P.P.H. MANDAM Sp. z o.o.
44-100 Gliwice ul. Toruńska 2, Poland
e-mail mandam@mandam.com.pl
Tel.: +48 32 232 26 60 Fax: +48 32 232 58 85
NIP (VAT no.): 648 000 16 74 REGON (Registration no.): P – 008173131

INSTRUCTION MANUAL

DISC HARROW, TYPES: TAL-S, TAL-C AND TAL-K

ISSUE 1/2015

EC DECLARATION OF CONFORMITY

FOR A MACHINE

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

Przedsiębiorstwo Produkcyjno-Handlowe "MANDAM" Sp. z o.o.
ul. Toruńska 2
44-100 Gliwice, Poland

herby declares at its sole responsibility that the following machine:

DISC HARROW, TYPE TAL

type/model: ……..
year of manufacture: ……
serial number: ……..

under this declaration, complies with:

the **Ordinance** of the Ministry of Economy of 21 October 2008 on fundamental requirements for machinery (Journal of Laws No. 199, item 1228)
and the **Directive** of the European Union 2006/42/EC of 17 May 2006.
The persons responsible for the technical documentation for the machine:
Jarosław Kudlek, Łukasz Jakus,
ul. Toruńska 2, 44-100 Gliwice

For assessment of compliance the following standards have been applied:
PN-EN ISO 13857:2010,
PN-EN ISO 4254-1:2009,
PN-EN ISO 12100-1:2005/A1:2009,
PN-EN ISO 12100-2:2005/A1:2009,
PN-EN 982+A1:2008

This EC Declaration of Conformity shall be cancelled if the machine is altered or redesigned without consent of the manufacturer

Board Manager
Director
inż. Bronisław Jakus

Deputy Board President
Technical and Organisational Director
mgr inż. Józef Seidel

Gliwice, 12 December 2009
Place and date of issue

……
Surname, first name, position and signature of the authorised person

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1. Introduction

Congratulations on your purchase of the TAL disc harrow!
This instruction manual contains information on hazards that may occur during work with the disc harrow, technical data and the most important guidelines and recommendations to be known and applied to ensure a proper operation. Keep this manual for future reference. Should you have any problems with understanding any statement in the instruction manual, please contact the manufacturer.
The following mark indicates guidelines that are important due to safety reasons:

The machine is provided with a name plate to be found on the main frame. The name plate presents basic data allowing the identification of the machine.

Type _____ **Number _____**

Weight _____ **Year of manufacture _____**

The warranty for the disc harrow is valid for 24 months from the date of sale.

Whenever you request any information on spare parts, please provide the serial number.

For more information on spare parts, you can:

- visit the website http://mandam.com.pl/parts/
- call +48 668 662 239
- send an e-mail: czesci@mandam.com.pl

Machine identification

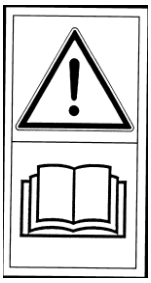
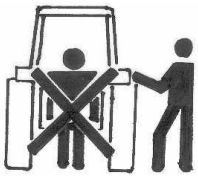
Identification data of the disc harrow can be found on the name plates attached to the main frame. The name plate provides basic information on the manufacturer, the machine and the CE marking.

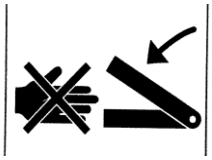
1.1 SAFETY SIGNS

Remember! While working with the disc harrow, act with due caution in places marked by special information and warning signs (yellow stickers).

The following signs and inscriptions can be found on the machine. Protect the signs and safety inscriptions against loss or becoming illegible. If lost or illegible, replace the signs and inscriptions with new ones.

Table 1. Information and warning signs

Safety sign	*Meaning of the safety sign*	*Location on the machine*
	Read the instruction manual prior to operating the machine.	Subsoiler frame adjacent to the mounting of the upper fastener
	Danger of toe or foot crush	Subsoiler frame adjacent to the mounting of the upper fastener
	Keep clear of lift bars while controlling the lift	Subsoiler frame adjacent to the mounting of the upper fastener

Safety sign	*Meaning of the safety sign*	*Location on the machine*
	Keep clear from foldable and moving parts of the machine	Front part of the mid frame adjacent to side frames
	Do not reach into the crushing zone if the elements can move	Mid frame adjacent to side frames
	Liquid jet under pressure – risk of injury	Cylinders
	Fixing point for transport belts	Upper part of the drawbar (upper fastener bolt) Rear part of the frame: • rigid frame (adjacent to the roller depth adjustment) • foldable frame (adjacent to the cylinder bolt on the mid frame)

2. Intended use of the TAL disc harrow

The disc harrow is designed for post-harvest cultivation and pre-sowing cultivation, both for the ploughing and non-ploughing technology. The machine also can be used for mixing catch crop or barrens grown with high self-seeding plants with the soil.

