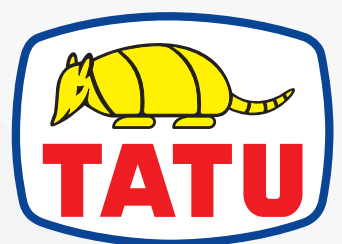


GH²

OPERATOR'S MANUAL



MARCHESAN

IDENTIFICATION

Dealer: _____

Owner: _____

Firm / Farm: _____

City: _____ State: _____

No. of the Certificate of Guarantee: _____

Serial / No.: _____

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

Product: _____

Notes: _____

[illegible]

This operator's manual helps on the assembly process and provides the necessary information for the correct operation and maintenance, thus assuring a higher yield, safety and durability. This manual contains the necessary information for the best performance of your equipment. The operator and the maintenance staff must carefully read the entire manual before working with the equipment. They must also read and understand the safety recommendations.

For any further explanation or in the case of technical problems that may arise during the service, consult your dealer and the Technical support department of the factory, as they can ensure the fully functioning of your TATU equipment.

We reiterate that a careful read and an observation of every item on this manual are needed to assure a greater lifetime of your equipment.



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

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1. To the owner

The acquisition of any Tatu product assures to the original purchaser the following rights:

- Warranty certificate;
- Operator's manual;
- Technical assistance by the dealer on equipment delivery.

However, the owner must check the condition of the equipment on delivery, as well as knowing the warranty terms.

Special attention should be given to the safety recommendations, operation precautions and maintenance of the equipment.

The instructions in this manual indicates how to get the best performance and allow the operator to get maximum income, increasing the equipment lifetime.

This manual should be read by operators and maintenance staff.



IMPORTANT!

- Only people who own a full knowledge of the tractor and equipment must transport, operate and carry out any maintenance on them;
- Marchesan is not responsible for any damage caused by accident on transporting, misuse or inadequate storage, either by negligence and/or lack of experience from any person;
- Marchesan is not responsible for any damage caused by unpredictable situations or for the incorrect use of the equipment.

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.

MODELO MODEL			
Nº SÉRIE SERIAL NR			
DATA DATE		PESO WEIGHT	
MARCHESAN IMPLEMENTOS E MÁQUINAS AGRÍCOLAS "TATU" S.A. www.marchesan.com.br AV. MARCHESAN, 1979 - MATÃO-SP-BRASIL CNPJ: 52.311.289/0001-63			

NOTE

- 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.

2. To the operator

Be careful with the environment



Dear operator!

Respect the ecology. Do not throw trash away. This gesture of goodwill helps to protect our environment.



Products such as oil, fuel, filters, batteries and others are spilt over the soil and can penetrate to the underground layers, compromising nature. Ecological and conscious disposal of them should be done.

Working safely

This equipment is simple to operate, requiring however the basic and essential cautions to its handling.

Always keep in mind that safety requires constant attention, observation and prudence during work, transportation, maintenance and storage. **The security aspects must be carefully observed to avoid accidents.**



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!

2. To the operator

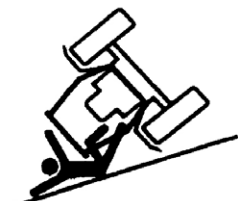
Working safely



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.



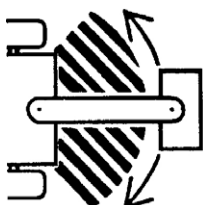
Be careful while driving on slopes. Risk of overturn.



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.



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

2. To the operator

Working safely



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 strictly forbidden.



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



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.



Keep away from the moving elements of your equipment, as they may be sharp and cause accidents. Always use protective gloves.



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

2. To the operator

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, 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.

NOTE

- Only certified PPE must be used.

2. To the operator

General and mandatory safety measures



1. Only trained and qualified personnel are allowed to operate the equipment.
2. While working or during transportation, only the presence of the operator is allowed on the tractor.
3. Do not allow any passengers on the equipment.
4. Do not allow children to play or to get over the equipment while it is operating, during transportation or storage.
5. When setting the equipment to transport position, check if there are no people or animals close or under it.
6. Use personal protective equipment (PPE).
7. Wear appropriate clothes and footwear. Avoid tight or hanging clothes that may become entangled to the moving parts of the equipment.
8. Never operate the equipment without its **protective devices**.
9. Have full knowledge of the soil before starting to work. Use the speed which is suitable to the conditions of the ground or pathways to be covered. Provide the delineation of obstacles or hazardous locations.
10. Carefully check the transport width on narrow locations.
11. Be careful while hitching the equipment to the tractor.
12. Only pull the equipment using a tractor with appropriate power.
13. Do not drive the equipment under the influence of alcohol or any soothing/ stimulating medicine, as it may result in a serious accident.
14. In case of a fire outbreak or any possible hazard, the operator must leave the area as fast as possible and look for a safe place. Always have emergency numbers in hands.
15. In case of emergency, know how to stop the tractor and equipment quickly.

2. To the operator

General and mandatory safety measures



16. Always shut down the engine, remove the key and use the handbrake before leaving the tractor seat.
17. Never attempt to change the adjustments, clean or lubricate the equipment while it is moving.
18. Whenever unhitching the equipment, either on the field or shed, do it on a flat and firm surface. Make sure that the equipment is properly supported.
19. We suggest that you carefully read the manual, as it will be a guide for periodic verifications that need to be done and will allow that you assure the maintenance of your equipment.
20. Fasten the safety chain between the tractor and equipment.
21. Do not allow any person or animal to get under the equipment at any time.
22. If there is any doubt after reading it, ask your dealer. For more complicated operations, there will be the right person to help you there.
23. Please check the general safety instructions on the back cover of this manual.

2. To the operator

Transportation over truck or trailer

Marchesan does not advise the equipment traffic on highways, because this practice involves serious security risks in addition to being prohibited by the current existing traffic law. The transportation for long distances should be done on truck, trailer or others by following these safety guidelines:



1. Use adequate ramps to load or unload the equipment. Do not make the loading on ditch banks, it can cause a serious accidents.
2. When lifting with a hoist, use the appropriate points to lift.
3. Fasten the moving parts that may get loose and cause accidents.
4. Underpin the equipment wheels appropriately.
5. Use chock blocks and safety chains to secure the equipment to the truck or trailer during the transport.
6. Stay away from the straps, cables or chains that are working under load.
7. Make sure the SMV (Slow moving vehicle) sign, and all the lights and reflectors that are required by the local highway and transport authorities are in place, are clean and can be seen clearly by all overtaking and oncoming traffic.
8. After 8 to 10 km transporting, please inspect the load condition. Repeat this procedure every 80 to 100 km. Give more attention when transporting the equipment on rough roads, slopes and other adverse conditions.
9. Always be careful with the load height, especially when passing under electrical power lines, bridges and others.
10. Check all laws and regulations regarding the height limits and load width while transporting the equipment on truck or trailer. If necessary use banners, lights and other devices to give adequate warning to the other drivers.

2. To the operator

Working safety standards

It is important to have knowledge not only about the functioning, operation of the equipment and its technology, but also the working legal aspects when using the equipment, such as: safety standards, operator's manual and working safety. The equipment and tools used on the rural area must be properly handled, otherwise health and safety of involved personnel may be compromised.

The operator must be capable and authorized to operate the tractor, meaning that that person must comprehend the functioning instructions of the tractor and know about the safety standards regarding the job that will be performed.

The Ministry of Labor and Employment created safety standards that aim to decrease the risk of accidents that may occur to the rural worker. Related to the subject of agricultural machines and equipments, we specifically cited the **NR 06**, **NR 12**, **NR 17** and **NR 31** standards.

Regulatory Standard - **NR 06**:

- For purposes of applying this Regulatory Standard, personal protective equipment (PPE) is considered any device or product that is worn by an individual worker for protection against risks that could threaten safety and health at work.

Regulatory Standard - **NR 12**:

- This Regulatory Standard and its annexes provide technical references, basic principles and protective measures to ensure the health and physical integrity of workers and establishes minimum requirements for the prevention of accidents and occupational diseases in the design stages and use of machinery and equipment of all kinds, and also to its manufacture, importation, trading, exhibition and cession in any way. It is understood as using phase the construction, transportation, assembly, installation, adjustment, operation, cleaning, maintenance, inspection, disabling and dismantling of machinery or equipment.

Regulatory Standard - **NR 17**:

- The purpose of this Regulatory Standard is to establish parameters for the adaption of the working conditions to the psycho-physiological characteristics of the workers in order to provide maximum comfort, safety and efficient performance.

- The working conditions include the aspects of lifting, carrying and unloading materials, furnitures, equipments and environmental conditions of the job and the organization of work itself.

Regulatory Standard - **NR 31**:

- This Regulatory Standard has the purpose to establish the precept to be applied on the organization and on the working environment, in order to make compatible the planning and development of agriculture, livestock, forestry, forest exploration and aquaculture with safety on the working environment.

2. To the operator

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.



Decal set

Quantity	Model	Serial number
1	GH ² decal	05.03.06.1546
1	Read the manual decal	05.03.03.1428
1	Lubricate and tighten daily decal	05.03.03.1827

Intended use of the equipment

The GH² mounted tandem disk harrow is excellent to prepare, level and clod break the soil, leaving it in ideal conditions for cereal plantation, after using a greater plow or disk harrow.

It features reinforced angle brackets on the frame to assure an uniform load distribution or tubular frames for special models with 20 or 24 disc blades. The adjustment points allow a great performance in several soil types.

This equipment is equipped with notched discs on the front gang and plain discs on the rear gang to clod break and level the soil, as well as to eliminate weed seedlings.

It is possible to adjust the cutting angle of the front and rear disc gangs according to your need and without using any tool.

Lateral displacement in the rear gang.

Category II brackets for universal three-point lift arrangement and quick connection.

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.

3. Data sheet

GH²

Type: mounted tandem disk harrow

Model: GH²

Number of disc blades: 20, 24, 28 and 32

Spacing between disc blades: 195 mm

Number of disc blades: 20 and 24

Spacing between disc blades: 225 mm

Disc blade dimension: Ø 18" x 3 mm, Ø 20" x 3.5 mm,
..... Ø 22" x 4 mm or Ø 22" x 4.5 mm

Disc blade type: Notched, plain or mixed

Bearings - length: 192.5 mm

- length: 225 mm (for models with 20 or 24 disc blades)

- type: Friction, grease or oil bath

- volume: 110 ml (oil bath bearing) and 130 ml (grease bearing)

Spacer spools - length: 192.5 mm

- length: 225 mm (models with 20 or 24 disc blades)

Axle: 1" squared type (25.4 mm) ABNT 5160

Axle; Ø1.1/2" (38,1 mm) (for models with 20 or 24 disc blades)

