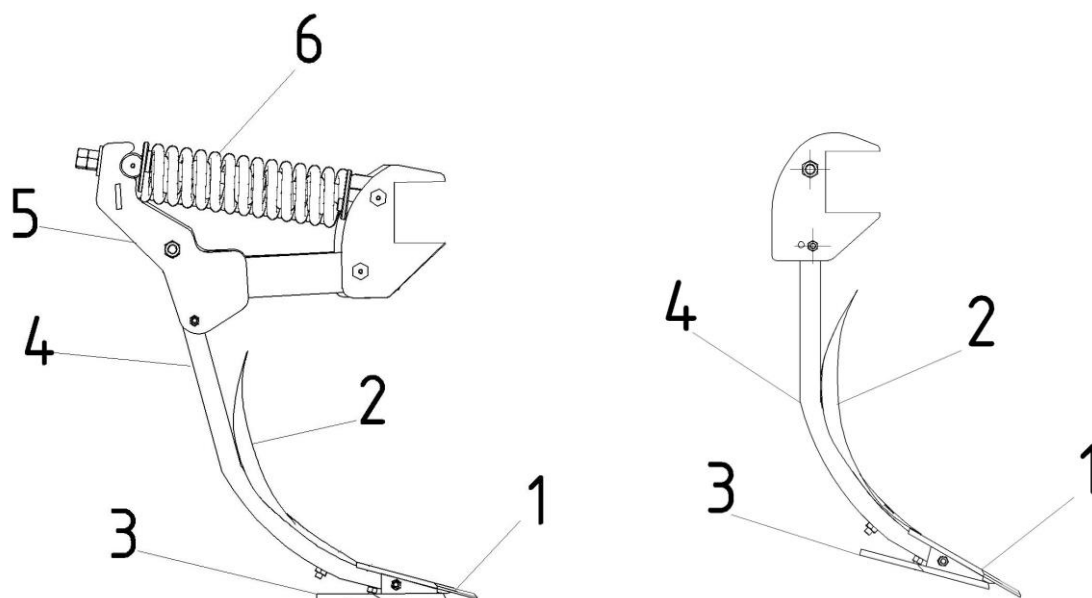


Fig. 2 Working components of the TOP cultivator: 1- coulter, 2- right/left shield, 3- tines, 4- plough beam, 5- beam arm*, 6- springs - external and internal*; (* TOP type "S").

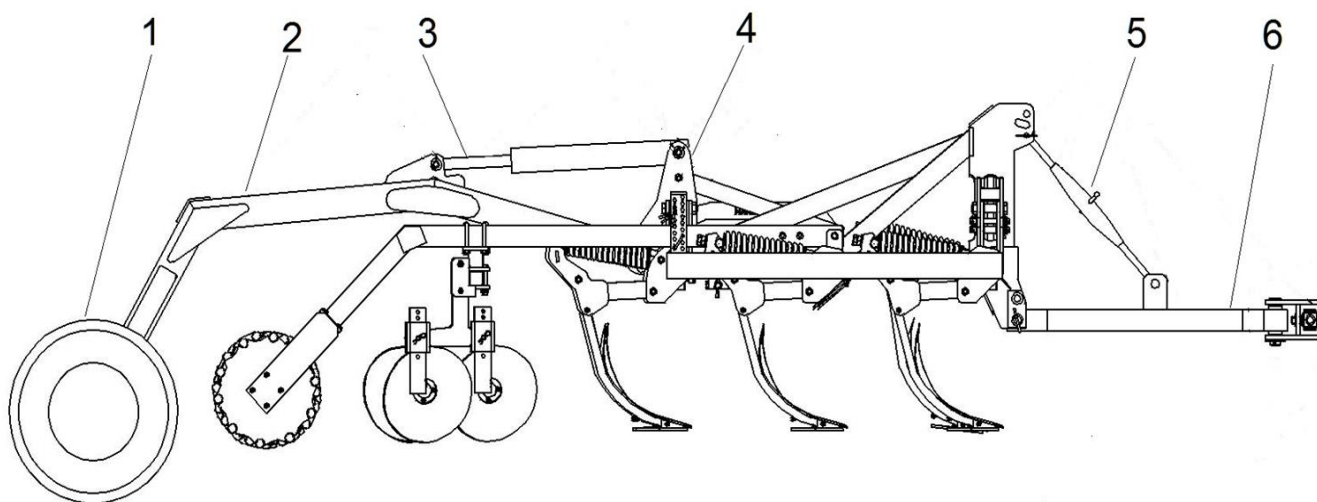


Fig. 3 Construction of the TOP cultivator transport carriage: 1- axle with wheels, 2- carriage frame, 3- cylinder with hydraulic system (fig. 13), 4- frame holder, 5- turnbuckle, 6- drawbar.

Table 2 Technical data of the TOP cultivator.

Type	Working width [m]	Number of teeth [pcs.]	Number of discs [pcs.]	Tractor power [HP]	Weight [kg]
TOP 2.5	2.50	9	6	105	920
		11	8	120	1062
TOP 2.5 S		9	6	120	1238
		11	8	140	1298
TOP 3.0	3.00	10	8	120	1078
		13	10	150	1174

TOP 3.0S	3.00	10	8	140	1360
		13	10	180	1575
TOP 4.0H	4.00	13	10	160	1777
		17	12	200	1933
TOP 4.0SH		13	10	180	2390
		17	12	240	2669
TOP 4.8H	4.80	16	12	190	2085
		22	16	300	2136
TOP 4.8SH		16	12	220	2705
TOP 6.0SH	6.00	20	15	300	5010

2.2. Intended use of the TOP cultivator

The TOP cultivator is an all-purpose machine for shallow ploughing or used instead of ploughing for:

- shallow stubble cultivation (up to 15 cm) to mix post-harvest residues, stop soil water evaporation, increase the growth of weeds and self-seeding plants, and reduce ploughing resistance, or deep cultivation,
- deep cultivation (up to 35 cm) to loosen cultivated soil, mix mineral and organic fertilizers, and prevent mineralisation of humus in the ploughing soil.

The application of right and left side shields improves the degree of stubble mixing. As a result, the concentration of phenol compounds affecting the growth of crops in the following year in the crop rotation system is reduced. The application of the TOP cultivator for deep cultivation eliminates the need of ploughing, and as such, this allows cost reduction, eliminates the risk of excessively compacted soil, and helps to complete farming work on time.



NOTE! The cultivator is designed exclusively for agricultural use. Use for any other purpose will be construed as misuse and will void the warranty.



NOTE! Failure to comply with the recommendations in these operating instructions will be construed as misuse. The manufacturer is not liable for damage resulting from the operation of the machine not in accordance with its intended use.

3. General safety rules

The cultivator may only be used and repaired by persons who are familiar with its operation and the mating tractor and with the rules of conduct for the safe operation and handling of the cultivator. The manufacturer is not responsible for arbitrary changes to the design of the cultivator. During the warranty period, only factory-made "MANDAM" parts must be used.

- The cultivator should be operated with all precautions in mind, in particular:
- before each start-up, check that the cultivator and the tractor are in safe condition when moving and working,
 - use of the machine by minors, persons who are ill or under the influence of alcohol or other intoxicants is prohibited,

- use work clothes, footwear and gloves when carrying out maintenance work,
- permissible axle loads and transport dimensions must not be exceeded,
- use only original safety and split pins,
- when working with the cultivator, when lifting, lowering and unfolding, there should be no bystanders in the vicinity, especially children,
- it is forbidden to stay between the tractor and the cultivator while the engine is running,
- move forward, lift and lower the cultivator slowly and smoothly without sudden jerks, making sure that nobody stays in the vicinity,
- do not stand on the machine or put any additional weight on it during operation or transport,
- during u-turns, special care should be taken if there are bystanders in the vicinity,
- carry out any repairs, lubrication or cleaning of working parts only with the engine switched off and the machine lowered and unfolded,
- when not in use, the machine must be lowered to the ground and the tractor engine stopped, machines must be stored in such a way as to prevent injury to people and animals,
- It is forbidden to turn or reverse with the machine lowered.

3.1. Attaching the tractor

- The attachment of the machine to the tractor must be made as specified, remembering to secure the pins and to secure the suspension pins with split pins.
- When coupling the tractor to the cultivator, it is forbidden for persons to stay between the machine and the tractor during this time.
- The tractor working with the cultivator must be fully operational. Coupling with a tractor with a defective hydraulic system is prohibited.
- Make sure that the tractor with the attached unit is stable, and the tractor steerability and stopping power can be maintained. The load on the front axle cannot drop below 20% of the total load on the tractor axle - use a set of front-mounted weights (see section 4.1.).
- In the resting position, the machine, when uncoupled from the tractor, should maintain a stable equilibrium.