The working components are toothed discs – 560 mm in diameter with sprint protective elements. They are arranged in two displaced rows, mounted at maintenance-free bearings. As every disc is equipped with a bearing, this allows optimum disc tilting towards the direction of travel and the ground. Therefore, precise stubble cutting as well as even mixing and grinding of post-harvest residues is possible. As a result, soil water evaporation can be stopped, plant residues can be decayed quicker and the concentration of phenol compounds affecting the growth of the following-year plants can be reduced. The toothed discs support deeper penetration. The shaft located at the back of the machine compacts the soil, resulting in a quicker growth of weeds and self-seeding plants. With the disc harrow used before sowing, fertilizers are thoroughly mixed with the soil, the surface is evened and a proper structure of soil is ensured.

The TAL disc harrows can be equipped with a transport carriage to facilitate transport using tractors. In addition, TAL can be fitted with an attachment point for the seeder, the hydropack.

The TAL-K unit is provided with its own driving system with a brake axle. For this purpose, a pneumatic system is used.

CAUTION! The disc harrow is designed for agricultural use only. Operating the machine for other applications shall mean a case of misuse and shall result in loss of warranty.

CAUTION! Any failure to observe the guidelines in this manual shall also mean a case of misuse . The manufacturer shall not be liable for any damage caused by improper use of the machine.

3. Safety information

3.1 General safety information

The disc harrow can be started, used and repaired only by persons familiar with its operation and the attached tractor as well as the rules of safe operation and maintenance of the disc harrow.

The manufacturer shall not be liable for any unauthorised alternation of the disc harrow design. Only genuine parts manufactured by MANDAM are allowed during the warranty period. The disk harrow must be operated with all precautionary measures, in particular:

- before every start-up, check the disc harrow and the tractor, make sure that their condition guarantees safety in traffic and operation,

- persons under age, disabled or intoxicated (under the influence of alcohol or drugs) must not operate the machine,
- wear work clothes, shoes and gloves during maintenance,
- only genuine safety and split pins may be used,
- do not stay between the tractor and the disc harrow when the engine is running,
- move forward, make U-turns, lift and lower the disc harrow slowly and smoothly without sudden jerks, making sure that nobody is in the vicinity, especially children
- do not reverse the tractor or make U-turns when the machine is lowered on the ground,
- do not stand on the machine or apply additional loads during operation and transport,
- do not operate the disc harrow if the slope is greater than 12°,
- any repairs, lubrication or cleaning of working components may be performed as long as the engine is not running and the machine is lowered and unfolded,
- during maintenance and replacement, when entering the machine or the space beneath it without a proper protection, there is a risk of head injuries – wear a safety helmet,
- while taking a break, lower the machine onto the ground and stop the tractor engine,
- for the disc harrow with the working width greater than 3.00 m, there is a mechanical lock to prevent the wings from accidental opening during stoppage or road transport,
- travelling and parking on a slope that is unstable may result in sliding,
- store the machine properly so that no person or animal can be injured.

3.2. Attaching and detaching the tractor

- Attaching the machine to the tractor must be carried out in accordance with the guidelines, bearing in mind the need to secure the suspension using bolts.
- While attaching the tractor to the disc harrow, it is forbidden for any person to stay between the machine and the tractor.
- The tractor used together with the disc harrow must be fully operable. It is forbidden to attach the disc harrow to any tractor with a malfunctioning pneumatic (if the machine has a brake axle) and hydraulic systems.
- Make sure that the tractor with the attached unit is stable and the tractor steerability and braking power can be maintained. The load on the front axle cannot decrease to less than 20 % of the total load on the tractor axle – use a set of front-mounted weights.
- When in resting position and disconnected from the tractor, the machine must be stable.
- The supporting foot must rest on a stable ground. It is forbidden to use any pads under the foot as it may result in support instability.

3.3 Tyres

- Tyre pressure cannot exceed the value recommended by the manufacturer. Transporting the machine when the pressure is too low is prohibited. This may cause damage to the machine or an accident when travelling too fast and on very uneven surfaces.
- Considerably damaged tyres (particularly in case of tyre profile damage) must be replaced immediately.
- Protect the machine from rolling away when replacing the tyres.
- The repair work on wheels or tyres must be performed by persons trained and authorised for this purpose. Such work must be performed with properly selected tools.
- Following every assembly of wheels, check the tightening of nuts after travelling a distance of 50 km.

3.4 Hydraulic and pneumatic systems

The hydraulic and pneumatic systems operate at high pressure (the TAL-K type is equipped with pneumatic systems). Apply all precautionary measures, in particular:

- do not connect and disconnect hydraulic hoses when the tractor hydraulic system is pressurised (hydraulics set to neutral),
- regularly check the condition of connections as well as hydraulic and pneumatic hoses,
- withdraw the machine from service for the period of repairing a hydraulic or pneumatic malfunction.

