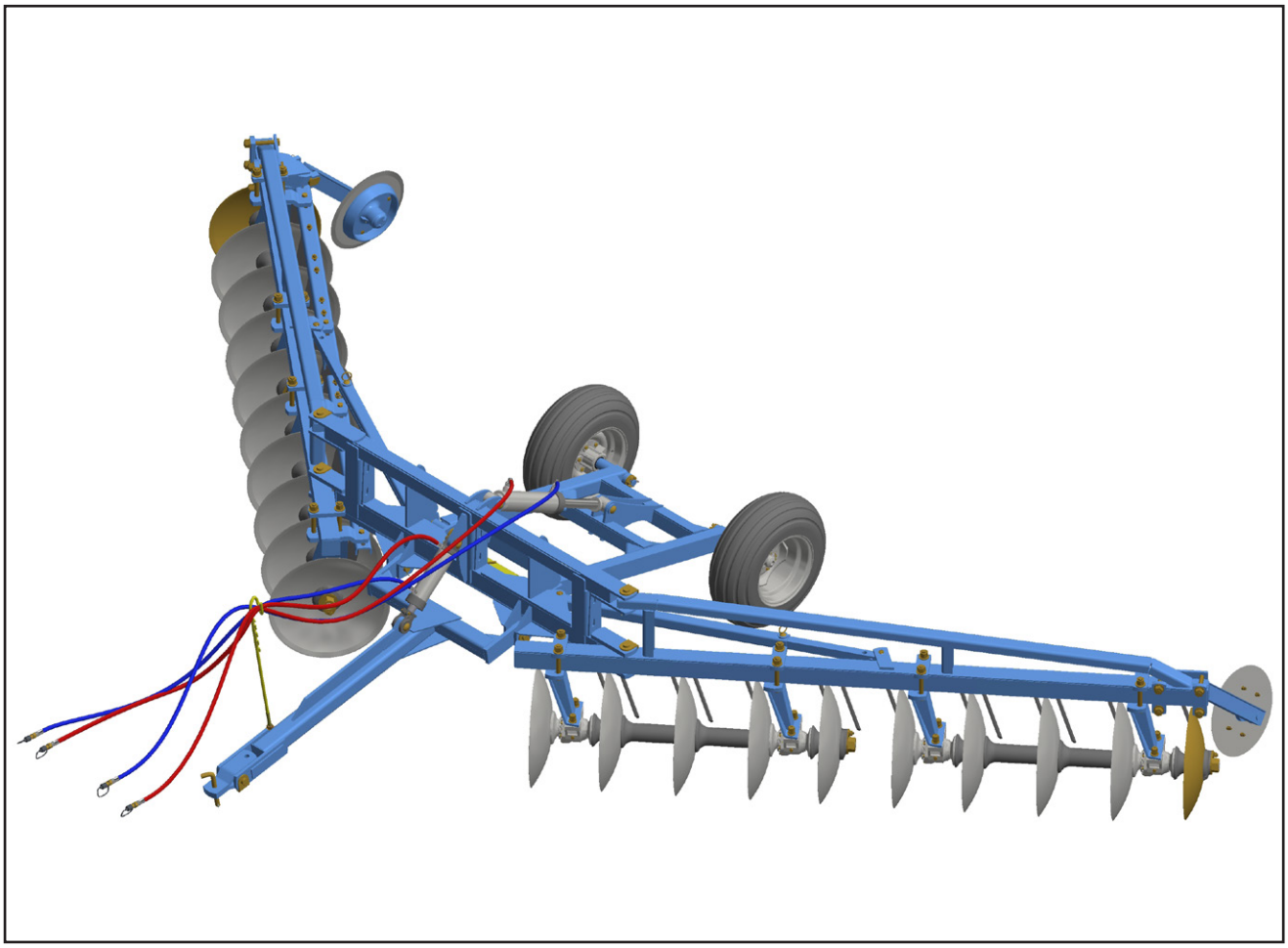
TATU MARCHESAN

OPERATOR'S MANUAL



TSTA

IDENTIFICATION

Dealer: _____

Owner: _____

Firm / Farm: _____

City: _____ State: _____

No. of the Certificate of Guarantee: _____

Serial / No.: _____

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

Product: _____

Notes: _____

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Introduction

TATU Terrace and Levee Plows, TSTA model is an specific equipment for the construction of wide-based and rounded terraces, which enable to plant the cultivation on them, with full use of the field.

