GAI

OPERATOR'S MANUAL

TATU MARCHESAN

IDENTIFICATION

Dealer: _____

Owner: _____

Firm / Farm: _____

City: _____ State: _____

No. of the Certificate of Guarantee: _____

Serial / No.: _____

Date: ____ / ____ / ____ Invoice No.: _____

Product: _____

Notes: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

To the customer

The manufacturer: MARCHESAN IMPLEMENTOS E MÁQUINAS AGRÍCOLAS TATU S.A.
Marchesan Av., 1979
Zip Code.: 15.994-900
Matão - SP - BRAZIL
Telephone.: +55 16 - 3382 - 8282

Hereby declares, that the product,

Designation of equipment: Disk harrow

Equipment type: GAI

This declaration conforms with all relevant fundamental health and safety requirements.

The following standards and technical specifications have been gathered for a correct application and a greater yield of the acquired product.

Matão, _____.

Place and date.

Delivery confirmation

To validate the warranty of your product, it is indispensable to re-sent this form!

For the reseller:

Telephone.:.....

Company:.....

Address:.....

.....

Location: .....

Country: .....

Equipment type:.....

Series number:.....

Serial number:.....

Warranty number:.....

Technician:

Name: .....

Last name: .....

E-mail: .....

( ) New sale of equipment - first utilization.

( ) Equipment for tests - change of place.

( ) Equipment for tests - first utilization.

( ) Final sale - equipment for tests.

Customer I:

Last name/Company:.....*

Person to contact:.....*

Street:.....*

Location:.....*

Country:.....*

Telephone:.....*

E-mail:.....*

Customer II:

Last name/Company:.....*

Person to contact:.....*

Street:.....*

Location:.....*

Country:.....*

Telephone:.....*

E-mail:.....*

Hereby declare that the manual from the equipment mentioned above was received,

....

Place, first formation date Customer signature

Original operator's manual

When receiving the equipment, register the following data.

These informations are useful for when contacting the company to request the warranty or to buy original spare parts.

Equipment type:.....

Serial number:.....

Equipment number:.....

Series number:.....

First utilization:.....

Accessories:.....

.....

.....

.....

Reseller address:.....

Street:.....

Location:.....

Telephone:.....

Customer number:.....

MARCHESAN IMPLEMENTOS E MÁQUINAS AGRÍCOLAS "TATU" S.A.
Marchesan Av., 1979 - Zip Code 15994-900 - Matão - SP - Brazil
Telephone 55.16.3382.8282
www.marchesan.com.br

Table of contents

Foreword

Before operating with the equipment, read and strictly comply with the operator's manual.

In doing so, you will avoid accidents, reduce repair costs and downtime and increase the reliability and service life of your equipment. Pay attention to the safety notes!

Marchesan will not assume liability for any damage or malfunctions resulting from failure of complying with the instructions.

This operator's manual will assist you in getting to know your equipment and using it correctly for its intended purposes.

The operator's manual must be read and strictly adhered to by everyone working on or with the equipment e.g.:

- Operation
- Conservation
- Transport

Trained personnel of our service and sales partners will instruct you in the operation and care of your equipment.

The warranty period starts with the date of delivery.

MARCHESAN reserves the right to make improvements in the design, material or specifications of machinery, equipment or parts at any time, without thereby becoming liable to make similar changes in machinery, equipment or parts previously sold.

Images are for illustration purposes only.

Warning signs about precautions with the equipment

This operator's manual has different types of warnings.

The following warning signs are used:

DANGER

Indicates any hazard that could result in serious injuries or death.

ATTENTION

Indicates any hazard that could result in serious injuries or death.

CAUTION

Indicates any hazard that could result in serious injuries.

WARNING

Indicates important informations.

The instruction steps are indicated by numbers:

1. Follow the numeric order. Alternatively, the instructions can be preceeded by interpuncts (•).

Operation

Marchesan hopes for your total satisfaction with the purchase of a new equipment and with our company.

If there is any problem, contact the Marchesan authorized reseller. Our technical assistance crew along with the technical assistance reseller crew are more than ready to help solving any issues as quick as possible.

To improve the agility to solve any problems, have the following informations at hand:

✔ Invoice number;

✔ Name and address;

✔ Model and series of your equipment;

✔ Purchase date, hours of service;

✔ Details and type of the problem.

Warranty

Any complaint about defects on the equipment must be presented to the Marchesan authorized reseller.

Future damages

Your equipment is produced with extreme care. However, even when using it correctly, failures on the application amount or a total failure may be caused by:

- Lack of/damaged work tools;

- Incorrect activation/rotation speed;

- Failure to follow the instructions on this manual;

- Inadequate maintenance and conservation.

After these statements, check if the equipment is working properly.

Requests to approve the warranty are excluded if the equipment is damaged due to lack of maintenance and conservation or mistakes during operation.

Safety and accident prevention

This equipment was designed according to its technical state and following every safety procedure. However, the equipment may be harmful to the life and physical integrity of the operator or third parties, and also there may be damages to the equipment itself or to any other assets.

Read and follow the warning signs before operating with the equipment.

Correct use

The GAI - hinge offset disk harrow - was specially designed to work in any type of soil with an excellent performance, mainly for seedbed preparation, incorporating stubbles and crumbling the soil.

The correct utilization includes the knowledge and observation of the warnings and instructions available on this manual, being necessary to follow the maintenance intervals, technical information and working area definition.

⚠ WARNING

- **Transportation over long distances must be done on a truck or trailer.**

Attention: to transport over truck or trailer, follow the procedures on this manual. Have extreme caution and use every necessary safety locks to preserve your physical integrity and the integrity of any people nearby.

Conservation and maintenance

An inadequate maintenance and conservation may compromise the safety operation of your equipment:

- It is important to follow the verification deadlines or periodic inspections;

- Carry out the operations described on this manual;

- Before carrying out any inspection or maintenance, stop the equipment on a leveled place and prevent it from moving;

- If it is necessary to carry out any welding operation on the equipment, establish the ground connection as close as possible to the welding point;

- Wash the whole equipment using a low-pressure spray of water to remove the dirty grease and the earth that accumulates on the corners.

- Inspect the friction points and damages. Immediately eliminate any detected defect;

- During the maintenance and conservation operations, retighten any loose bolts and nuts;

- Do not clean new equipments with a steam jet of a high pressure cleaner. The paint takes approximately 3 months to cure and could thus be damaged if this time has not expired.

Danger zone

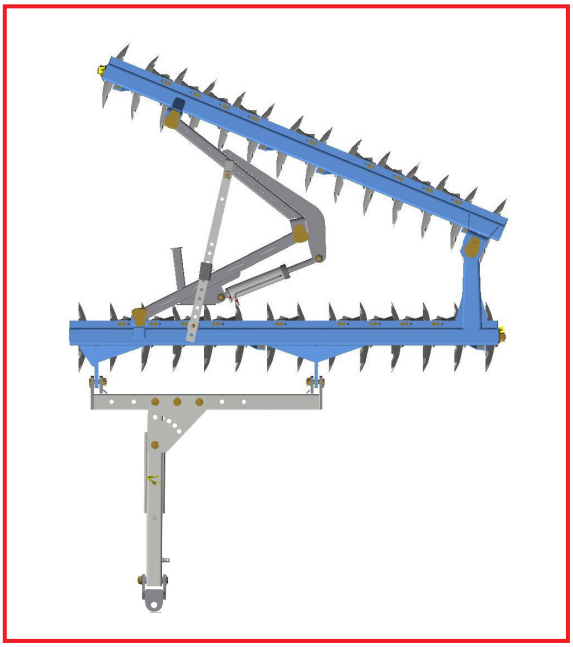
The restricted area indicates the equipment danger zone.

The danger zone around the machine poses the following endangerments:

- Accidental operation of the hydraulic system can trigger dangerous movements of the machine;

- Failing to pay attention to the danger zone can result in severe or even fatal physical injuries;

- Before working in the danger zone of the equipment or between equipment and tractor: Shut down the tractor!



Restricted area

CAUTION

- **Serious accident hazard during maneuvers! Keep an eye on the area.**
- **Remove any people from the maneuvering area.**

WARNING

- **It is mandatory to use PPE when operating the equipment.**
- **The Personal Protective Equipment - PPE has the function to protect the worker from possible hazards that may threat their safety and health, thus avoiding or reducing the gravity of possible injuries during operation.**

Personal protective equipment (PPE)

The personal protective equipment must be used as stated by the Ministry of Labor and Employment on the working standards.

ATTENTION

• Safety must be present on every working step to avoid accidents, such as the impact of objects, falling, noises, cuts and similar. Therefore, the working person is subject to inner and outer damages to the body.

Use earplugs or muffs to avoid loud noises that may lead to complications or hearing loss.

Use gloves to protect your hands and arms from the abrasive elements that may cause cuts or scratches. Whenever assembling or disassembling the equipment, always use safety gloves.

The safety helmet protect the worker's head from any injury that would be caused by falling objects.

The safety glasses protect the eyes from any type of debris that would cause irritation or injuries.

Use the respiratory protection to filter the air and avoid that any dirt particles or material debris may be inhaled by the worker, what would compromise its respiratory system.

The foot protection will prevent damages from the impact of objects, nails or bolts scattered on the floor, crushing hazards, injuries from falling on slippery or wet areas and so on. Always use foot protection during the job.

Personal clothing must be used. Avoid tight or hanging clothes that may become entangled to the moving parts of the equipment.

WARNING

The used PPE types may vary depending on the type of activity or the hazards that may threat the safety and health of the worker and the part of the body that is intended to be protected.

The PPE are essential to protect the worker and also assures the physical health and protection against operation hazards and/or professional diseases.

DANGER

- **Risk of accident!**

Observe every tractor specification (weight, tires and oil flow rate) so that the equipment is connected with a compatible tractor.

- **Starting the job**

The operation must only be done by people who was previously trained by the Marchesan technicians and staff.

When starting the operation, there is a high risk of accidents.

Note the indications.

WARNING

- **During installation and maintenance there is a high risk of accidents.**

Before starting the operations, read the operator's manual and be familiar with the equipment.

- **Regarding the equipment extent**

Correct any defects.

CAUTION

- **Dangers and injuries when working with the equipment.**

Use personal protective equipment when carrying out any repairing/maintenance job.

CAUTION

- **Be careful when working with the equipment.**
- **Turn the equipment on / off.**

DANGER

- **People may get stuck and suffer serious injuries between the tractor and equipment.**
- **Move people away from the area between the tractor and equipment.**

WARNING

- **Risk of a serious accident during maneuvers! Keep an eye on the area.**
- **Move people away from the maneuvering area.**

Turning the equipment on:

Before turning the equipment on, read the instructions on this manual carefully.

Be sure that the person responsible for the operation is well instructed regarding its utilization on a correct and safe way.

⚠ WARNING

• Keep a first aid kit on an easy-to-access place and know how to use it.

⚠ ATTENTION

• Do not remain between the tractor and equipment when coupling or uncoupling it from the tractor.

Operating with the equipment:

When operated in a correct way, this equipment is very simple to handle. However, it is indispensable that every operator know its functioning and the risks if working on a wrong manner. Follow the safety instructions described on this manual to avoid risky situations to the operator, to third parties and to any person that may be nearby.

⚠ WARNING

• The equipment utilization on areas that were not mentioned above is taken an inadimissable operation and it is not authorized by this manufacturer.

⚠ ATTENTION

• During operation or when transporting the equipment, be careful with holes or elevations on the soil that may lead to accidents.

Equipment storage:

⚠ WARNING

• Place the equipment on a covered and dry place, protected from the sunlight and rain and properly supported on the soil.

Cares and maintenance:

DANGER

• It is prohibited to carry out any maintenance, lubrication, repair, adjustment or cleaning when the equipment is turned on. Before carrying out any service, turn off the tractor, remove the key from the ignition and uncouple the cardan shaft from the PTO.

CAUTION

• Note the safety, care and maintenance indications.

This equipment was designed and assembled for maximum performance, economy and easiness on the operations, under a variety of functioning conditions.

In order to keep a functioning without any problems, make sure that the cares, the cleaning and the maintenance intervals are being respected.

Lubricating the equipment

The equipment must be lubricated regularly after every wash.

This assures that the equipment is ready to operate, reducing repair costs and the inactivity time.

CAUTION

Hygiene

- Lubricants and mineral oil products are no threat to health as long as they are used as instructed.

- Prolonged skin contact or the inhalation of vapours should, however, be avoided.

Handling lubricants

- Wear gloves or use protective creams to protect against direct contact with oils.

- Thoroughly clean any oil off your skin by washing with warm water and soap.

- Do not clean your skin with petrol, diesel fuel or other solvents.

Waste disposal

- Oils, greases and wastes contaminated with these substances represent a great danger for the environment and must be disposed of environmentally and in compliance with the corresponding legal regulations.

- If necessary contact your local authorities to get all relevant information.

⚠ CAUTION

Spare parts

Genuine spare parts and accessories from Marchesan have been specially designed for this equipment.

Installation or use of non-original products may have a detrimental effect on specific design features of the equipment and impair the safety of equipment operators and the equipment itself.

Marchesan will not assume liability whatsoever for damage resulting from the use of non-original parts and accessories.

If the component to be replaced is marked with a safety decal, these decals must also be ordered and attached to the spare part.

Operator's manual

The operator's manual are a part of the equipment!

Failure to comply with the operator's manual can result in severe or even fatal physical injuries.

- Read and follow the corresponding sections in the operating instructions before starting work.

- Store the operator's manual and keep for future use.

- Pass the operator's manual on to a later user.

Qualification of personnel

Unintended use of the equipment can lead to severe or even fatal physical injuries.

In order to prevent accidents, each person involved in work with the equipment must meet the following general minimum requirements:

- The person is able to perform work with the equipment safely within the scope of these operator's manual;

- The person is acquainted with the function of the equipment within the scope of its work and is able to assess and avoid any work related dangers. The person is able to recognize and avoid work related dangers;

- The person has understood the operator's manual and is able to implement the information given accordingly;

- A person being instructed must only work with or on the equipment under the supervision of an experienced person.

⚠ CAUTION

The owner of the equipment must:

- Regulate the area of responsibility, competence and monitoring of personnel;
- If necessary train and instruct the personnel;
- Make the operator's manual accessible for the operator;
- Ensure that the operator has read and understood the operator's manual.

Groups of operators

People who work with the equipment must have been trained for the different activities involved.

Trained operators

For certain activities the corresponding personnel must have been trained by service personnel. This refers to the following activities:

- Transportation on public roads;
- Utilization and configuration;
- Operation;
- Maintenance;
- Spotting and eliminating flaws.

Children in danger

Children are not able to assess dangers and may behave unpredictably. Children are therefore especially endangered:

- Keep children away from the equipment;
- Especially before drive off and before triggering equipment movements you must make sure that the danger zone is free of children;
- Shut down the tractor before leaving it;
- Children can trigger dangerous equipment movements. An insufficiently secured equipment parked without being attended poses a danger for playing children!

Lifted equipment movimentation

DANGER

- Only CAPABLE and AUTHORIZED personnel should carry out the equipment movimentation.
- Note every condition of each PPE, such as the foot protection, safety glasses, safety helmet, protective gloves and other PPE as required.
- Use chains, of at least 3 meters long, to lift the equipment safely.
- Use the adequate points for lifting and be sure that the equipment is safe. Avoid accidents.
- Always isolate the area where the lifting and components movimentation will be carried out. Always keep a safe distance from the equipment.

Safety in traffic

DANGER

- No passengers are allowed to ride on the equipment!
- Pay attention to the permissible transport widths and heights. Pay attention to the transport height when passing under bridges and low hanging overhead power lines.
- For equipments without brake select the weight of the tractor and the speed so that the equipment can be managed securely under all conditions.
- Always match the travel mode to the road conditions to avoid accidents and damage to the frame.
- Consider your personal abilities, carriage way, traffic, sight and weather conditions.
- Lock the equipment for transportation.
- Underpin the equipment appropriately.
- Use chock blocks and safety chains to secure the equipment to the truck or trailer during the transport.

Safety decals

Safety decals on the equipment warn of hazards at dangerous points and are an important safety part. Missing safety decals increase the risk of severe or even fatal injuries.

- Clean soiled safety decals.
- Damaged or illegible safety decals must be replaced immediately.

⚠ ATTENTION

- **This symbol is a warning used to prevent accidents.**
- **The instructions under this symbol refers to the safety of the operator, mechanician or third parties, therefore they should be carefully read and observed. If the safety instructions are not being followed, a serious accident or even death may occur.**

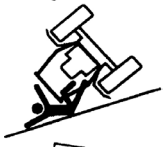
Read and understand the information before making any adjustment or maintenance.

Follow every recommendation, warning and safety practice that can be found inside this manual, as any accident may lead to injuries or death.

REMEMBER, ACCIDENTS MUST BE AVOIDED!

Never use your bare hands to check hydraulic leaks, the high pressure can cause injuries.

Never attempt to change the adjustments, clean or lubricate the equipment when the same is switched on or in movement.



Be careful while driving on slopes. Risk of overturn.

Prevent that chemical products (i.e.: fertilizers and treated seeds) make any contact with your skin or clothes.

Keep access and work places clean or free from oil and grease. Risk of accidents.

Never transport the equipment on highways or paved roads. Avoid that the tractor wheels touch the drawbar in sharp turns.

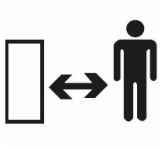
When hitching the equipment to the tractor, use a chain to lock the equipment drawbar to the tractor hitch bar. This procedure will prevent a possible rupture of any hydraulic hose or breaks on the hitching system, what would make the equipment tilt up.

Always use the safety locks to carry out any maintenance or to transport the equipment.

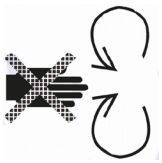
Have extreme caution when operating with the power take-off (PTO), which you should not get closer during operation.

The presence of any other people on the tractor or equipment is stricly forbidden.

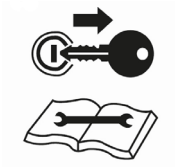
Have extreme caution when driving under electrical power lines. Any contact may result in severe shocks, injuries or death.



Keep a safe distance from the equipment during the job.



Do not open or remove the safety protections while the equipment is on.



Shut down the engine and remove the tractor key from the ignition before carrying out any maintenance or repair on the equipment.

Use the adequate devices to assemble the tires. Only capacitated personnel must do this job.

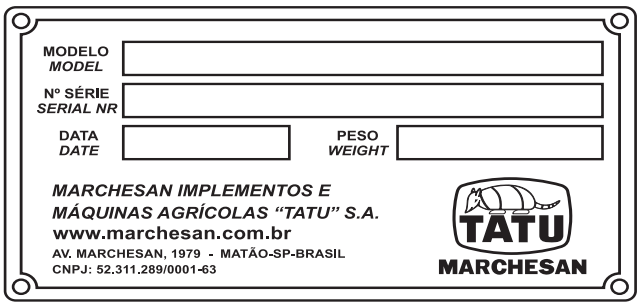
Never weld or heat a wheel. The heat can cause increase in pressure, with a risk of tire explosion.

When filling up the tires, position yourself at the side of the tire and never in front of it.

Every professional should be oriented when lifting and carrying heavy loads to avoid any serious accident that a bad execution of this process may cause.

General information

Right and left hand side indications are made observing the equipment from the rear. To order any parts or request technical assistance services, it is required to provide the data contained on the nameplate, which is located on the equipment's frame.

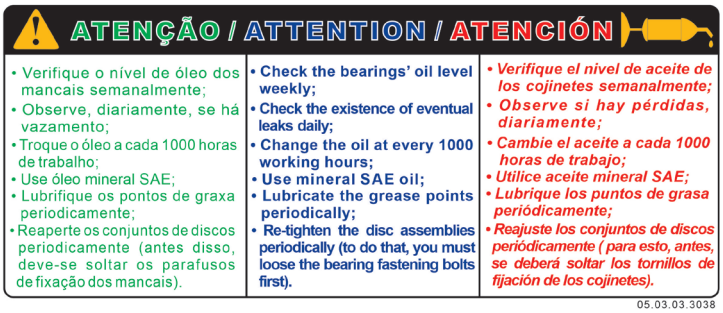


WARNING

• The warranty shall not be applied to any equipment or any part that has been altered elsewhere than at the place of manufacture, or which the original purchaser thereof at retail has used or allowed to be used parts, not made or supplied by Marchesan.