Cutting depth: 60 - 120 mm

Hitching type: Universal three-point lift arrangement

Working speed: 6 to 8 km/h

For the models with a spacing between disc blades of 195 mm

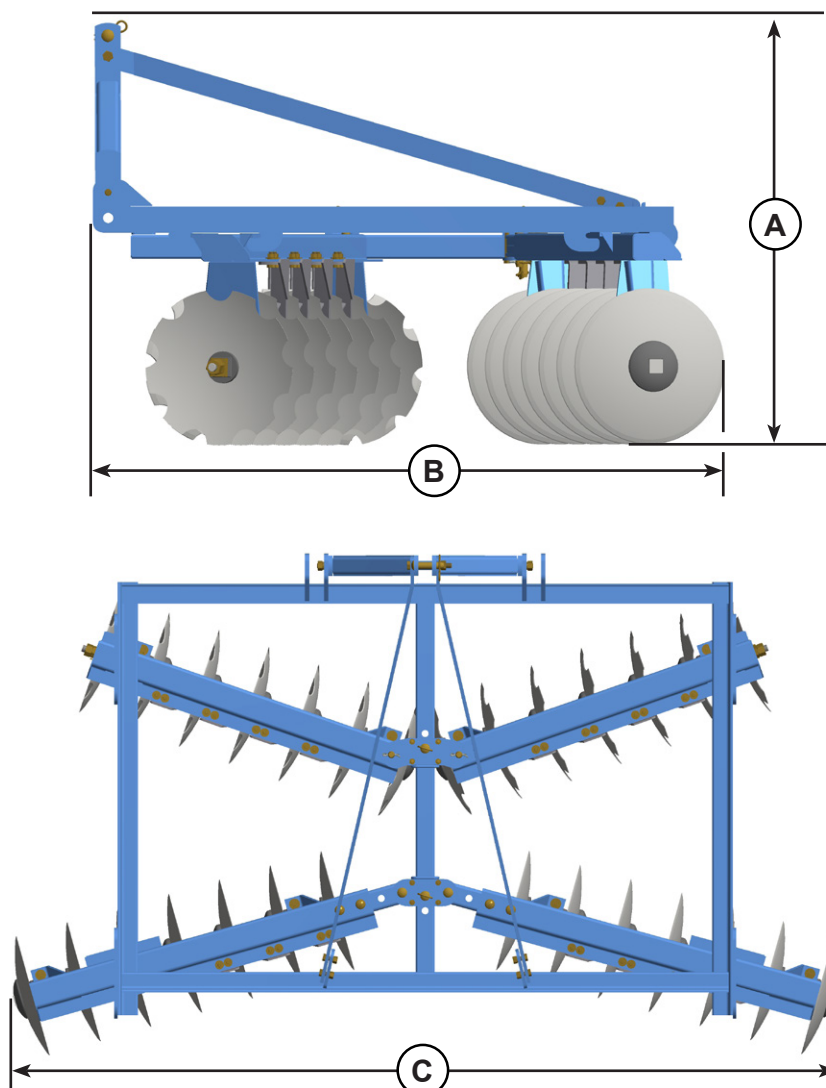
Model	Number of disc blades	Cutting width (mm)	Tractor required (cv)
GH²	20	2290	60 - 65
	24	2595	65 - 70
	28	2970	75 - 80
	32	3345	85 - 90

For the models with a spacing between disc blades of 225 mm

Model	Number of disc blades	Cutting width (mm)	Tractor required (cv)
GH²	20	2330	90 - 100
	24	2760	100 - 110

3. Data sheet

Dimensions for transportation and storage



Model	Number of disc blades	A	B	C	Approximated weight (kg)	**Approximated weight (kg)
GH ²	20	1230	1615	2310	531*	716
	24	1230	1760	2640	558	796
	28	1230	1850	3040	660	
	32	1230	1900	3460	707	

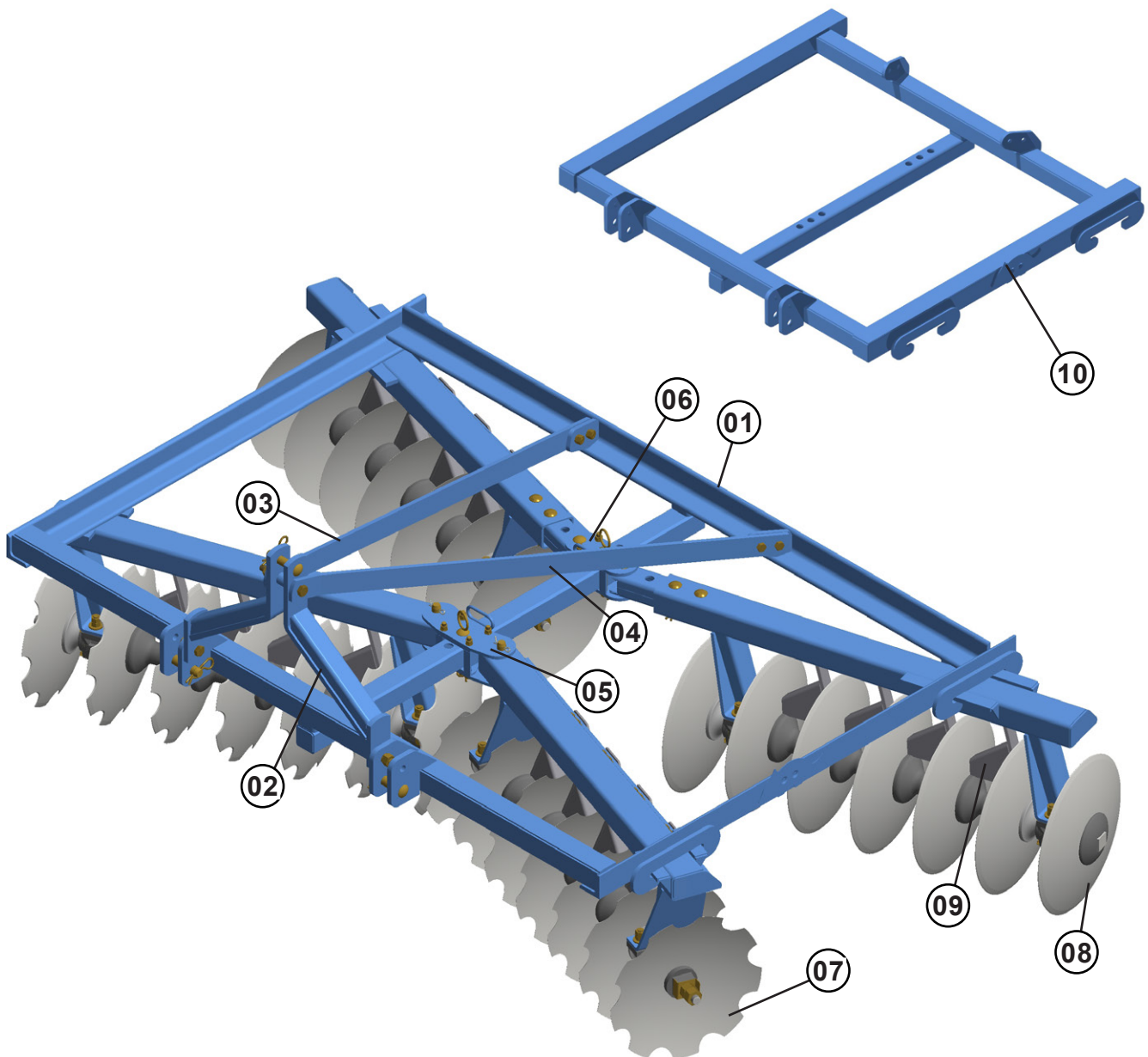
IMPORTANT

- Approximated weights quoted using 18" x 3 mm disc blades (friction bearing).
- *Approximated weights quoted using 20" x 3.5 mm disc blades (friction bearing).
- ** Approximated weight quoted using a model with 20 or 24 disc blades, spacing of 225 mm and Ø1.1/2" axle.
- Measures in millimeters.

4. Components

GH²

- | | |
|-------------------------------|------------------------------|
| 01 - Frame | 06 - Rear disc gang adjuster |
| 02 - Semi drawbar | 07 - Front disc gang |
| 03 - Right angle bar | 08 - Rear disc gang |
| 04 - Left angle bar | 09 - Scraper |
| 05 - Front disc gang adjuster | 10 - Frame* |



NOTE

- The frame* (10) must be used when the spacing between disc blades is 225 mm.

5. Assembly



ATTENTION!

- 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.

To facilitate the transportation, the disk harrow is usually delivered disassembled. Therefore, the next instructions have the necessary details and procedures to assemble it properly.

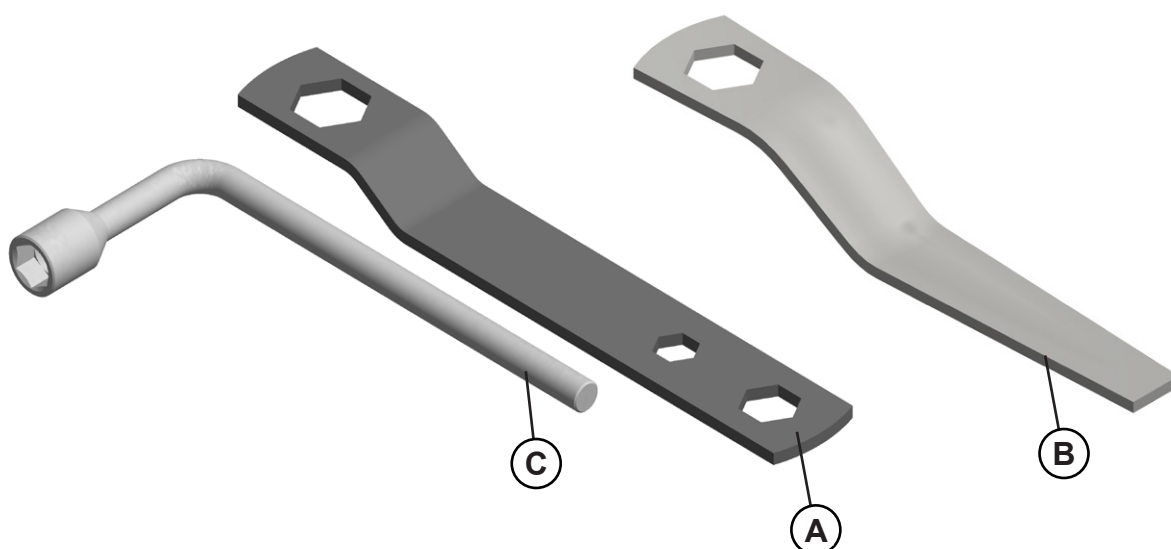
First of all, put the parts in a clean place to identify them easier. Check the parts using the list that comes inside the packing box.

Using the set of wrenches

Use the box end wrench (A) to tighten the nuts of the disc gangs.

Use the box end wrench (B) to tighten the nuts of the disc gangs (models with a spacing between disc blades of 225 mm).

Use the L-type socket wrench (C) to tighten the bearings.



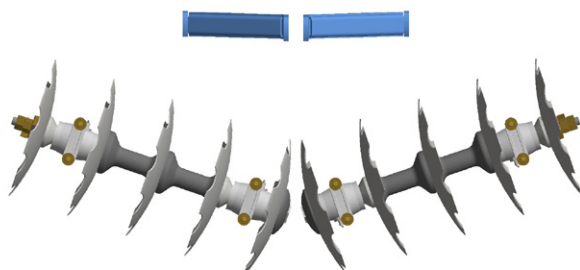
ATTENTION

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

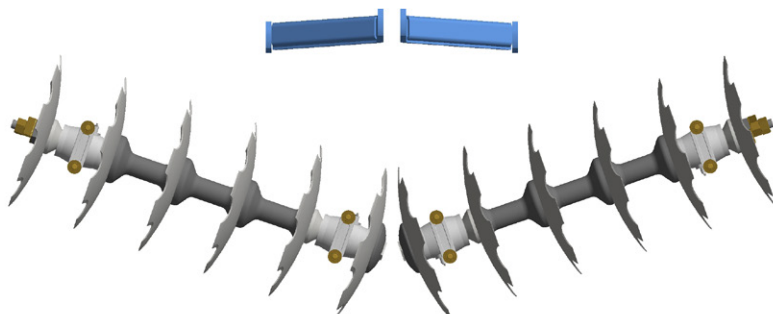
5. Assembly

Assembly of bearings and spacer spools

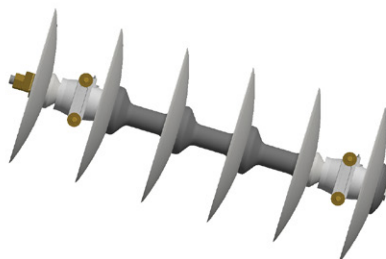
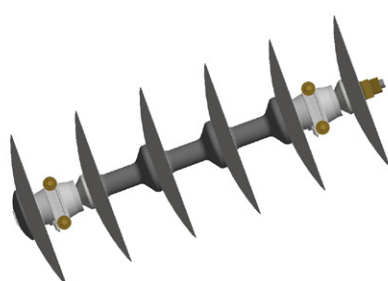
Before starting to assemble the disc gangs, check the correct position of the bearings and spacer spools:



20 disc blades
08 bearings
08 spacer spools



24 disc blades
08 bearings
12 spacer spools



Bearing

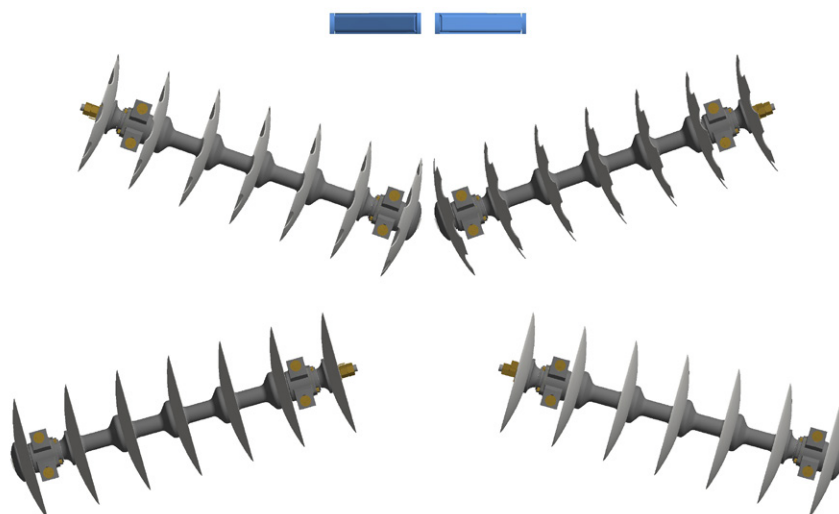


Spacer spool

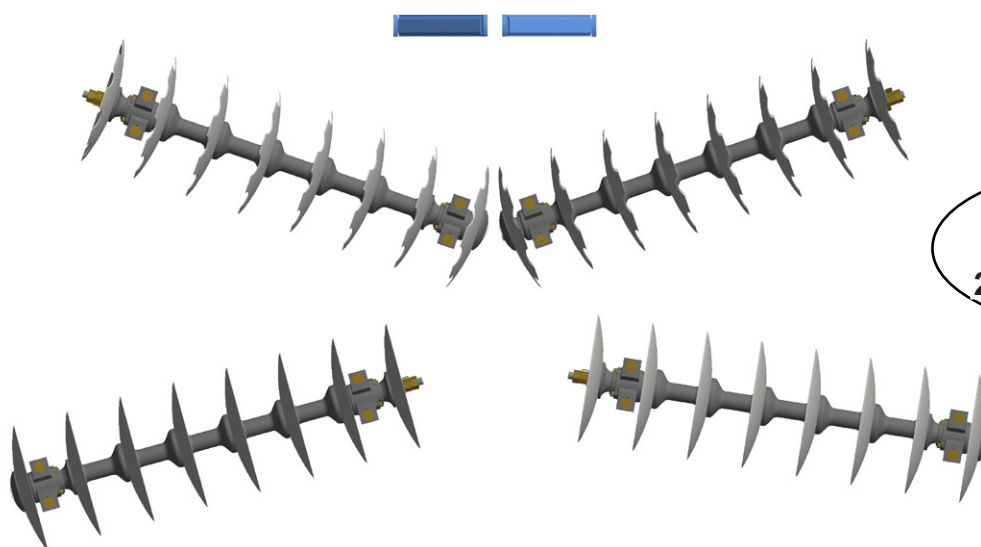
5. Assembly

Assembly of bearings and spacer spools

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



28 disc blades
08 bearings
16 spacer spools



32 disc blades
08 bearings
20 spacer spools



Bearing



Spacer spool

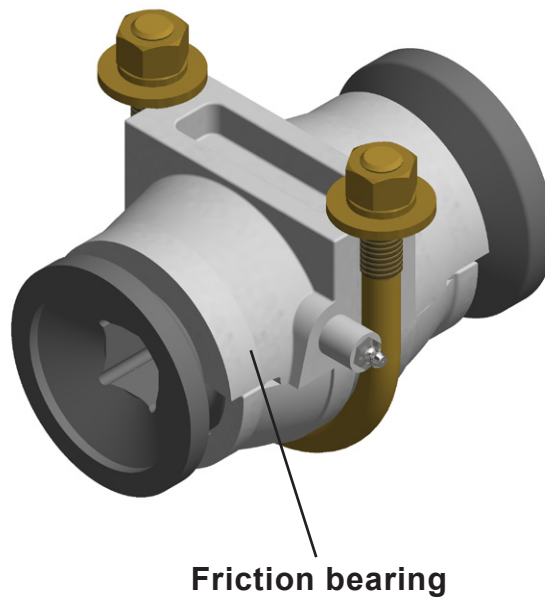
5. Assembly

Disc gangs assembly sequence

1. Place the external lock (A) along with the axle (B).
2. Place the disc blades (C), bearings (D) and spacer spools (E), following the instructions on the previous pages.
3. Put the internal lock (F) and the nut lock (G). Use the wrench from the 'set of wrenches' page to tight the gang properly, using a nut and counter nut (H).
4. Being the gangs assembled, use the L-type socket wrench from the 'set of wrenches' page to tighten the nut (I) and washer (J) that will join the bearing (D) to the bearing hanger using the clamp (K).

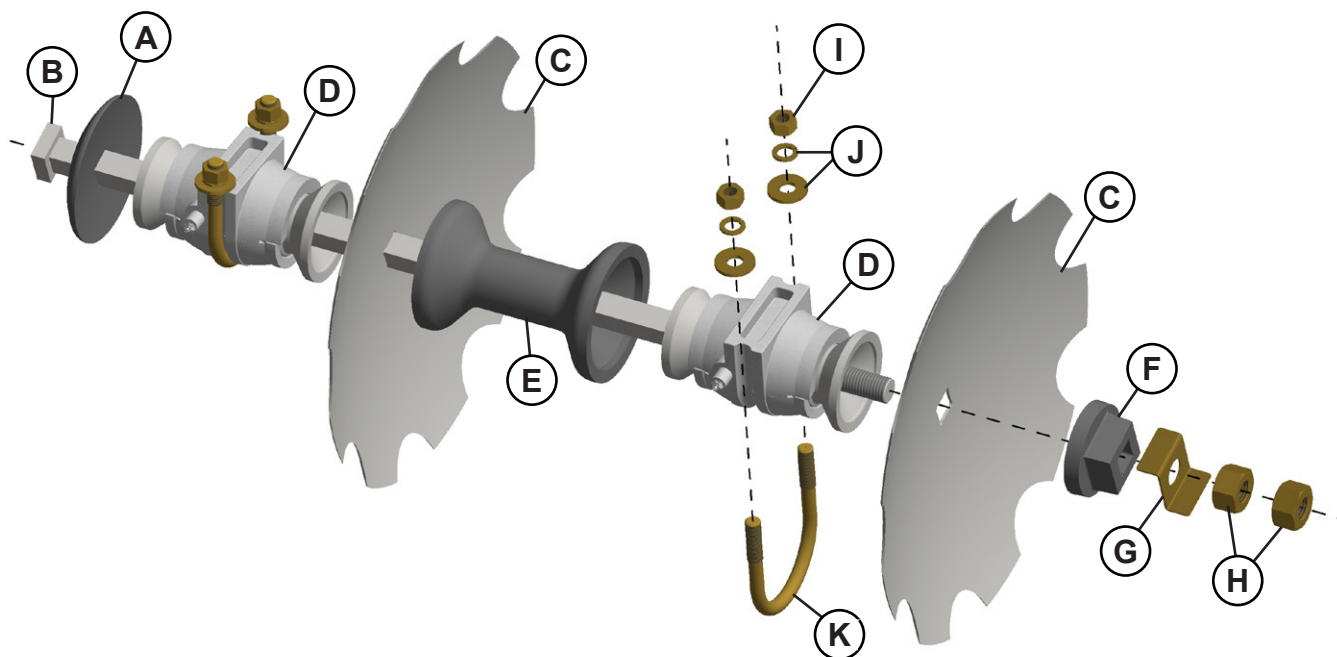
IMPORTANT

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

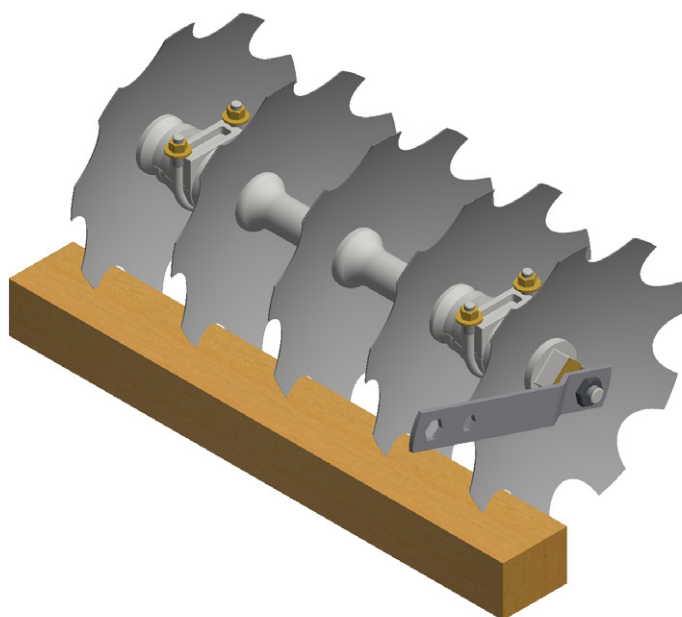


5. Assembly

Disc gangs assembly sequence



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



NOTE

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

5. Assembly

Disc gangs assembly sequence (spacing of 225 mm and 1.1/2" axle)

For the front gangs, the nut is welded on one end of the axle. It must be on the inner side of the disk harrow and on the outer side of the disc gangs. On this case, use the axle lock (A) on the welded nut.

Place the outer lock (A) along with the axle (B) until touching the nut (C) that is welded to the axle (B).

Place a disc blade (D), bearings (E) and spacer spools (F), following the instructions on the previous pages.

Place the inner lock (G) and nut (H).

Use the wrenches from the 'set of wrenches' page and tighten the gangs:

1) Use the wrench on the inner side and tighten the gangs until it reaches the maximum torque.

2) To tight the gangs, keep them underpinned using a wood or similar object (as shown on the next page).

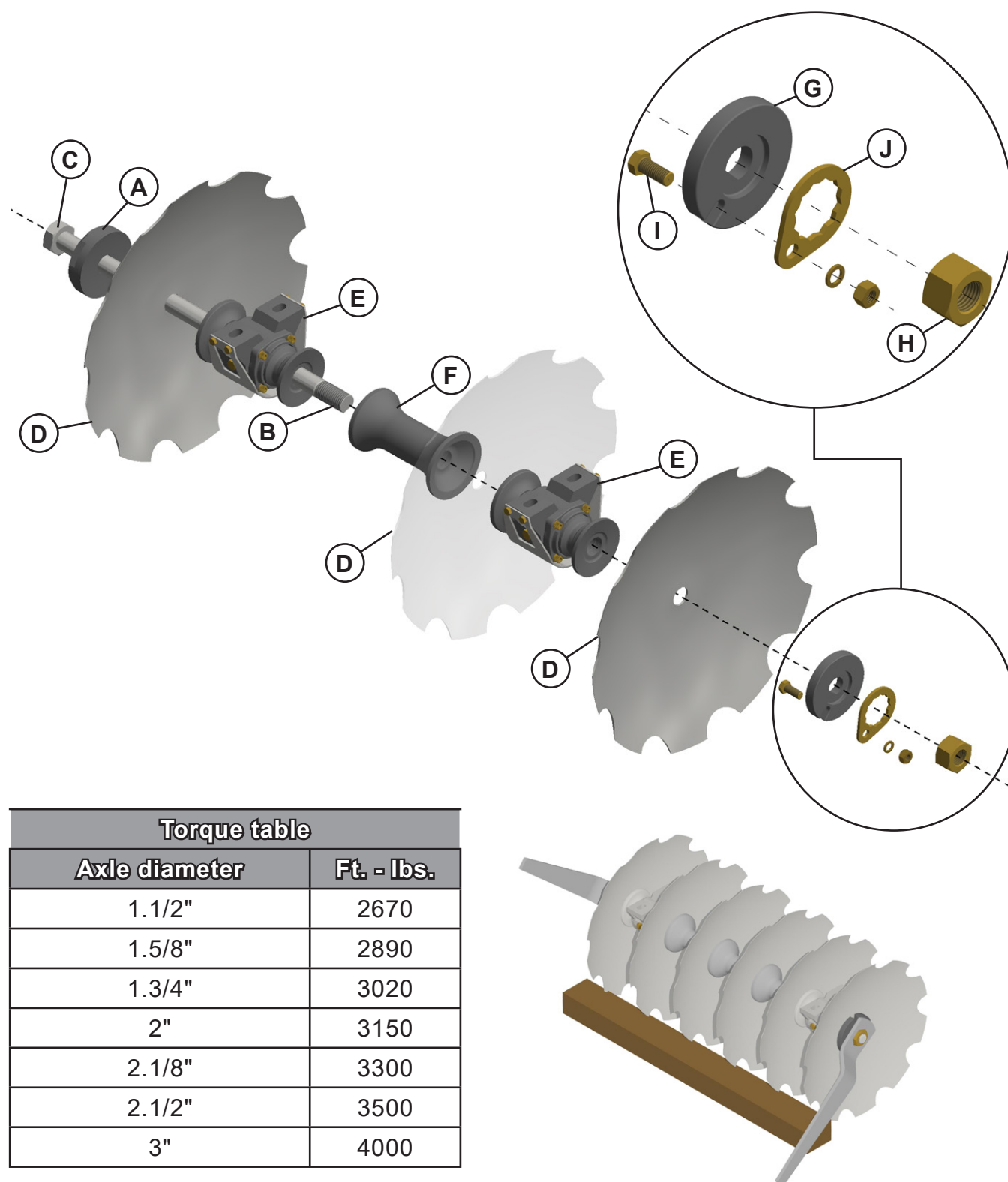
Lastly, place the bolt (I) and position the lock nut (J), fastening it using a spring washer and nut.