The use of terrace and levee plows also provides the advantage of incorporating the earth located on the surface of the terrace, and which will be used by the plants. Terraces prepared by other kinds of equipments, which scrape the soil and remove the fertile layer, cause large irregularities in the planting.

TATU terrace and levee plows feature an exclusive articulation system for the adjustment of the disc blades angle, using the hydraulic cylinder connected to the drawbar, which enable the operator to carry out all the work without leaving the seat, providing agility in the construction of terraces.

The last disc blade at every gang end is smaller in order to reduce the furrow at the base and provide a better finish to the terrace.

The finishing job on the terraces is usually done using a disc/subsoiler plow.

The hitching to the tractor is made using the drawbar and the hydraulic outlets, leaving the three-point hitch system free. The well-designed wheelset facilitate the maneuvers and streamline the transportation.

This instructions manual contains the necessary information for the best performance of this plow. The operator must carefully read the entire manual before working with the equipment. Also, read and understand the safety recommendations.

For any further clarification or in the event of technical problems that may arise during the service, consult your dealer and the Technical Support department of the factory. They can ensure the fully functioning of your TATU terrace and levee plow.

TATU
MARCHESAN

Table of contents

To the owner

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

• Warranty certificate;

• Instructions 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.

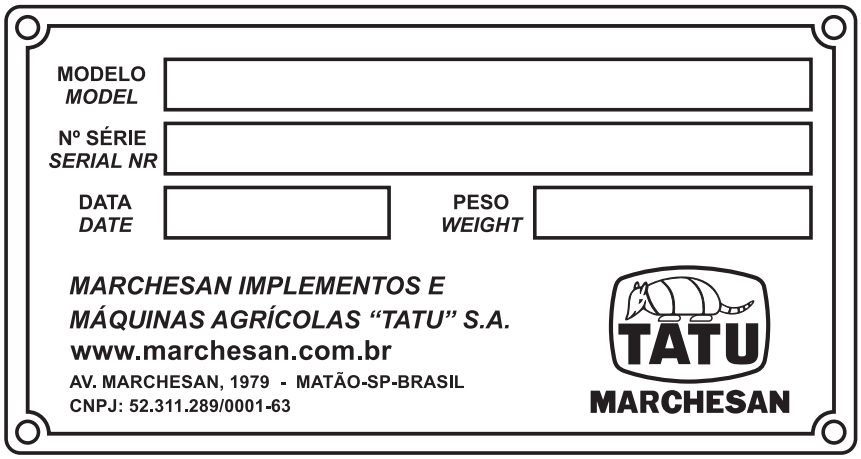
Important

- **Only people who own a full knowledge of the tractor and equipment must operate them;**
- **Marchesan is not responsible for any damage caused by accident on transporting, incorrect utilization 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 the incorrect use of the equipment.**

General information

Right and left hand side indication 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 frame.



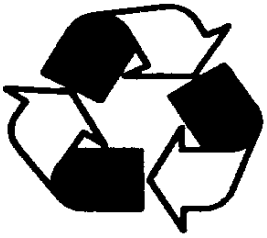
NOTE **The warranty shall not be applied to any equipment, or any parts thereof, which has been altered elsewhere than at the place of manufacture or which the original purchaser thereof, at retail, has used or allowed to be used parts, not made or supplied by Marchesan S/A.**

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

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

The TSTA terrace and levee plow 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 the transportation, maintenance and storage.