Safety decals

The safety decals warn about the equipment points that require more attention and they should be kept in good repair. If these decals become damaged or illegible, replace them. Marchesan provides decals, upon request and indication of the respective serial number.



WARNING

• Always keep the safety decals clean.

Safety decals

Decal set

Item	Model	Serial number
1	**GAI** decal	**05.03.03.4120**
1	Tatu logotype decal	**05.03.03.3427**
1	Opening/closing the disc gangs decal	**05.03.03.4438**
1	Read the manual decal	**05.03.03.1428**
1	Lubricate and tighten daily decal	**05.03.03.1827**
1	Danger decal	**05.03.03.3038**
1	Danger decal	**05.03.03.1739**

WARNING

• Replace the missing or damaged safety decals. The operator must know the need and importance to keep the decals in the proper place and in good conditions. The operator also have to know the need to follow the instructions, as the lack of safety may increase the risk of accidents.

Intended use of the equipment

The GAI - hinge offset disk harrow - was specially designed to work in any type of soil with an excellent performance, mainly for seedbed preparation, incorporating stubbles and crumbling the soil.

Its rugged structure has a proper size and it is made of folded steel plates joined by a good penetration weld and with fine finishing, with resistant parts at the concentrating points of mechanical strength.

This model also features a locking adjustment that allows a mechanical opening/closure. Optionally, it is possible to use a hydraulic cylinder to help in this operation.

Prohibited use of the equipment

1. To avoid damages, serious accidents or death, do NOT allow passengers on any part of the equipment.
2. The equipment must not be used by an inexperienced operator or one that do not know every conduction, operation and command controlling techniques.

GAI

Type: .....Hinge offset disk harrow

Model: ..... GAI

Number of disc blades: ..... 12, 14, 16, 18, 20, 24, 28, 32, 36 and 40

Spacing between disc blades: .....270 mm

Disc blades dimension: ..... Ø 26" x 6 mm , Ø 28" x 6 mm e Ø 28" x 7.5 mm

Disc blade type: ..... Concave notched

Bearings - Length: .....262 mm

- Type: ..... Regreasable roller bearings / Oil bath bearings

Spacer spools - Length: .....262 mm

- Type: .....Iron cast

Axle diameter: .....Ø 41 mm (1.5/8")

Hitching type: .....Drawbar

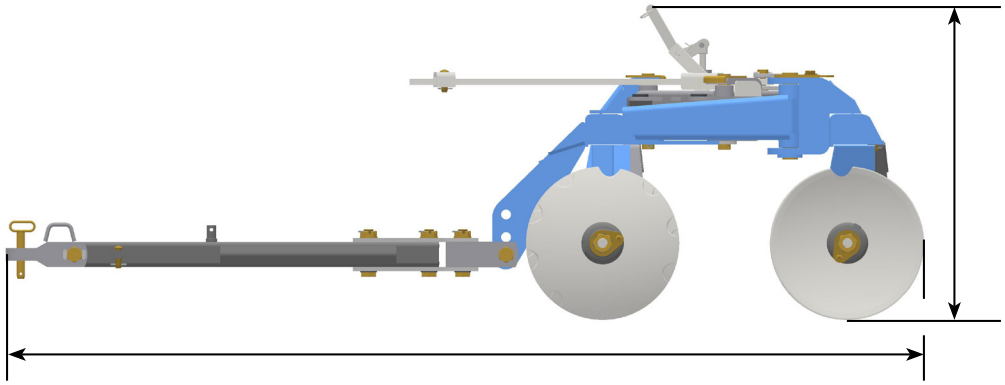
Working speed:.....5 to 7 km/h

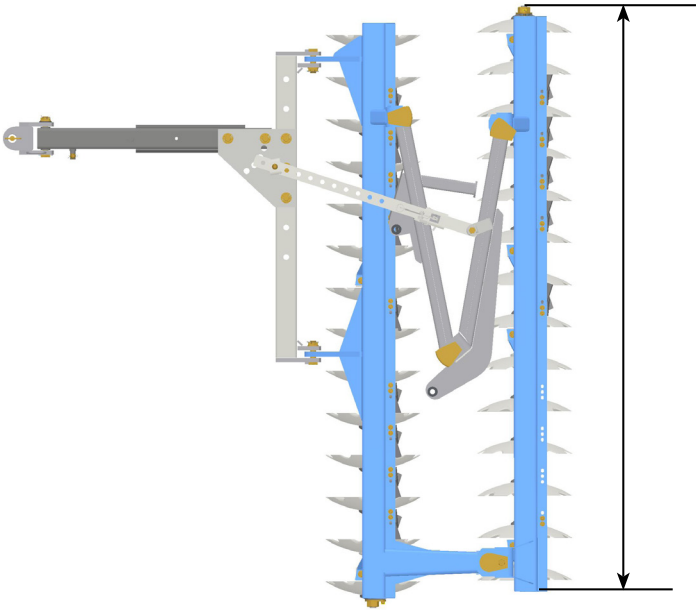
Model	Number of disc blades	Cutting width (mm)	Weight (kg)	Tractor required power (cv)
GAI	12	1500	1014	70 - 80
	14	1750	1119	80 - 90
	16	2000	1281	90 - 105
	18	2300	1489	105 - 115
	20	2570	1721	115 - 130
	24	3110	2267	130 - 150
	28	3650	2129	150 - 170
	32	4180	2538	170 - 190
	36	4720	2867	190 - 210
	40	5250	2911	210 - 230

⚠ WARNING

- **Weights quoted using Ø 26" disc blades.**
- **The tractor required power may suffer variations to match the soil conditions.**

Dimensions for transportation and storage





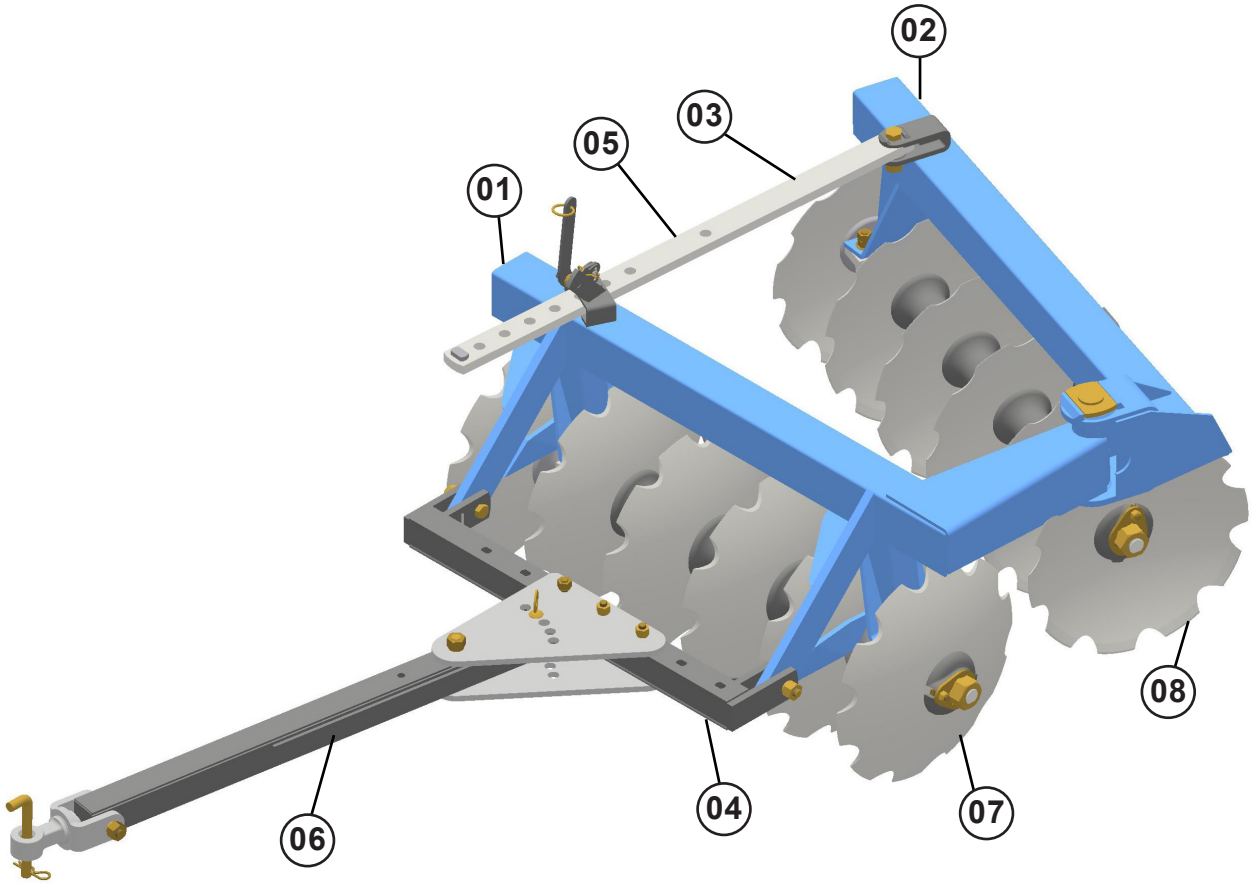
Model	Number of disc blades	A	B	C
GAI	12	1200	3250	1760
	14	1200	3250	2030
	16	1200	3250	2500
	18	1200	3250	2550
	20	1200	3250	2890
	24	1200	3630	3300
	28	1200	3630	3810
	32	1200	3630	4420
	36	1200	3630	4930
	40	1200	3630	5480

⚠ WARNING

- **Measures in millimeters.**

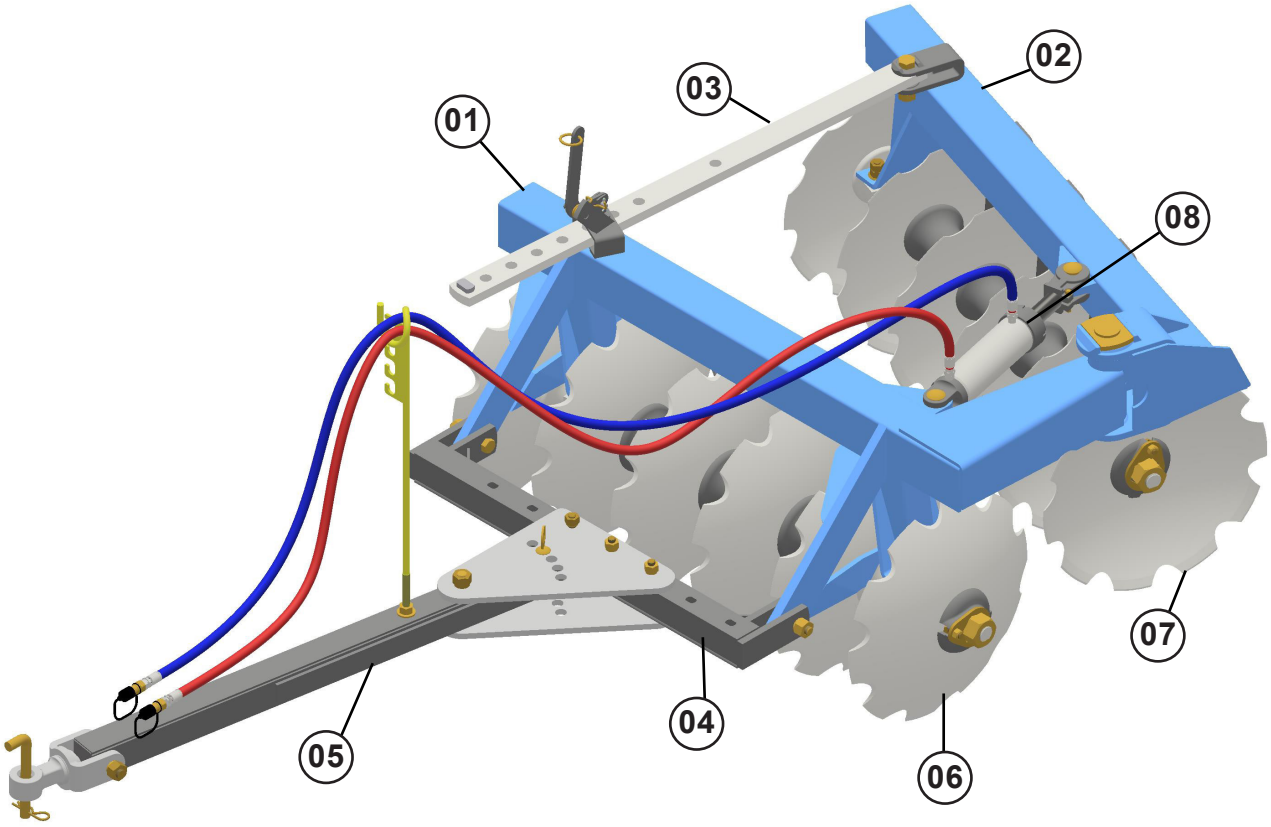
GAI - 12 and 14 disc blades (mechanical)

01 - Front frame
02 - Rear frame
03 - Adjustment bar
04 - Hitch bar
05 - Locking adjustment
06 - Drawbar
07 - Front disc gang
08 - Rear disc gang



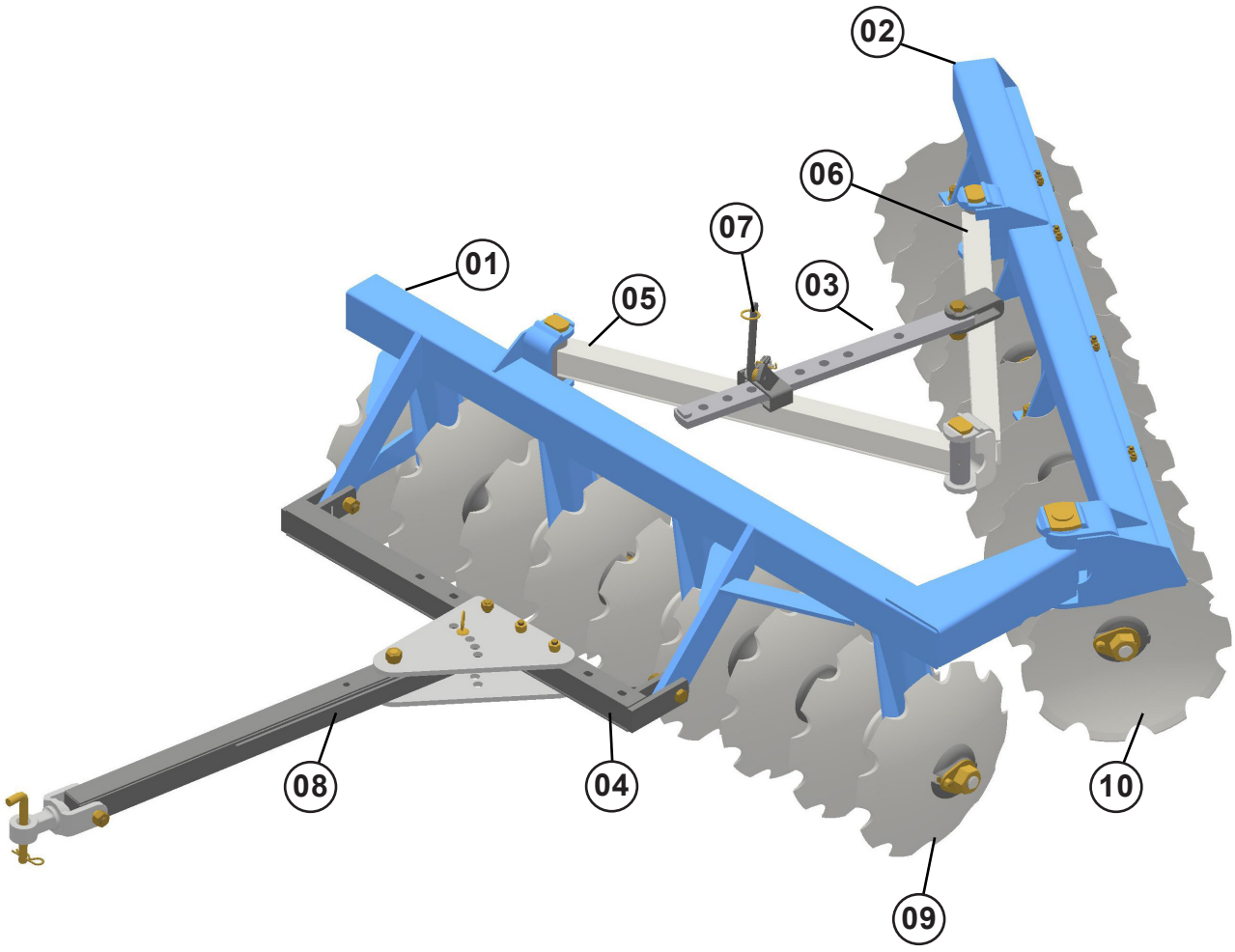
GAI - 12 to 14 disc blades (hydraulic cylinder)

01 - Front frame
02 - Rear frame
03 - Adjustment bar
04 - Hitch bar
05 - Drawbar
06 - Front disc gang
07 - Rear disc gang
08 - Hydraulic cylinder



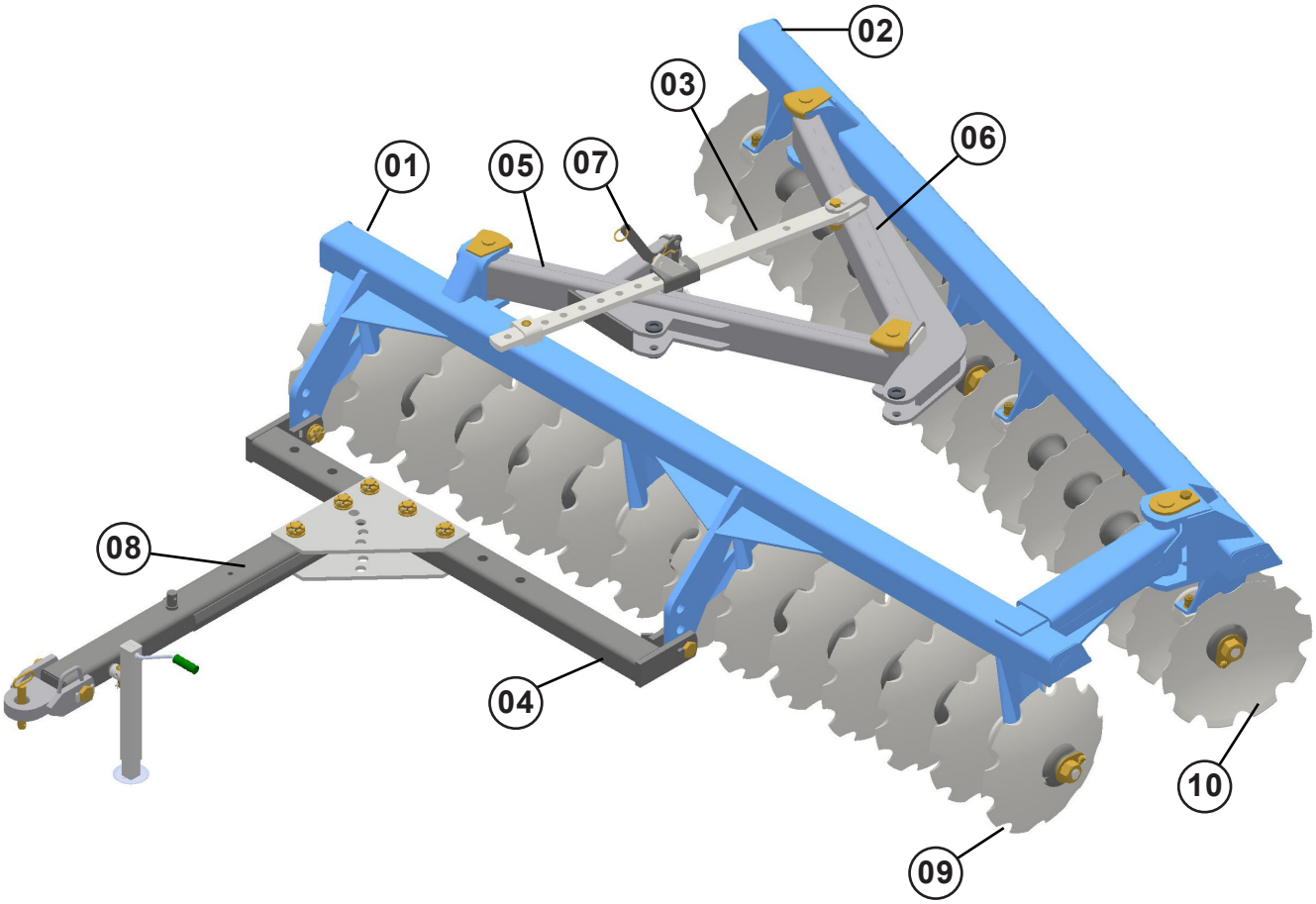
GAI - 16 to 20 disc blades (mechanical)