IMPORTANT

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

5. Assembly

Disc gangs assembly sequence (spacing of 225 mm and 1.1/2" axle)



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

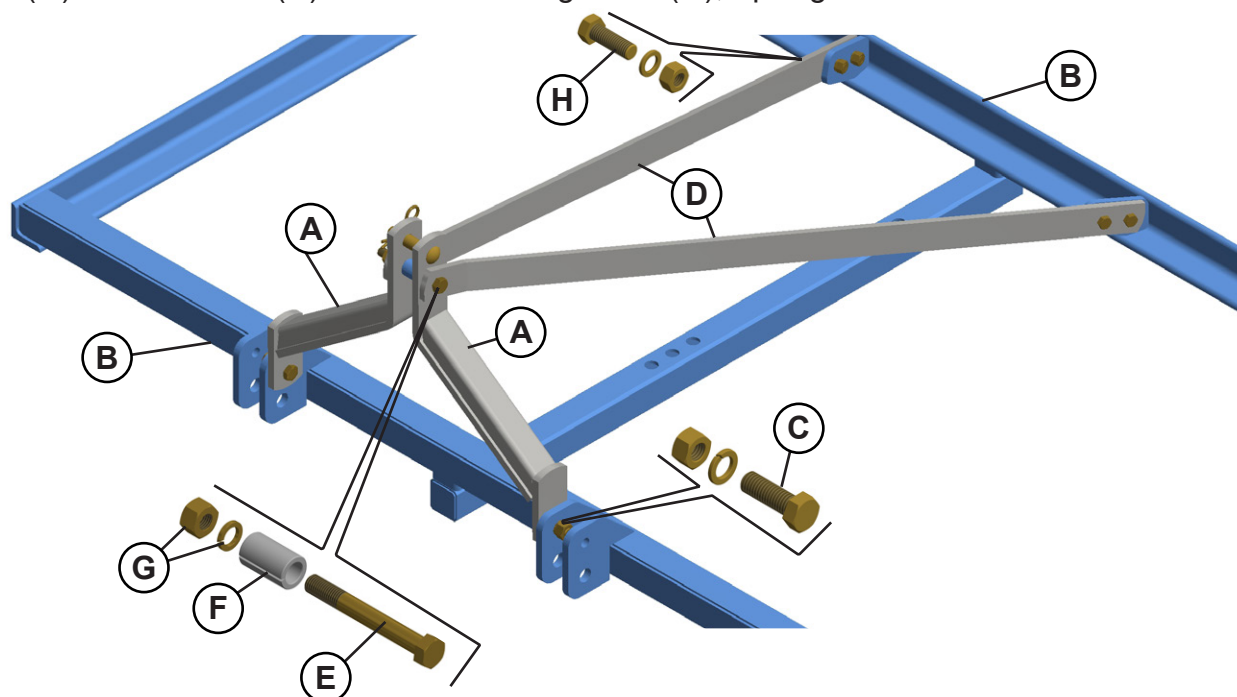
NOTE

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

5. Assembly

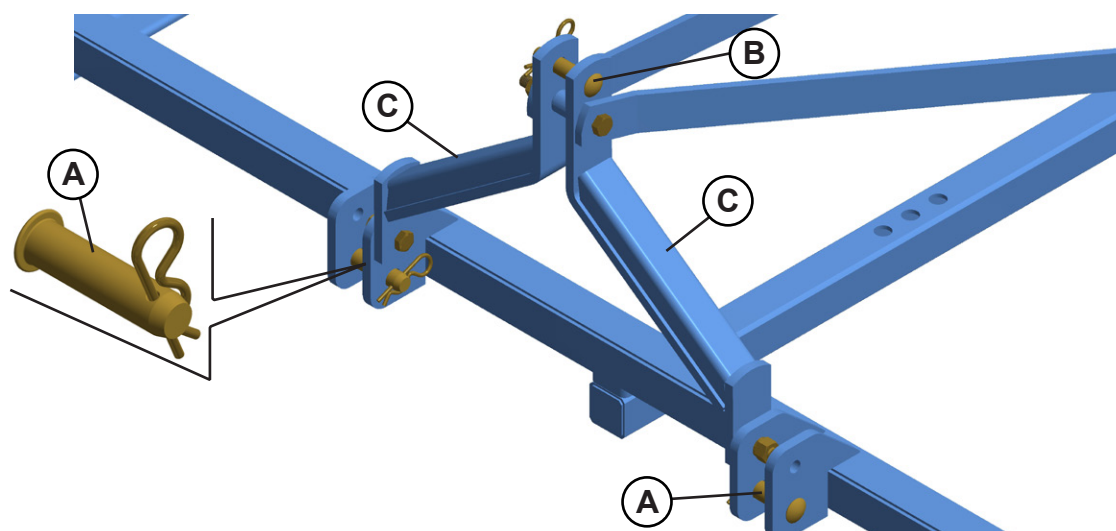
Drawbar assembly

1. Assemble the semi-drawbar (A) to the front frame (B) using bolts (C), spring washer and nuts.
2. Then, hitch the angle bar (D) to the semi-drawbar (A) locking it using a bolt (E), bushings (F), spring washer and nut (G). In the other end, support the angle bar (D) to the frame (B) and lock it using bolts (H), spring washers and nuts.



Hitching pins assembly

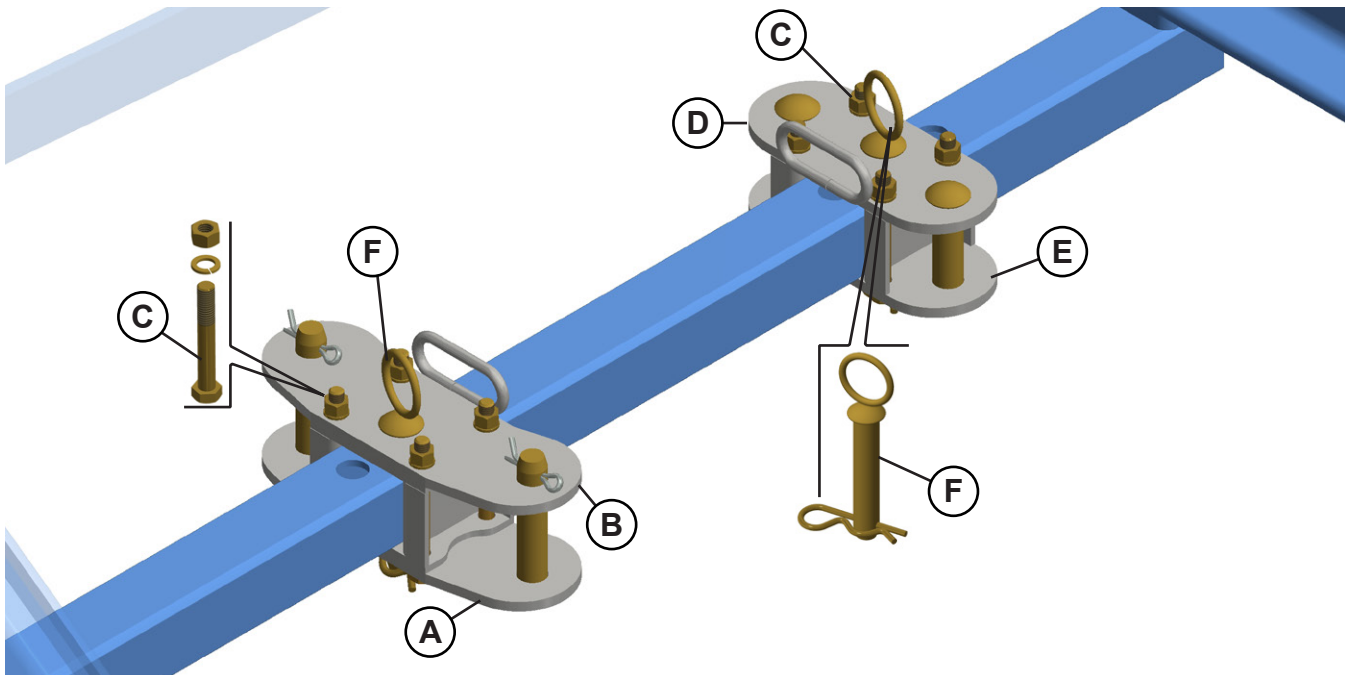
1. Assemble the lower hitch pins (A) in the frame and the upper hitch pin (B) in the semi-drawbar (C) holes.
2. Observe that the semi-drawbars are fixed in the inner side of the frame.
3. Hitch the frame to the three-point arrangement or put the frame on a trestle of 80 cm, approximately.
4. For a perfect hitching, follow the instructions on the 'hitching to the tractor' page.



5. Assembly

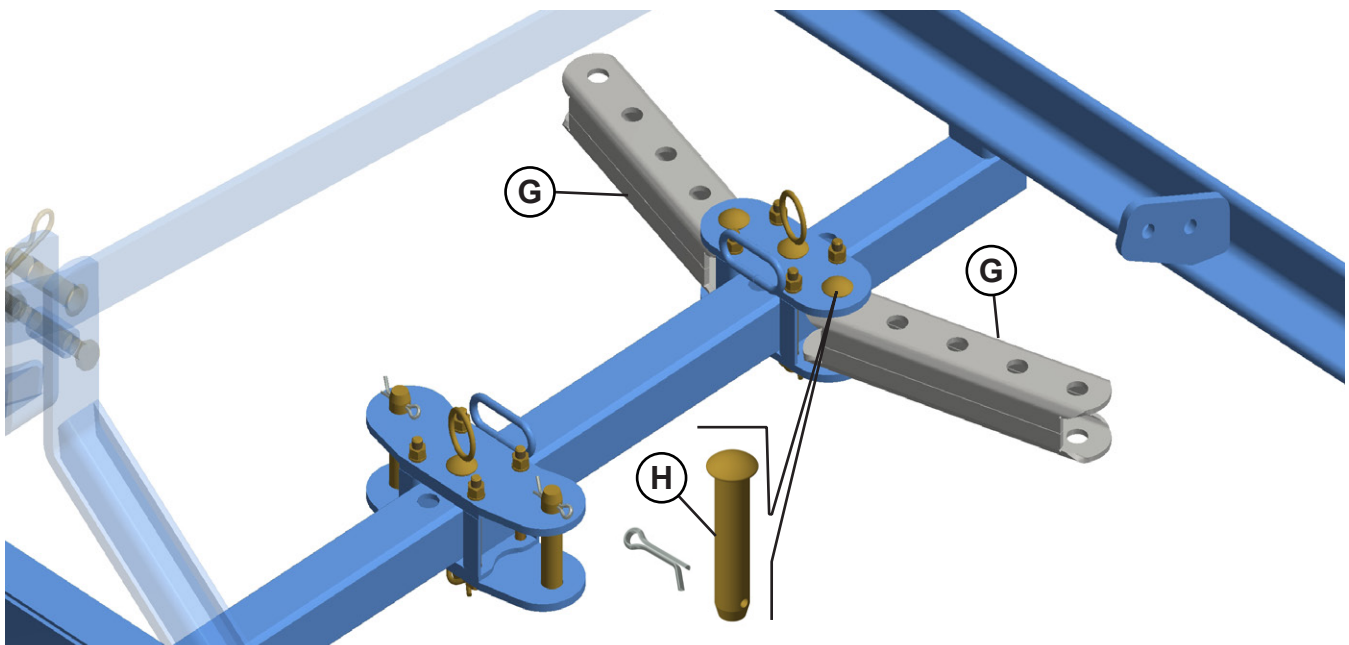
Regulators assembly

1. Assemble the frontal lower regulator (A) and the frontal upper regulator (B) to the frame, locking it with a bolt (C), spring washer and nuts.
2. Assemble the rear regulator base (D) and body (E), also locking it with a bolt (C), spring washer and nuts.
3. Put the junction axle using a ring (F) and cotter pin in the central hole of the regulators.