3.2. Hydraulic system

The hydraulic system is under high pressure - all precautions must be taken, in particular:

- do not connect or disconnect the hydraulic lines when the tractor's hydraulic system is under pressure (hydraulics set to neutral),
- regularly check the condition of the connections and hydraulic lines,
- the unit must be taken out of service while the hydraulic fault is being rectified.

3.3. Tyres

- Tyre pressures must not exceed those recommended by the manufacturer and it is forbidden to transport the machine at too low a pressure. This may damage the machine and cause an accident on large uneven surfaces and when driving too fast.
- Significantly damaged tyres (particularly profile damage) must be replaced immediately.

- When replacing tyres, the machine must be secured against rolling.
- Repair work on wheels or tyres should be carried out by persons trained and authorised for this purpose. This work should be carried out with appropriately selected tools.
- Each time the wheels are fitted, the tightness of the nuts should be checked after 50km.

3.4. Transport on public roads

For transport, the side sections of the TOP cultivator must be folded into the transport position using the hydraulic system. Before folding, the machine must be raised to the extent that the side sections do not interfere with the ground during folding.

During transport, the clearance under the machine should be at least 30 cm

While transporting the unit on public roads, it is mandatory to apply lighting equipment, identification

emblem and reflective side lights if the rear 3-point hitch is used.

The travelling speed during transport must not be exceeded:

- on roads with a smooth surface (asphalt) up to 20 km/h,
- on dirt or paved roads 6-10 km/h,
- on bumpy roads not more than 5 km/h.

The driving speed must be adapted to the condition of the road and the conditions on the road, so that the cultivator does not bounce on the tractor's suspension system and there are no excessive loads on the machine frame and the tractor's suspension system.

Particular care should be taken when passing and overtaking and on bends. The permissible width of the machine running on public roads is 3.0 m.



WARNING! Failure to comply with the above rules may create hazards for the operator and bystanders as well as damage to the machine. Damage resulting from non-compliance with these rules is the responsibility of the user.

3.5. Description of residual risk

Mandam Sp. z o.o. makes every effort to eliminate the risk of accidents. There is, however, a residual risk that could result in an unfortunate accident. The greatest danger occurs when:

- using the machine for purposes other than those described in the instructions,
- using the machine by minors, persons who are not authorised, who are ill or who are under influence of alcohol or other drugs,
- persons and animals within the operating range of the machine are present,
- no caution is paid when transporting and manoeuvring the tractor,
- staying on the machine or between the machine and the tractor while the engine is running,
- operating and failure to comply with operating instructions,
- driving on public roads.

3.6. Assessment of residual risk

Residual risk can be minimised by applying the following recommendations:

- prudent and unhurried operation of the machine,
- careful reading of operating instructions,

- keeping a safe distance from danger zones,
- prohibition on being on the machine and in the operating area of the machine while the tractor engine is running,
- carrying out maintenance work in accordance with safety rules,
- use of protective clothing and, if working under machinery, a helmet,
- prevention of unauthorised access to the machines, especially by children.

Hazards:

Noise: If the TOP cultivator is used on stony soils, this can cause considerable noise. In this case, it is advisable to keep the windows and doors of the tractor closed. You can also wear ear protectors.

Dust: In very dry conditions, very heavy dusting can occur. In such cases, it is recommended that the doors and windows of the tractor remain closed. In extreme conditions, a dust mask is recommended.

4. General information on use

The main frame of the cultivator is the basic load-bearing element of the entire machine. In the version that exceeds a width of 3 m, the cultivator consists of a mid frame and side frames that fold hydraulically into the transport position. The plough beams with working components are attached to the frame. Standard cultivators are equipped with a shaft and a disc beam mounted to the shaft arms. The task of the discs is to level the soil surface distorted by the last row of working components. The shafts are used to compact opened soil and maintain the working depth of the cultivator.

Before starting the machine for the first time:

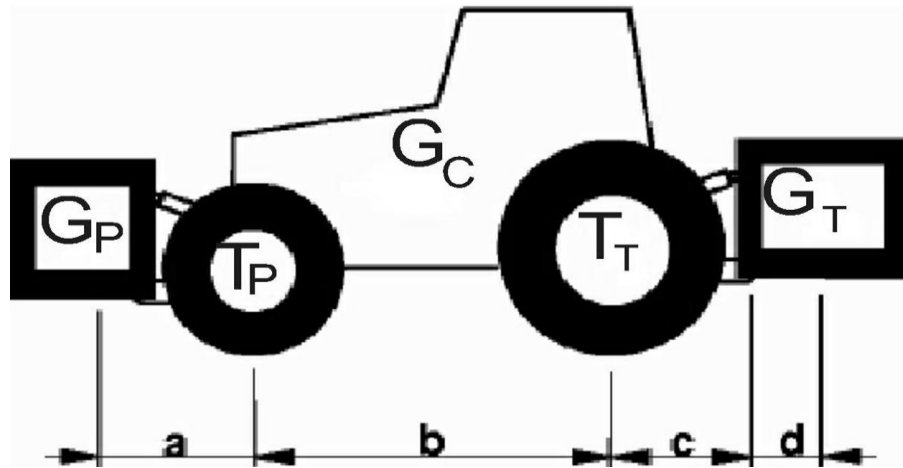
- refer to the operating instructions,
- make sure the machine is in good working order,
- check the condition of the hydraulic system (replace components if damaged, e.g. pressure hoses),
- make sure that the machine's pressure hose couplings fit into the sockets on the tractor,
- check the tightness of the individual bolts and nuts,
- check the air pressure in the wheels in accordance with the manufacturer's recommendations,
- ensure that all components requiring lubrication are lubricated,
- ensure that the pressure in the tractor wheels is the same on each axle to ensure even operation.



NOTE! While preparing the machine for deep soil cultivation, **dismount all cutting wings as they may contribute to extensive compaction of the soil, resulting in plough pan effect, and increase the operating resistance.**



NOTE! The permissible axle loads and tyre load capacities must not be exceeded. The front axle load must not be less than 20%. The tyre pressure should be in accordance with the manufacturer's recommendations



Axle load calculations

Designations:

G_C - tractor weight,

T_P - front axle load of the empty tractor,

T_T - rear axle load of the empty tractor,

G_P - total weight of rear-mounted device,

G_T - total weight of front-mounted device,

a - distance between the centre of gravity of the front-mounted device and the centre of the axle,

b - tractor wheel track,

c - distance between the centre of the rear axle and the centre of the hitch bolt of the rear device,

d - distance of the machine's centre of gravity from the tractor's hitch bolt (for all widths assume 1.9 m)

x - distance of the centre of gravity from the rear axle (if the manufacturer does not specify this parameter, enter 0.45).

Minimum load at the front for rear-mounted machine:

$$G_{Pmin} = \frac{G_T \cdot (c + d) - T_P \cdot b + 0,2 \cdot G_C \cdot b}{a + b}$$

Minimum load at the back for front-mounted machines:

$$G_{Tmin} = \frac{G_P \cdot a - T_T \cdot b + x \cdot G_C \cdot b}{b + c + d}$$

Actual front axle load:

$$T_{Pcal} = \frac{G_P \cdot (a + b) + T_P \cdot b - G_T \cdot (c + d)}{b}$$

Actual total weight:

$$G_{cal} = G_P + G_C + G_T$$

Actual rear axle load:

$$T_{T cal} = G_{cal} - T_{P cal}$$

When connecting the cultivator to the tractor, the cultivator should stand on firm and level ground. When attaching the cultivator to the tractor's three-point hitch, perform the following steps:

- switch the tractor's hydraulic system to position control,
- remove the lower hitch bolts (in case the tractor linkage is not equipped with hitching hooks),
- drive up carefully, suspend the machine from the lower links, then secure,
- connect the top upper fastener on the tractor. During operation of the unit, the hitch point of the upper fastener at the unit must be higher than the attachment point of this fastener at the tractor,
- check the lifting and lowering of the cultivator and the operation of the hydraulic system.



NOTE! Hitching the tractor to the cultivator must be done carefully, at minimum tractor speed! When hitching the machine, make sure there are no bystanders in the vicinity.

4.1. Preparing the cultivator for work

The cultivator is usually delivered ready for work. Due to the limitations of transport facilities, it is also possible to deliver it in a partially dismantled state - this usually involves disconnecting the rear shaft, disc beam and discs.

When the unit is first prepared for use, its components must be assembled: cultivator, shaft and discs. To do this, place the cultivator on a flat hard surface in a position that allows the shaft to manoeuvre. Position the shaft arms in the cultivator brackets and connect the arms to the shaft bracket with screws (Fig. 4). Then mount the beam with discs to the shaft arms. The discs should be set so that their work causes the furrows created by the coulters of the last row of the cultivator to be filled in. There is one pair of discs per plough beam in the last row (left and right discs - Fig. 5). The arrangement of the hydraulic work control components is shown in Fig. 8. Diagram of the hydraulic hoses installation - Fig. 17, 18.