01 - Front frame
02 - Rear frame
03 - Adjustment bar
04 - Hitch bar
05 - Front stabilizer bar
06 - Rear stabilizer bar
07 - Locking adjustment
08 - Drawbar
09 - Front disc gang
10 - Rear disc gang



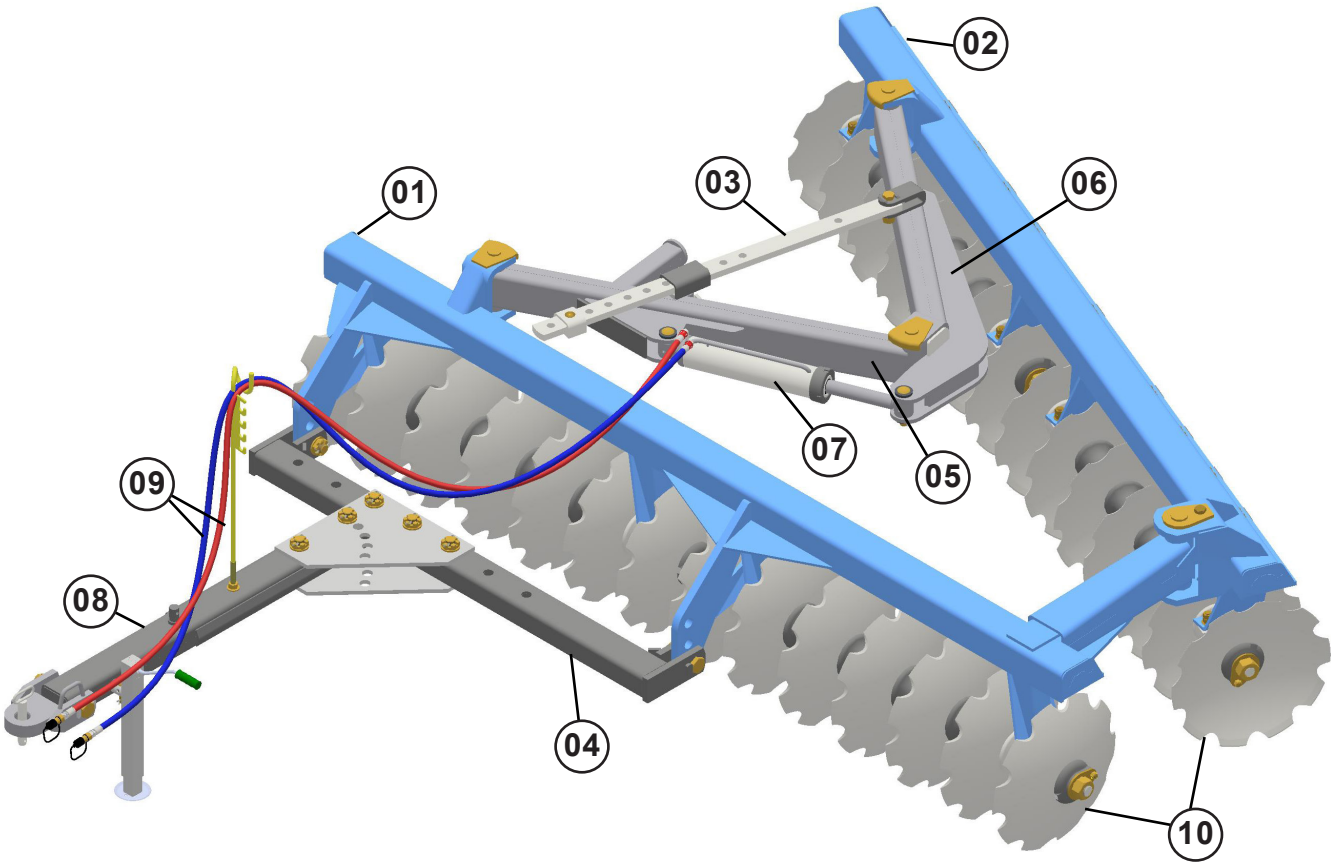
GAI - 24 to 40 disc blades (mechanical)

01 - Front frame
02 - Rear frame
03 - Adjustment bar
04 - Hitch bar
05 - Front stabilizer bar
06 - Rear stabilizer bar
07 - Locking adjustment
08 - Drawbar
09 - Front disc gang
10 - Rear disc gang



GAI - 24 to 40 disc blades (hydraulic cylinder)

01 - Front frame
02 - Rear frame
03 - Adjustment bar
04 - Hitch bar
05 - Front stabilizer bar
06 - Rear stabilizer bar
07 - Hydraulic cylinder
08 - Drawbar
09 - Hoses
10 - Front and rear disc gangs



⚠ DANGER

• Only QUALIFIED and AUTHORIZED personnel must assemble/disassemble the equipment.

• Use safety glasses, earplugs/muffs, protective gloves and any other required PPE.

• Avoid direct contact with the lubrication oil and do not throw it or any other type of oil or grease away on the environment.

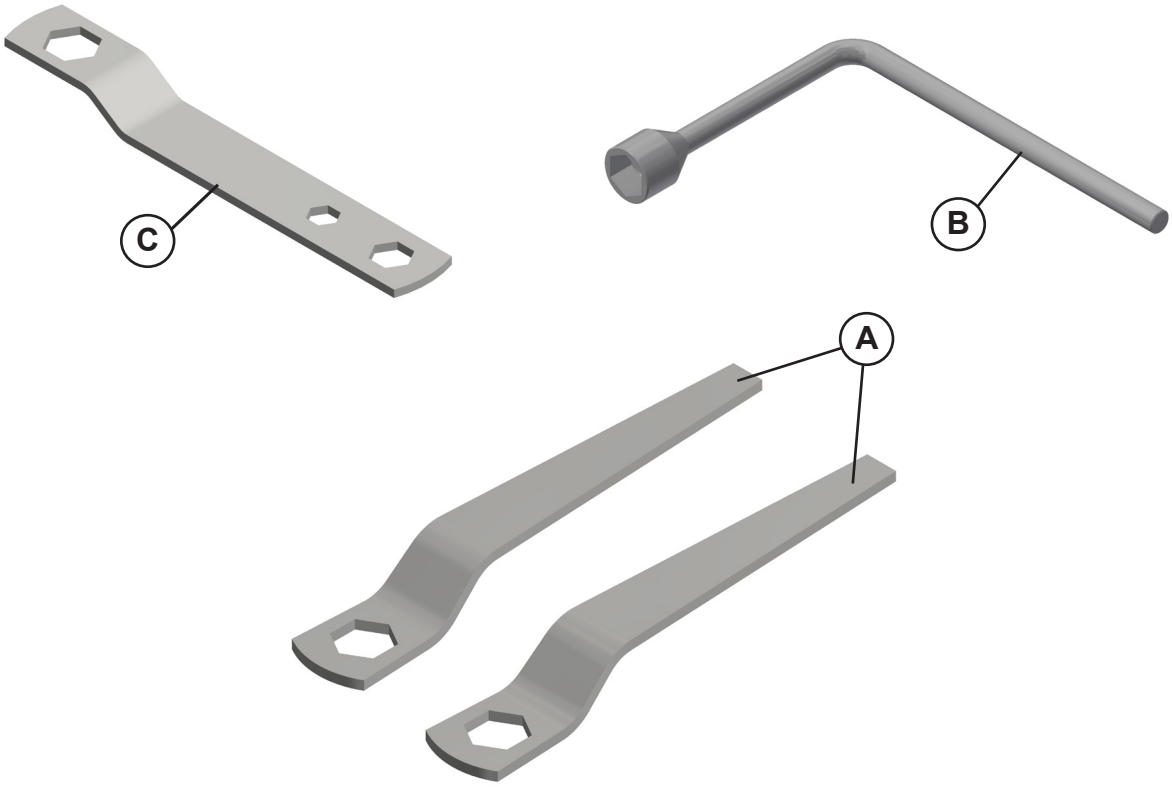
First of all, put the parts in a clean place to identify them easier. Check the parts using the list that comes inside the packing box.

Using the set of wrenches

• Use two box end wrenches (A) to tighten the nuts of the disc gang, being one to hold the axle nut on one side while the other tighten the nut to the other end, thereby preventing the axle from rotating.

• Use the L shaped socket wrench (B) to tighten the nuts and bolts of the bearings.

• Use the box end wrench (C) to tighten the nuts of the traction set.



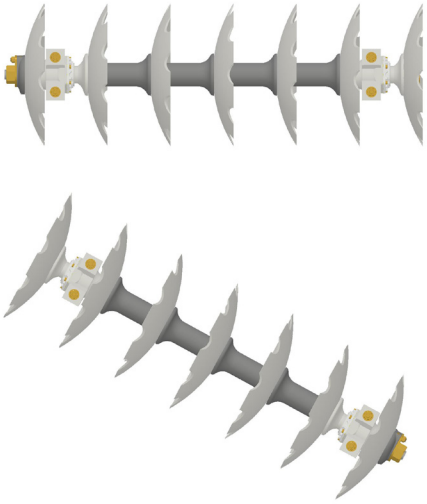
⚠ CAUTION

• We recommend wearing gloves, especially while assembling the disc gangs.

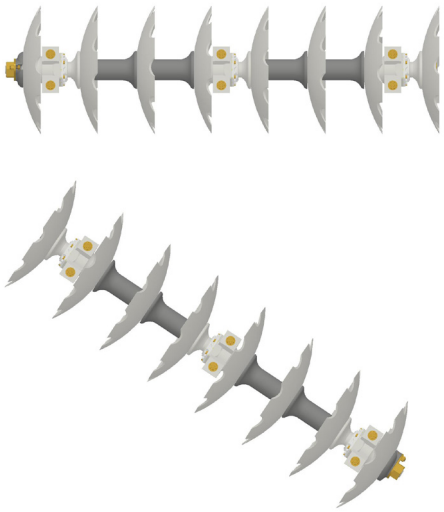
Before starting to assemble the disc gangs, check the correct position of the bearings and spacer spools:

Assembly of bearings and spacer spools

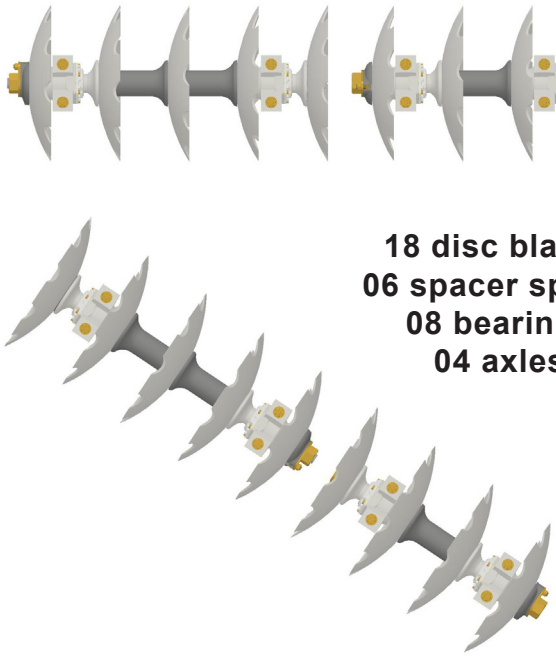
12 disc blades
06 spacer spools
04 bearings
02 axles



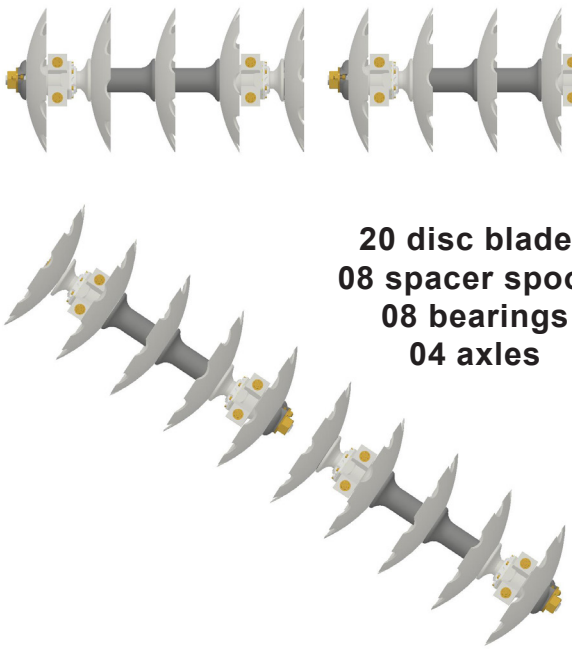
14 disc blades
08 spacer spools
04 bearings
02 axles



16 disc blades
08 spacer spools
06 bearings
02 axles

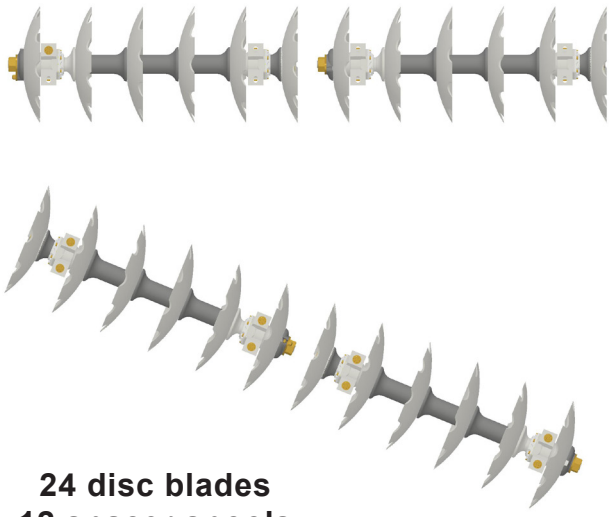


18 disc blades
06 spacer spools
08 bearings
04 axles

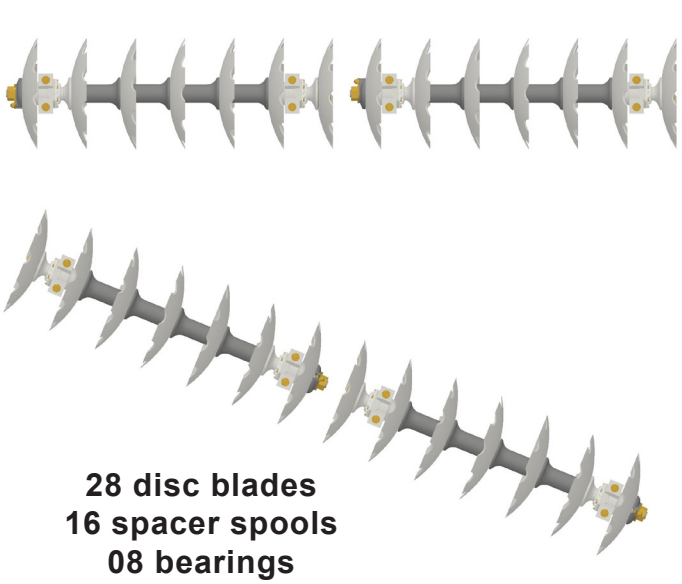


20 disc blades
08 spacer spools
08 bearings
04 axles

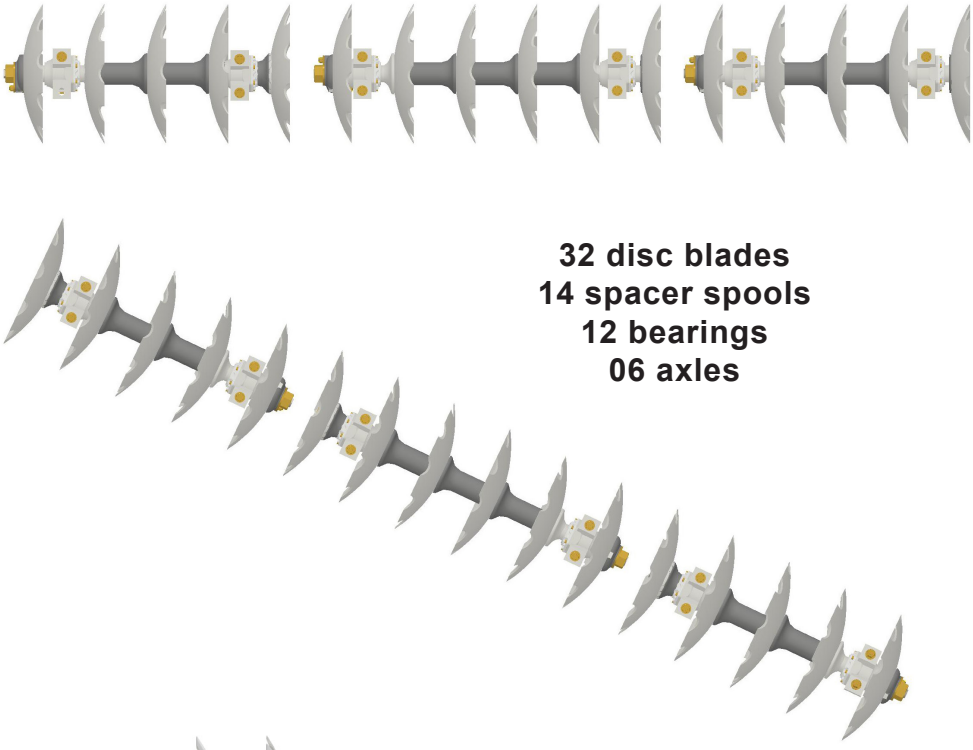
Assembly of bearings and spacer spools



24 disc blades
12 spacer spools
08 bearings
04 axles



28 disc blades
16 spacer spools
08 bearings
04 axles

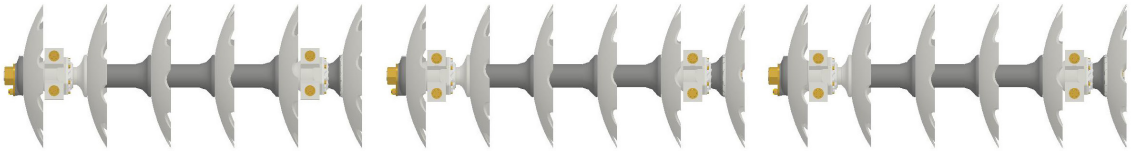


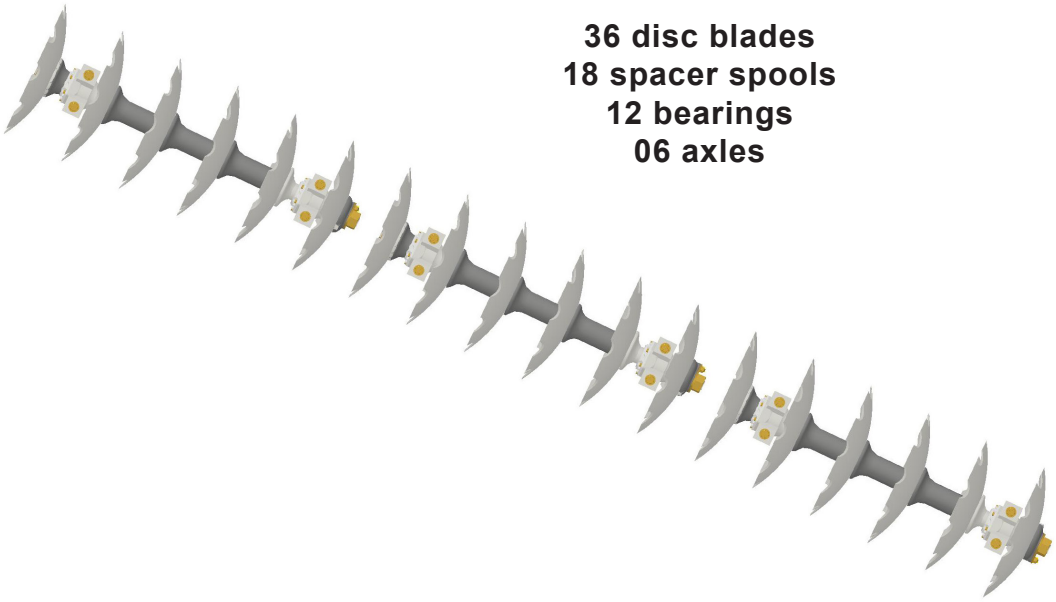
32 disc blades
14 spacer spools
12 bearings
06 axles