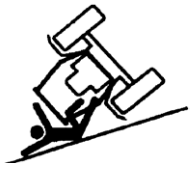
Read and understand the information before making any adjustment or maintenance.

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

To the operator

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, treated seeds) make any contact with your skin or clothes.

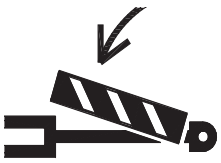
Keep access and work places clean or free from oil and grease. Risk of accidents.

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

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.

For your protection and safety, always wear adequate clothes and footwear while operating the equipment.



Always use the safety locks to carry out maintenance operations and to transport the equipment.

To the operator

- Only trained and qualified personnel are allowed to operate the equipment.
- While working or during transportation, only the presence of the operator is allowed on the tractor.
- Do not allow children to play or to get over the equipment while it is operating, during transportation or storage.
- Have full knowledge of the soil before starting to work. Use the speed which is suitable to the conditions of the ground. Provide the delineation of obstacles or hazardous locations.
- Use personal protective equipment (PPE).
- Wear appropriate clothes and footwear. Avoid clothes that are either loose or hanging from the body, which may become entangled in moving parts.
- Never operate the equipment without its **protective devices**.
- Be careful while hitching the equipment to the tractor.
- Wear protective gloves to work near the disc blades.
- Never attempt to change the adjustments, clean or lubricate the equipment while it is moving.
- Carefully check the transport width on narrow locations.
- When setting the equipment to transport position, check if there are no people or animals close or under the equipment.
- In case of emergency, know how to stop the tractor and equipment quickly.
- Always shut down the engine, remove the key and use the handbrake before leaving the tractor seat.
- Only pull the equipment using a tractor with appropriate power.
- Do not drive the equipment under the influence of alcohol or any soothing/ stimulating medicine, as it may result in a serious accident.
- 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 at hands.
- Do not allow people or animals to get under the equipment at any time.
- Whenever you unhitch the equipment, either on the field or shed, do it on a flat and firm surface and use the parking jacks. Make sure the equipment is properly supported.
- 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.
- 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.
- Please check the general safety instructions on the back cover of this manual.

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 other by following these safety guidelines:

- Use adequate ramps to load or unload the equipment. Do not make the loading on ditch banks, it can cause a serious accident.

- When lifting with a hoist, use the appropriate points to lift.

- Underpin the equipment appropriately.

- Use chock blocks and safety chains to secure the equipment to the truck or trailer during the transport.

- Make sure the SMV (Slow Moving Vehicle) sign, and all the lights and reflectors that are required by the local highway and transport autorithies are in place, are clean and can be seen clearly by all overtaking and oncoming traffic.

- 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.

- Always be careful with the load height, especially when passing under electrical power lines, bridges and others.

- Check all laws and regulations regarding the height limits and load width while transporting the equipment to the truck or trailer. If necessary use banners, lights and other devices in order to give adequate warning to the other drivers.

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 provide decals, upon request and indication of the respective serial number.

05.03.03.1428

05.03.03.1827

Decal set

Model	Serial number
Marchesan logo	**05.03.03.4070**
TSTA decal	**05.03.03.4071**

Data sheet

Type: .....Terrace and levee plow

Model: .....TSTA

Number of disc blades: .....14, 16, 18, 20, 22 and 24

Spacing between disc blades: .....400 mm

Disc blades dimension: ..... Ø 26" x 6 mm (Smaller disc: Ø 24" x 6 mm)