3.5 Transport on public roads

For the period of transport, the side sections of the disc harrows of types TAL 4,00 H, TAL 5,00 H, TAL 6,00 H and TAL-K must be put in transport position using the hydraulic system. Before folding, the machine must be lifted sufficiently high until the side sections do not collide with the ground when folded.

The disc harrow must be protected against unfolding by the mechanical lock. For the disc harrows of type TAL-K and TAL equipped with a carriage, the wheels must be sufficiently lowered so that the side sections cannot collide with the ground when folded.

While transporting, the clearance under the machine must be at least 30 cm.

While transporting the unit on public roads, it is absolutely mandatory to use lights, an identification sign and reflective side lights.

While transporting, do not exceed the speed, which is:

- up to 20 km/h on smooth surface (asphalt) roads,
- 6-10 km/h on field or sett paving roads,
- up to 5 km/h on bumpy roads.

After folding the machine, move the shafts together and secure them with bolts on ladders to reduce the width during transport.

Travelling speed must be adapted to the road conditions so that the disc harrow cannot jump on the tractor suspension system and excessive loads on the machine frame and the tractor suspension system can be avoided.

Act with due caution when passing and overtaking or travelling at curves. The permissible dimensions of the machine travelling on public roads is 3.0 m (width) and 4.0 m (height).

It is forbidden to transport the unit if the slope crosswise to the unit is more than 7°.

WARNING! Any failure to observe the above rules may pose hazard to the operator and other people. It may also result in damaging the machine. The customer shall be liable for any damage caused by the failure to observe the rules!

3.6 Description of residual risk

Mandam Sp. z o. o. act with due diligence to eliminate the risk of accidents. However, there is some residual risk that may result in an accident. The greatest risk is posed:

- if the machine is not used according to this manual,
- if the machine is operated by persons under age, disabled or intoxicated (under the influence of alcohol or drugs),
- if persons or animals are present within reach of the machine,
- if caution is not paid during transport and manoeuvring with the tractor,
- if persons are standing on the machine or between the machine and the tractor when the engine is running,
- during operation when operation guidelines are not followed,
- when travelling on public roads.

3.7 Residual risk assessment

Residual risk may be reduced to a minimum provided the following recommendations are applied:

- operate the machine carefully and without rush,
- read the manual carefully,
- keep a safe distance from hazardous zones,
- it is forbidden to stand on the machine or be present in the working zone when the engine is running,
- perform maintenance in accordance with safety rules,
- wear safety clothes and safety helmet during your work under the machine,
- prevent unauthorised persons from accessing the machine, in particular children.

4. General operation and use information

4.1 Prior to operation of the disc harrows

The disc harrow is usually supplied for sale in a ready-to-operate condition. Due to limited transport means, it is possible to deliver the machine as partially disassembled, i.e. usually with the shaft disconnected.

For preparing the unit for first use, its components (shaft) must be assembled. For this purpose, the disc harrow must be placed on a flat hardened surface, where the shaft can be manoeuvred freely. Position the arms on harrow holders and connect the arms with the shaft clamp using screws (Fig. 1).

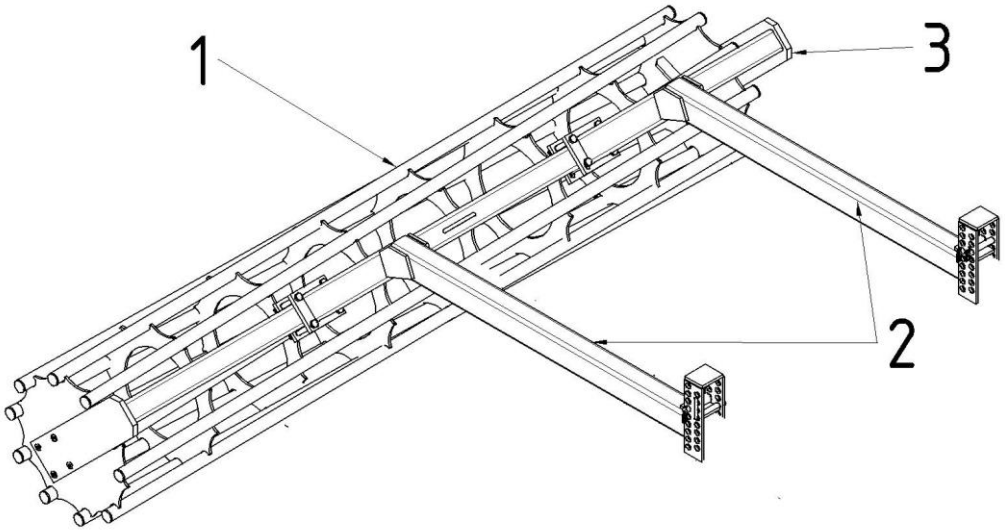


Fig. 1. Connection of arms with the shaft clamp: 1 – tubular shaft; 2 – arms; 3 – shaft clamp.