Adjustment tube assembly

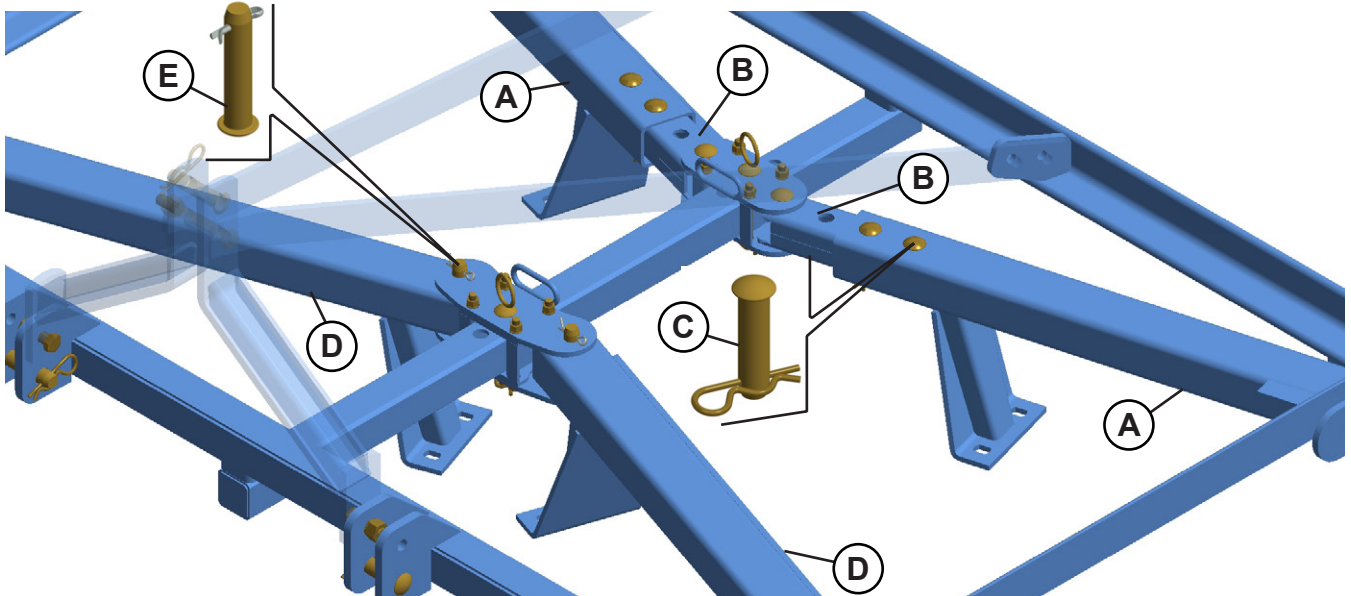
1. Place the adjustment tube (G) on the rear regulator set and lock using a junction axle (H) and cotter pin.



5. Assembly

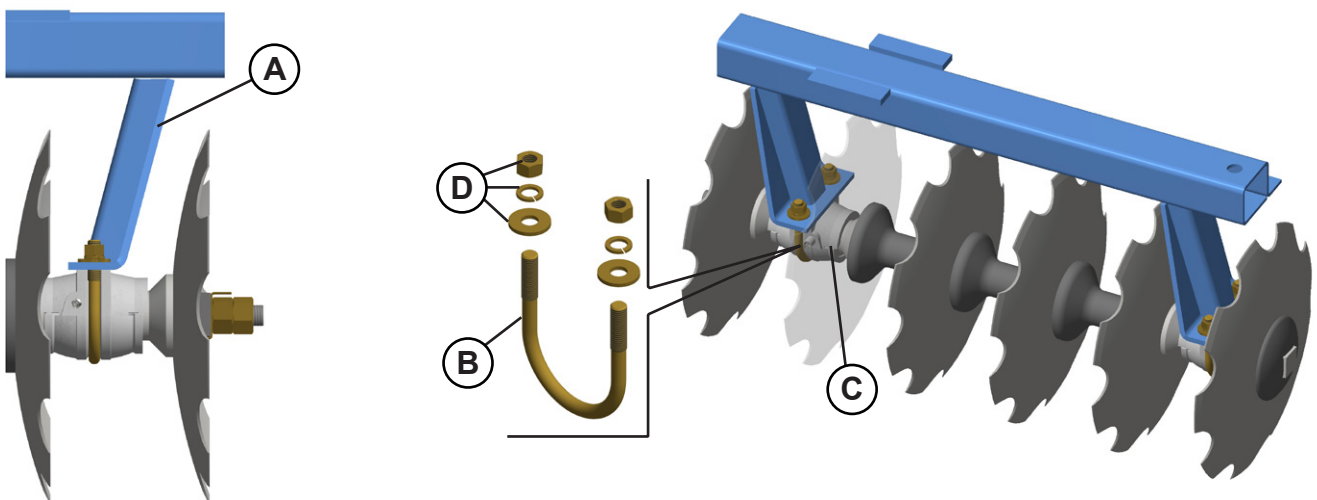
Disc gang carrier assembly

1. The rear disc gang carriers (A) are fastened to the tubes (B), using the junction axle (C) and cotter pin.
2. The front disc gang carriers (D) are fastened directly to the regulators using junction axles (E) and cotter pin.



Disc gangs assembly to the frame

1. In the disc gangs assembly to the frame, the bearing hangers must remain facing the disc blades concavity as shown on the detail (A).
2. Pass the clamp (B) through the bearing (C).
3. Lock the bearing with clamp to the bearing hanger using washers and nuts (D).



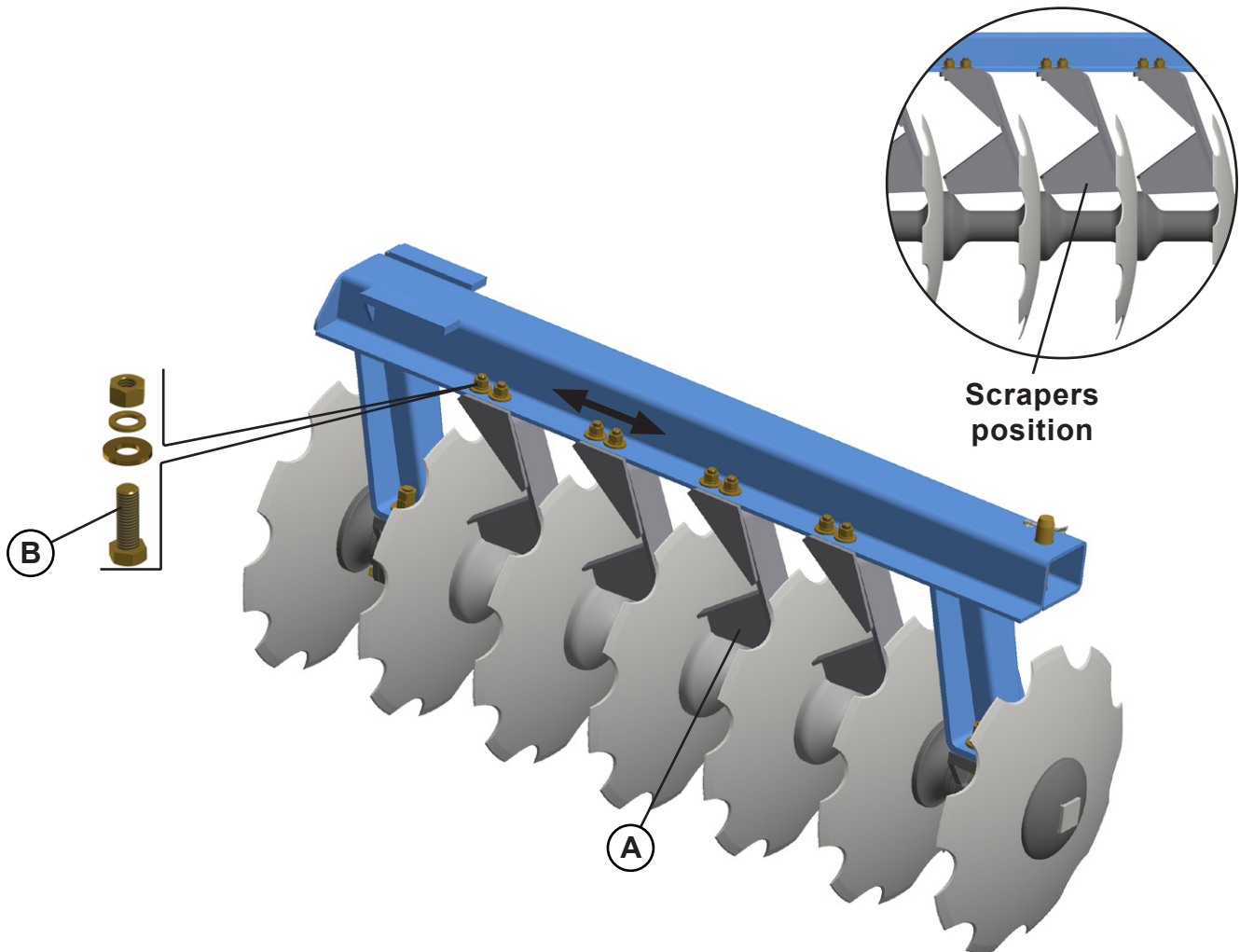
IMPORTANT

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

5. Assembly

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), which are placed underneath the fixation plates. On the upper part, place flat and spring washers and nut.



NOTE

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

6. Set-up instructions



ATTENTION! RISK OF ACCIDENT

- 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

Before starting the operations, prepare the tractor and equipment appropriately.

Check the general conditions of the tractor, especially the good functioning of the hydraulic system that must be in flotation mode.

The addition of water ballasts on the tires or a set of weights on the tractor front part or on the rear wheels are the most used ways to increase the traction over the soil and to assure a greater stability of the set.

The front and rear wheel gauges must be equal (consider a measure from the center of the tires).

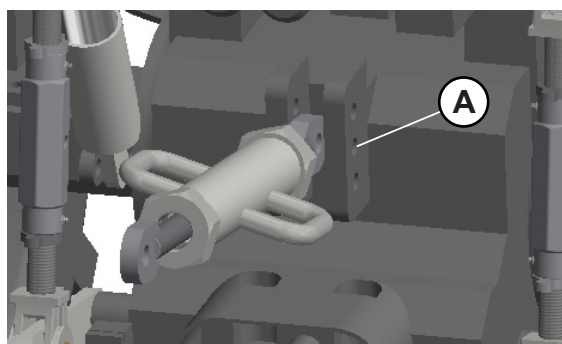
The reservoir fill-up process must be always done after the daily working period. This avoids that the air humidity that is inside the reservoir condenses. If filled up, the air volume inside the reservoir exits through the breather.