Terrace height (mm): .....700 to 900

Transportation width (mm): 3000

Tires: ..... 7.50 x 16 - 10 ply

Working speed: ..... 6 to 8 Km/h

Average yield: .....700 m/h

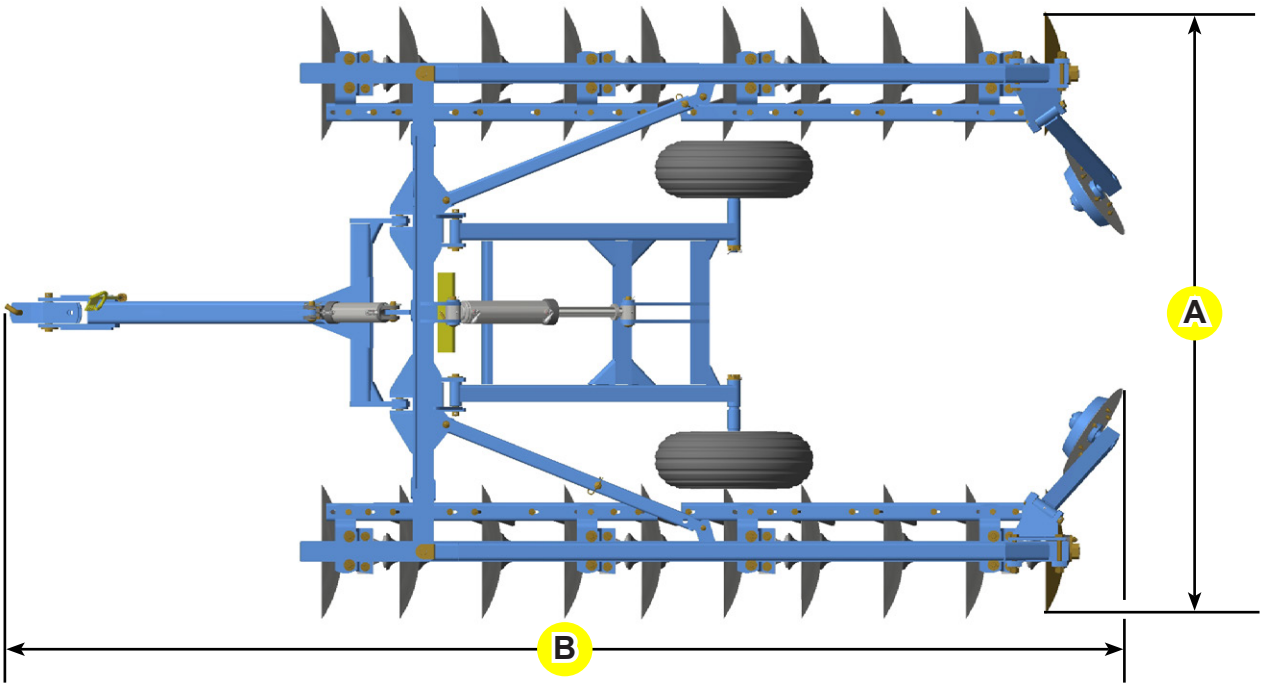
Model	Number of disc blades	Terrace dimensions* (m) Height x Width	Weight (Kg)	Tractor required (hp)**
TSTA	14	1.20 x **5.2**	1967	85
	16	1.20 x **5.8**	2190	100
	18	1.20 x **6.4**	2299	120
	20	1.20 x **7.0**	2464	140
	22	1.20 x **7.6**	2573	160
	24	1.20 x **8.2**	2740	180

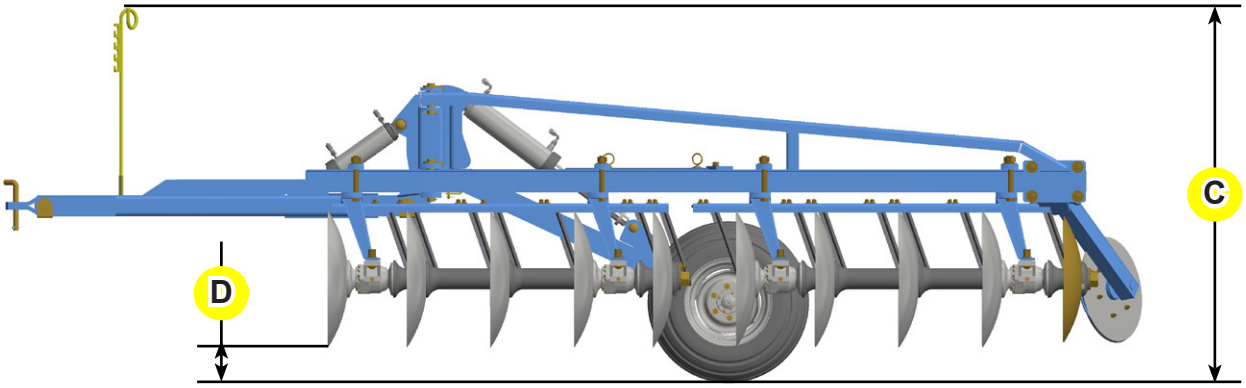
* Maximum dimension before finishing.