Before starting your work, check technical condition of the disc harrow, in particular the condition of working components and screwed joints.

CAUTION! Do not exceed the permissible axle load and tyre carrying ability. The front axle load cannot be lower than 20 %.

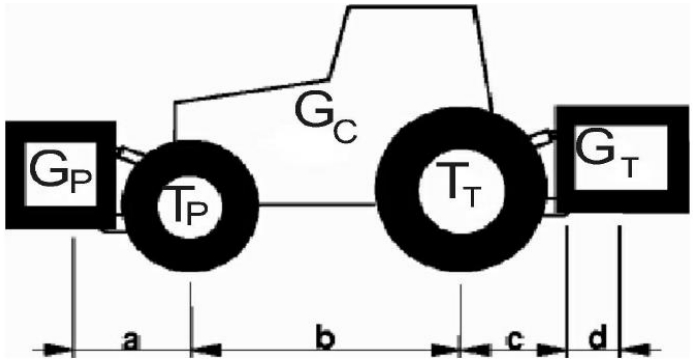


Fig. 2 Diagram of the marked tractor loads.

Calculating axle load

Key:
G_C – tractor weight,
T_P – front axle load if the tractor is empty,
T_T – rear axle load if the tractor is empty,
G_P – total weight of the rear-mounted equipment,
G_T – total weight of the front-mounted equipment,
a – distance between the centre of gravity of the front-mounted equipment and the axle centre point,

b – tractor wheelbase,
c – distance between the centre point of the rear axle and the centre point of the hitch bolt of the rear-mounted equipment,
d – distance between the machine centre of gravity from the hitch bolts at the tractor (assume 1.4 m if suspended machine, assume 3 m and 0.6 of mass if semi-suspended machine),
x – distance of the centre of gravity from the rear axle (assume 0.45 if the manufacturer does not provide this parameter).

Minimum load at the front if this is a rear-mounted machine:

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

Actual load on the front axle

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

Actual total weight

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

Actual load on the rear axle

$$T_{Ttotal} = G_{total} - T_{Ptotal}$$

4.2 Attaching the disc harrow to the tractor

Tyre pressure in the tractor wheels must comply with the values recommended by the manufacturer. The lower bars of the three-point linkage should be at the same height, spaced out correspondingly to the spacing of the lower points of suspension.

While attaching the disc harrow to the tractor, the disc harrow must be located in a hard and even ground.

- while attaching the disc harrow to the tractor, complete the following steps:
- switch the tractor hydraulic system into adjustment position,
- remove lower hitch bolts; remove the hitch beam and suspend it on the lower bars at the tractor (if the tractor lift is not equipped with hitch hooks),
- reverse carefully, suspend the machine on the lower bars and secure,
- attach the tractor upper fastener (for disc harrows without the carriage). 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 operation of disc harrow lifting and lowering as well as the hydraulic system.

4.3 Attaching the seeder to the disc harrow

Before suspending the seeder, find out the weight of the seeder including seeding material. The capacity of the hydropack is 1300kg. Complete the following steps to attach the seeder to the disc harrow:

- adjust the hook spacing to the spacing of seeder bolts by relocating the hook on the appropriate side of the arm; put a spacer beneath.
- put the lower hitch bars down below the hitch bolts at the seeder (for the case of carriage attachment, insert a bolt into the appropriate opening at the bar hangers and adjust the position using the cylinder),
- reverse the assembly back so that the seeder bolts are on the hooks,
- apply the safety lock to the bolts, the opening on the hooks and secure using a pin,
- attach the upper fastener to the seeder.

CAUTION! Prior to raising the disc harrow, raise the seeder due to the unit's stability.

4.4 Operation and adjustments

Before unfolding, release the mechanical protection of the side frames. In TAL-C, the cylinders are protected by a mechanical lock (Fig. 3). Pull the unlocking cords and proceed with unfolding. Once unfolded, the lock engages automatically. In TAL-K 8,0 the section arms (Fig. 5) are protected by bolts with pins. Remove the pins before unfolding.

TELESCOPE – LOCKING DEVICE THAT PREVENTS OPENING SIDE WINGS OF FARMING MACHINES IN ACCORDANCE WITH DIRECTIVE 2006/42/EC (**EU PATENT APPLICATION**).

The telescope locks the cylinders mechanically. When folding machine wings, the locking device locks the telescope mechanism and the wings are locked mechanically.