The operator must know the tractor operation commands to assure safety, preservation and integrity of the tractor, as well as to allow an efficient and correct operation.

The option to choose the hole on the third point on the control rod (A) is related to the type and humidity of the soil and the depth actuation of the equipment. For soils that have smooth texture and light equipments, use the upper hole.

When working over harder soils or to reach greater depths, the sensibility must be lowered in order to avoid that the control itself prevents the equipment penetration.

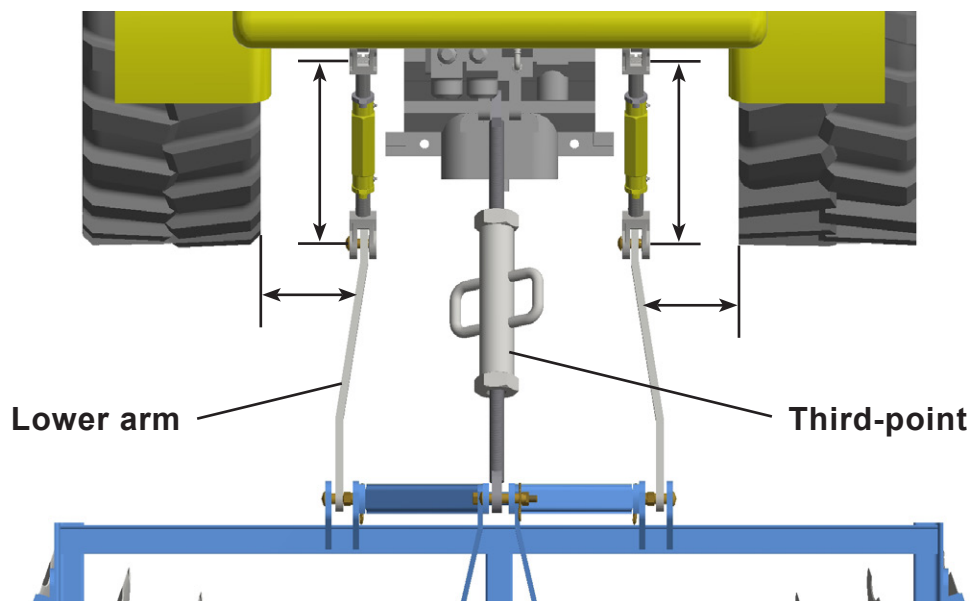
Follow the instructions on the tractor and equipment manual to assure the good functioning of both of them.



6. Set-up instructions

Hitching to the tractor

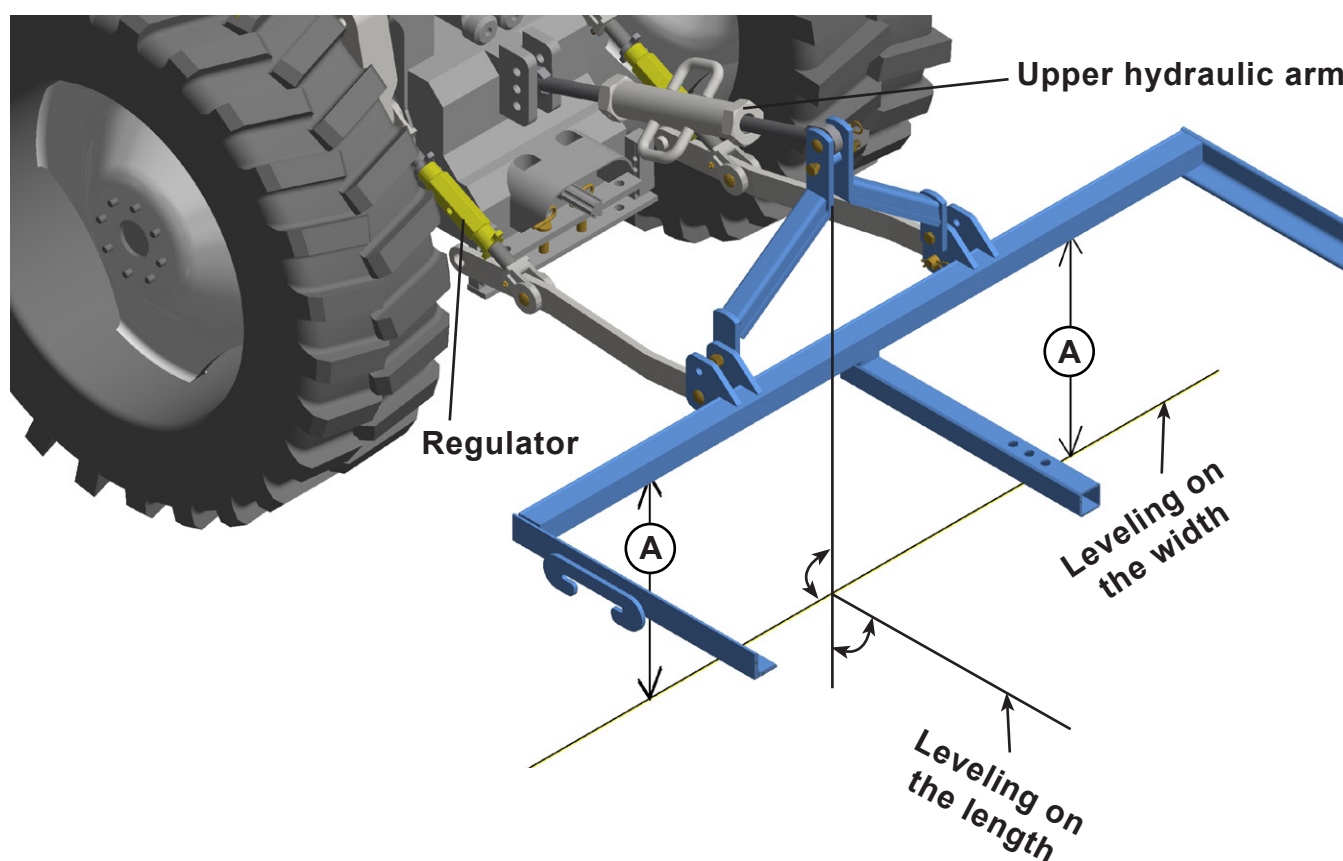
1. For hitching, choose a place as flat as possible. Drive the tractor slowly in reverse gear to the equipment direction and be ready to brake. When close enough, use the lever to control the hydraulic position, leaving the left lower arm in the same level of the hitch pin.
2. Hitch the right and left arms, which features ascent and descent movements through the arm adjuster and place the lock pins. At this moment, the extension thread of the upper arm can be used to approach or put away the equipment to facilitate hitching.
3. Place the upper arm (third point) and lock it using a lock pin. For a perfect hitching, the equipment must be centered with the tractor, which is done as follows:
 - a) Align the third point of the equipment with the third point of the tractor;
 - b) Totally raise the disk harrow;
 - c) Check if the distances between the lower arms and tires are the same on both sides (as in "A"), being both in the same level (as in "B").



6. Set-up instructions

Leveling the disk harrow

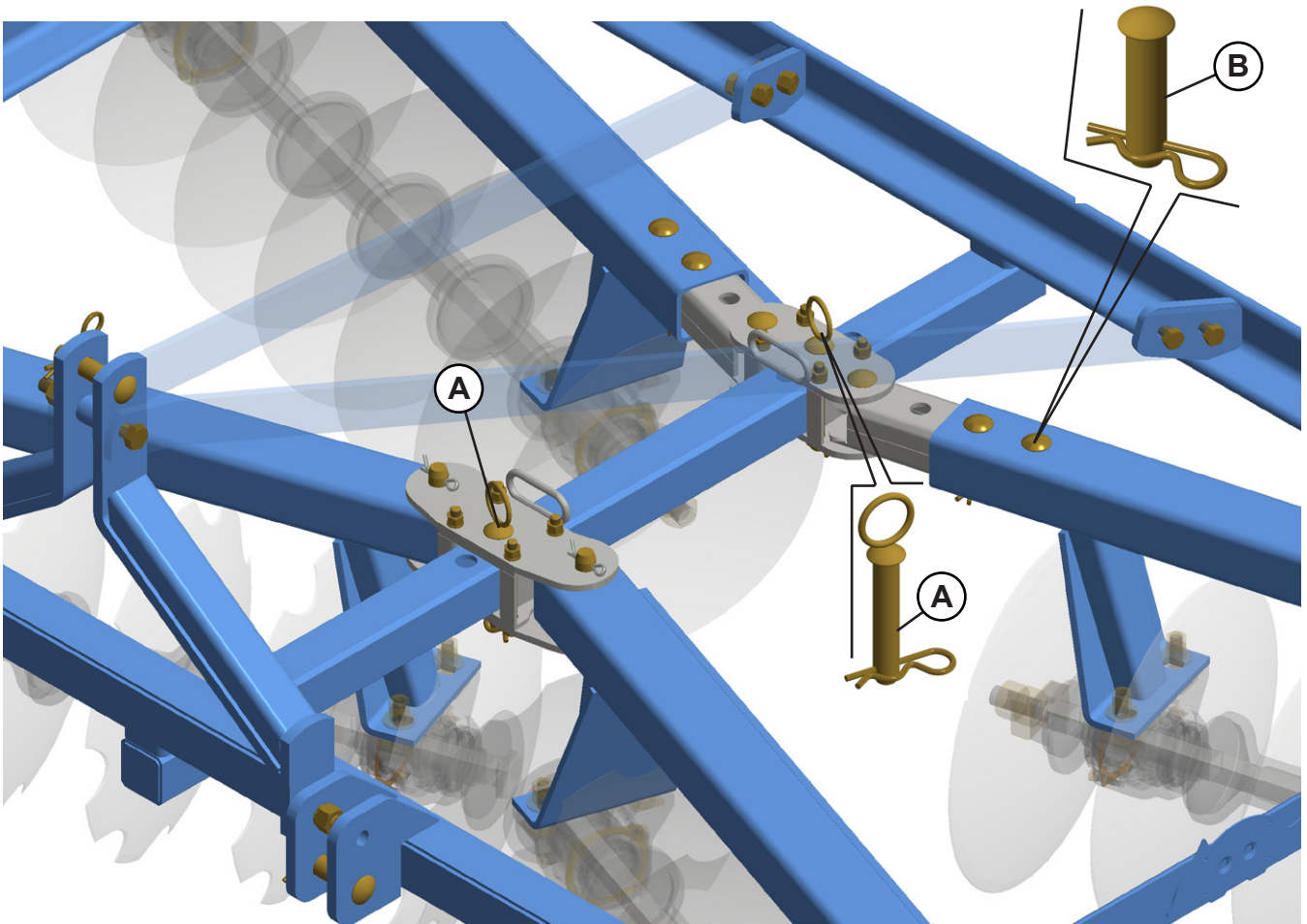
1. To level the harrow, proceed as follows:
2. Place the tractor in a flat location and level the harrow by its width (transversal) and length (longitudinal), according to the illustration below.
3. Widthwise, the leveling is made by the regulator of the right and left hydraulic lower arms, letting the harrow drawbar vertically or the (A) measures equally.
4. Lengthwise, the leveling is made by the hydraulic upper arm (Third point of the arrangement), letting the frame parallel to the soil.



6. Set-up instructions

Angle adjustment and disc gang opening

1. The GH² feature angle adjustments for the notched and plain disc gangs. It also feature opening adjustments for those gangs.
2. To adjust the cutting angle of the discs in any of the two gangs, lift the junction axle (A) and move the gang to the desired hole, decreasing or increasing the angle.
3. To adjust the gang opening, remove the junction axles (B) that fasten the rear disc gang and move the gang, in order to get the desired opening.