Bearing

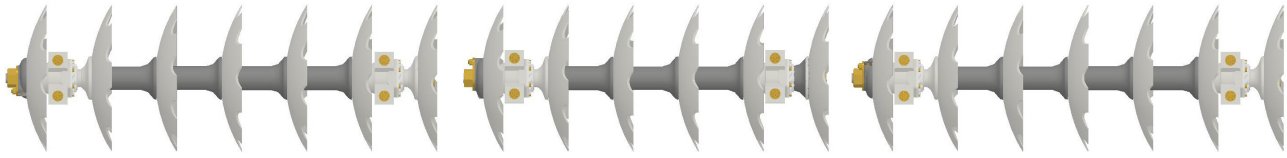
Spacer spool

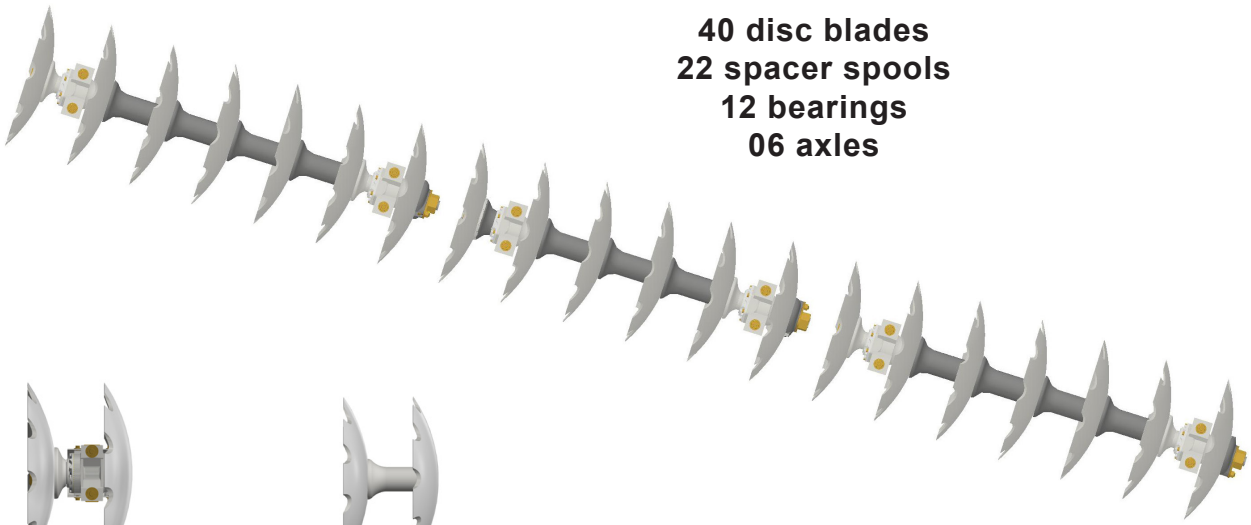
Assembly of bearings and spacer spools





36 disc blades
18 spacer spools
12 bearings
06 axles





40 disc blades
22 spacer spools
12 bearings
06 axles

Bearing

Spacer spool

Disc gangs assembly

Place the outer washer (A) along with the axle (B).

Tighten the nut (C) passing 5 mm from the axle face.

Place the disc blades (D), bearings (E) and spacer spools (F), following the instructions on the next page.

Place the inner washer (G) and the other nut (C-1).

Place the bolt (H) that fasten the lock nut (I), along with a spring washer and nut (only on the outer side of the gangs).

Use the wrenches from the 'set of wrenches' page to tighten the gangs as follows:

1) Place one of the wrenches on the outer side of the gangs (locked side), supporting it on the ground;

2) On the inner side, use the other wrench and tighten the gangs to get maximum torque;

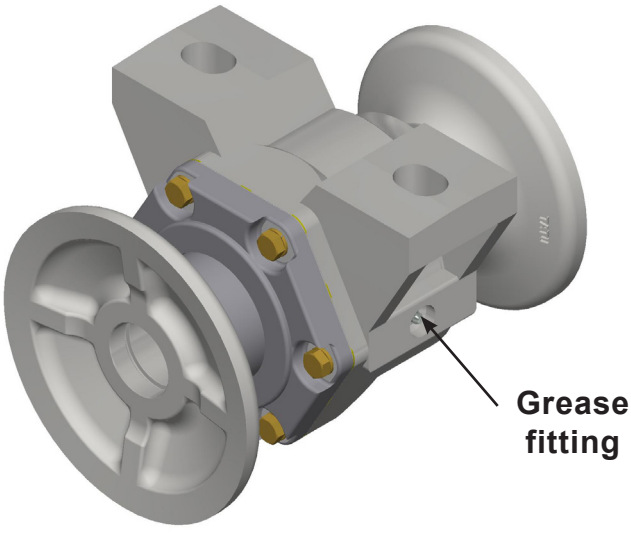
3) To tighten the gangs, underpin with a piece of wood or another object, preventing them from moving (as shown on the following page).

Lastly, place the bolt (H-1) and position the lock nut (I-1), fastening with a spring washer and nut.

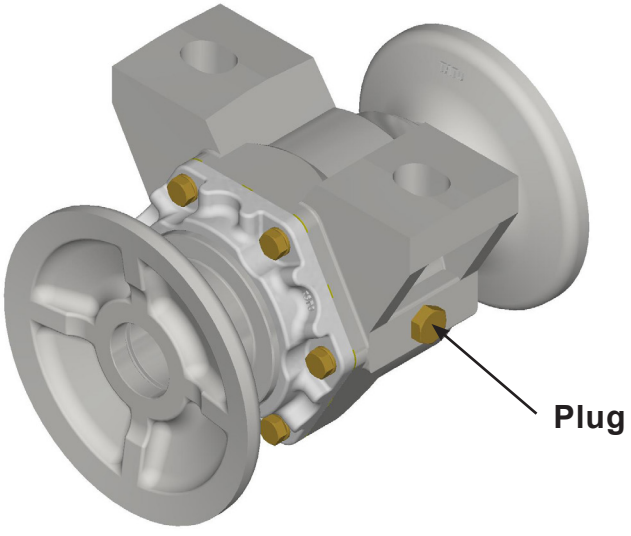
⚠ WARNING

• Check the correct side of the bearings and spacer spools according to the disc blades concavity.

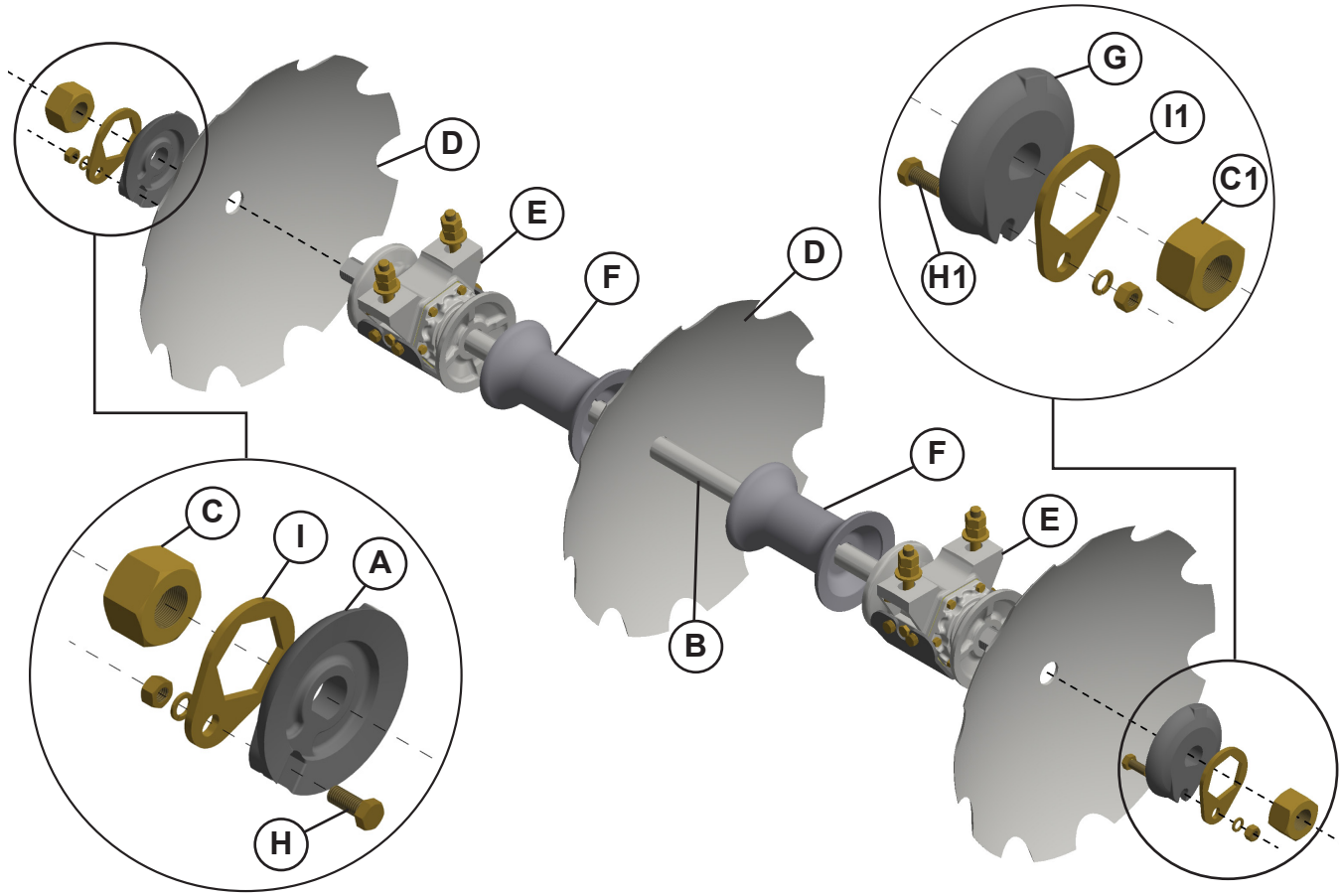
CM bearing



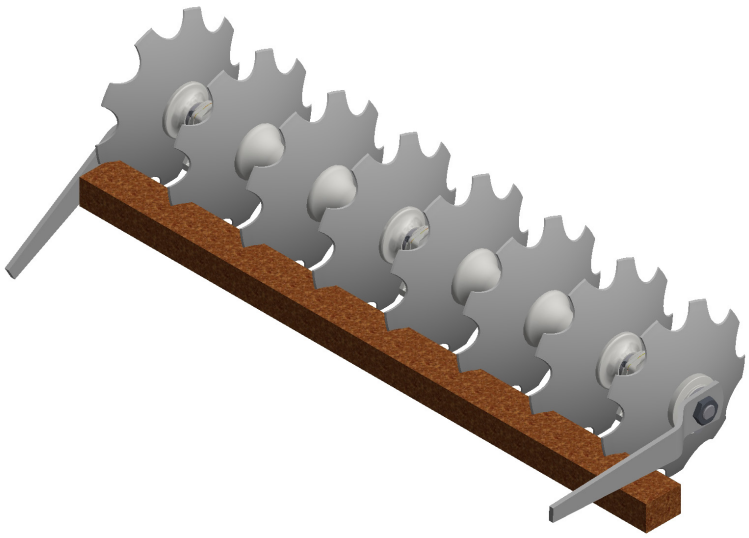
DM bearing



Disc gangs assembly



Torque table	
Axle diameter	**Ft. - lbs.**
1.1/4"	1840
1.1/2"	2670
1.5/8"	2890
1.3/4"	3020
2"	3150
2.1/8"	3300
2.1/2"	3500
2.3/4"	3750
3"	4000



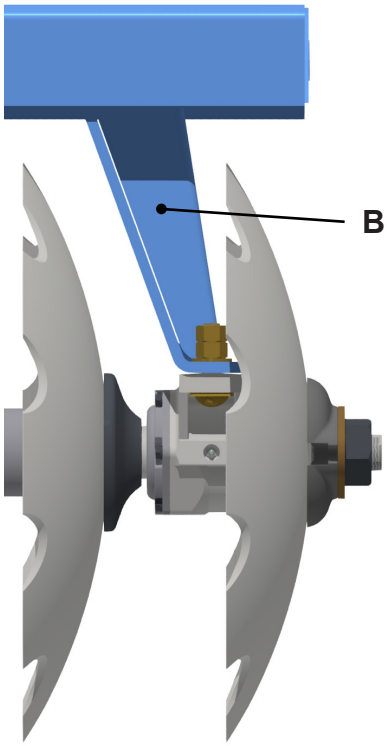
WARNING

• The axle threads (B) must be cleaned and greased before their assembly. Check the torque table on the 'important data' section.

Assembly of the disc gangs on the frame

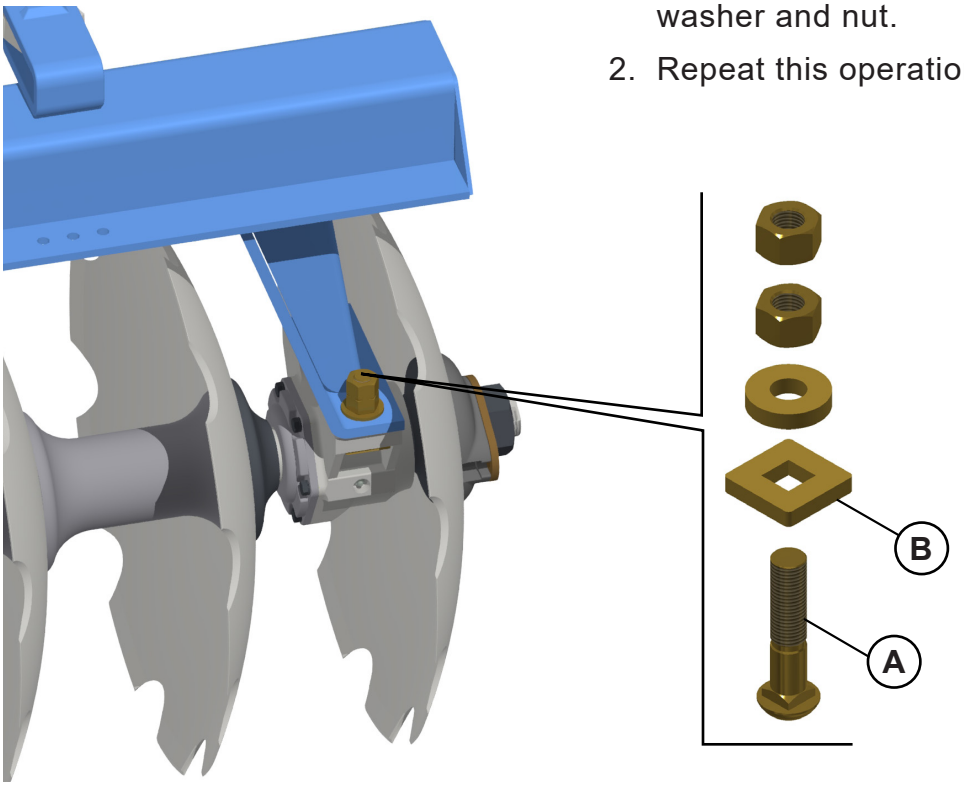
WARNING

- **The rear gang turns earth to the left and the front gang turns earth to the right.**



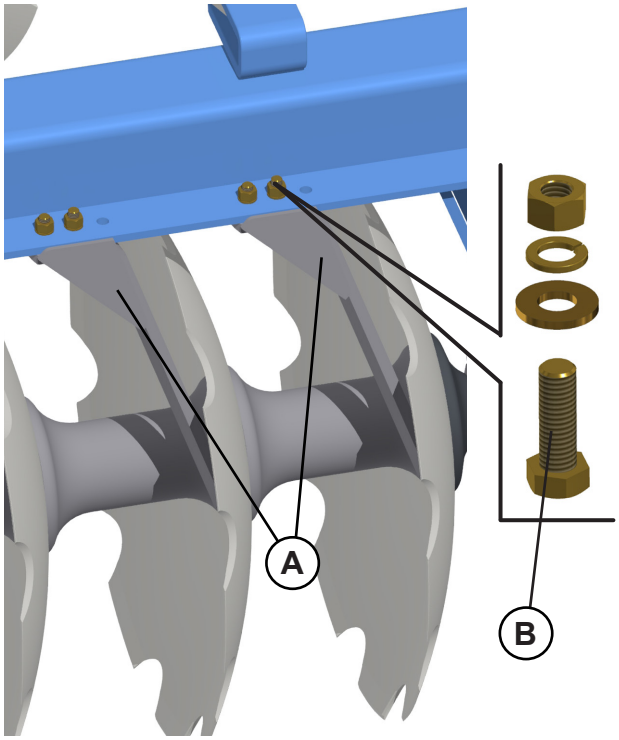
In the gang assembly to the carriers, the bearing hangers should remain facing the disc blades concavity.

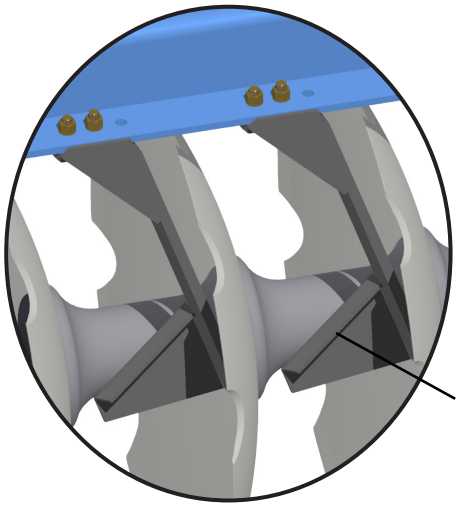
1. Place a bolt (A) and squared washer (B), passing through the bearing housing and the bearing hanger holes. On top, place a flat washer and nut.
2. Repeat this operation for the other bearings.



Scrapers assembly

1. Note the fixing point of the scrapers with the end facing the concave side of the disc blades.
2. Assemble the scrapers (A) using bolts (B) and flat washers, which are placed underneath the fixation plate. On the upper part, place spring washers and nuts.



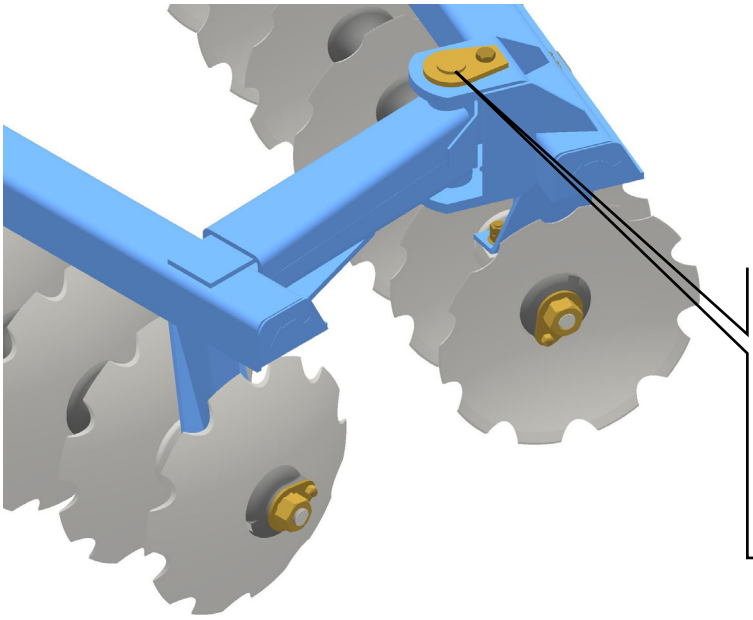


Double scraper for the GAI 24 - 40 disc blades

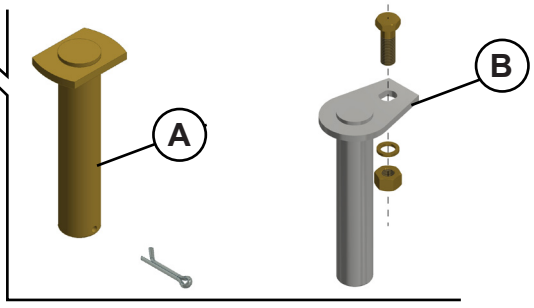
⚠ WARNING

• The scrapers feature an adjustment to approach or distance them from the disc blades, on a range from 5 to 10 mm.