Fig. 3 Mechanical lock in TAL-C: 1 – mechanical protection, 2 – cord-pulled lock arm, 3- cylinder

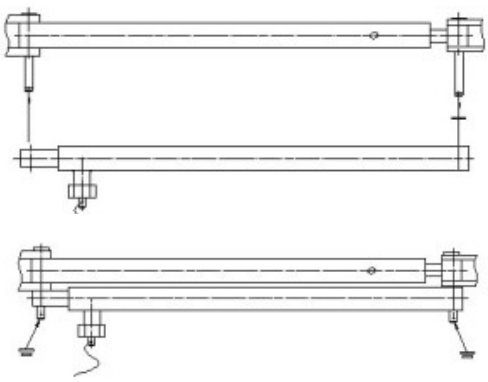
OPERATING INSTRUCTIONS OF THE LOCKING DEVICE IN THE TELESCOPE

In order to release the locking device at the telescope, retract the cylinders completely using the tractor hydraulic pump (fully close the wings), and at the same time, pull the cord and hold it until the machine opens completely (both wings). Then, the machine wings will open by gravity and forced by the movement of the cylinders (depending whether these are single-action or dual-action cylinders). The condition of the cord and its location must be checked. The cord must be located freely above the machine so that the operator can access it at any time from the tractor cab. The cord must not be obstructed by any object. While folding the machine, the cord does not need tensioning as it locks automatically.

SAFETY LOCKING DEVICE INSTALLATION

1. Remove the current bolts at the cylinder

2. Replace them with new longer bolts



3. Mount the telescope with the bolts in parallel to the cylinder and secure with pins

4. Attach the cord on the latch (telescope lock) and pass it all the way to the tractor cab.

Fig. 4 Illustration of safety lock attachment

Fig. 5 Arm lock for the sections in TAL-K 8,0: 1 – locking device, 2 – section arm, 3 – carriage frame

Before starting field work with the TAL disc harrow, perform an initial setup of individual working components. Level the machine longitudinally using the upper bar at the tractor and the turnbuckle at the drawbar; and crosswise using the hanger at the right lower bar. In case of TAL-K 8,0 longitudinal levelling of the working sections is performed using turnbuckles installed between the carriage and the working section. Next, perform the first test drive to set an optimum working speed and make adjustments while assessing whether the operation of individual units is as desired. **The working speed should range from 10 to 15 km/h.** If the machine is properly adjusted, the frame is parallel to the ground and all working components penetrate the soil at the same depth along the entire working width.

The working depth of the disc harrow is adjusted by shaft position, the arms of which are locked by bolts (Fig. 6), or adjusted by cylinders with latches (Fig. 8). In case of TAL-K 6,0 also front adjustment of the working depth is possible, which is changed using the turnbuckle to set the height of wheel position (Fig. 7). At first, the shaft and wheels must be positioned above the lower edge of the discs at a height approximately corresponding to the assumed working depth. During operation, this must be adjusted according to the shaft depth. In order to change the shaft position, when the disc harrow is lifted, mount bolts in appropriate openings, ensuring that the bolts are mounted in the same manner in both openings. Once lifted, shaft lowering is limited by a screw. It can be additionally limited using a bolt inserted in the openings located next to the screw.

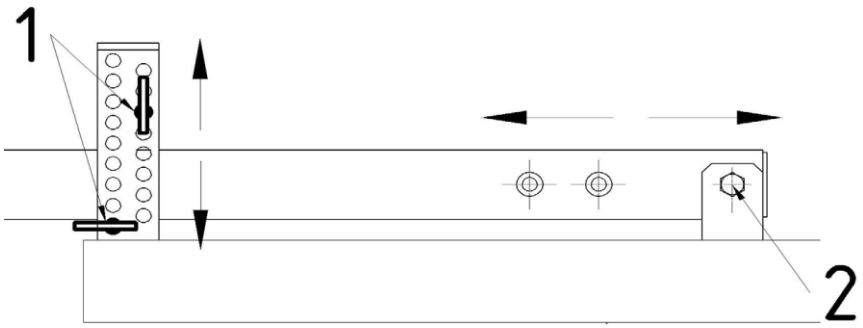


Fig. 6 Depth and shaft distance adjustment: 1 – bolts for adjusting the working depth with a stabiliser plate; 2 – screw for fixing the shaft arms.

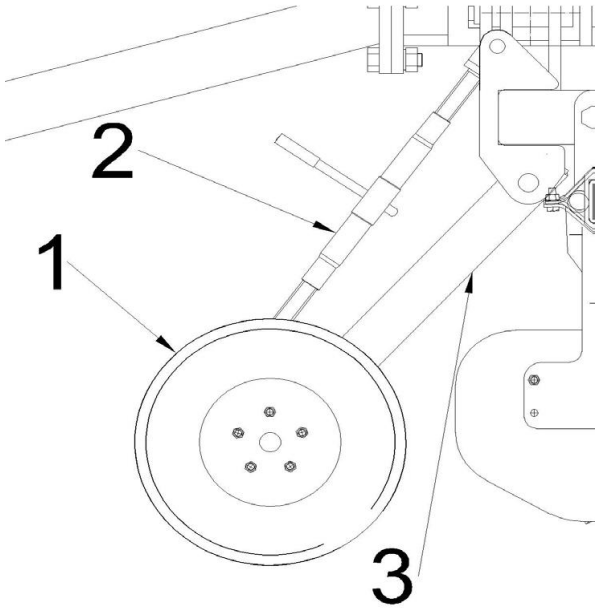


Fig. 7 Adjustment of the working depth of the front pieces in TAL-K: 1 – support wheel, 2 – turnbuckle for adjusting the wheel depth, 3 – support wheel arm.