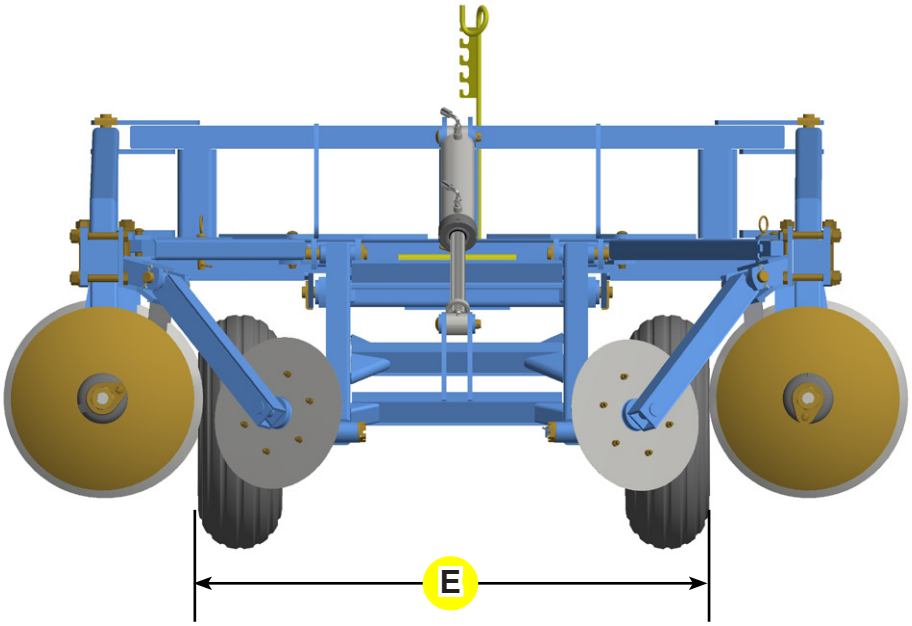
** Minimum power required.