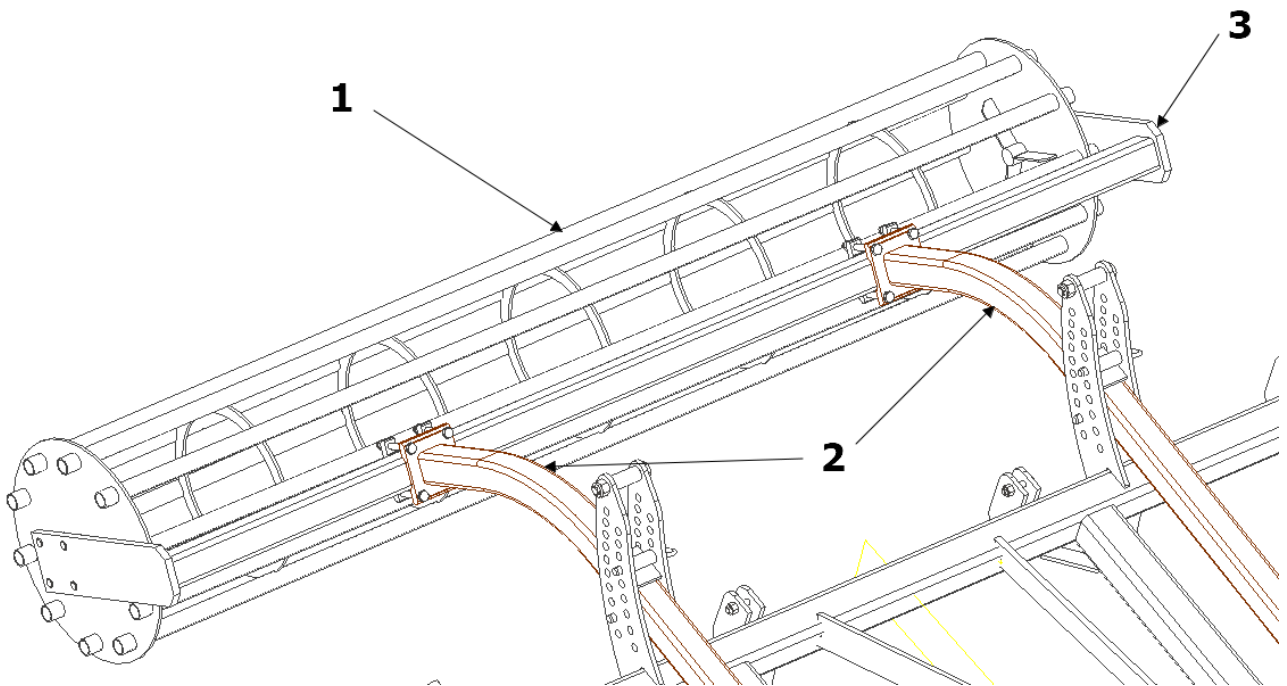


Fig. 4 Connection of the arms with shaft bracket: 1 - tubular shaft; 2 - arms, 3 - shaft bracket.



NOTE! The correct procedure for mounting the shafts in the arm holders requires that the bolts be evenly tightened diagonally, so that the entire plane of the arm holders is adjacent to the plane of the shaft clamp profile. This provides the most secure way of connecting the shaft arms to the machine!

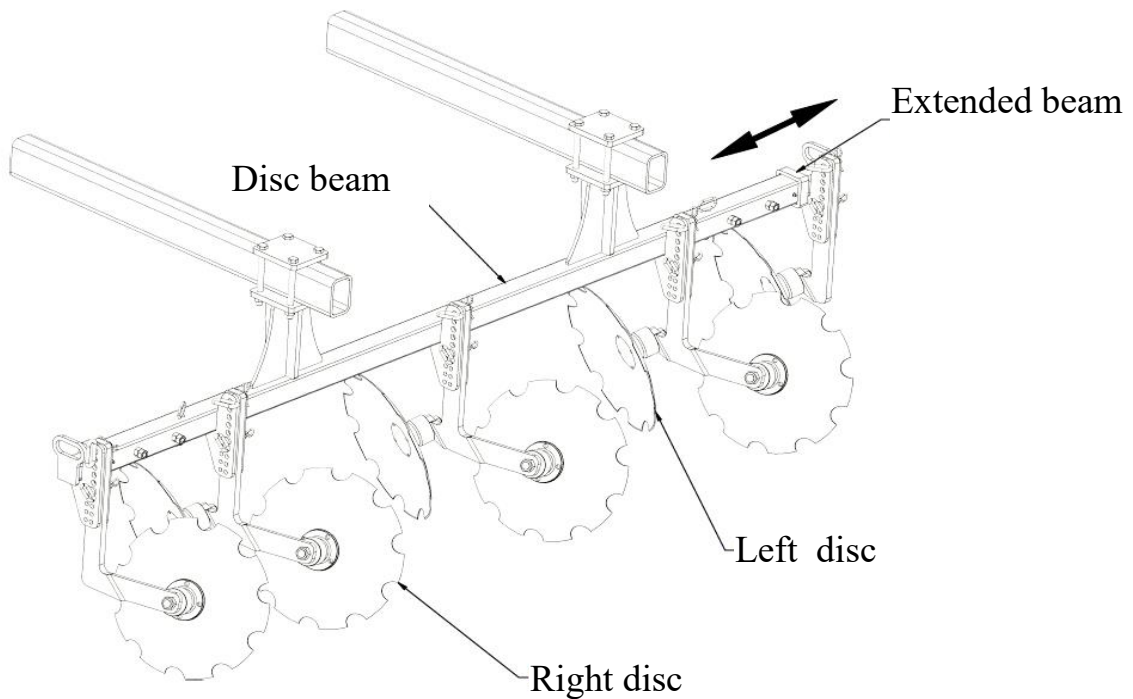


Fig. 5 Arrangement of discs on the beam.

4.2. Coupling the cultivator to the tractor

The tractor wheel tyre pressure should be in accordance with the manufacturer's recommendations. The lower links of the three-point hitch should be at an equal height, at a spacing corresponding to the spacing of the lower suspension points. When connecting the cultivator to the tractor, the cultivator should stand on firm and level ground.

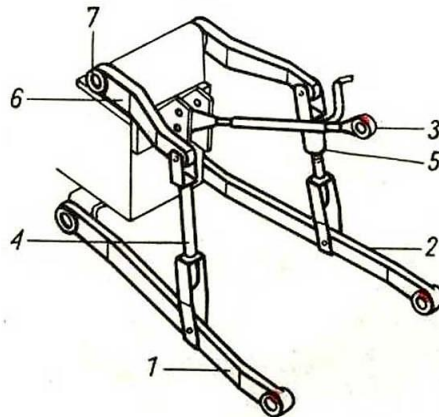


Fig. 6 Three-point suspension system of the tractor's three-point hitch: 1,2 - lower links, 3 - upper fastener, 4 - left suspension, 5 - right suspension with adjustable length, 6 - lift arm, 7 - lift shaft.

When attaching the cultivator to the tractor's three-point hitch, perform the following steps:

- switch the tractor's hydraulic system to position control,
- remove the lower hitch bolts (in case the tractor linkage is not equipped with hitching hooks),
- drive up carefully, suspend the machine from the lower links, then secure,
- connect the top upper fastener on the tractor. During operation of the unit, the hitch point of the upper fastener at the unit must be higher than the attachment point of this fastener at the tractor,
- check the lifting and lowering of the cultivator and the operation of the hydraulic system.

Any tractor that is used with the machine must be equipped with a set of weights and must remain steerable during transport, i.e. a minimum of 20% of the tractor's weight must be on the front axle.



NOTE! Hitching the tractor to the cultivator must be done carefully, at minimum tractor speed! When hitching the machine, make sure there are no bystanders in the vicinity.

4.3. Operation and adjustment

The working depth is adjusted by changing the height of the shaft relative to the cultivator frame. This is done by inserting pins into a drilled plate fixed to the frame, together with stabilising plates (Figure 7) and adjusting the tractor's hydraulic lift.