Fig. 8 Hydraulic adjustment of the shaft depth 1 – cylinder, 2 – latches for adjusting the working depth, 3 – shaft arm

Shaft distance from the disc harrow depends on the attachment opening of the shaft arms (Fig. 6). It must be increased when the soil scattered by the discs passes above the shaft. It must be remembered, however, that a backward displacement of the shaft results in extending the machine and reducing tractor stability. The disk harrow can be operated without the shaft. For this option, the disc depth cannot be limited and the soil will remain scarified. For the maximum disc depth, the shaft can be released to allow its operation by gravity.

The side guard must be positioned and locked using a screw at a proper height so that it is positioned above the soil surface and protected from being hit by stones and accumulated post-harvest residues. If required, it must also be moved forward or backwards (rearranged openings) so that it retains the soil thrown by the outermost front disc and sweeps the furrow made by the outermost rear disc.

4.5 Maintenance and lubrication

- Always after finishing work, the disc harrow must be cleaned of soil. Afterwards, the parts and units must be inspected.
- After the first four hours of operation, all screws must be retightened, and then periodically checked to make sure that they are tightened properly.
- While using the machine, grease the lubrication points at the hinge bolts on a daily basis. Bearings of the tabular shaft and the levelling discs must be lubricated every 25 hours of operation. (This does not apply to maintenance-free bearings of the discs).
- Use only genuine screws and nuts when replacing worn parts.
- Always remember to tighten the screwed joints properly.

CAUTION! Periodic lubrication guarantees machine durability.

Durability and efficiency of the machine greatly depends on a regular lubrication. For lubrication purposes, use mineral grease only. Before filling or applying grease, clean the lubrication points thoroughly.

5. Maintenance

5.1 Daily maintenance

Always after finishing work, clean the disc harrow thoroughly of soil and plant residues. Inspect screwed and bolted connections as well as the condition of the working components and other parts. While cleaning, remove all plant residues and strings wound around the bearing points of the discs and the shaft. If a damaged or worn part is identified, replace it. All loose screwed joints must be retightened while any damaged safety and split pins must be replaced.

5.2 After-season maintenance

Once the season for the disc harrow is finished, clean it thoroughly and repair damaged paint coating. Wash wiped surfaces of the working teeth, discs, strings and shaft rings, adjusting screw threads with the paraffin and apply a corrosion protection using the grease. In addition, perform complete lubrication. During idle periods, storage under a roof is recommended. Should it be impossible, check the condition of the protection from time to time and fill up the grease washed away by rain if required.

5.3 Maintenance of the TAL driving system

Regularly check tyre pressure. If air leakage in the tyres is considerable, check tightness of the air valve. Next, have the wheel inspected by a specialised company to locate and repair the damage. Considerably damaged tyres (particularly in the case of tyre profile) must be replaced immediately.

Setting the axle clearance of wheel bearings.
It is recommended that this task should be carried out by a specialised company. This is done by tightening the nut on the wheel hub once the wheels are dismounted. A clearance of 0.12-0.15 mm is recommended. The inspection and adjustment must be performed every 2 years.
Procedure:

- Dismount the hub cover and the spring pin securing the spring nut.
- While rotating the hub, press and tighten the castle nut.
- Stop tightening when with a vigorous manual rotation there is no more than a half-turn of the hub.
- Loosen the nut partially until the hub can rotate freely and repeat the tightening step.
- After repeated rotation locking, loosen the nut by max. 30° until the immediate nut locking is possible. Mark the position with a line.
- Untighten the nut from the marked position by a half-turn; slightly tap the hub, pressing the hub to the nut all the way down.
- Keep tightening the nut until it reaches the position marked with the line.
- Mount the hub cover.

CAUTION! While carrying out the maintenance, the machine must be prevented from rolling away; it must be attached to the tractor with the parking brake engaged and be unfolded. TAL-K 8,0 should be folded and the wheel should be lifted using the proper cylinder.

5.4 Hydraulic system maintenance

The maintenance of the hydraulic system consists in visual inspections to prove leak tightness. Remember to insert pins into quick-fit connectors. If there is an oil leakage from connections of hydraulic hoses, the connector must be tightened. If the oil leak is not remedied, replace the element or the hose with a new one. If the leak occurs outside the connector, the leaking hose must be replaced with a new one. Mechanical damage also requires replacement of the sub-unit. It is recommended that the hydraulic hoses should be replaced every 5 years.