NOTE **Optional tire 11L15 - 10 ply.**

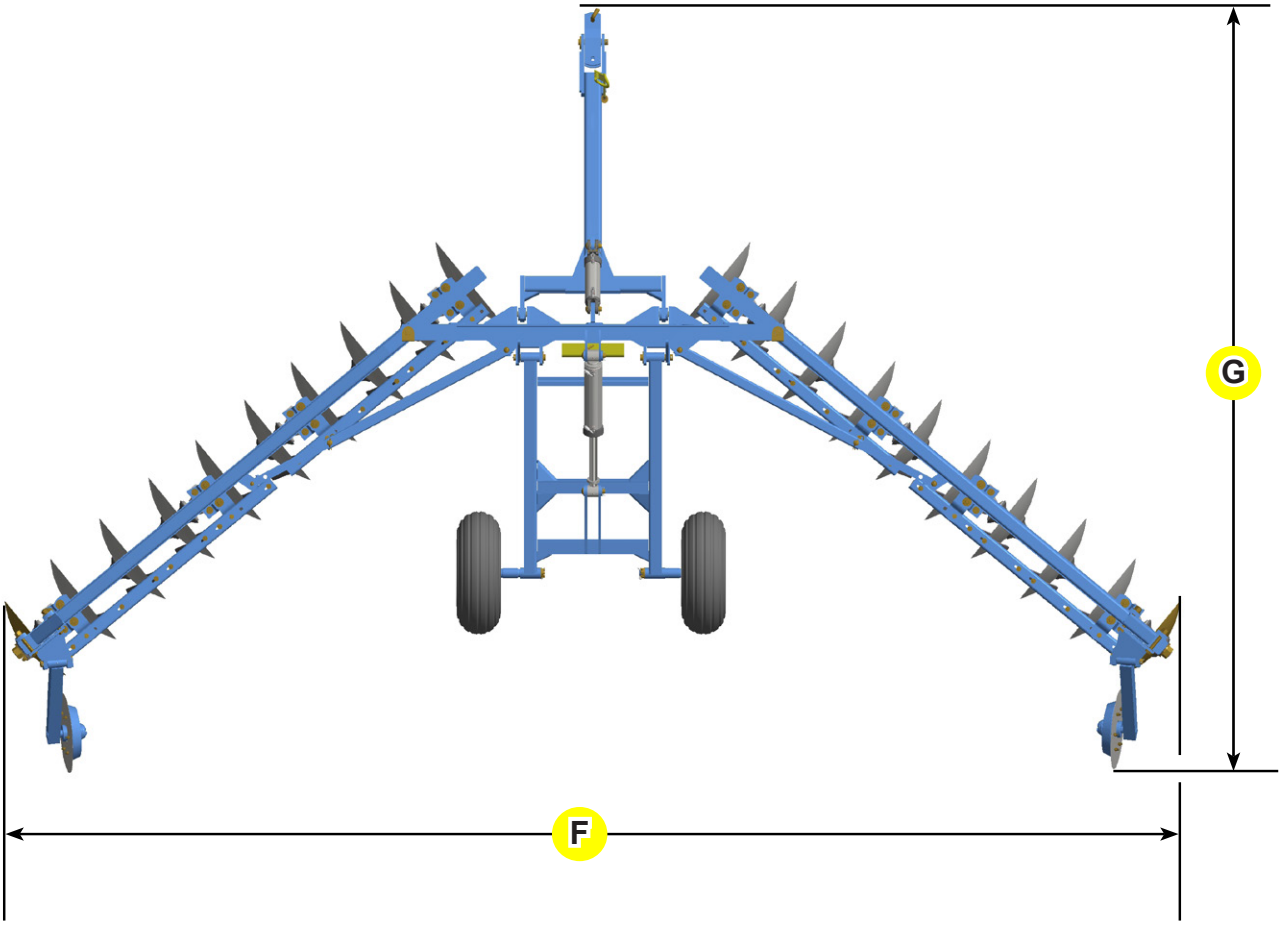
General dimensions







General dimensions



Model	Number of disc blades	Dimensions (mm)						
		A	B	C	D	E	F	G
TSTA	14	3000	4240	1785	155	1700	5600	4040
	16		4595				6250	4315
	18		5000				6750	4515
	20		5430				7430	4770
	22		5820				8045	5040
	24		6225				8680	5285