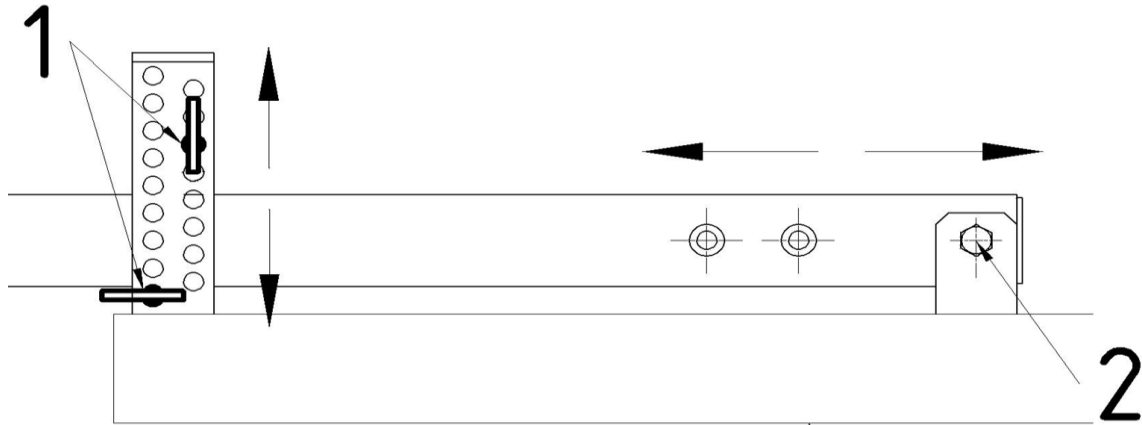


Fig. 7 Adjusting the depth and distance of the tubular shaft: 1 - working depth adjustment pins with stabilising plate; 2 - shaft arm fixing screw.

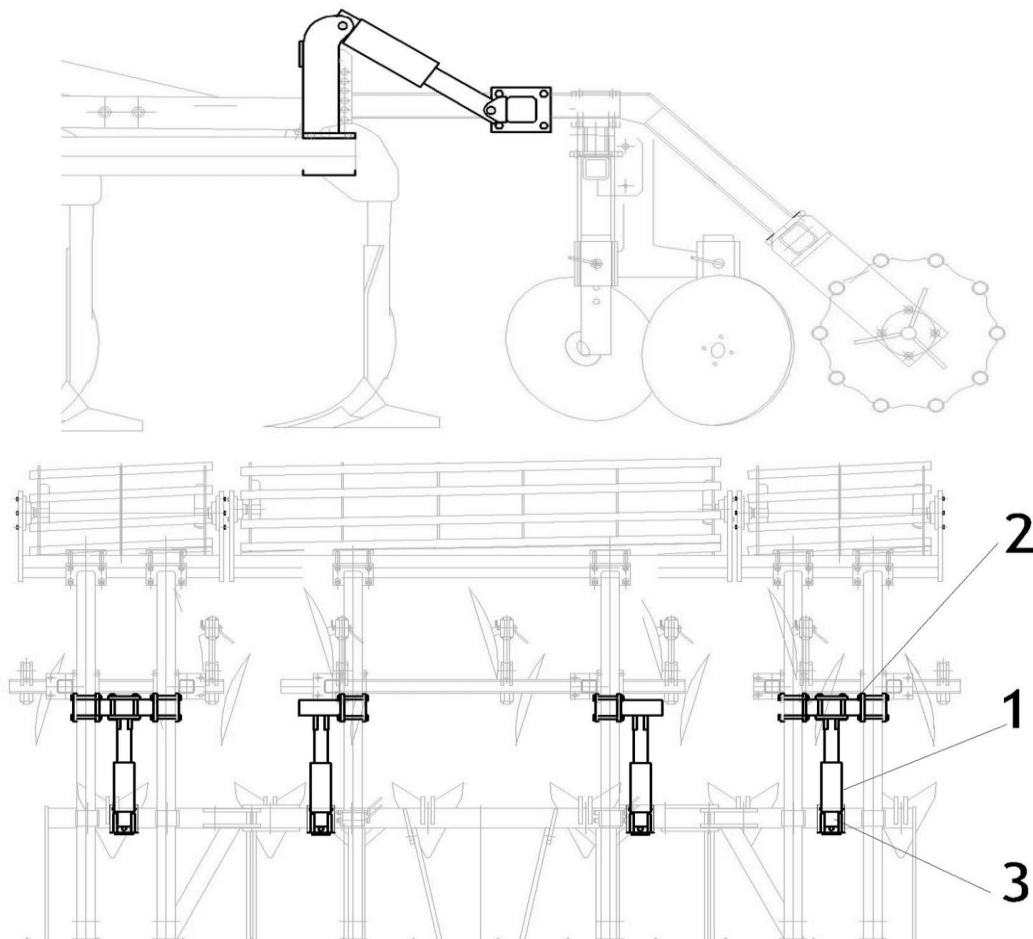


Fig. 8 Hydraulic adjustment of the roller: 1- cylinder, 2- beam with arm bracket, 3- cylinder bracket.

On machines with hydraulic adjustment of working depth, the working depth is set using pawls located at the piston rod of the cylinder. As more pawls are folded, the operation of the machine becomes shallower. In a configuration where none of the pawls are installed, the machine is in its greatest working depth configuration. In (Fig. 10 and Fig. 11), the correct way of installing the subsequent pawl plates on the actuator and the incorrect way of installing them are shown.

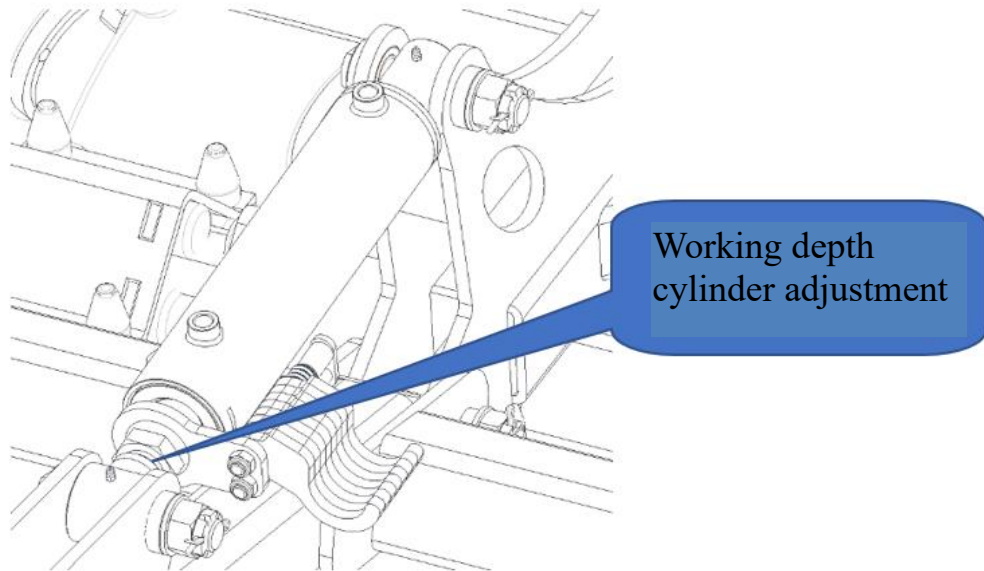


Fig. 9 Hydraulic adjustment of the cultivator working depth.

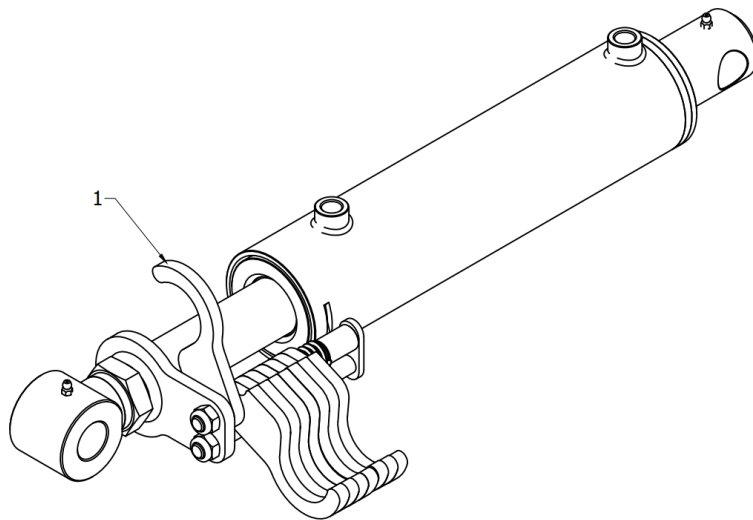


Fig. 10 Correct way to put the first (1) pawl on the piston rod of the cylinder to adjust the working depth of the machine.