Frame junction



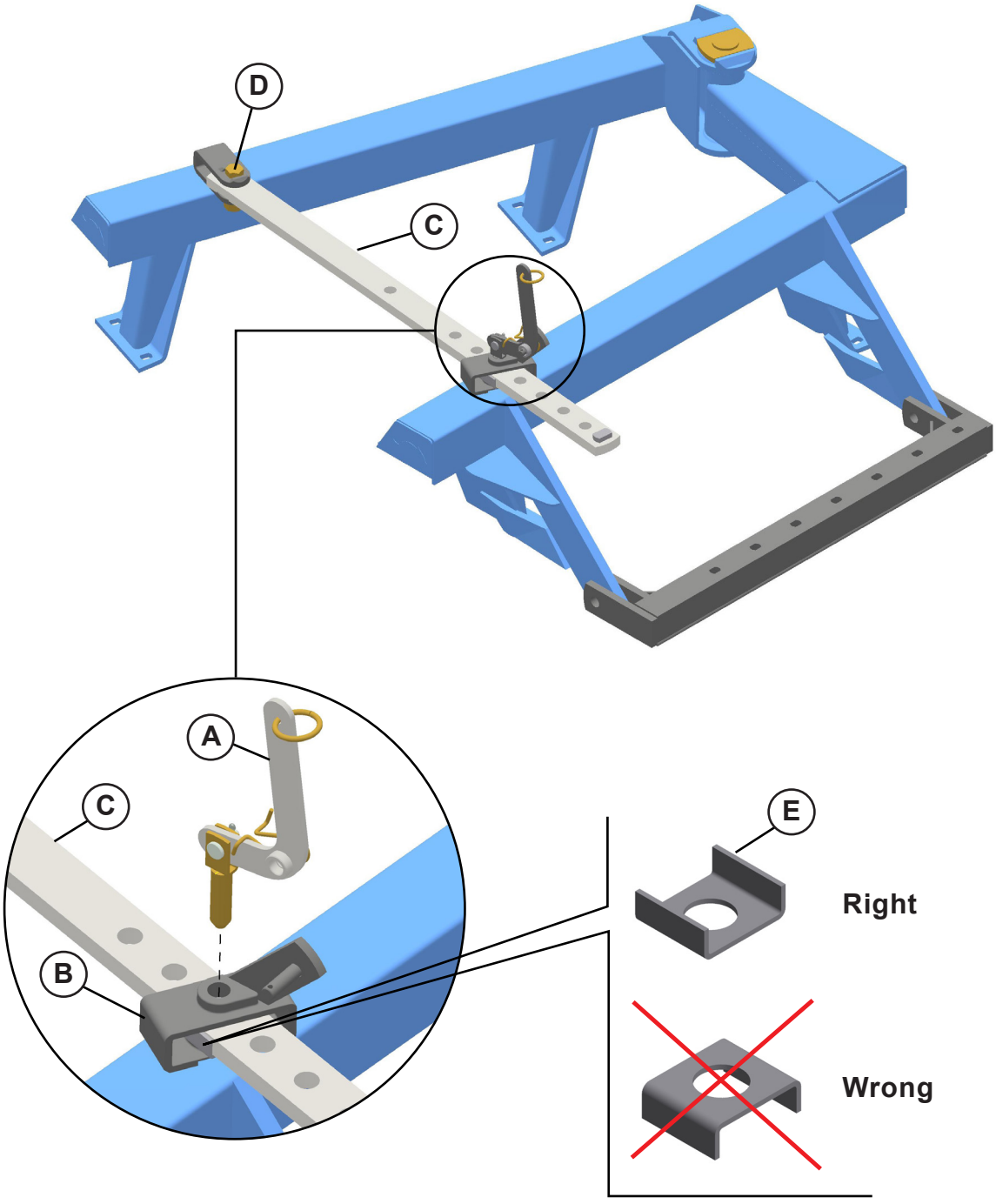
1. Approach both frames and place the junction pin (A) and cotter pin for the GAI model with 12 - 20 disc blades. For the GAI model with 24 - 40 disc blades, use a junction axle (B), bolt, spring washer and nut.



Opening adjustment set assembly

- **12 and 14 disc blades**

1. To assemble the adjustment set, fasten the locking adjustment (A) to the front frame support (B).
2. Pass the adjustment bar (C) inside the support and couple it to the rear frame using a bolt (D), spring washer and nut.



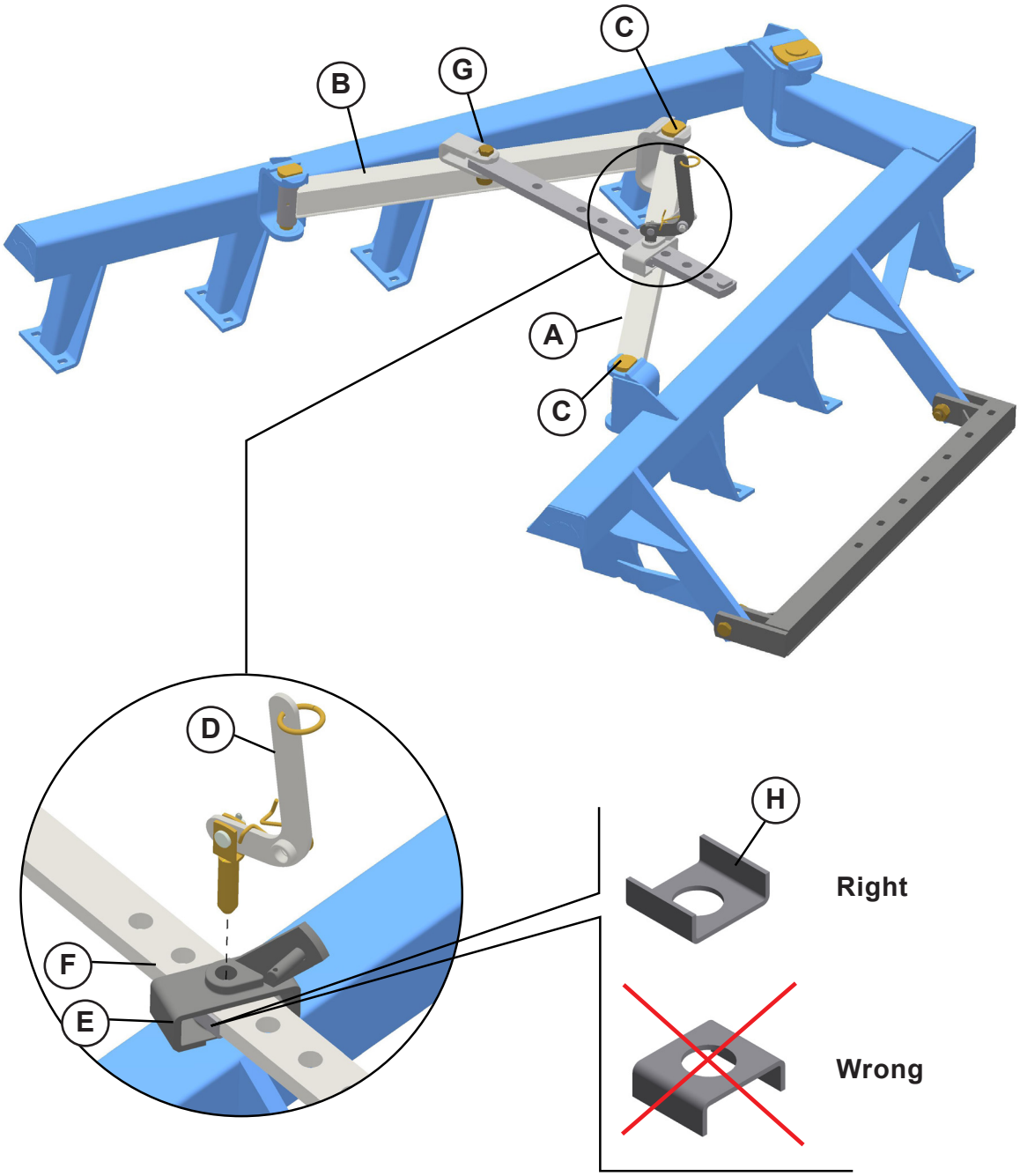
WARNING

• Note the correct position of the adjustment bar guide (E) inside the locking adjustment support.

Opening adjustment set assembly

- **16 to 40 disc blades**

1. Fasten the stabilizer bars (A & B) to the front and rear frames using pins (C) and cotter pins.
2. Couple the locking adjustment (D) to the support (E).
3. Pass the adjustment bar (F) inside the support (E) and couple it to the stabilizer bar (B) using a bolt (G), spring washer and nut.

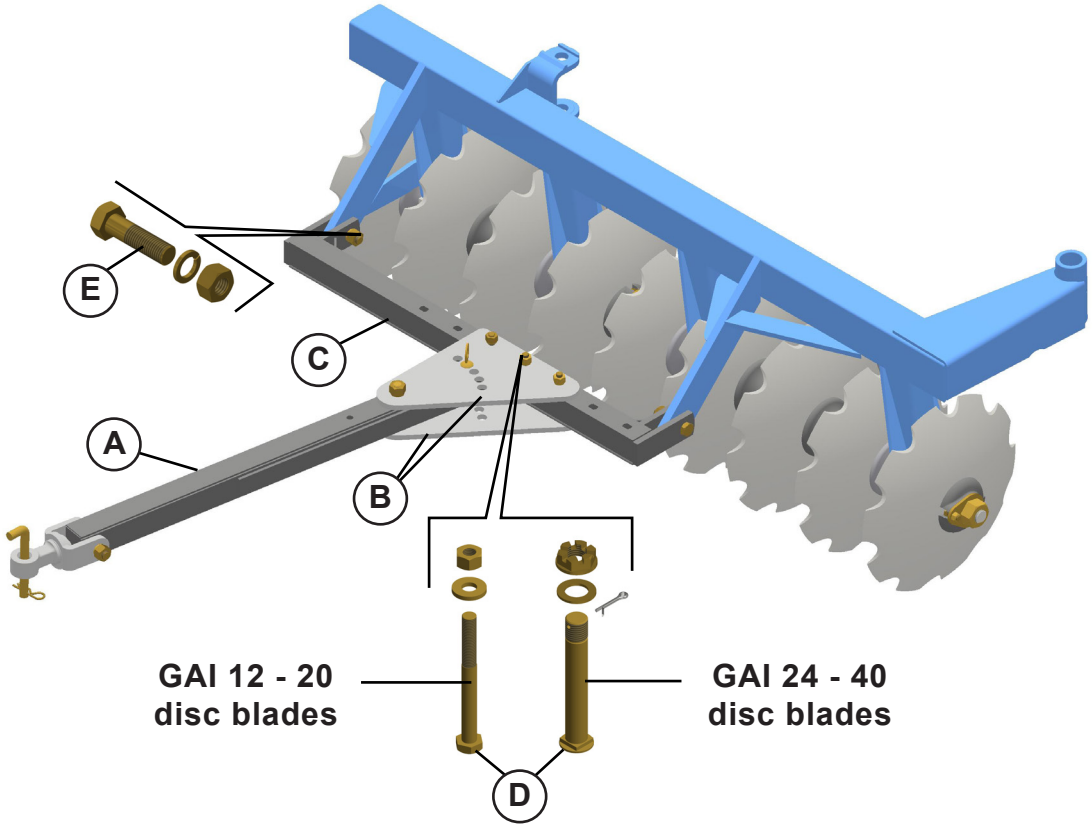


⚠ WARNING

- **Note the correct position of the adjustment guide (H) inside the support (E).**

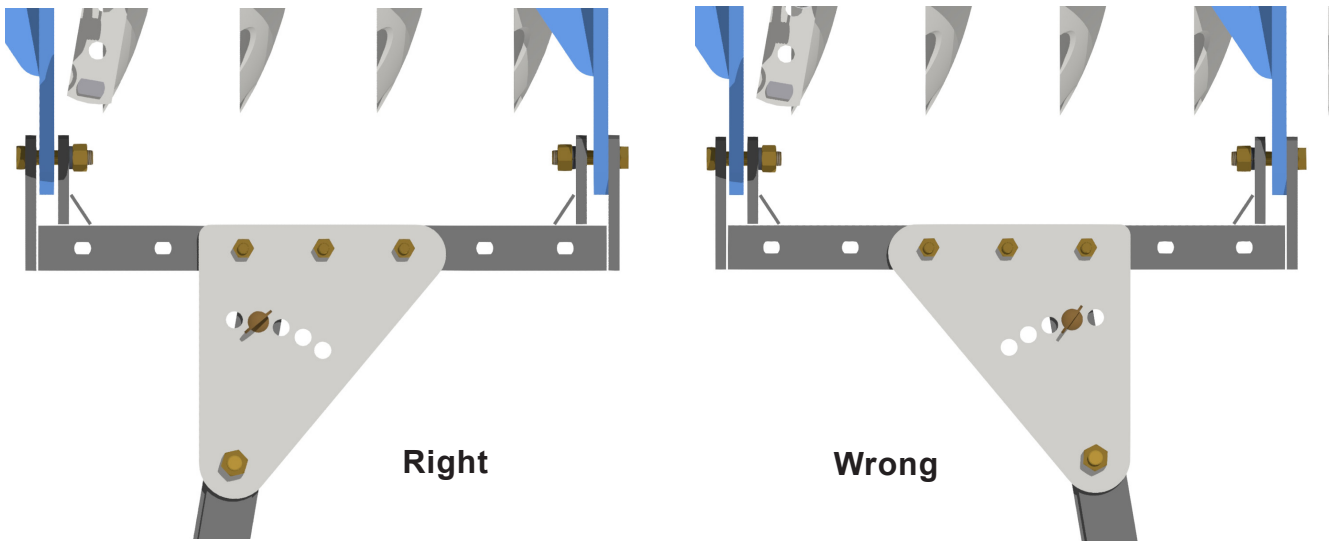
Traction set assembly

1. Couple the drawbar (A) to the plates (B) and these plates to the hitch bar (C) using bolts (D), flat washers and nuts.
2. Then, assemble the whole set in the front frame using bolts (E), spring washers and nuts.



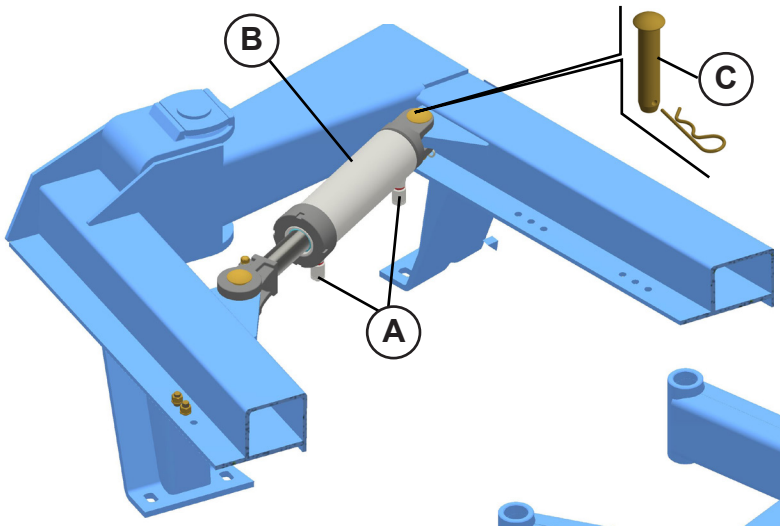
WARNING

• Note the correct position of the upper and lower plates, which are assembled as shown below.

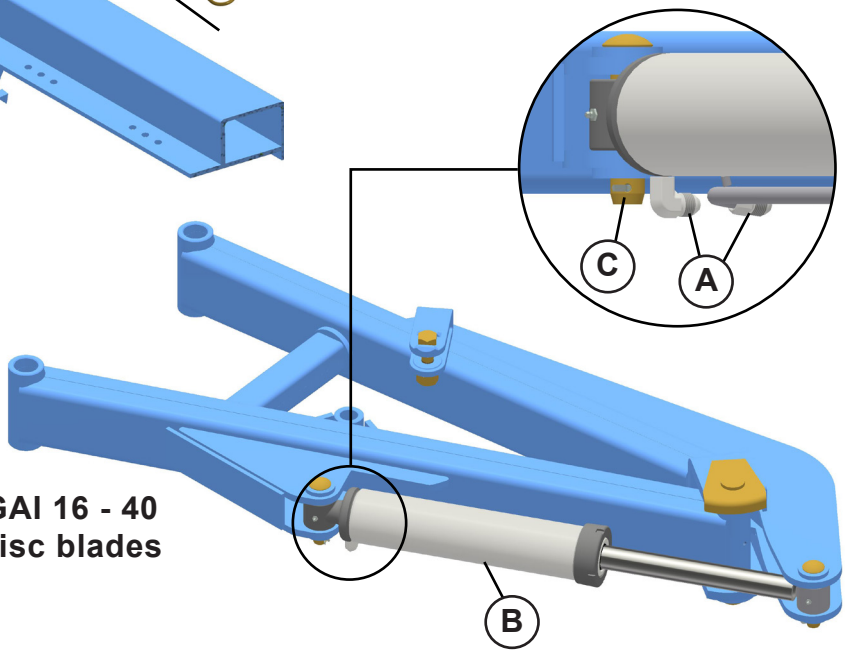


Cylinder assembly

1. The cylinder (B) ports (A) are delivered to the owner facing down in order to protect them. To return the cylinder ports to their correct position, loosen up the pin (C) and cotter pins, letting the cylinder barrel free.

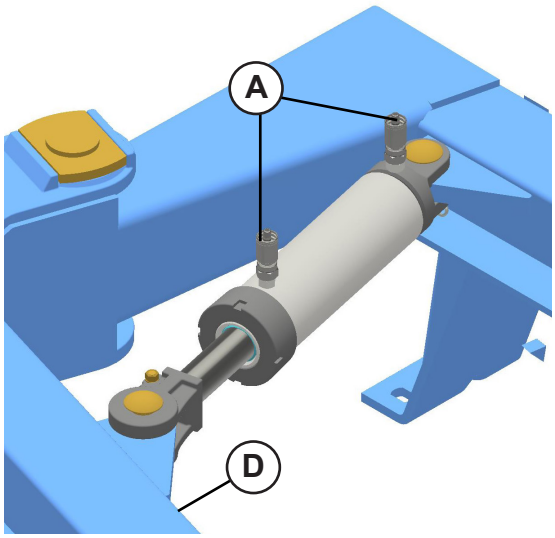


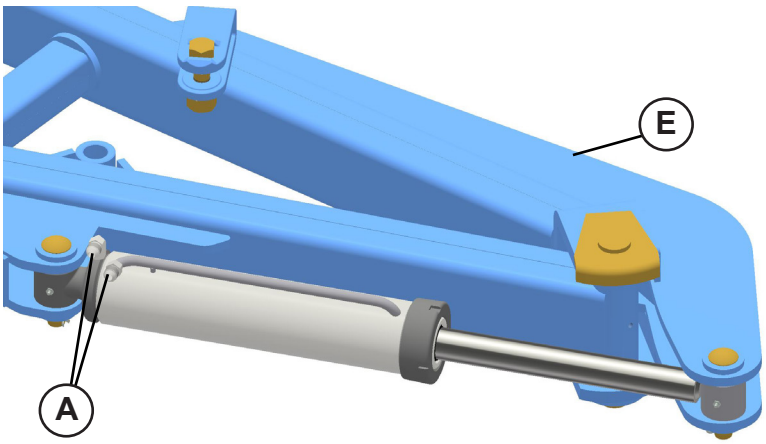
GAI 12 and 14 disc blades



GAI 16 - 40 disc blades

2. Give a 180° turn on the cylinder barrel to let the ports (A) facing up and the cylinder rod must be pointing to the rear frame (D) direction for the model with 12 - 14 disc blades. For the model with 16 - 40 disc blades, the cylinder rod must be pointing to the rear stabilizer bar (E) direction, as shown on the illustration.