Components

01 - Front frame

02 - Right side frame

03 - Left side frame

04 - Telescopic arm

05 - Wheelset

06 - Disc gangs

07 - Bearing hanger

08 - Scrapers

09 - Guide wheel

10 - Hydraulic cylinders

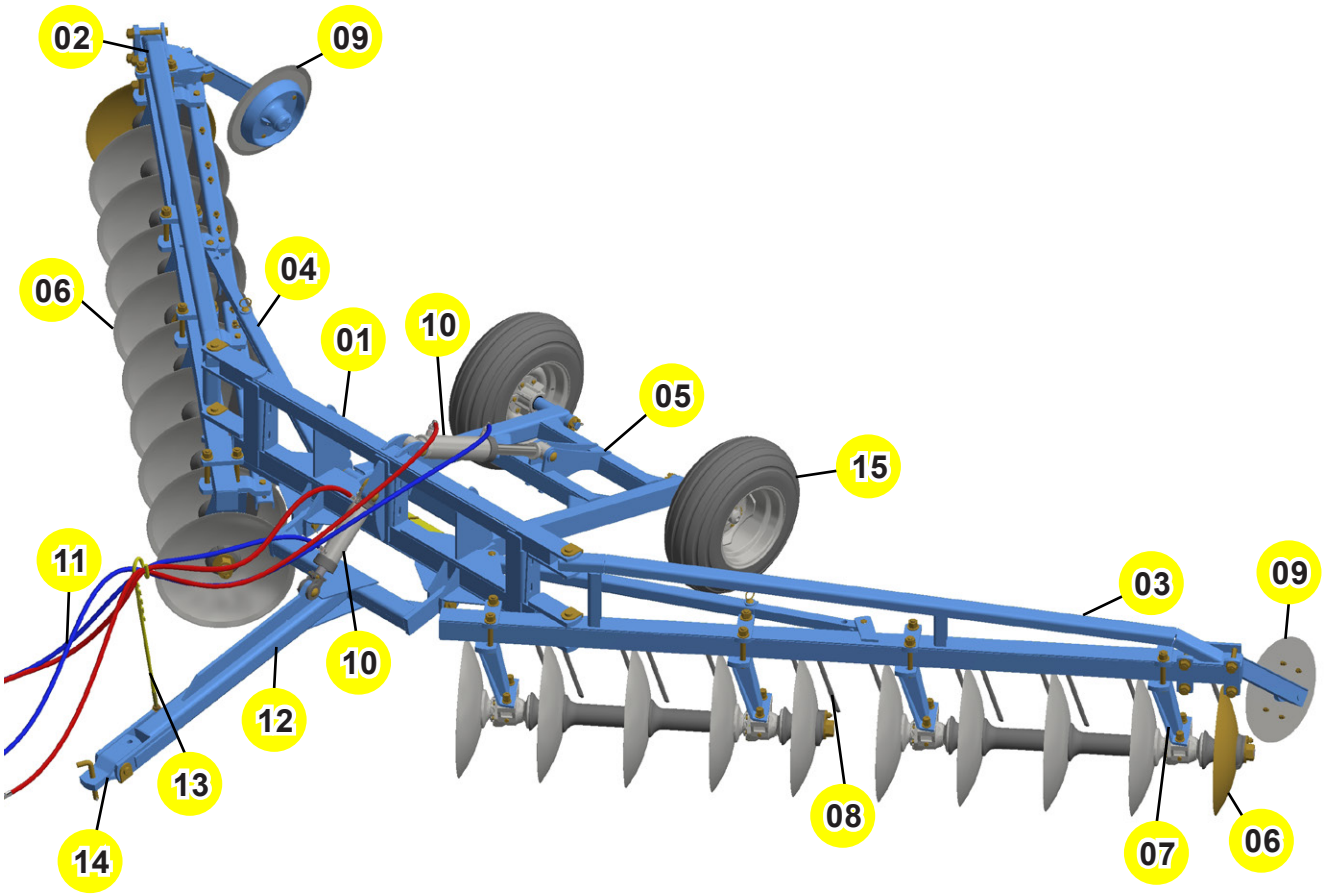
11 - Hoses

12 - Drawbar

13 - Hose support

14 - Tractor hitch

15 - Tire



Assembly

To facilitate transportation, this product is delivered unassembled. Therefore, follow the instructions with every detail and procedure to assemble the equipment.