If oil appears on the piston rod of the hydraulic cylinder, check for the nature of the leak. Check the sealing once the piston rod is fully moved out. Small leakage which results in covering the piston rod with an oil film is acceptable (damaged wiper seal). If the amount of oil is greater or there are oil drops, shut down the unit for the period required to repair the malfunction (damaged sealing).

5.5 Braking system maintenance (pneumatic system)

The three-stage braking force adjuster is not to be altered under normal operation. It must be in its mid position. If the braking force does not match the tractor braking force, the regulating device can be adjusted to avoid improper operation of the assembly on road. If modified, it must be remembered to avoid accidents or machine damage.

Removal of water condensed in the tank is done using the valve located under the tank. Remove the mandrel and compressed air will force water out. By releasing the mandrel, the valve will close automatically. Once a year (before winter), the drain valve must be unscrewed and cleaned.

In order to inspect the pneumatic system, inspect leak tightness, in particular at connections. During the inspection, the pressure in the system must not be lower than 6 atmospheres. If hoses, gaskets and other system elements are damaged, a hissing sound will be heard. In places of small leaks, small bubbles will be visible. (This can be checked by applying some washing-up liquid). **Replace damaged elements with new ones.**

Braking adjustment – reduction of the braking delay must be performed whenever:

- the braking force decreases as the jaws become worn during operation and due to the occurring clearance,
- wheel brakes operate in uniformly and non-simultaneously.

For this purpose, change the position of the spreader arm affected by the piston rod of the pneumatic cylinder. Change the initial angle of the spreader rod at the multi-groove end of the rod and adjust the bar length using the screw. The adjustment must be performed separately for each wheel.

6. Replacement procedure and defects

Replacement of bearings

Damaged bearings must be replaced:

- place the machine on a horizontal surface,
- unscrew the four bolts securing ball bearings on each side,
- move the tubular shaft away,
- loosen both headless screws at each bearing, and then remove the bearings using a puller,
- place new bearings on the roller loosely,
- draw the roller between bearing plates and screw the bearings to the plates; drive the headless screws with the use of a thread locking glue,
- do not replace the ball bearings on the disc holders,
- if damaged, replace the entire disc holder.

Replacement of working components

Excessive wear of the working components makes it more difficult for the tools to penetrate and increases the operating resistance. The discs must be replaced with new ones when their diameter reduces to 510 mm.

The replacement of working components must be completed when the machine is lowered on the ground and the tractor engine is not running. To avoid the element touching the ground, place durable pads below (e.g. wooden blocks with the thickness of about 20 cm below the adjacent working components or the shaft). For the carriage, the wheel in its maximum lowered position can be used as a support as well. Once the disc harrow is lowered, the tractor engine is stopped and the parking brake is engaged, inspect stability of the tractor-machine unit. For mounting new elements, use standard screws only.

Replacement of cylinders

A malfunctioning cylinder (leakage, etc.) must be replaced. Dismount it to have it inspected by a specialised company. Cylinder replacement must be performed when the machine is unfolded. Connect the cylinder to the system and with one side mounted, the operating cycle of the actuator should be repeated several times until the cylinder is completely filled with oil. Otherwise, the section being lowered may suddenly fall down.

CAUTION! During repairs and maintenance, the machine must be lowered on the ground and be resting on supports ensuring full stability. The tractor engine must be stopped. During repairs and maintenance, use proper spanners and safety gloves.

Table 2. Causes and solutions of malfunctions of the TAL disc harrow

Malfunction	Cause	Solution
- working components do not penetrate soil at the same	- improper levelling of the machine	- level the machine along its length and width
- discs penetration is insufficient	- discs are excessively worn - the shaft is excessively lowered - insufficient disc pressure when used on compact soil	- replace the discs - lift the shaft
- the stubble is not undercut completely	- insufficient working depth of the discs	- increase the working depth of the discs
- deep furrow at the contact point of passages	- improperly positioned side guard	- position the side guard properly
- soil scatters above the shaft	- missing rear guard - the shaft is too close to the discs	- attach the rear guard - move the shaft away from the discs
- disc clogging	- the working depth is too large	- reduce the depth
- side guard clogging	- the amount of post-harvest residues is too large	- detach the side guard
- the shaft force pressing the soil is insufficient	- improperly levelled disc harrow	- extend the upper fastener
	- the shaft is lifted too high	- lower the shaft

7. Storage of the disc harrow

The disc harrow should be stored under a roof. If no roofed space is available, the machine can be stored outdoors.