⚠ WARNING

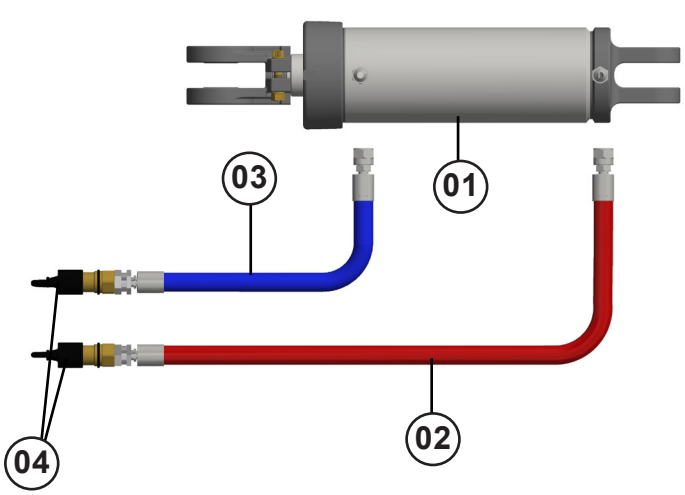
• Always use thread sealing tape to couple the male quick couplers to the hoses.

Hydraulic circuit

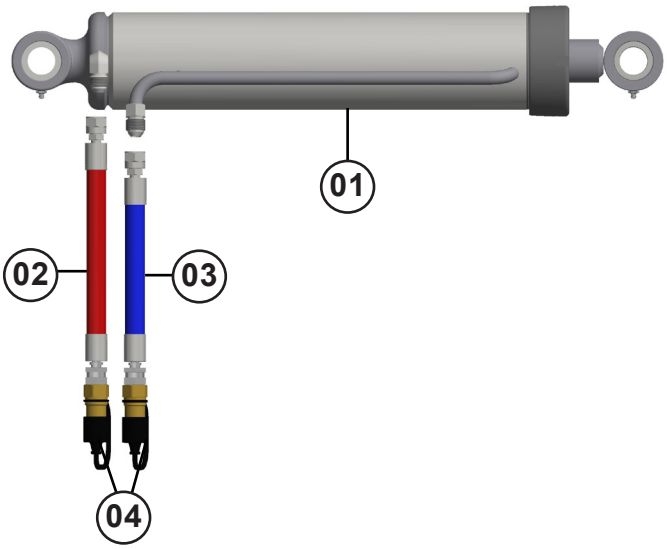
DANGER

- Do not make any repair when the system is pressurized or if the cylinder is under load.
- Use proper hand and eye protection to search for high-pressure hydraulic leaks.

12 - 20 disc blades



24 - 40 disc blades



12 - 20 disc blades			
Item	Description		Quantity
01	Hydraulic cylinder		01
02	3/8" X 4000 TR-TM hose	Pressure	01
03	3/8" X 4000 TR-TM hose	Return	01
04	Male quick coupler		02

24 - 40 disc blades			
Item	Description		Quantity
01	Hydraulic cylinder		01
02	3/8" X 4500 TR-TM hose	Pressure	01
03	3/8" X 4500 TR-TM hose	Return	01
04	Male quick coupler		02

WARNING

- Always use thread sealing tape to couple the male quick coupler to the hoses.
- During assembly, avoid that the ports touch the soil.
- When finishing to assemble the hydraulic hoses, carry out a general inspection to check if all hose ports are tightened and if they are properly installed.

⚠ ATTENTION

• Only CAPABLE and AUTHORIZED personnel must operate the equipment.

• Observe every safety condition and use safety glasses, foot protection, earplugs/ muffs, protective gloves and any other required PPE.

• Before starting the job or transporting the equipment, check for any people or obstructions on the area.

The following instructions must be carefully observed in order to get the best working performance.

Preparing the tractor

The addition of water ballasts in the tires and a set of weights on the front part and rear wheels of the tractor are the most used ways to increase the soil traction and give greater stability to the tractor. Check if the tractor is in its full condition before using it.

The drawbar is used to get a better power supplied by the tractor to perform the equipment dragging.

Drawbar types:

Straight up and positioned on a single height related to the soil, without the option to adjust the hitching height;

Angled drawbar with two height adjustments (going up or down).

When the bar is totally retreated on its length, the operator must be aware for any curve or maneuvers, as the equipment drawbar may touch the tractor tires or damage the hydraulic hoses.

When using the tractor drawbar, lift the three-point hitches entirely.

The tractor drawbar must be compatible with the equipment. Do not exceed the static load capacity of the tractor drawbar.

Preparing the equipment

The equipment must always be parked on a dry and flat place, free from any debris or strange objects. Follow this procedure to set the equipment up:

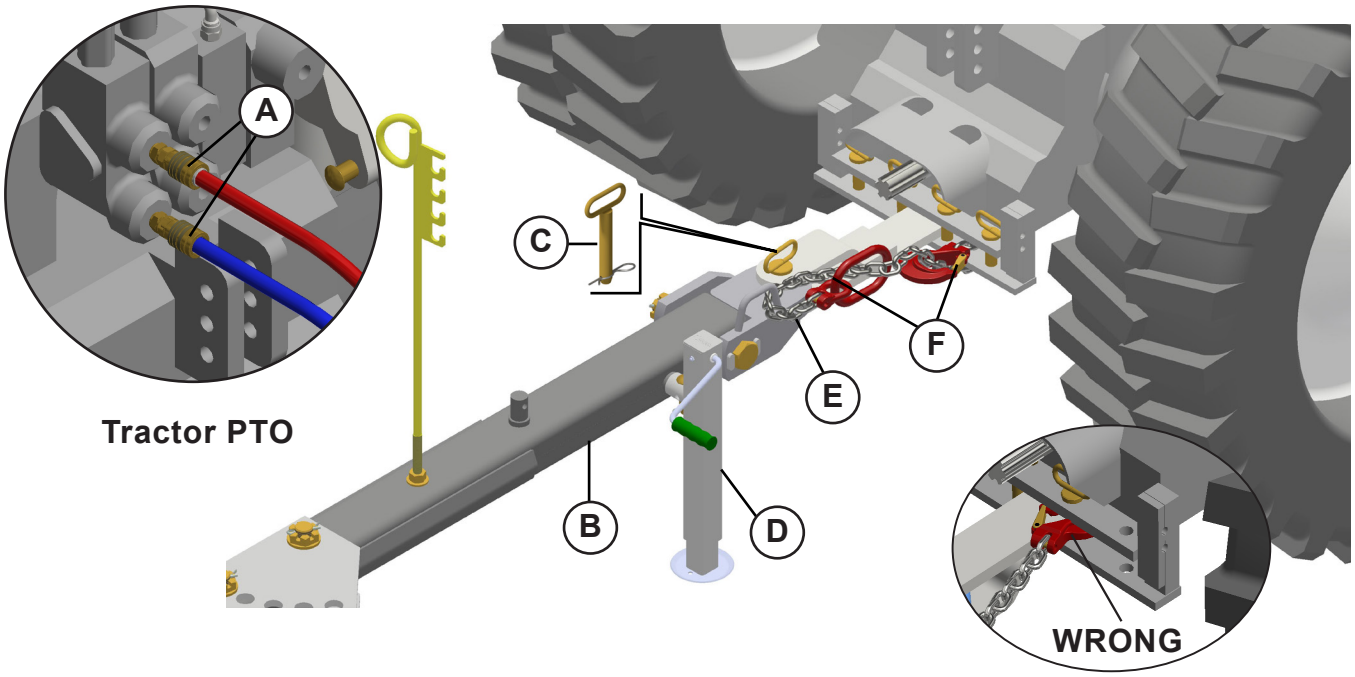
1. Clean up to remove strange objects from the equipment and from the working area;
2. Make sure that there is enough room to maneuver the tractor until it hitches to the equipment;
3. Turn on the tractor and slowly approach it to the hitching point direction;
4. Use a clean cloth or a paper towel to clean the couplers in the end of the hoses. Also, clean the area around the tractor couplers;

Preparing the equipment

5. Check the tires inflation and keep the pressure as stated on the 'tires inflation' page;
6. Lubricate all grease fittings appropriately (see the 'lubrication' page in the 'maintenance' section).

Hitching to the tractor

1. Approach the tractor and couple the hoses (A) to the quick couplers. To do so, shut down the engine, relieve the control valve pressure by activating the lever a couple of times and check if the quick couplers are clean.
2. Couple the drawbar (B) to the tractor drawbar by placing a pin and cotter pin (C). To facilitate hitching (24 - 40 disc blades model), use the parking jack (D) adjustment. Lock the chain (E) to the equipment and tractor to assure that they will not get loose, but leave a small clearance so that the disk harrow can perform maneuvers.



⚠ WARNING

• The correct way to hitch the safety chain (E) may vary according to the tractor model. However, the hitch and the hoop must pass through the chain links as shown on the detail (F). Never hitch the hook without passing it through the chain.

DANGER

• Only CAPABLE and AUTHORIZED personnel must carry out the adjustments and operations of the equipment.

• Observe every safety condition and use safety glasses, foot protection, earplugs/ muffs, protective gloves and any other required PPE.

• Do not carry out any adjustment while the equipment is working.

On-field adjustments

GAI disk harrow has an "OFFSET" type and it is well adjusted when the rear gang disc blades pass exactly at the center of the spacing of the front gang disc blades and when they have the same rotation, meaning that they will have the same number of turns in a determined area.

Cutting depth

The cutting depth can be adjusted following the next steps:

Disc gangs opening.

Increase the opening (A) angle between the gangs to work on soils that are harder to penetrate. In loose soils, the disc blades must penetrate less.

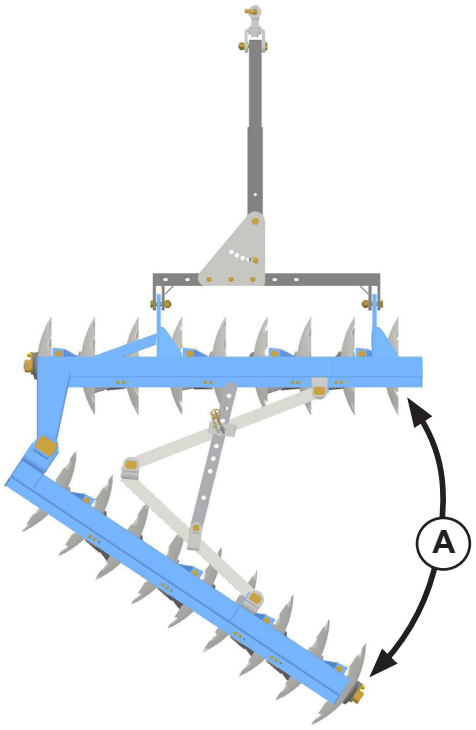
To open or close the disk harrow, activate the locking adjustment and move the disk harrow forward or backward until the desired point.

If the equipment is equipped with a hydraulic cylinder, the activation is done by the operator through the control valve.

Note that the disk harrow opening only changes the cutting angle of the rear gang.

WARNING

• The disk harrow activation to open or close the gangs must be done gradually, being the tractor in movement.



Increase the "A" angle for a greater penetration.

Decrease the "A" angle for a lesser penetration.

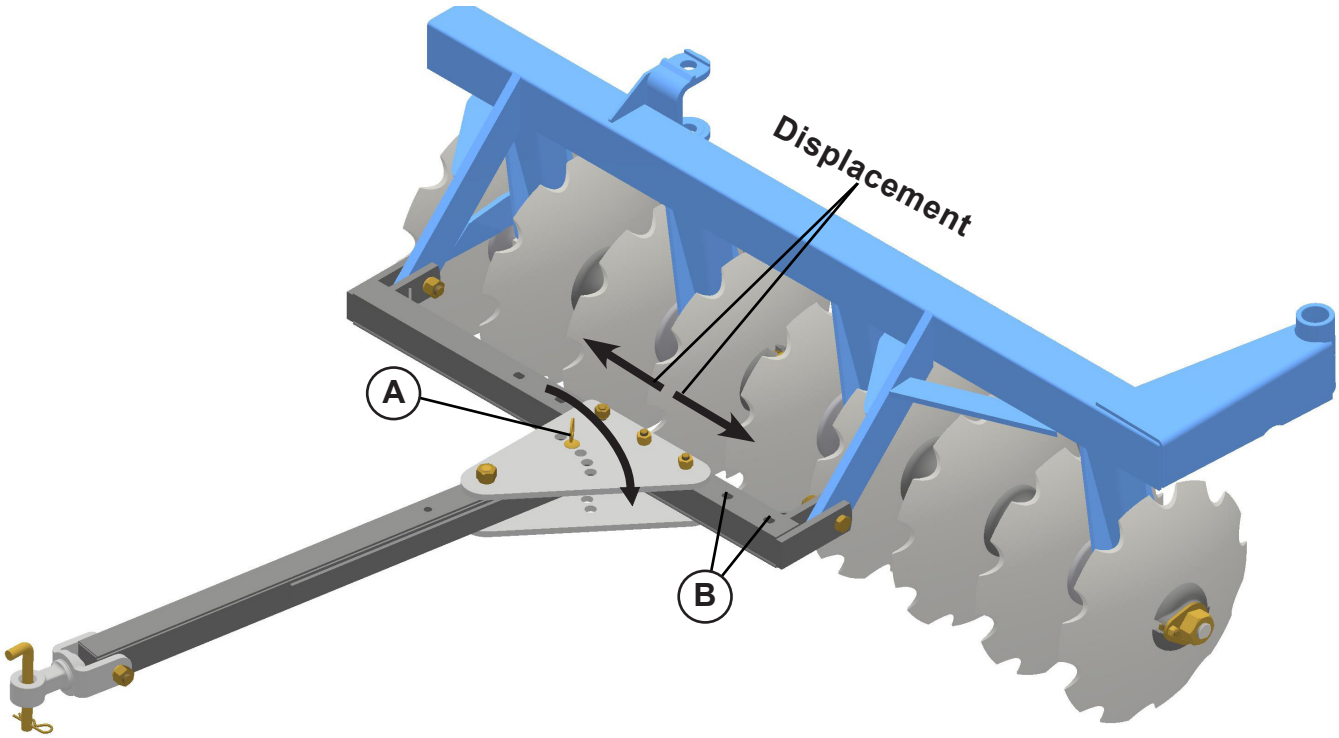
Cutting depth

Drawbar angle:

In medium soils, the drawbar works in the central hole of the upper and lower plates.

The first hole (A) is used to transport the disk harrow when there is a small angle of the disc blades to penetrate the soil. Move the bar to the other holes in order to increase the penetration.

Note that this adjustment changes the position of the tractor related to the previous pass.



WARNING

• Both adjustments described previously determine the cutting depth, so it is necessary to keep an accordance between them for a greater performance of the disk harrow.

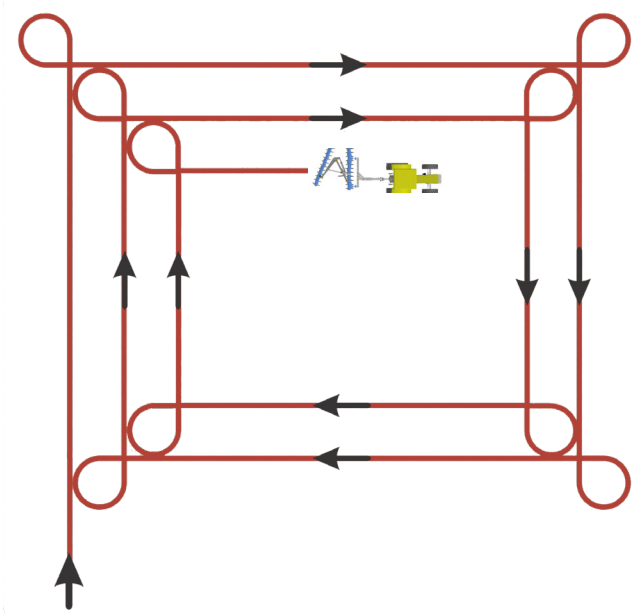
Lateral displacement

The lateral displacement can be done by the holes (B) and it is a resource used to position the tractor related to the furrow left by the previous pass and allow the operator to drive the tractor closer or farther from it to get a reference that will be useful.

Ways to start the harrowing

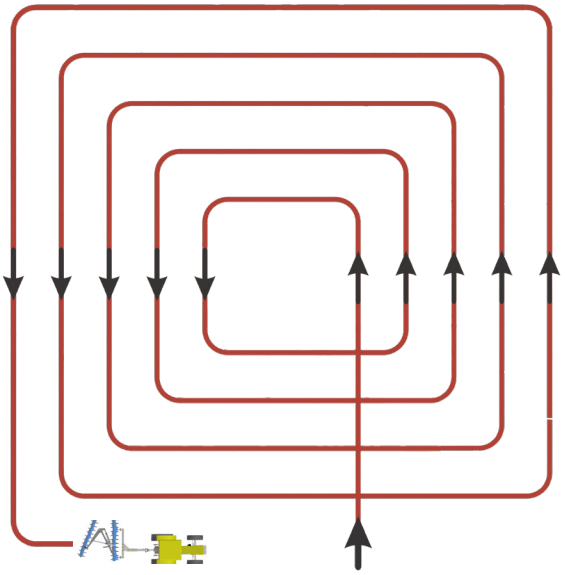
Regardless of the format and size of the field, the harrowing is made basically in two ways: from outside to inside or from inside to outside.

Harrowing in squares from outside to inside



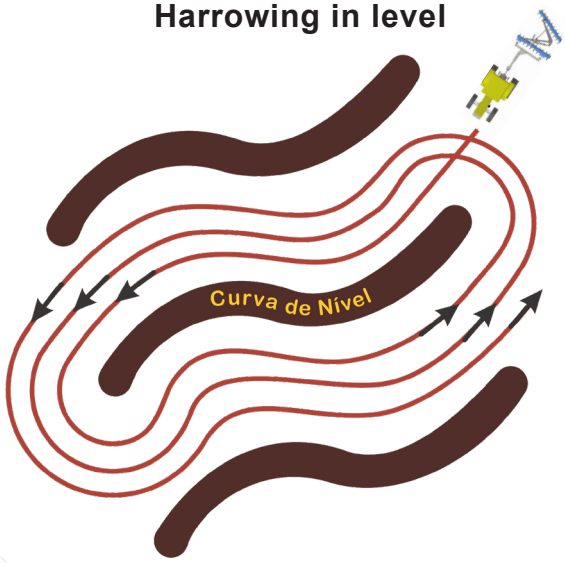
Entrance

Harrowing in squares from inside to outside



Entrance

Harrowing in level



Entrance

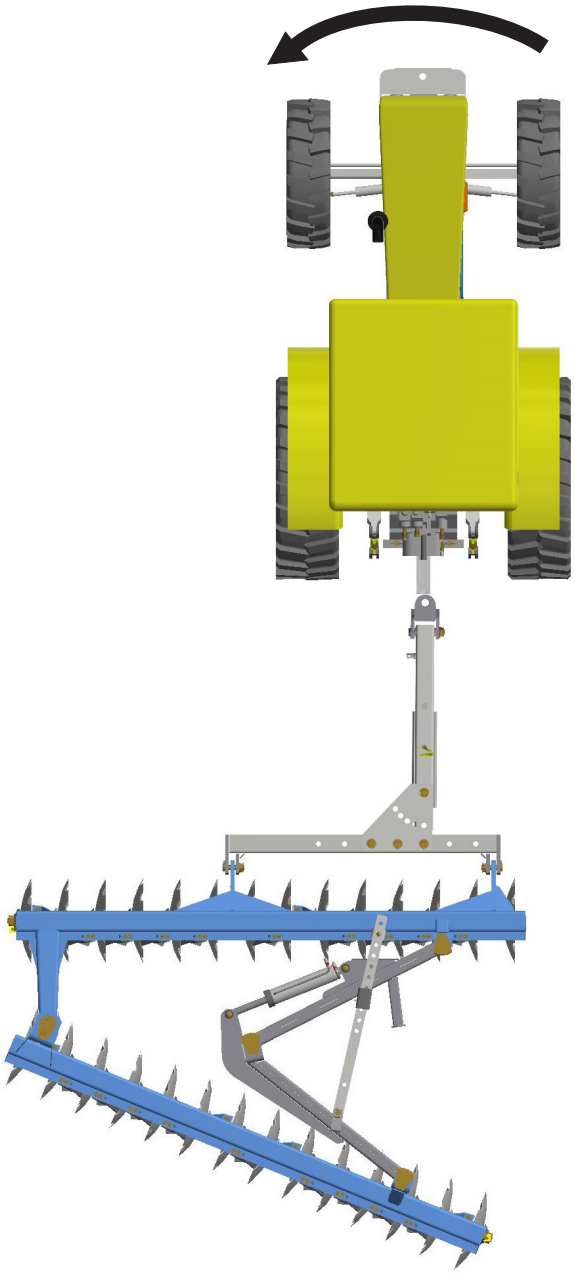
Exit

WARNING

- **Note that the harrowed ground is always on the left hand side of the operator.**
- **Being the disc gangs lowered, only maneuver to the left hand side.**

Direction of the maneuvers

As previously mentioned, this disk harrow provides several working angles to operate properly in all types of soil. However, this disk harrow requires certain care during operations, like never make maneuvers to the right hand side, because the angle formed on its vertex transmits great effort to the equipment, overloading traction components such as the hitch bar, the drawbar and other fixation parts.