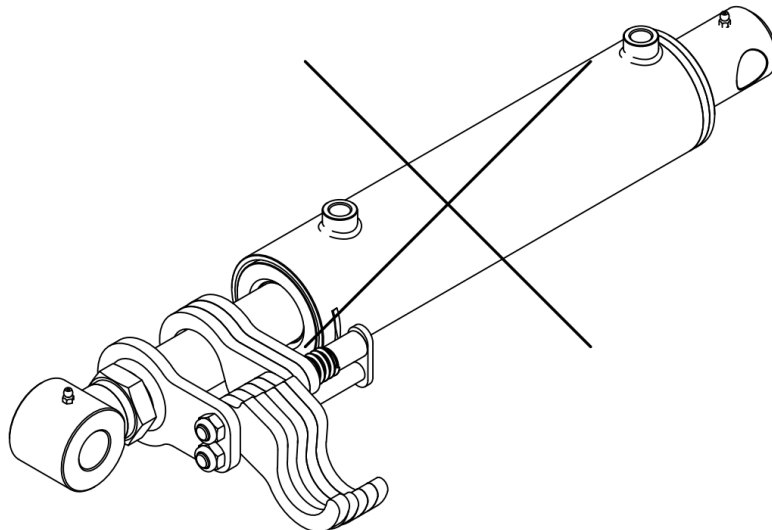


Fig. 11 Incorrect installation of pawls on cylinder piston rod. Partial omission of the attachment of the pawls to the cylinder results in uneven distribution of the forces acting on the piston rod and can lead to piston rod buckling resulting in damage to the entire cylinder assembly. This kind of adjustment is **unacceptable!**

The number of pawls on all shaft arm cylinders must always be equal!

It is also possible to change the distance of the shaft from the cultivator frame (screw in Fig. 7). Note that too little distance between the tines and the plates can cause clogging with plant residues.

The working depth of the discs is set according to the depth of the cultivator. Note that the discs must work on the surface to evenly level the soil behind the plough beams. When changing the height of the working shaft arms, adjust the height of the disc beam so that the discs are always at the correct height relative to the field plane.

The TOP cultivator elements can be adjusted in terms of angle of attack. The more horizontal position of the coulter reduces working resistance and undercuts the stubble with low loosening - recommended for compact soils with optimum moisture content and soils of medium and low compactness (Fig. 12 opening A, Fig. 13 nut C, unscrewed). The steeper position of the coulter facilitates penetration and loosens the soil to a greater extent - recommended for hard and dry soils (fig. 12 opening B, fig. 13 screw C, screwed). In the case of working elements with spring guards, it must be remembered that with a change in the torque of the screw, the releasing force of the guard also changes.

Fig. 12 Tooth deflection adjustment with screw lock.

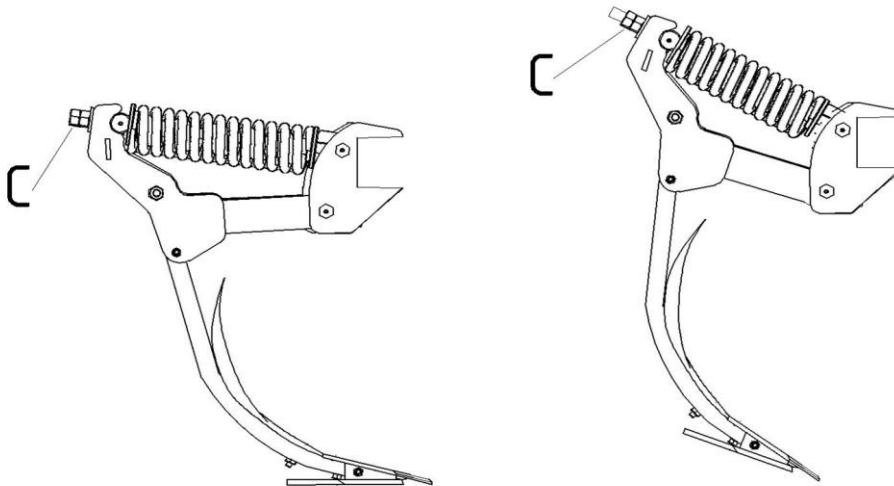
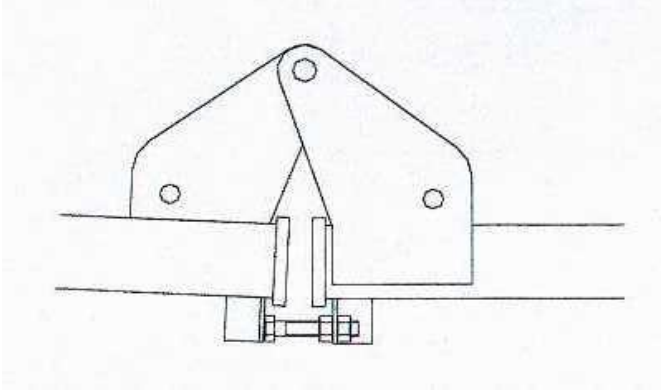
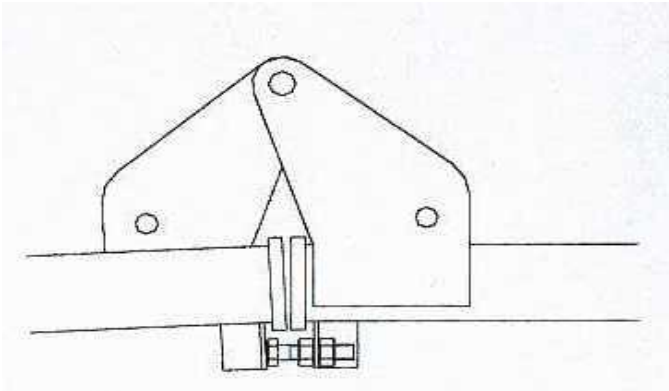
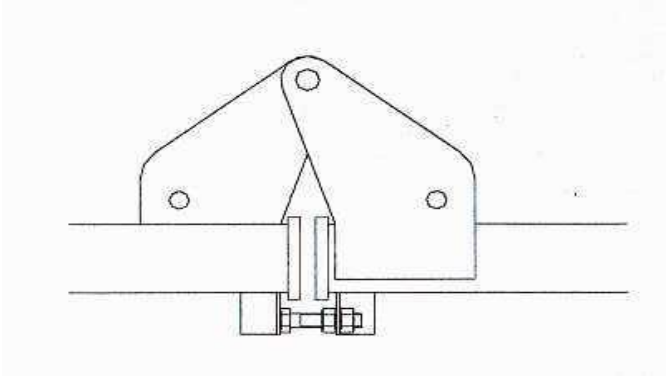


Fig. 13 Tooth deflection adjustment with spring guard.

On cultivators with folding side frames, it is necessary to carry out the level adjustment of these frames by means of the screws built into the front and rear of the mid frame (at each hinge - Fig. 14A). Properly adjusted side arms should be at the same level as the mid frame. Once adjusted, secure the screw with a lock nut.

Table 3 Side frame level adjustment.

	<p style="text-align: center;">Incorrect adjustment</p>
	<p style="text-align: center;">Incorrect adjustment</p>
	<p style="text-align: center;">Correct adjustment</p>



NOTE! It is forbidden to carry out field work with units with folding side arms without the hinge lock in place.

Remember to remove the hinge lock before lifting the side arms into the transport position.

A properly hitched cultivator should follow the tractor evenly during operation and loosen the soil uniformly over the entire working width. For longitudinal levelling, use the tractor's top link (turnbuckle), while for transverse levelling, use the crank on the tractor's right-hand suspension.

4.4. Operation of the TOP cultivator

Before starting field work with the unit with folding side arms, the hinge lock **must always** be in place and secured with a cotter pin (Fig. 14A).

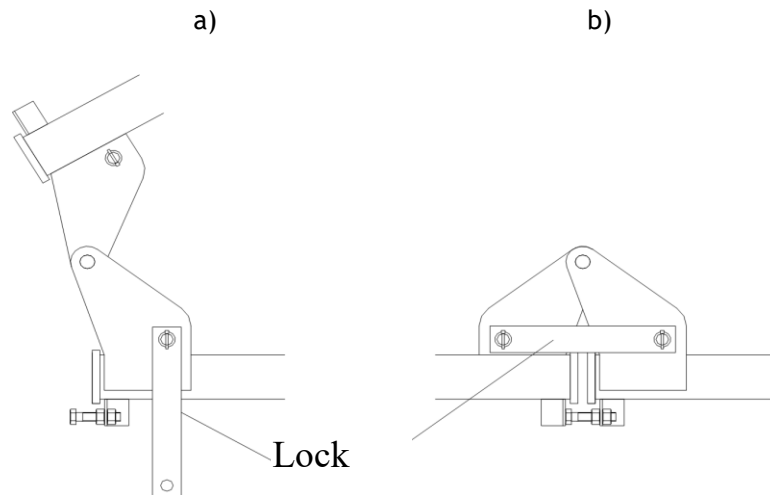


Fig. 14A Lock in transport position (fig. a), lock in working position (fig. b).