7. Adjustments and operations



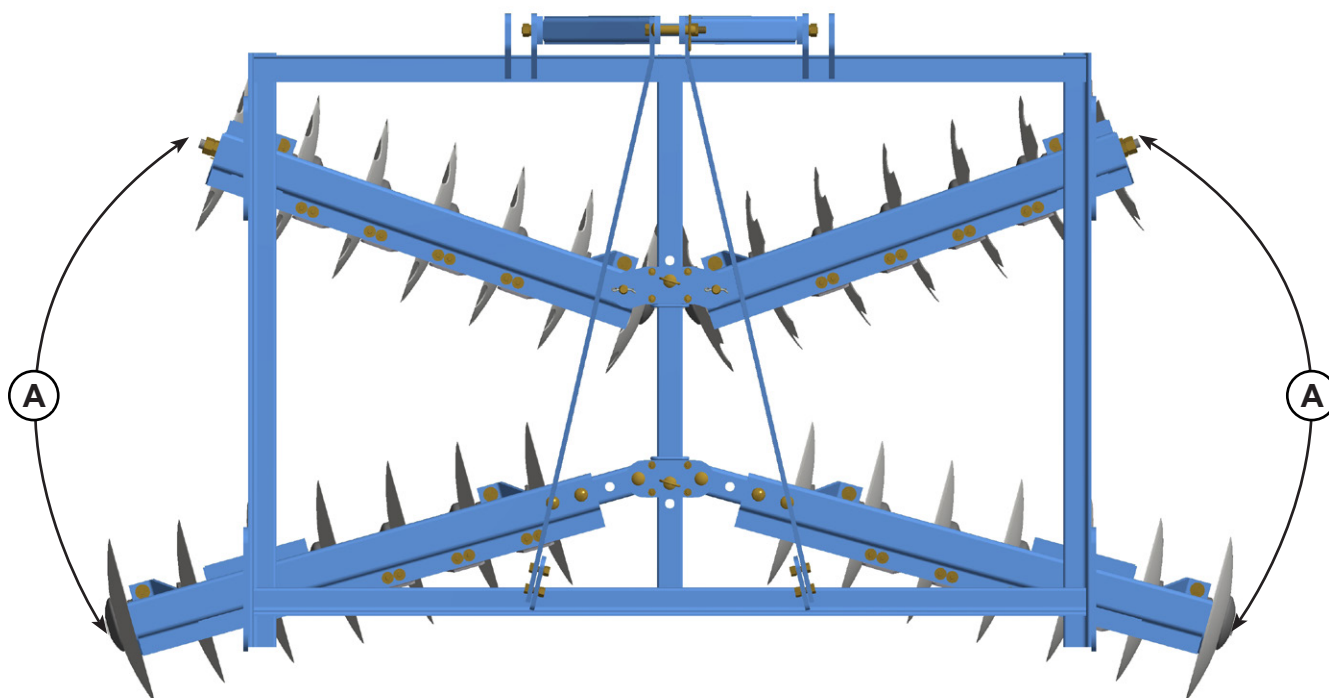
ATTENTION! RISK OF ACCIDENT

- 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.

Cutting depth

The cutting depth is adjusted through the disc gangs opening.

1. Increase the opening (A) between the gangs to work over soils that are harder to penetrate with the disc blades. In light and loose soils, it is appropriate to work with a smaller opening angle.



IMPORTANT

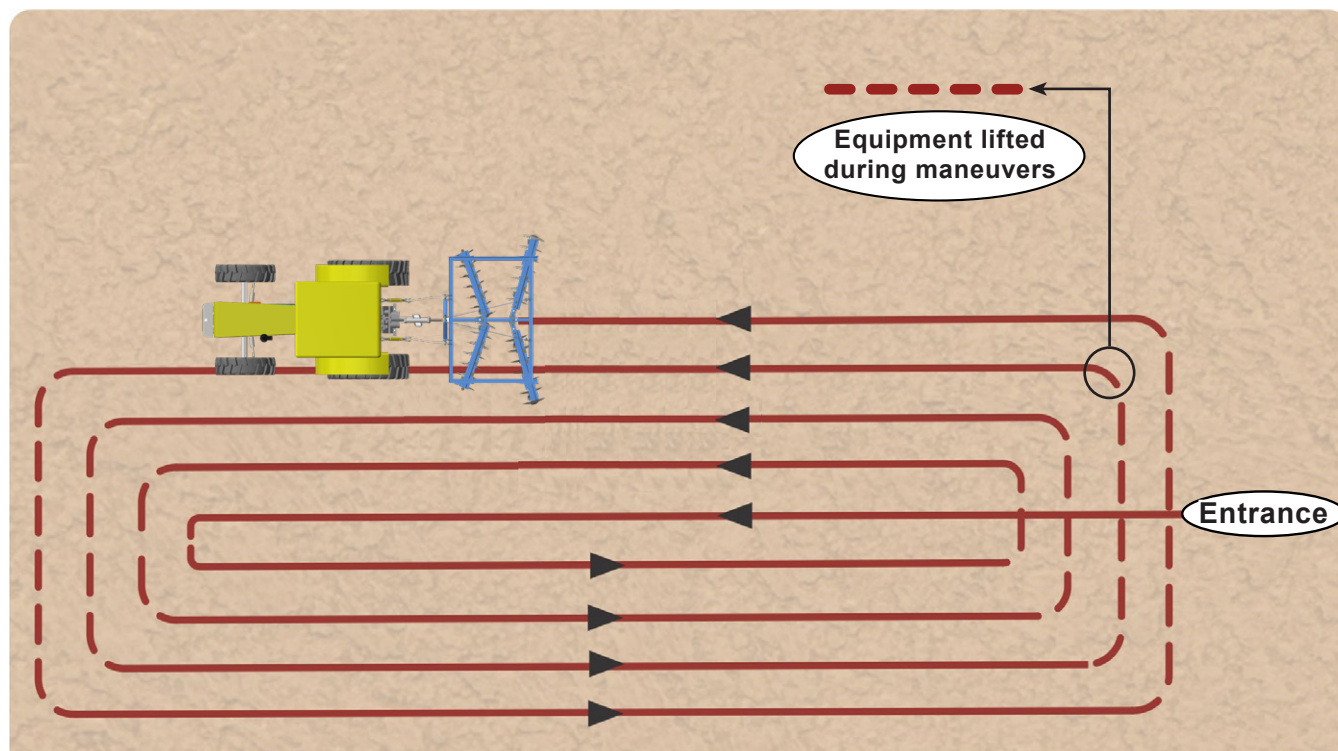
- We recommend using an average disc gang opening. Then, adjust it as necessary.
- Drive the tractor properly to obtain a great finishing on each pass.
- Avoid the formation of windrows or untilled strips.

7. Adjustments and operations

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.

The equipment works in a continuous way.



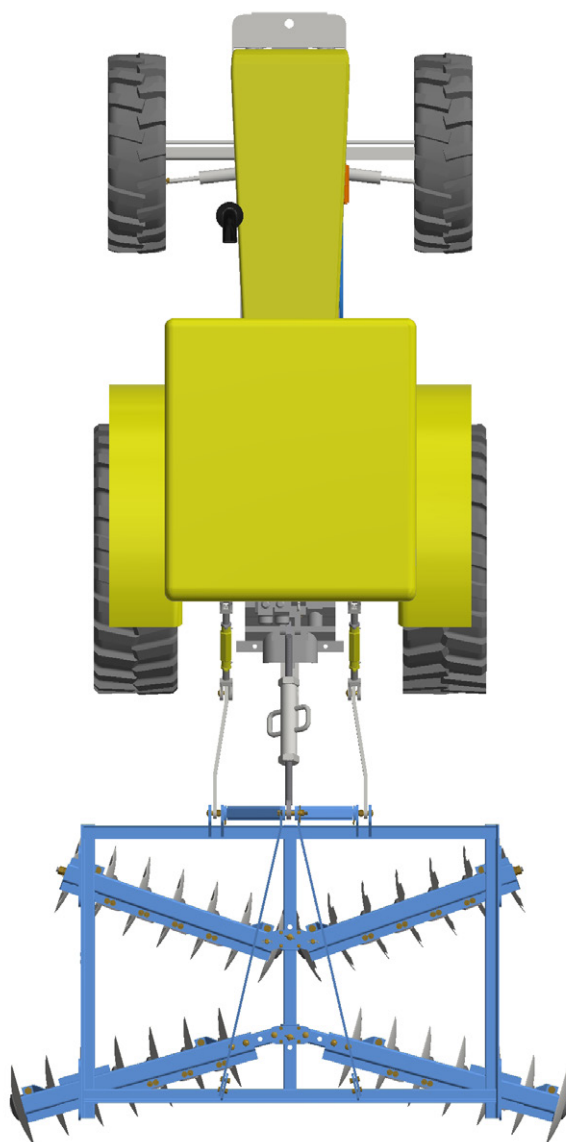
IMPORTANT

- Note that the harrowed soil must always be to the left hand side of the operator.
- Drive the tractor properly to obtain a great finishing on each pass. Avoid the formation of windrows or untilled strips.

7. Adjustments and operations

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 without totally lifting the equipment, otherwise the angle formed on its vertex would transmit great effort to the equipment, overloading traction components such as the hitch bar, the drawbar and other fixation parts.



7. Adjustments and operations

Operations - important points



1. Retighten nuts and bolts after the first day of work. Check the conditions of all pins and cotter pins. Then, retighten every 24 hours of service.
2. Special attention should be given to the disc gangs. Retighten daily on the first week of use. Then, retighten periodically.
3. Carefully observe the lubrication intervals.
4. Choose a gear that allows the tractor to maintain a certain power reserve, ensuring against unforeseen efforts.
5. Speed is relative to the tractor gear and can only be determined by local conditions. We adopted an average 6 to 8 km/h, which is not advisable to overcome, to maintain service efficiency and to avoid possible damages to the equipment.
6. It is important to keep a constant speed during the whole operation.
7. Only people who own a complete knowledge of the tractor and equipment must operate them.
8. Use a tractor with enough power to work with the equipment.
9. The harrowed soil must always be on the left hand side.
10. Remove sticks or any object that may get stuck on the disc blades.
11. During work, do not maneuver to the right hand side, as the angle that is formed by the disc gangs would transmit a great effort to the equipment, thus overloading the traction components.
12. During work or transportation, do not allow passengers on the tractor or in the equipment.
13. When unhitching the equipment from the tractor, check if it is properly underpinned.
14. As previously mentioned, this disk harrow has several settings. However, only the local conditions can determine its best adjustment.

NOTE

- Before retightening the disc gangs, it is necessary to loosen up the bearing fixation bolts.



ATTENTION! RISK OF ACCIDENT

- 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 between 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.

b) The lubrication of the roller bearings should be done in the same 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:

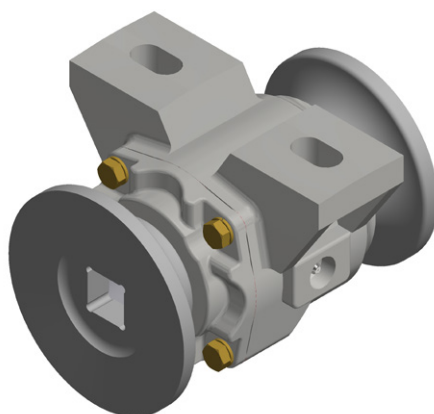
1. In a flat place, check the oil level of each bearing before using the disk harrow for the first time and every day of the first week.
2. Then, start to check weekly.
3. Change all the oil every 1,000 operating hours.
4. Use SAE 90 mineral oil only.

8. Maintenance

Lubrication

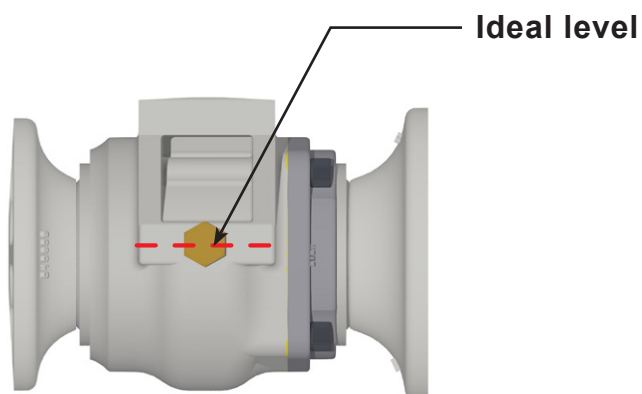
NOTE

- The grease volume on the bearing is 130 kg.