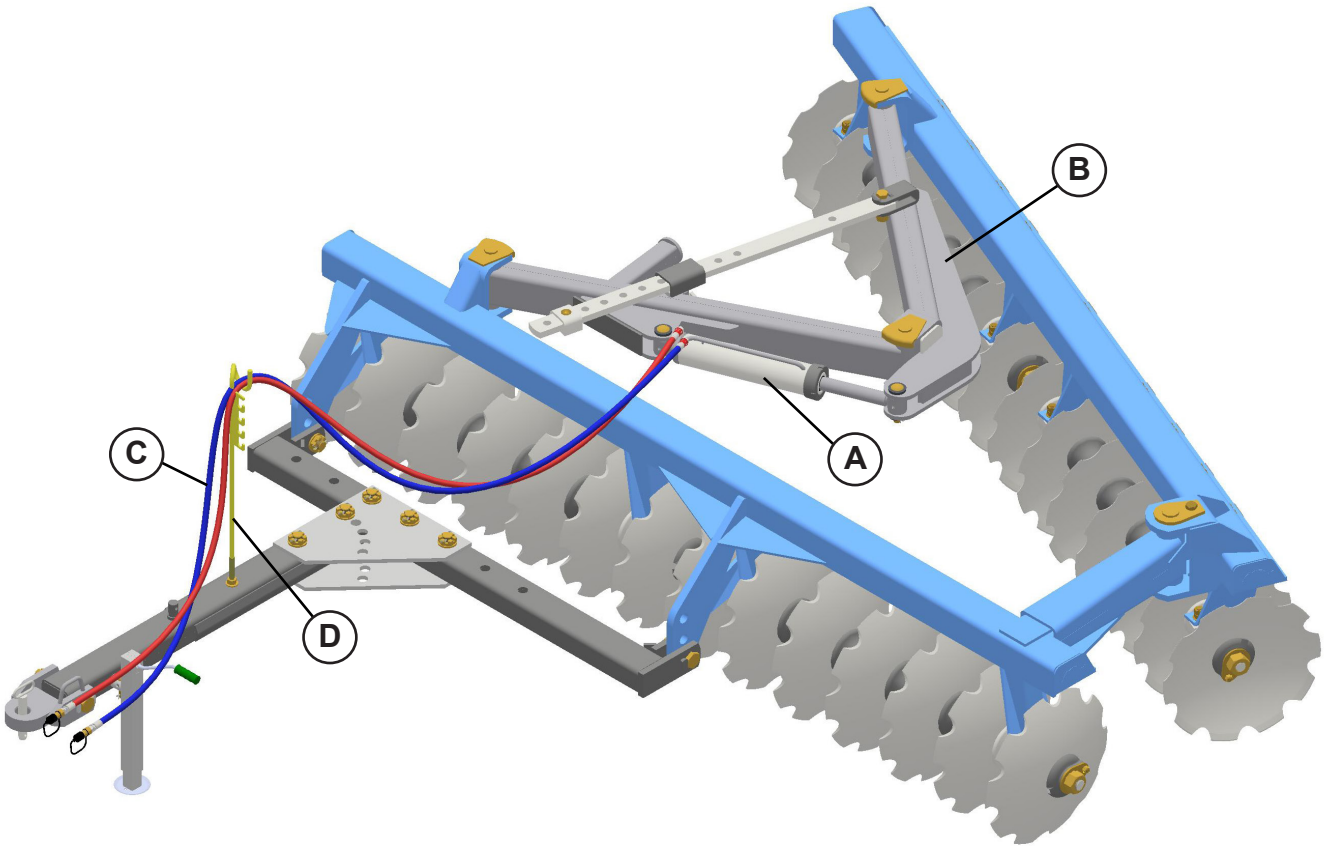


WARNING

• It is necessary to perform the maneuvers in the left side to avoid overloading the equipment and allow it to operate normally. Following these instructions also avoids the undesirable formation of large furrows in the local maneuvers.

Hydraulic cylinder to open or close the gangs

Marchesan supplies (as an optional part) a hydraulic cylinder (A), stabilizer bars (B), hoses (C) and hose support (D) to open or close the disc gangs on models with 16 - 24 disc blades. It is not necessary to change the stabilizer bars for models with 28 - 40 disc blades; just add the cylinder, hoses and hose support.



⚠ WARNING

- **The cylinder ports must remain facing up.**
- **Always use thread sealing tape to couple the male quick couplers to the hoses.**

DANGER

• Only QUALIFIED, CAPABLE and AUTHORIZED personnel must carry out the maintenance of the equipment.

• Every maintenance must follow the recommendations that are included on the NR-12 (July/19 version) on the chapter 'maintenance, inspection, preparation, adjustment and repairs' (from item 12.11.1 to 12.11.5).

• Observe every safety condition and use safety glasses, foot protection, earplugs/ muffs, protective gloves and any other required PPE.

• Remove the ignition key before carrying out any type of maintenance on the equipment. If the equipment is not properly hitched, do not start the tractor engine.

Lubrication

To reduce the wear caused by the friction caused by the moving parts of the equipment, it is necessary to carry out a proper lubrication, as indicated below:

a) Lubricate every grease fitting after 24 hours of service.

1. Be sure about the lubricant quality in relation to its efficiency and purity, avoiding the use of products contaminated by water, dirt or others.
2. Remove the remainder old grease around the articulations.
3. Clean the grease fittings with a cloth before inserting lubricant and replace the damaged ones.
4. Introduce enough amount of new grease.
5. Use medium consistency grease.
6. Use lithium soap based grease (NLGI2-EP grade), which has a high washing resistance and greater stability to oxidation.

b) The grease roller bearings must be done on the aforementioned period (24 hours).

c) The roller bearings with oil bath works in constant lubrication, but it is still necessary to give them the following attention:

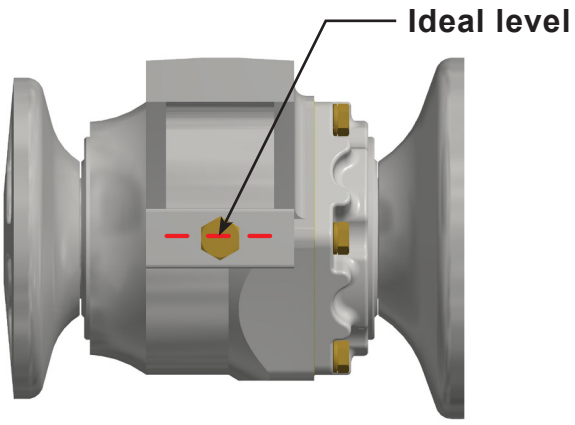
1. In a flat place, check the oil level of each bearing before using the disk harrow for the first time and every day of the first week.
2. Then, start to check weekly.
3. Change all the oil every 1,000 operating hours.
4. Use SAE 140 mineral oil only.

Lubrication

⚠ WARNING

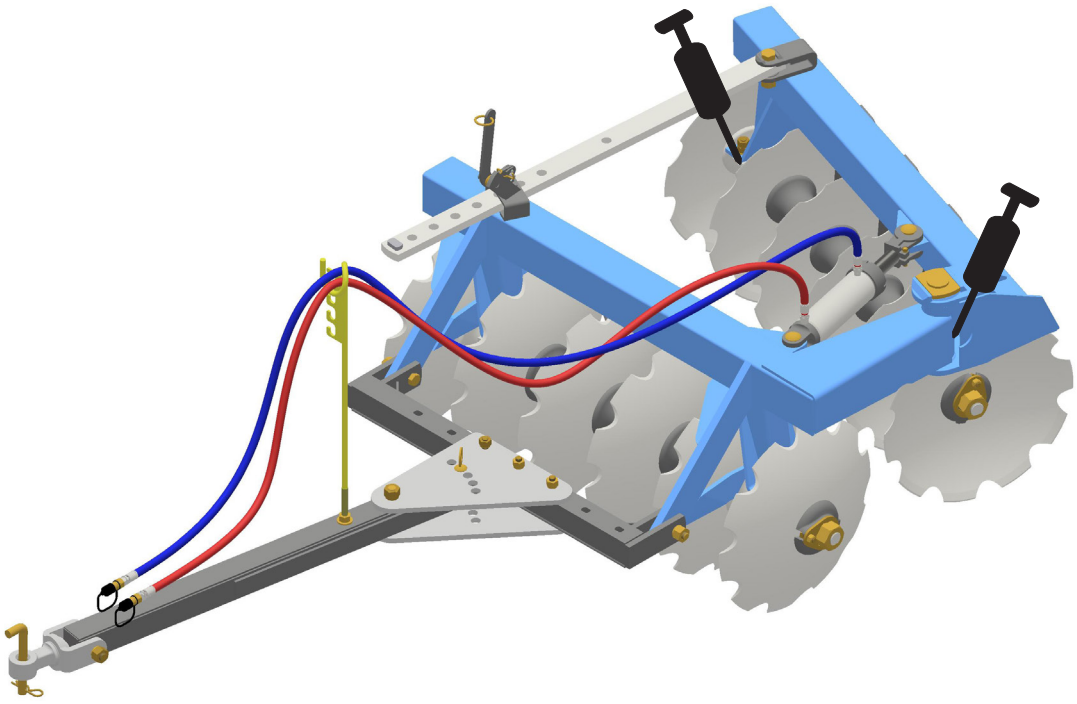
• The suitable level is when the oil reaches the hole of the plug, being the disk harrow in a flat place.

• The oil volume on the DM bearings is 190 ml.



Lubrication points

Lubricate every 24 working hours.

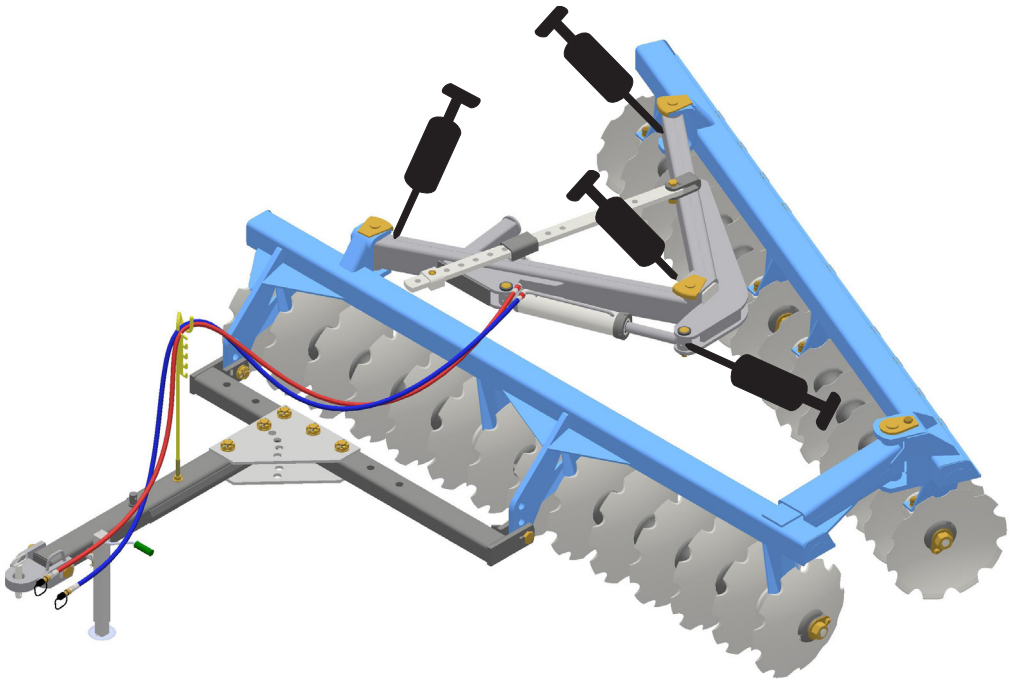


⚠ WARNING

• Lubricate the points shown above and all grease fittings as well.

Lubrication points

Lubricate every 24 working hours.



WARNING

- **Lubricate the points shown above and all grease fittings as well.**

Hydraulic cylinder maintenance

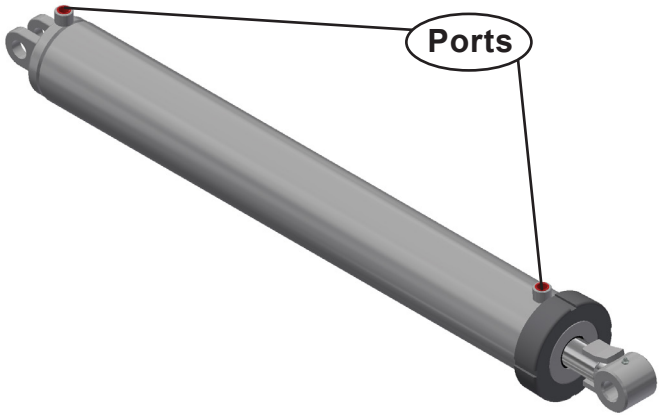
When cylinder repair is required, clean off unit, disconnect hoses and plug ports before removing cylinder.

When removed, open the cylinder ports and drain the cylinder's hydraulic fluid.

Examine the type of cylinder. Make sure you have the correct tools for the job.

You may require the following tools:

- Proper seal kit;
- Screwdriver and rubber cable;
- Pliers and wrenches.



DANGER

- **Never make any verification or maintenance if the system is pressurized.**

Disassembly:

1. Remove the end cap (A);
2. Carefully remove inner assemblies (B);
3. Disassemble the piston (C) removing the nut (D) on the rod;
4. Slide off gland assembly (E) and end cap (A);
5. Remove seals and inspect all parts for damage;
6. Install new seals and replace damaged parts with new components;
7. Inspect the inside of the cylinder barrel, piston, rod and other polished parts for burrs and scratches. Smooth areas as needed with an emery cloth.

WARNING

- **Do not clamp rod by chrome surface.**

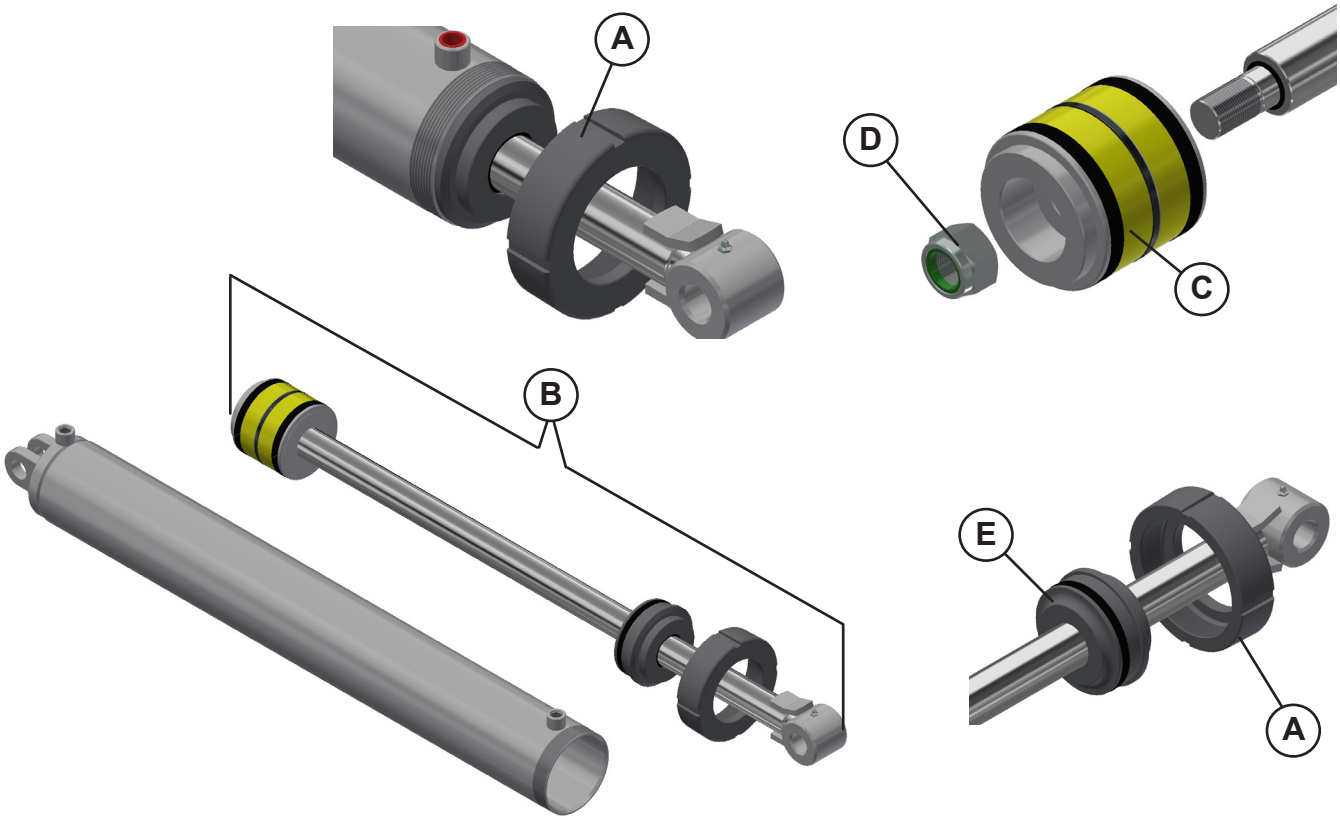
Hydraulic cylinder assembly

Reassembly:

1. Reinstall rod through gland assembly (E) and end cap (A);
2. Secure piston (C) to rod with nut (D). Torque lock nut to proper value (consult torque table on the "maintenance" section);
3. Lube inside of barrel, piston seals, and gland seals with hydraulic oil;
4. With cylinder body held gently, insert the inner assemblies (B) using a slight rocking motion;
5. Apply Loctite 277 before installing the cylinder end cap (A);
6. Torque cylinder end cap (A) to 400 lb.ft (600 N.m).

⚠ WARNING

• Insert the gland (E) on the cylinder head and align it with the tube so it will fit correctly on the cylinder barrel.



⚠ WARNING

• Do not clamp rod by chrome surface.

Hydraulic safety

1. Make sure that all components in the hydraulic system are kept in good condition and are clean.
2. Carry out the maintenance of the hydraulic parts on a clean place, free from dust or contaminants. Otherwise, there may have malfunction or premature wear on the equipment.
3. The correct operation and maintenance of the hydraulic system will prevent damages, air infiltration on the system, oil and system overheating, damages to the rubber components, etc.
4. Periodically or when the oil is replaced anormally or even when there is loss of power, inspect the hydraulic system, fasten the connections that are leaking, replace the hoses that are almost reaching its expiration date or if they show any cut, crack or dryness. Regarding the hoses assembly, do it in a way that they always can flex, without twisting or pulling it.
5. If there is any problem with the hydraulic cylinder, do not carry out any maintenance procedure or weld heating, as both of this may cause roundness on the barrel or other problems, consequently leading to internal leakages, lack of power, gripping, damages to the cylinder rods, etc.

DANGER

• Do not attempt any makeshift repairs to the hydraulic lines, fittings or hoses by using tape, clamps or cements. The hydraulic system operates under extremely high-pressure. Such repairs will fall suddenly and create a hazardous and unsafe condition.

• Wear proper hand and eye protection when searching for a high-pressure hydraulic leak.

6. Before applying pressure to the system, make sure all components are tight and that lines, hoses and coupling are not damaged.

WARNING

• If injured by a concentrated high-pressure stream of hydraulic fluid, seek medical attention immediately.