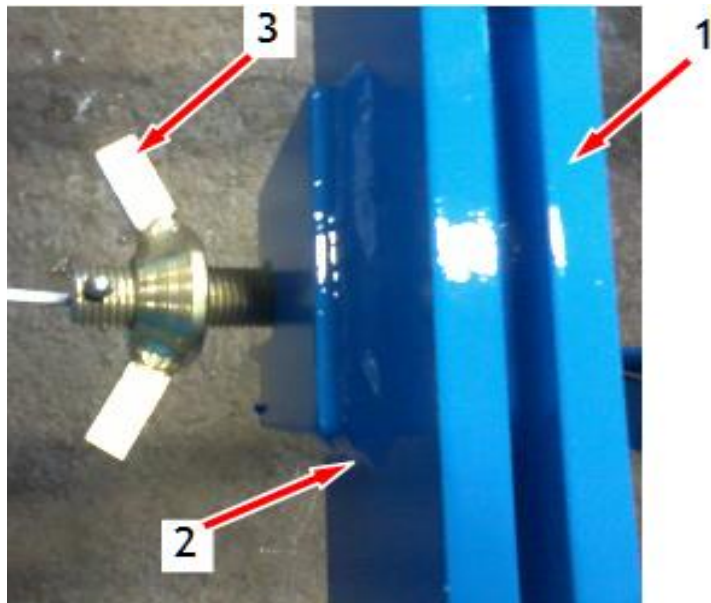


Fig. 14B Locking the frame in the working position: Once unfolded, place the bolt and nut (3) on the eye of the side frame (2) and turn to lock with the mid frame (1).

A properly hitched cultivator should follow the tractor evenly during operation and loosen the soil uniformly over the entire working width. For longitudinal levelling, use the tractor's top link (turnbuckle), while for transverse levelling, use the crank on the tractor's right-hand suspension.

The working speed of the TOP cultivator under normal operating conditions should be 8 - 12 km/h.

The machine must be raised before turning and during reverse travel.

Remember to remove the hinge lock before lifting the side arms into the transport position.

4.5. Rules for transporting the cultivator on public roads and lighting the machine

In accordance with the road safety regulations (Regulation of the Minister of Infrastructure of 31.12.2002. Journal of Laws No. 32 of 2002, item 262) - the unit consisting of the agricultural tractor and the agricultural machine coupled with it must meet requirements identical to those imposed on the tractor itself.



NOTE! The unit as a part of the vehicle protruding beyond the rear side contour of the tractor obscuring the rear lights of the tractor poses a danger to other vehicles on the road. Remember to follow the transport recommendations in the chapter: 3 "General safety rules". It is forbidden to travel on public roads without appropriate markings.

The units should be equipped with:

- triangular plate to distinguish slow-moving vehicles,
- two forward-facing plates having a white position light and a white retro-reflector,
- two rear-facing plates having a combination light and a red reflector. The plates should be painted with diagonal white and red stripes.

Once the plates have been fixed, the electrical wires of the warning-light device should be connected to the socket of the tractor's electrical installation.

The manufacturer does not supply warning signs as standard equipment on the machine. Warning signs are available commercially.

Driving style should always be adapted to the road conditions - this will help avoid accidents and damage to the chassis. Consider your own skills and the intensity of the movement, the prevailing visibility and the weather.

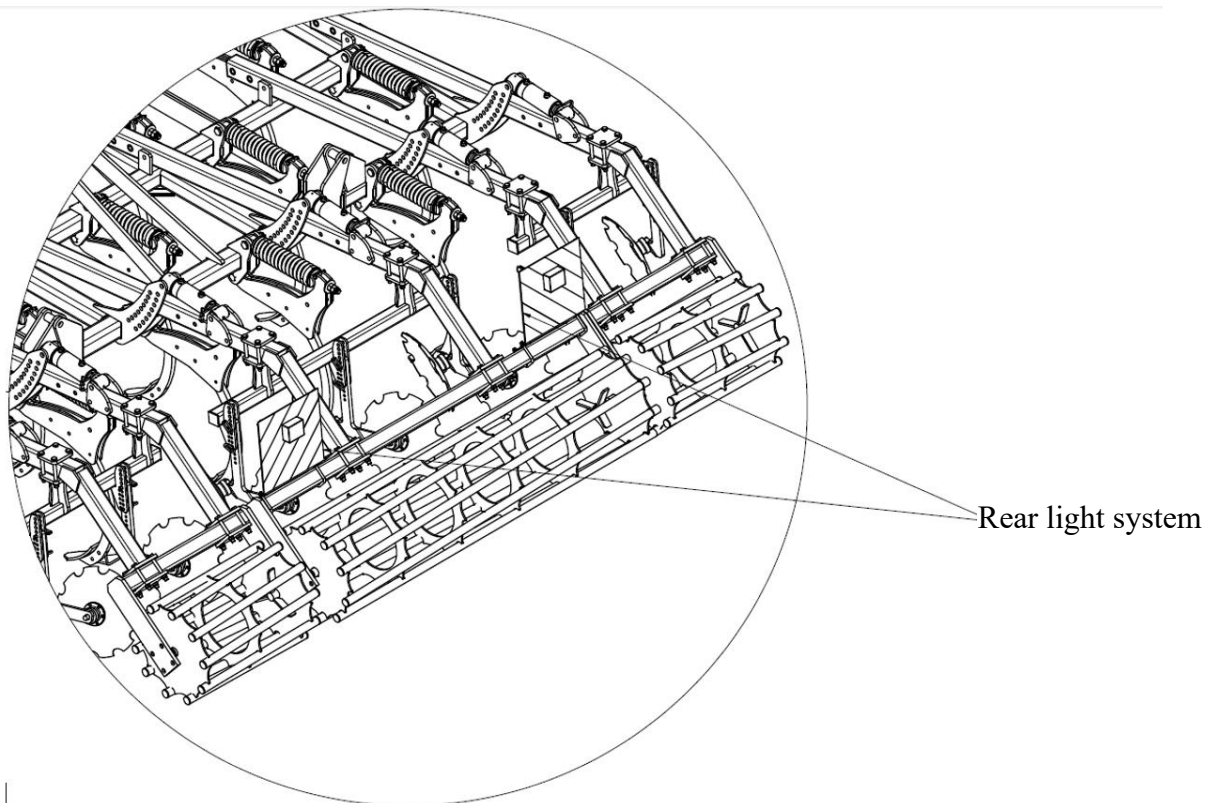


Fig. 15 Lighting and rear light assemblies and their location.

Before transporting, the machine should be cleaned from the soil and the operation of the lights checked. After lifting the machine, check the clearance under the lowest working elements, which should be at least 25 cm. The permissible transport speed of the tractor with the machine is 15 km/h. It should be reduced to 10 km/h on roads with poorer surfaces and 5 km/h on dirt roads. Extreme caution should be exercised when passing and overtaking other vehicles, avoiding obstacles and crossing large irregularities in fields and dirt roads.

4.6. Maintenance and lubrication

- Each time the cultivator is finished working, the soil must be cleaned, followed by an inspection of the parts and assemblies. **Otherwise, there may be a problem with the folding of the machine if the shafts are clogged with soil and there is an additional load!**
- Re-tighten all bolts after the first 4 hours of operation and periodically check the tightness. **Failure to do so will exacerbate backlash and result in damage to the machine.**
- Lubricate the lubrication points on the hinge pins, shaft bearings, disc bearings and spring systems every 25 operating hours during the service life of the machine.
- When replacing worn components, use thread glue, original bolts and nuts.
- Always ensure that screw connections are properly tightened.

NOTE! Periodic lubrication is a guarantee of the durability of the machine.

The service life and efficiency of the machine depend to a large extent on regular lubrication. Mineral lubricants should be used for lubrication. Lubrication points must be thoroughly cleaned before pressing in or applying grease.

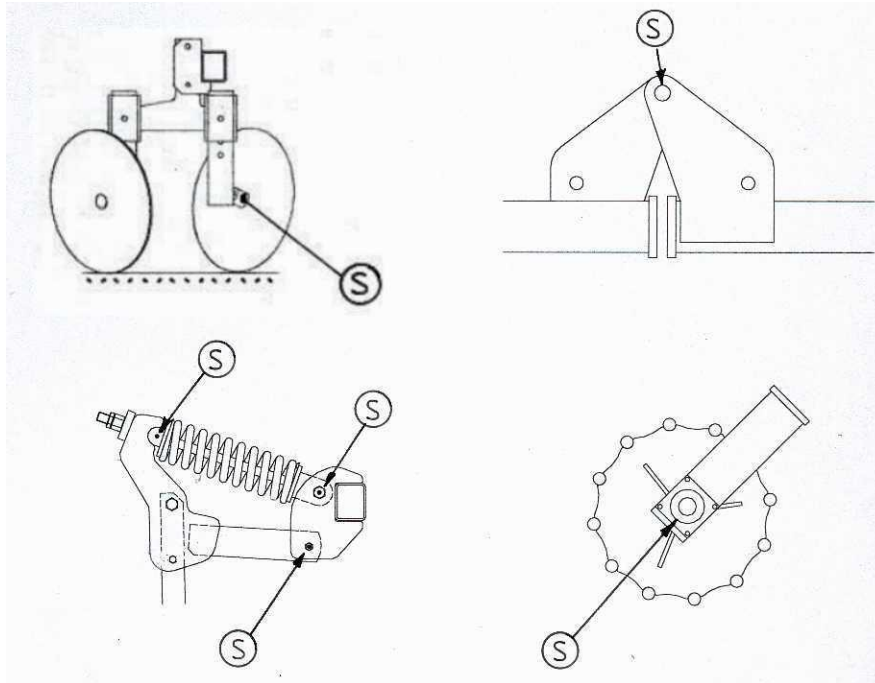


Fig. 16 Lubrication points on the TOP cultivator.