The disc harrow should be stored in a place that does not pose any hazard to people and the surrounding area. For a prolonged outdoor storage, repeat the maintenance of working components when the preservative coating is washed away. Once disconnected from the tractor, the machine must rest on a hard and even surface so that it can remain stable. All working components must rest on the ground. Lower the machine smoothly so that the working components cannot hit the hard surface. Once lowered, disconnect the suspension system at the machine and drive the tractor away. The elements dismounted from the machine also must be supported on the ground. Uncontrolled movement must be prevented. It is recommended that the machine should be stored in a hardened and roofed area that cannot be accessed by unauthorised persons and animals.

Store the machine securely resting on a hard surface to avoid human or animal injuries.

8. Disassembly and withdrawal from service

CAUTION! Before disassembly, detach the machine from the tractor.

When operated in accordance with the principles provided in the instruction manual, the machine will be operable for many years; however, worn and damaged components must be replaced. In the event of emergency damage (frame cracks and deformation), deteriorating quality of machine operation posing hazard if kept in operation, the machine must be withdrawn from service.
The machine must disassembled by persons who have been familiarised with its design. Such tasks must be carried out once the machine has been placed on an even and hard surface. Dismounted metal parts must be scraped and rubber parts must be handed over to a waste disposal company. Oil must be drained into a tight container and handed over to a waste disposal company.

9. Technical data of the TAL disc harrows

Table 3. Technical data of TAL-C

Type	Working width [m]	Disc diameter [mm]	Number of discs [pcs]	Disc spacing [mm]	Min. power demand [HP]	Weight [kg]
TAL-C 2,5	2.5	560	20	250	80	1240
TAL-C 3,0	3.0		24		100	1335
TAL-C 4,0	4.0		32		130	1820
TAL-C 4,0 H	4.0		32		150	2386
TAL-C 5,0 H	5.0		40		180	2827
TAL-C 6,0 H	6.0		48		200	3090

Table 4. Technical data of TAL-S

Type	Working width [m]	Disc diameter [mm]	Number of discs [pcs]	Disc spacing [mm]	Hydropack capacity [kg]	Min. power demand [HP]	Weight [kg]
TAL-S 2,5	2.5	560	20	250	1300	100	1490
TAL-S 3,0	3.0		24			140	1630

Table 5. Technical data of TAL-K

Type	Working width [m]	Disc diameter [mm]	Number of discs [pcs]	Disc spacing [mm]	Min. power demand [HP]	Weight [kg]
TAL-K 6,0H	6.0	560	48	250	200	4250
TAL-K 8,0H	8.0		64		220	7500

Table 6. Technical data of TAL-K 8,0

Working width	[m]	8
Operating angle	[º]	12
Transport angle	[º]	7
Operating speed	[km/h]	7-12
Max. operating speed	[km/h]	15
Width	[m]	to 3.00
Height	[m]	to 4.00
Length	[m]	6.1
Type of frame wheel	-	560/45-R22.5
Min. power demand	[KW]	150 -240
Carriage weight	[kg]	2250
Weight*	[kg]	7500

*with the complete set of working tools

10. GENERAL WARRANTY TERMS

- **Only genuine spare parts for the machines manufactured by Mandam can ensure long-lasting and efficient operation. The parts for all machines manufactured by Mandam can be purchased in our dealer network or directly from the manufacturer.**

- The warranty covers defects and damage arising from the manufacturer's fault caused by material defects, improper processing or assembly. The manufacturer, under the granted warranty, shall be obliged to the following actions, wherein the scope and total cost of a warranty repair shall be agreed between the Manufacturer and the other Party in each case:
  a) repair the equipment under complaint free of charge,
  b) provide the User with new, properly manufactured parts free of charge,
  c) incur the costs of labour and transport,
- complete replacement of the equipment by a defect-free unit if the actions stated in (a) and (b) are not successful in ensuring a proper operation of the equipment.
- Warranty servicing is performed by the Manufacturer or the assigned warranty service provider.
- The User shall report a warranty complaint immediately, at the latest within 14 days after the occurrence of a defect.
- The warranty period shall be extended by the period of servicing such equipment.
- The Manufacturer will not accept any warranty claims if the equipment has been altered or repaired without the Manufacturer's knowledge or improperly stored, maintained or operated.
- If the user finds that the executed warranty service is insufficient, the user has the right to request the seller to examine the issue with the participation of an expert to be assigned by both parties.

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P.P.H. MANDAM Sp. z o.o.
44-100 Gliwice ul. Toruńska 2, Poland
e-mail mandam@mandam.com.pl
Tel.: +48 32 232 26 60 Fax: +48 32 232 58 85
NIP (VAT no.): 648 000 16 74 REGON (registration no.): P – 008173131

WARRANTY CARD
FOR DISC HARROW, TYPE TAL

Type	……
Serial number	……
Year of manufacture	……
Date of sale	……

The warranty is valid for 24 months from the date of sale.
Warranty service will be performed on behalf of the manufacturer by:

……
(to be filled out by the seller)

…… ……..
(manufacturer's stamp) (seller's stamp)

Present this warranty card when reporting a warranty complaint.