ATTENTION

• Carry out the operations on a carefully and controlled manner. Avoid to let the hydraulic system working when it is not being used.

• Failure to follow these procedures may lead to fatal accidents or even death.

Disk harrow maintenance

- During offseason wash the equipment, repair any damaged paintwork, protect the disc blades with oil and lubricate all grease fittings.

- The disc blades must be replaced as soon as they are providing a low yield, mainly because of the reduction in its diameter, loss of cut and other damages that may occur during the job.

- After 24 working hours, the bolts on the disk harrow must be checked to see if they are properly tightened. To assure a great performance and avoid wear and rupture, these bolts must be tightened every so often.

- Check wear occurence on all moving parts. Replace any part, if necessary.

- Replace the missing or damaged safety decals. The operator must know the need and importance to keep the decals in the proper place and in good conditions. The operator also have to know the need to follow the instructions, as the lack of safety may increase the risk of accidents.

- Always store the equipment on a dry place, protected from the rain and sunlight.

⚠ CAUTION

• Be careful with the dirt that may compromise your health.

• When carrying out cleaning or maintenance repairs, use adequate protective clothing, masks, protective gloves and articular protection.

⚠ WARNING

• Do not use chemical detergents to clean the equipment, as they may damage the paintjob.

• Never use corrosive or abrasive subtances to clean or to handle any part of the equipment. Such products may damage the equipment and their systems due to their high chemical content.

• When any component is disassembled and is not going to be used anymore, send that part to a company that could recycle it and that respects the local law to avoid causing damages to the environment.

• Use TATU original parts only.

Important recommendations

- Retighten nuts and bolts after the first day of work and check the conditions of all pins and cotter pins. Then, retighten every 24 operating hours.
- Carefully observe the lubrication intervals.
- Special attention should be given to the disc gangs, retightening daily during the first week of use. Then, retighten periodically.
- Choose a gear that allows the tractor to maintain certain power reserve, ensuring against unforeseen efforts.
- Speed is relative to the tractor gear and can only be determined by local conditions. We adopted an average 5 to 7 km/h, which is not advisable to overcome to maintain service efficiency and avoid possible damages to the equipment.
- It is important to keep a constant speed during the whole operation.
- Only people who own a complete knowledge of the tractor and equipment must operate them.
- Be on a wide field and maneuver on slow gear to hitch the equipment, being ready to brake when necessary.
- Remove sticks or any object that may get stuck on the disc blades.
- The tractor drawbar must oscillate during working and transportation.
- Only pull the equipment using a tractor with enough power.
- During working or transportation, do not allow passengers on the tractor or equipment.
- Always keep the equipment centralized related to the tractor and leveled related to the soil.
- To carry out any verification on the equipment, lower it to the ground and shut down the tractor engine.
- Whenever unhitching the equipment (either on the field or shed), do it on a flat and firm place.Make sure the equipment is properly supported.
- Carry out the operations on a controlled and careful manner.
- Relieve the control valve pressure before disconnecting the quick couplers and when doing any verification in the hydraulic circuit or on the retention valve.
- Do not check eventual leaks using your bare hands, as the high pressure may cause body injury. Use a cardboard or any other suitable object.
- As previously mentioned, this disk harrow has several settings. However, only the local conditions can determine its best adjustment.

⚠ CAUTION

• Note the safety, care and maintenance indications.

• This equipment was designed and assembled for maximum performance, economy and easiness on the operations, under a variety of functioning conditions.

• In order to keep a functioning without any problems, make sure that the cares, the cleaning and the maintenance intervals are being respected.

Troubleshooting guide

PROBLEM	CAUSES	POSSIBLE SOLUTIONS
Tractor steering wheel pulling to the right.	Too much angle on the front gang or too small on the rear gang.	Reduce the angle from the front gang or increase the angle from the rear gang.
	Drawbar touching the stop to the left.	Move the drawbar to the left.
Disc gangs are not on harrowing level.	Front and rear disc gangs are not operating on the same depth.	Adjust the angle of the disc gangs.
Furrow opened on the left side.	Speed is too low for the soil conditions.	Increase the speed.
	Tractor being positioned far on the right.	Position the tractor in a way that the front disc on the left pass on the edge of the furrow.
	Incorrect adjustment of the disc gangs laterally.	Move the rear disc gang to the left or the front disc gang to the right.
Windrows forming on the left side.	Insufficient overlapping. Incorrect rear disc gang adjustment.	If windrows are forming, move the front disc gang to the left or the rear disc gang to the right.
Quick couplers do not adapt.	Different type of quick couplers.	Use male and female quick couplers from the same type.
Hoses leaking with fixed terminals.	Insufficient tightening.	Retighten carefully.
	Lack of sealing material on the thread.	Use thread sealing tape and retighten carefully.

WARNING

• Only CAPABLE, QUALIFIED and AUTHORIZED personnel must carry out the maintenance of the equipment.

Troubleshooting guide

PROBLEM	CAUSES	POSSIBLE SOLUTIONS
Hydraulic cylinder leaking.	Damaged repairings.	Replace the repairings.
	Damaged rod.	Replace the rod.
	Oil with impurities.	Replace the oil, repairings and filter elements.
	Working pressure superior than the recommended one.	Adjust the control valve using the relief valve with the aid of a pressure gauge. Normal pressure: 180 Kgf/cm^2.
Hoses leaking with fixed terminals.	Insufficient tightening.	Retighten carefully.
	Lack of sealing material on the thread.	Use thread sealing tape and retighten carefully.
	Damaged repairings.	Replace the repairings.
Locked disc gangs.	Wet field.	Let the field dry out or penetrate the disc blade superficially to help the drying process.
	Maximum angle on the disc gangs adjustment.	Reduce the angle.
	Deep penetration on wet soil.	Use the depth stops to decrease the depth.
		Lift the disc blade to reduce the penetration.
	Worn out / incorrectly adjusted scrapers.	Adjust or change the scrapers when necessary.

⚠ WARNING

• Only CAPABLE, QUALIFIED and AUTHORIZED personnel must carry out the maintenance of the equipment.

Hourly income calculation

To calculate the hourly income, use the following calculation:

$$\mathbf{R} = \frac{L \times V \times E}{X}$$

Where:

R = Hourly income;

L = Disk harrow working width (meters);

V = Average speed of the tractor (meters per hour);

E = Efficiency: 0.90;

X = Hectare value = 10,000 m^2.

Example with a GAI (20 disc blades):

R = ?

L = 2.57 m

V = 6,000 m/h

E = 0.90

X = 10,000 m^2

$$\mathbf{R} = \frac{2.57 \times 6{,}000 \times 0.90}{10{,}000}$$

R: The hourly income working with an equipment that has 20 disc blades will be approximately of 1.39 hectares per hour.

⚠ WARNING

• The disk harrow hourly income can vary by physical factors such as humidity, slope, soil hardness, appropriate adjustments and especially the working speed.

Based on this calculation, the table on the following page shows the average hourly income and also for a day, that is, nine (9) hours of work.

Average income table

Model	Number of disc blades	Cutting width (m)	Hourly income (ha)	Daily income (ha)
GAI	12	1.50	0.81	7.29
	14	1.75	0.95	8.51
	16	2.00	1.08	9.72
	18	2.30	1.24	11.18
	20	2.57	1.39	12.49
	24	3.11	1.68	15.11
	28	3.65	1.97	17.74
	32	4.18	2.26	20.31
	36	4.72	2.55	22.94
	40	5.25	2.84	25.52

⚠ WARNING

- **An average speed of 6 km/h was assumed to prepare the table above.**

To know how many hours will be spent to work a certain previously known area, it is necessary to divide the value of the area by the hourly income.

Example: An area of 50 hectares to be worked with a GAI that has 20 disc blades (hourly income = 1.39 hectares).

So: $\frac{50}{1.39} = 35.97$

Approximately will be spent 36 (thirty-six) hours to work in an area of 50 hectares.

Torque table

The table below gives correct torque values for various bolts. Tighten all bolts to the torques specified in chart unless otherwise noted. Check the tightness of bolts periodically, using this bolt torque chart as a guide. Replace hardware with the same strength (grade/ class) bolt.

TATU MARCHESAN

TORQUE TABLE

civemasa

Bolt Size (Inches) (a)	Grade 2		Grade 5		Grade 8	
	Lbs-ft (b)	N.m (c)	Lbs-ft	N.m	Lbs-ft	N.m
1/4" - 20	5,5	7,5	8,5	11,5	12	16,3
1/4" - 28	6	8,1	9,5	12,9	14	19,0
5/16" - 18	10,5	14,2	17,5	23,7	24,5	33,2
5/16" - 24	12	16,3	19,5	26,4	27,5	37,3
3/8" - 16	19,5	26,4	31,5	42,7	44	59,7
3/8" - 24	22	29,8	35	47,5	50	67,8
7/16" - 14	31	42,0	50	67,8	70,5	95,6
7/16" - 14	34,5	46,8	56	75,9	79	107,1
1/2" - 13	47	63,7	76	103,1	107,5	145,8
1/2" - 20	53,5	72,5	86	116,6	121,5	164,8
9/16" - 12	68	92,2	110	149,2	155	210,2
9/16" - 18	76	103,1	122,5	166,1	173	234,6
5/8" - 11	94	127,5	151,5	205,4	214,5	290,9
5/8" - 18	106,5	144,4	171,5	232,6	242,5	328,8
3/4" - 10	167	226,5	269,5	365,4	380,5	516,0
3/4" - 16	186	252,2	300	406,8	424,5	575,6
7/8" - 9	169,5	229,8	434	588,5	612,5	830,6
7/8" - 14	187	253,6	478,5	648,8	676,5	917,3
1" - 8	254,5	345,1	650	881,4	918,5	1.245,5
1" - 12	285,5	387,1	729,5	989,2	1031	1.398,0
1.1/8" - 7	360,5	488,8	921,5	1.249,6	1302	1.765,5
1.1/8" - 12	404,5	548,5	1033,5	1.401,4	1460	1.979,8
1.1/4" - 7	508,5	689,5	1300	1.762,8	1837,5	2.491,7
1.1/4" - 12	563,5	764,1	1439,5	1.952,0	2034,5	2.758,8
1.3/8" - 6	667	904,5	1704,5	2.311,3	2408	3.265,2
1.3/8" - 12	759,5	1.029,9	1940	2.630,6	2741,5	3.717,5
1.1/2" - 6	885,5	1.200,7	2262,5	3.068,0	3197	4.335,1
1.1/2" - 12	996	1.350,6	2545,5	3.451,7	3597	4.877,5

a) Nominal thread diameter in inches-threads per inch
b) Foot pounds
c) Newton-meters
d) Nominal thread diameter in millimeters x thread pitch

Bolt Size (Metric) (D)	4.6		8.8		10.9	
	Lbs-ft	N.m	Lbs-ft	N.m	Lbs-ft	N.m
M5 x 0.8	2,5	3,39	5	6,78	8,5	11,526
M 6 x 1	3	4,068	8	10,85	11,5	15,594
M 6 x 0.75	3,5	4,746	8,5	11,53	13	17,628
M 8 x 1.25	7	9,492	19,5	26,44	28	37,968
M 8 x 1	8	10,848	21	28,48	30,5	41,358
M 10 x 1.5	14	18,984	38,5	52,21	56	75,936
M 10 x 1	16	21,696	43	58,31	63	85,428
M 12 x 1.75	25	33,9	66,5	90,17	98	132,888
M 12 x 1.25	27	36,612	73	98,99	107,5	145,77
M 14 x 2	40	54,24	107	145,09	156,5	212,214
M 14 x 1.5	43	58,308	115,5	156,62	169	229,164
M 16 x 2	62	84,072	165,5	224,42	243,5	330,186
M 16 x 1.5	66,5	90,174	177	240,01	260	352,56
M 18 x 2.5	86	116,616	229	310,52	336	455,616
M 18 x 1.5	96,5	130,854	257	348,49	378	512,568
M 20 x 2.5	121,5	164,754	323,5	438,67	475	644,1
M 20 x 1.5	134,5	182,382	359	486,80	527	714,612
M 22 x 2.5	165,5	224,418	441	598,00	647,5	878,01
M 22 x 1.5	182	246,792	484	656,30	711,5	964,794
M 24 x 3	210	284,76	559	758,00	821	1113,276
M 24 x 1.5	238,5	323,406	636	862,42	933,5	1265,826
M 27 x 3	307	416,292	820	1111,92	1204	1632,624
M 27 x 1.5	344	466,464	918	1244,81	1348,5	1828,566
M 30 x 3.5	416,5	564,774	1111,5	1507,19	1632,5	2213,67
M 30 x 1.5	477,5	647,49	1273	1726,19	1870	2535,72
M 33 x 3.5	567	768,852	1512,5	2050,95	2221,5	3012,354
M 33 x 1.5	641,5	869,874	1709,5	2318,08	2511	3404,916
M 36 x 4	729	988,524	1943	2634,71	2854	3870,024
M 36 x 1.5	838,5	1137,006	2236	3032,02	3284	4453,104
M 39 x 4	943	1278,708	2515	3410,34	3693,5	5008,386
M 39 x 1.5	1073	1454,988	2860,5	3878,84	4201,5	5697,234

Values are for reference and are based on average steel-to-steel friction conditions.

⚠ ATTENTION

• **MARCHESAN reserves the right to make improvements in the design, material or specifications of machinery, equipment or parts at any time, without thereby becoming liable to make similar changes in machinery, equipment or parts previously sold.**

• **Images are for illustration purposes only.**

• **Some illustrations in this manual appear without the safety devices, removed to allow a better view and detailed instructions. Never operate the equipment without these safety devices.**

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May, 2023

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ATENÇÃO

- RECOMENDAÇÕES GERAIS DE SEGURANÇA -

1 - Apenas pessoas que possuem o completo conhecimento do trator e dos implementos devem conduzi-los.

2 - Para engatar os implementos, faça as manobras em marcha lenta, em local espaçoso e esteja preparado para aplicar os freios.

3 - Para acoplamento na tomada de força, desligue o motor do trator.

4 - O motor não deve funcionar em locais sem o ideal arejamento, devido à toxidade dos gases expelidos.

5 - Faça todos os lastreamentos necessários para tracionar equipamentos que os exigem, assim as operações tornam-se mais seguras.

6 - Em operações com o trator estacionado, trave os freios e calce as rodas.

7 - Todas as peças móveis como correias, polias, engrenagens etc. merecem cuidados especiais.

8 - Vista roupas e calçados adequados para a operação das máquinas e implementos agrícolas.

9 - Não permita que demais pessoas acompanhem o operador no trator ou no implemento.

10 - O uso das roçadeiras exige cuidados especiais. Não permita a aproximação de pessoas ou animais durante o serviço.

11 - Não efetue regulagens com o implemento em funcionamento.

12 - Não permita que crianças brinquem sobre ou próximo o implemento estando o mesmo em operação, transporte ou armazenado.

13 - A velocidade de operação deve ser cuidadosamente controlada.

14 - Em terreno inclinado mantenha a estabilidade ideal. Em início de desequilíbrio abaixe a aceleração e não levante o implemento.

15 - Os implementos de controle hidráulico devem ser abaixados até o solo e aliviados da pressão antes de desconectar qualquer tubulação.

16 - Não verifique vazamentos nos circuitos hidráulicos com as mãos. A alta pressão pode provocar lesões corporais, use papelão.

17 - No término do trabalho, os implementos deverão ser desengatados e devidamente apoiados no solo ou sobre cavaletes, não podendo ficar suspensos pelo hidráulico do trator.

18 - Não transite em rodovias ou estradas pavimentadas.

19 - Os implementos agrícolas tais como grades, arados e outros possuem normalmente órgãos ativos afiados, com bordas cortantes que oferecem riscos de acidentes mesmo quando não estão operando. Portanto, estes devem ser mantidos em local apropriado, devidamente apoiados no solo e impedindo-se o acesso de crianças e pessoas alheias ao manuseio dos mesmos.

20 - Para estacionar o trator, desligue o motor, neutralize a ação dos comandos e aplique os freios.

ATENCION

- RECOMENDACIONES GENERALES DE SEGURIDAD -

1 - Solamente personas con el completo conocimiento del tractor y de los implementos deben conduzirlos.

2 - Para enganchar los implementos, proceda con maniobras en marcha lenta, en local con espacio y este preparado para aplicar los frenos.

3 - Para acoples en la toma de potencia apague el motor del tractor.

4 - El motor no debe funcionar en locales sin ventilación suficiente debido la toxicidad de los gases expelidos.

5 - Proceda con los lastres necesarios para traccionar equipos que asi exigir de esta manera, las operaciones se tornan mas seguras.

6 - En operaciones con el tractor estacionado (parqueado) trabar los frenos y las ruedas.

7 - Todas las piezas movibles como: bandas, poleas, engranajes, etc... necesitan cuidados especiales.

8 - Vestir ropas y calzados adecuados para operación de las máquinas e implementos agrícolas.

9 - No permita que otras personas acompañen el operador en el tractor o en el implemento; salvo si posee asiento adecuado.

10 - El uso de las rotativas (cortamalezas) exige cuidados especiales. No permita la aproximación de personas o animales durante el trabajo.

11 - No efectuar regulajes con el equipo en funcionamiento.

12 - No permitir que niños jueguen sobre o próximo de los equipos, en operación, durante el transporte o almacenado.

13 - La velocidad de operación debe ser cuidadosamente controlada.

14 - En terreno inclinado mantenga la estabilidad ideal. En inicio de desequilibrio baje la aceleración y no levante el implemento.

15 - Los implementos de control hidráulico deben ser rebajados hasta el suelo y aliviar la presion antes de desconectar cualquier tuberia.

16 - No verificar filtraciones en los circuitos hidráulicos con las manos, la alta presión puede provocar lesiones corporales, use carton u otro objeto adecuado.

17 - Después del termino del trabajo, los equipos deberán ser desenganchados y debidamente apoyados en el suelo o sobre caballetes, aliviando el hidráulico del tractor.

18 - No transitar en carreteras o caminos pavimentados.

19 - Los implementos agrícolas, como: rastras, arados y otros, tienen normalmente organos activos afilados, con bordes cortantes que ofrecen riesgos de accidentes, aún cuando detenidos, por lo tanto, estos deben ser mantenidos en local apropriado, debidamente apoyados en el suelo e impidiendo el acceso de niños y personas ajenas al uso de los mismos.

20 - Para estacionar (parquear) el tractor, apague el motor, neutralice la acción de los comandos y aplique los frenos.

ATTENTION

- GENERAL RECOMMENDATION ABOUT SAFETY -

1 - Only person who owns a full knowledge of tractor and implements must operate them.

2 - Take care to prevent injury to the hands or fingers when hitching the implement to the tractor.

3 - Always shut the tractor off before connecting the power take off.

4 - Never turn on the tractor engine within not aired places, due to toxic gases expelled.

5 - Before start the season it is necessary to prepare adequately the tractor and the implement to make the operations safer.

6 - Lock the tractors parking brake and block the wheels before dismounting the tractor for service or to make adjustments.

7 - Never allow riders to accompany the operator on tractor or implement, except if there is an adequate seat.

8 - Be sure that everyone is standing clear before operating the agricultural implement or machinery.

9 - Use extreme caution and wear gloves when handling the disc blades or gang assemblies.

10 - Wear adequate clothes and shoes to operate agricultural implements and machinery.

11 - Do not attempt to make adjustments when the unit is running.

12 - Disconnect the hydraulic hoses from breakaway couplers after bleeding off the system.

13 - Always block-up raised equipment when servicing. Never rely on the hydraulic system.

14 - The speed must be controlled when transporting the implement on rough roads, bridges, steep grades or any other adverse conditions.

15 - Lower the implement or machinery completely to the ground before unhitching from the tractor.

16 - Before making any inspection on hydraulic hoses for leaks, cycle the hydraulic cylinders several times to purge entrapped air from the system.

17 - When the tractor is equipped with swinging drawbar, lock the drawbar in the fixed position.

18 - Agricultural implements such as: disc harrows, disc ploughs and others have disc blades that are sharp and could cut hands, feet etc, even when they are not in operation. In other to avoid serious accidents, use chock blocks to prevent the gang assembly from rolling surfaces before assembly to the frame. Wear gloves when handling the blades or gang assemblies.

19 - On the transport of the harrow, always install transport lock devices.

20 - When parking the tractor, turn the engine off, lock the tractors parking brake and remove the key.

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