NOTE! It is forbidden to work on a damaged machine caused by any event resulting in a broken, or deformed frame, shaft or other assembly of the machine!

4.7. Screw tightening torque

Bolts and nuts should be tightened in the machine with the correct torque depending on the strength class of the bolt and its thread size and pitch. Their respective tightening torque values are shown in Table 4.

Table 4 Tightening torque values for nuts and bolts.

Tightening torque for nuts and bolts [Nm]					
		Thread pitch	Bolt strength class		
			8.8	10.9	12.9
Dimensions	M4	0,7	3,2	4,5	5,2
	M5	0,8	6	8,4	10
	M6	1,0	11	15	17
	M8	1,3	27	34	40
		1,0	21	30	35
	M10	1,5	46	65	76
		1,3	41	75	67
		1,0	36	50	59
	M12	1,8	79	111	129
		1,3	65	91	107
	M14	2,0	124	174	203
		1,5	104	143	167
	M16	2,0	170	237	277
		1,5	139	196	228
	M18	2,0	258	363	422
		1,5	180	254	296
	M20	2,5	332	469	546
		1,5	229	322	375
	M22	2,5	415	584	682
		1,5	282	397	463
	M24	3,0	576	809	942
		2,0	430	603	706
	M27	3,0	740	1050	1250
		2,0	552	783	933
	M30	3,5	1000	1450	1700
		2,0	745	1080	1270
	M36	4,0	1290	1790	2020
		2,0	960	1340	1500



NOTE! It is forbidden to work on a damaged machine caused by any event resulting in a broken, or deformed frame, shaft or other assembly of the machine!

5. Technical maintenance

Everyday service

Thoroughly clean the cultivator of soil and plant debris each time after use and inspect the bolt and pin connections and the condition of the working elements and other parts. When cleaning, plant debris and strings winding up at the bearing points of the discs and shaft should be removed. If parts are found to be damaged or worn, they should be replaced. All loose screw connections must be tightened and damaged cotter pins and pins must be replaced.

Post-season service

After the working season, the cultivator should be thoroughly cleaned, the damage to the varnish coating should be repaired, and the stripped working surfaces of the teeth, discs, strings and roller rings, as well as the threads of the adjusting screws, should be washed with "Antykor" paraffin and protected against corrosion with "Antykor 1" grease, and a full lubrication should be carried out. It is advisable to store the machine under a canopy when not in use. However, if this is not possible, the condition of the protection should be checked from time to time and, if necessary, the rain-washed grease should be replenished. **The cultivator should be stored in a place that poses no danger to persons or the environment.** The machine, when uncoupled from the tractor, should be supported on firm and level ground. Also, components dismantled from the machine should be stored securely supported on the ground, excluding possible uncontrolled movement.

Clean the piston rods of the hydraulic cylinders during winter and when the machine is not in use for a long period of time, and protect them with vaseline or acid-free grease to protect them from corrosion.

5.1. Operation of the hydraulic system

Maintenance of the hydraulic system (Fig. 17, 18, 19, 20) consists of a visual inspection for leaks. Remember to put plugs on the quick-release couplings. Oil leakage at the connections of the hydraulic lines should be tightened. If this does not rectify the fault, the component or hose must be replaced with a new one. Leakage occurring outside the connector - the leaking hose must be replaced with a new one. Mechanical damage also requires replacement of the component. It is recommended to replace the hydraulic hoses every 5 years.

The appearance of oil on the piston rod of a hydraulic cylinder should be checked for the nature of the leak. When the piston rod is fully extended, check the sealing points. Minor leaks characterised by wetting of the piston rod with an "oil film" are permissible (defective sealing ring). In the event of heavier sweating or the appearance of drops, the unit should be switched off while the fault is being rectified (defective seal).

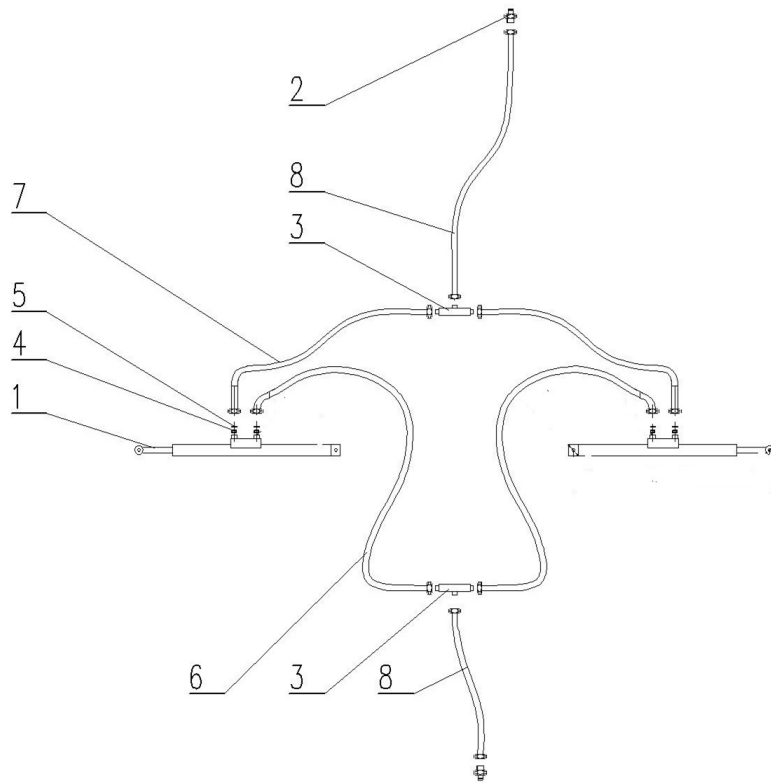


Fig. 17 Diagram of the TOP hydraulic system: 1- cylinder, 2- quick coupling, 3- T-piece, 4- orifice, 5- copper washer, 6- hydraulic hose 1m, 7- hydraulic hose 0.7m, 8- hydraulic hose 2.2m.

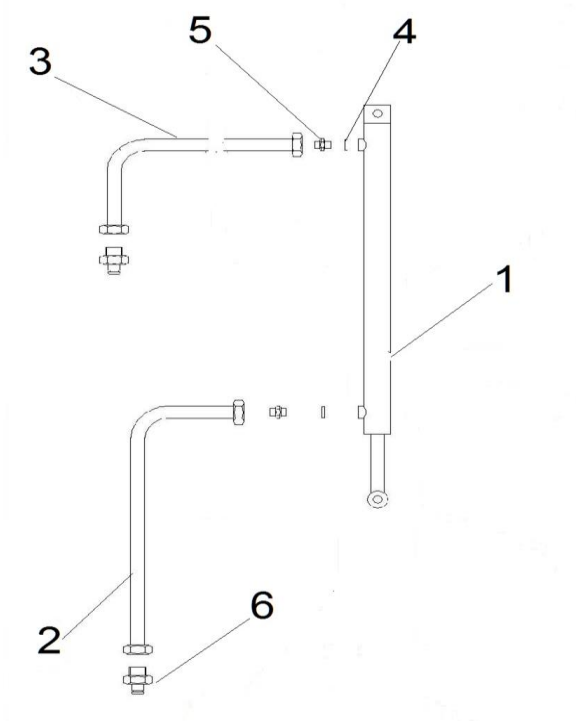


Fig. 18 Diagram of the hydraulic system of the TOP carriage: 1- cylinder, 2,3- hydraulic hose 6.5 m, 4- copper washer, 5- orifice, 6- quick coupling.

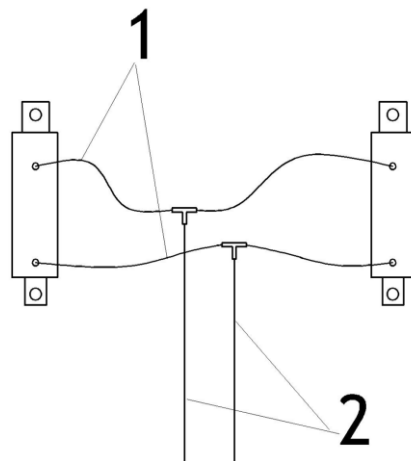


Fig. 19 Hydraulic depth control system TOP 2.5 - 3.0: 1- hydraulic hose 1 m (4 pcs.), 2- hydraulic hose 2 m (2 pcs.).