NOTE

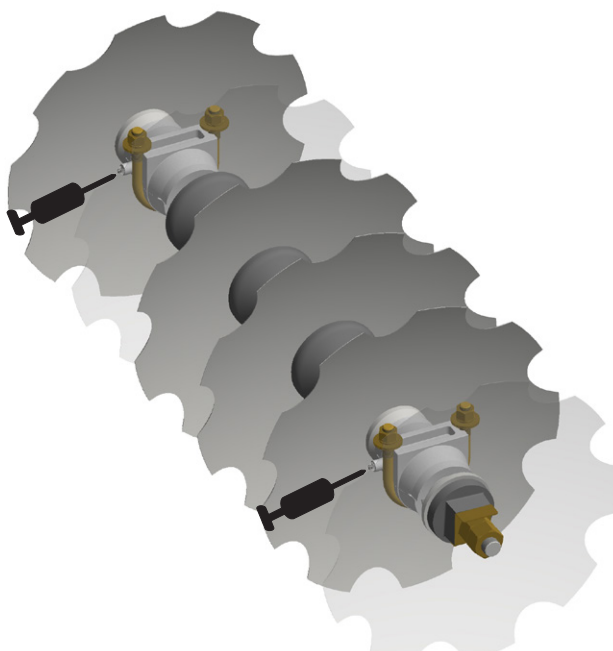
- The suitable level is when the oil reaches the hole of the plug, being the disk harrow in a flat place.
- The oil volume on the DM bearings is 110 ml.



8. Maintenance

Lubrication points

Lubricate every 24 hours of service.



NOTE

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

8. Maintenance

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.
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.
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.	Lift the disc blade to reduce the penetration.
	Worn out / incorrectly adjusted scrapers.	Adjust or change the scrapers when necessary.

IMPORTANT

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

Disk harrow maintenance

- During offseason wash the equipment, repair any damaged paintwork, protect the disc blades with oil, lubricate all grease fittings and store the disk harrow in a covered and dry place, avoiding the direct contact of the disc blades with the soil.

- 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 occurrence on all moving parts. Replace any part, if necessary.

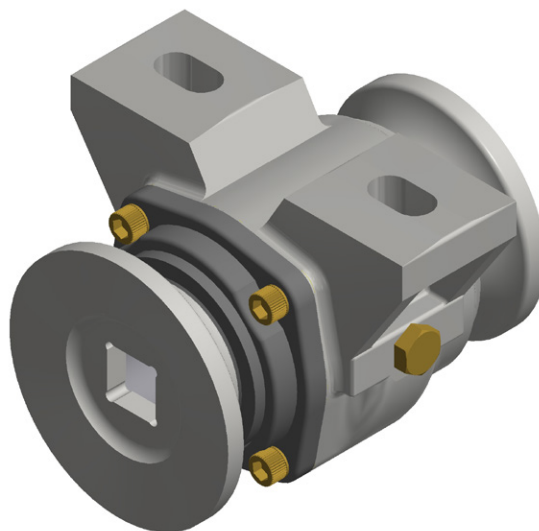
- Replace the missing or damaged safety decals. Marchesan supplies these decals, upon request and indication of their respective serial numbers. The operator must know the need and importance to keep the decals in the proper place and in good conditions. The operator also have to know the need to follow the instructions, as the lack of safety may increase the risk of accidents.

NOTE

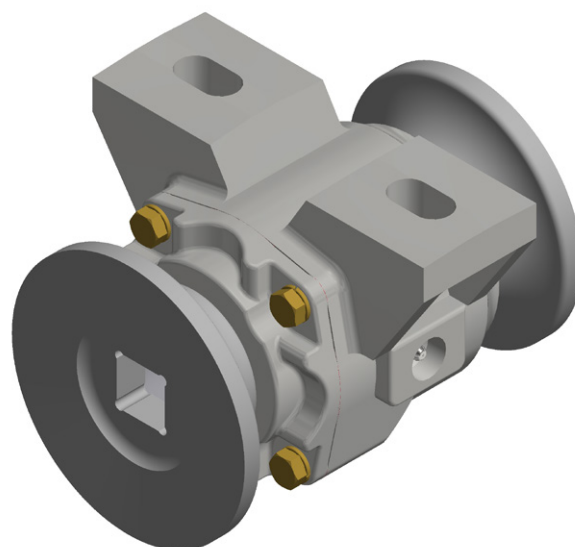
- Use TATU original parts only.

9. Optional

Duromark oil bath bearing (DM)



Grease bearing (CM)



10. Important data

Hourly income calculation

To calculate the hourly income, use the following calculation:

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

Where:

R = Hourly income;

L = Harrow working width (meters);

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

E = Efficiency: 0.90;

X = Hectare value = 10,000 m².

Example with a GH² (24 disc blades):

R = ?

L = 2.59 m

V = 7,000 m/h

E = 0.90

X = 10,000 m²

$$R = \frac{2.59 \times 7,000 \times 0.90}{10,000}$$

R: The hourly income working with an equipment that has 24 disc blades will be approximately of 1.63 hectares per hour.

NOTE

- The 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.

10. Important data

Average income table

Model	Number of disc blades	Cutting width (m)	Hourly income (ha)	Daily income (ha)
GH ²	20	2.29	1.44	12.98
	24	2.59	1.63	14.69
	28	2.97	1.87	16.84
	32	3.34	2.10	18.94

For the GH² models with a spacing of 225 mm.

Model	Number of disc blades	Cutting width (m)	Hourly income (ha)	Daily income (ha)
GH ²	20	2.33	1.47	13.21
	24	2.76	1.74	15.65

NOTE

- An average speed of 7 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 GH² disk harrow that has 32 disc blades (Hourly income = 2.10 hectares).

$$\text{So: } \frac{50}{2.10} = 23.8$$

R: Approximately will be spent 23 (twenty-three) hours to work in an area of 50 hectares.

10. Important data

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.

 TORQUE TABLE 													
Bolt Size (Inches) (a)	 Grade 2		 Grade 5		 Grade 8		Bolt Size (Metric) (D)	 4.6		 8.8		 10.9	
	Lbs-ft (b)	N.m (c)	Lbs-ft	N.m	Lbs-ft	N.m		Lbs-ft	N.m	Lbs-ft	N.m	Lbs-ft	N.m
1/4" - 20	5,5	7,5	8,5	11,5	12	16,3	M5 x 0.8	2,5	3,39	5	6,78	8,5	11,526
1/4" - 28	6	8,1	9,5	12,9	14	19,0	M 6 x 1	3	4,068	8	10,85	11,5	15,594
5/16" - 18	10,5	14,2	17,5	23,7	24,5	33,2	M 6 x 0.75	3,5	4,746	8,5	11,53	13	17,628
5/16" - 24	12	16,3	19,5	26,4	27,5	37,3	M 8 x 1.25	7	9,492	19,5	26,44	28	37,968
3/8" - 16	19,5	26,4	31,5	42,7	44	59,7	M 8 x 1	8	10,848	21	28,48	30,5	41,358
3/8" - 24	22	29,8	35	47,5	50	67,8	M 10 x 1.5	14	18,984	38,5	52,21	56	75,936
7/16" - 14	31	42,0	50	67,8	70,5	95,6	M 10 x 1	16	21,696	43	58,31	63	85,428
7/16" - 14	34,5	46,8	56	75,9	79	107,1	M 12 x 1.75	25	33,9	66,5	90,17	98	132,888
1/2" - 13	47	63,7	76	103,1	107,5	145,8	M 12 x 1.25	27	36,612	73	98,99	107,5	145,77
1/2" - 20	53,5	72,5	86	116,6	121,5	164,8	M 14 x 2	40	54,24	107	145,09	156,5	212,214
9/16" - 12	68	92,2	110	149,2	155	210,2	M 14 x 1.5	43	58,308	115,5	156,62	169	229,164
9/16" - 18	76	103,1	122,5	166,1	173	234,6	M 16 x 2	62	84,072	165,5	224,42	243,5	330,186
5/8" - 11	94	127,5	151,5	205,4	214,5	290,9	M 16 x 1.5	66,5	90,174	177	240,01	260	352,56
5/8" - 18	106,5	144,4	171,5	232,6	242,5	328,8	M 18 x 2.5	86	116,616	229	310,52	336	455,616
3/4" - 10	167	226,5	269,5	365,4	380,5	516,0	M 18 x 1.5	96,5	130,854	257	348,49	378	512,568
3/4" - 16	186	252,2	300	406,8	424,5	575,6	M 20 x 2.5	121,5	164,754	323,5	438,67	475	644,1
7/8" - 9	169,5	229,8	434	588,5	612,5	830,6	M 20 x 1.5	134,5	182,382	359	486,80	527	714,612
7/8" - 14	187	253,6	478,5	648,8	676,5	917,3	M 22 x 2.5	165,5	224,418	441	598,00	647,5	878,01
1" - 8	254,5	345,1	650	881,4	918,5	1.245,5	M 22 x 1.5	182	246,792	484	656,30	711,5	964,794
1" - 12	285,5	387,1	729,5	989,2	1031	1.398,0	M 24 x 3	210	284,76	559	758,00	821	1113,276
1.1/8" - 7	360,5	488,8	921,5	1.249,6	1302	1.765,5	M 24 x 1.5	238,5	323,406	636	862,42	933,5	1265,826
1.1/8" - 12	404,5	548,5	1033,5	1.401,4	1460	1.979,8	M 27 x 3	307	416,292	820	1111,92	1204	1632,624
1.1/4" - 7	508,5	689,5	1300	1.762,8	1837,5	2.491,7	M 27 x 1.5	344	466,464	918	1244,81	1348,5	1828,566
1.1/4" - 12	563,5	764,1	1439,5	1.952,0	2034,5	2.758,8	M 30 x 3.5	416,5	564,774	1111,5	1507,19	1632,5	2213,67
1.3/8" - 6	667	904,5	1704,5	2.311,3	2408	3.265,2	M 30 x 1.5	477,5	647,49	1273	1726,19	1870	2535,72
1.3/8" - 12	759,5	1.029,9	1940	2.630,6	2741,5	3.717,5	M 33 x 3.5	567	768,852	1512,5	2050,95	2221,5	3012,354
1.1/2" - 6	885,5	1.200,7	2262,5	3.068,0	3197	4.335,1	M 33 x 1.5	641,5	869,874	1709,5	2318,08	2511	3404,916
1.1/2" - 12	996	1.350,6	2545,5	3.451,7	3597	4.877,5	M 36 x 4	729	988,524	1943	2634,71	2854	3870,024
a) Nominal thread diameter in inches-threads per inch b) Foot pounds c) Newton-meters d) Nominal thread diameter in millimeters x thread pitch							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 S/A 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.

TECHNICAL PUBLICATION DIVISION

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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 toxicidade 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 afilados, 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.



ATENCIÓN

- RECOMENDACIONES GENERALES DE SEGURIDAD -

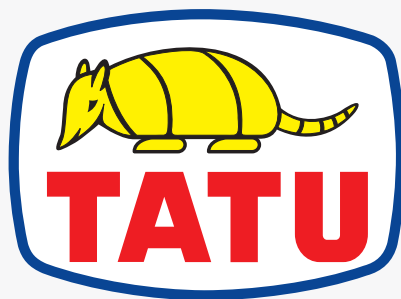
- 1 - Solamente personas con el completo conocimiento del tractor y de los implementos deben conducirlos.
- 2 - Para enganchar los implementos, proceda con maniobras en marcha lenta, en local con espacio y este preparado para aplicar los frenos.
- 3 - Para acoples en la toma de potencia apague el motor del tractor.
- 4 - El motor no debe funcionar en locales sin ventilación suficiente debido a la toxicidad de los gases expelidos.
- 5 - Proceda con los lastres necesarios para traccionar equipos que así 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 móviles 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 (coifamalezas) 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 presión antes de desconectar cualquier tubería.
- 16 - No verifcar filtraciones en los circuitos hidráulicos con las manos, la alta presión puede provocar lesiones corporales, use cartón u otro objeto adecuado.
- 17 - Después del término 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: rasas, arados y otros, tienen normalmente órganos activos afilados, con bordes cortantes que ofrecen riesgos de accidentes, aún cuando detenidos, por lo tanto, estos deben ser mantenidos en local apropiado, 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 alied 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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