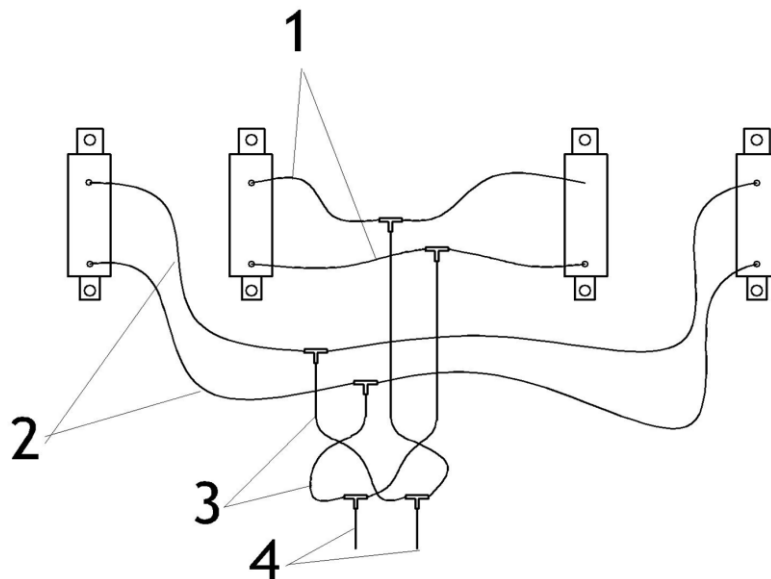


Fig. 20 Hydraulic depth control system TOP 4.0 - 4.8: 1- Hydraulic hose 1 m (4 pcs.), 2- Hydraulic hose 1.7 m (4 pcs.), 3- Hydraulic hose 1.8 m (4 pcs.) 4- Hydraulic hose 0.6 m (2 pcs.).

5.2. TOP running gear operation

Regular control of wheel pressure. If there is a significant loss of air from the tyres, check the air valve for leaks. Next, take the wheel to a specialised workshop to locate and repair the damage. Significantly damaged tyres (particularly profile damage) must be replaced immediately.

Setting of wheel bearing axial clearance.

It is recommended that this operation is carried out by a specialised company. Performed by tightening the nut on the wheel hub after the wheels have been removed. The recommended clearance is 0.12-0.15 mm. Inspection and adjustment should take place every 2 years.

Procedure :

- Removal of the hub cover and the spring pin securing the spring nut.
- At the same time, while turning the hub, press down and tighten the crown nut.

- Tightening is complete when no more than half a turn of the hub is caused by vigorous hand rotation.
- Partially loosen the nut until the hub rotates freely and repeat the tightening.
- After repeated rotation locking, loosen the nut by 30° max. until the immediate nut locking with the pin is possible. Mark the position with a line.
- From the marked position, unscrew the nut by half a turn and, with a gentle tap, press the hub against the nut as far as it will go.
- Tighten the nut to the position marked with the line.
- Fit the hub cover.



NOTE! During maintenance work, the unit should be secured against rolling (it should be connected to the tractor with the parking brake on) and unfolded.

Operation of the brake system (pneumatic system)

The three-range brake force regulator is not adjustable under normal use. It should be in a central position. If the braking force deviates from that of the tractor, the regulator can be adjusted to avoid incorrect road behaviour. When making any change, be sure not to cause an accident or damage to the machine.

The removal of condensed water in the tank is carried out by means of a valve located underneath the tank. The stem must be pressed, which will cause the compressed air to displace the water. Releasing the stem will automatically close the valve. Once a year (before winter) the drainage valve should be unscrewed and cleaned.

Checking the pneumatic system involves visually inspecting for leaks, especially at the connection points (when checking the system, the pressure should not be less than 6 atmospheres). If hoses, seals and other system components are damaged, this will manifest itself as hissing. Bubbles will appear at small leaks (check by applying wash liquid). **Damaged components should be replaced with new ones.**

Braking adjustment - braking deceleration levelling, should be carried out when:

- As the lining jaws wear during use and as a result of the resulting clearance, the braking force decreases,
- the wheel brakes brake unevenly and inconsistently.

To do this, the position of the spreader arm on which the piston rod of the pneumatic cylinder acts must be changed. Change the starting angle of the spreader shaft on the multi-shaft end and correct the length of the linkage on the bolt. Adjustments should be carried out for each wheel separately.

6. Replacement procedures

Bearing replacement.

If the bearings are damaged, they must be replaced:

- place the machine on a horizontal surface,
- unscrew the four screws holding the ball bearings on each side,
- move the tubular shaft away,
- loosen the two headless screws on each bearing and pull off the bearings using an extractor,
- fit the new bearings loosely onto the shaft,
- roll the shaft between the bearing plates and screw the bearings to them. Screw in headless screws using adhesive to prevent loosening.

Replacement of working components

Excessively worn working components make it difficult for the tools to sink in, increase working resistance and insufficiently mix harvest residues. The working components must be changed on the machine lowered to the ground after the tractor engine has been switched off. To ensure that the components to be replaced do not rest on the ground, sturdy shims should be placed under the shaft. After lowering the cultivator, switching off the engine and applying the handbrake, check the stability of the tractor-machine unit. Only typical screws should be used to fix new components.

If machine components are disassembled several times, it is necessary to inspect and possibly replace connecting elements such as bolts, washers or nuts, excessive wear of which may lead to uncontrolled loosening of the connecting elements and subsequent damage.

When working on extremely worn work tools, such work can cause, for example, bearing damage in the case of a small disc diameter. Tools should be replaced when their wear and tear exceeds the limits allowed by the manual. If the recommendations are not followed, damage may occur for which the manufacturer is **NOT RESPONSIBLE!**

Replacement of cylinders

A malfunctioning cylinder, leakage, etc. should be dismantled and taken to a specialist workshop. Replacement of the cylinder must be carried out on an unfolded machine. Connect the cylinder to the system and, when mounted on one side, run through the entire cycle a couple of times to fill the cylinder completely with oil. Failure to do so may result in a sudden fall of the drop section.

The bearings of the levelling discs are not demountable. If damaged, they should be replaced in their entirety.



NOTE! When carrying out repairs and maintenance, the machine should be lowered to the ground and supported on supports to ensure full stability and the tractor engine switched off. Use proper spanners and protective gloves during maintenance and repairs.

7. Disassembly and disposal

A machine used in accordance with the instructions in this manual will last for many years, but worn or damaged parts must be replaced. In the event of emergency damage (cracks or deformation of the frames) impairing the quality of the machine and posing a danger to further operation, the machine must be disposed of.

The disassembly of the machine should be carried out by persons previously gotten familiar with its construction. These operations should be carried out after the machine has been set up on a level and stable surface. Sequence of activities:

- Disconnect the shaft bracket from the arms. Remove the bearing mounting bolts and roll the shaft to one side.
- Disconnect the shaft arms from the frame.
- Remove the three-point hitch turret arms connecting to the main frame (for non-welded three-point hitch).
- Remove the three-point hitch turret.
- Place the frame on stable stands. For units with folding side arms, additional stands must be prepared.
- Remove the working components of the unit.

- Detach the side arm supports from the mid frame.
- Disassembly of hydraulic components should be carried out wearing gloves and protective goggles. Wrap the connectors with oil cloth before unscrewing the bent wires. Drain the used oil into a container (bucket).



Store the machine securely supported on a hard surface to prevent injury to people or animals.



NOTE Take all precautions when dismantling the machine by using operable tools and personal protective equipment. Disassembled parts must be disposed of in accordance with environmental protection requirements.

8. Spare parts for the TOP cultivator

To search, price and order genuine spare parts for MANDAM machines, please visit our website at: www.mandam.com.pl, tab “Parts”.

On this page, we provide catalogues and spare parts sheets in PDF format, containing up-to-date parts diagrams for each machine, together with their numbers and prices.

Parts orders, or enquiries regarding them, can be made directly from this page (tab: “contact/order”) or via e-mail: parts@mandam.com.pl

The order should include the part numbers and quantities, as well as the purchaser/payer’s details including a contact telephone number.

Parts are shipped directly to the address provided and payment is made on delivery.

If you are not sure, please contact the Mandam spare parts department on the following telephone numbers : +48 32-232-2660 ext. 39 or 45 or on the mobile number +48 668-66-22-89.

Original MANDAM spare parts are also available from all authorised MANDAM machine distributors.