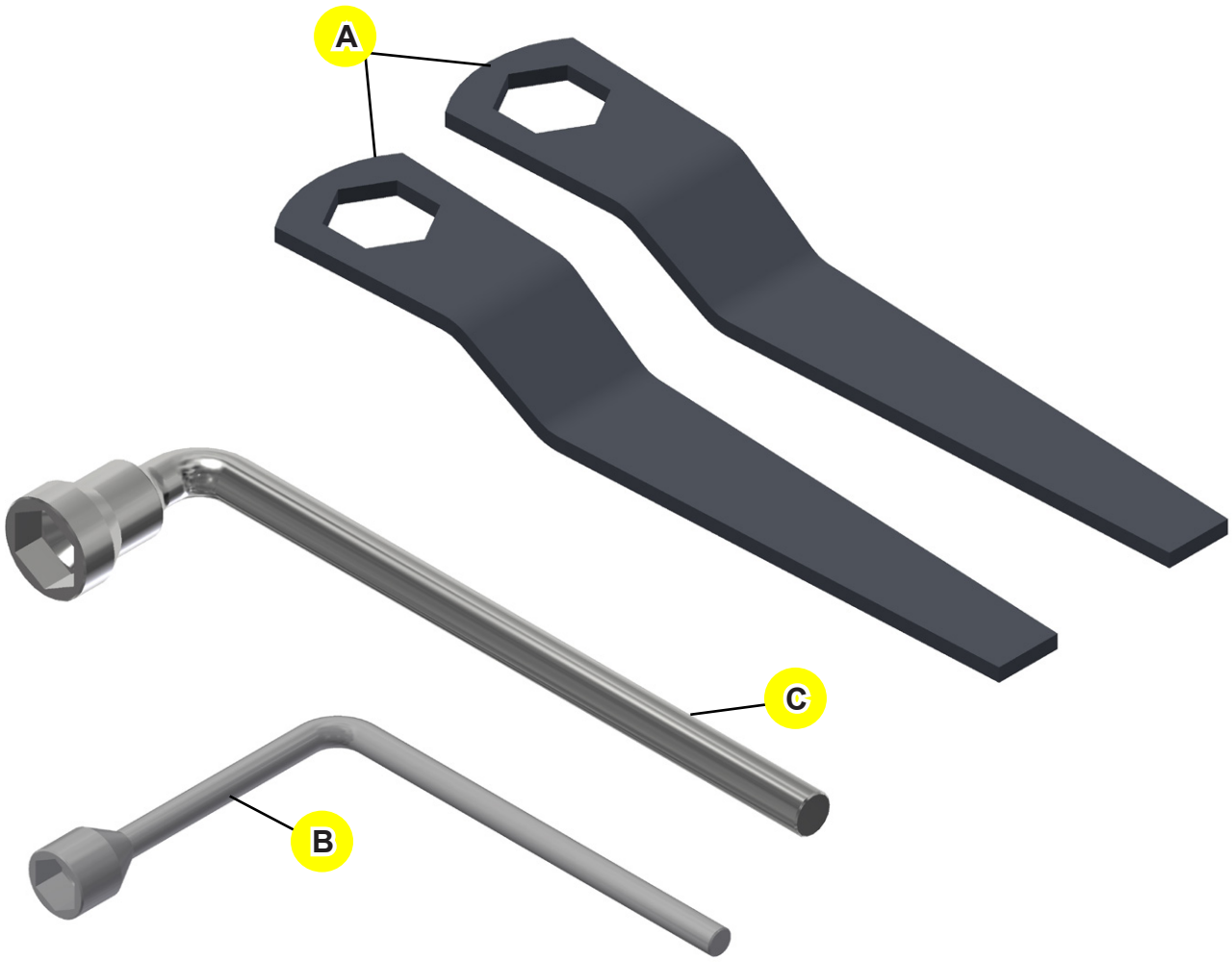
First of all, spread all the parts in a clean area to identify them easily. Check the quantity of parts with the packing list which is found inside the packing box.

Using the set of wrenches

• The box ended wrenches (A) are used to tighten the nuts of the disc gangs, one wrench to hold the axle nut on one end, while tightening the nut on the other end; thereby preventing the axle from rotating.

• The box ended wrench (B) is used to tighten the bearing bolts.

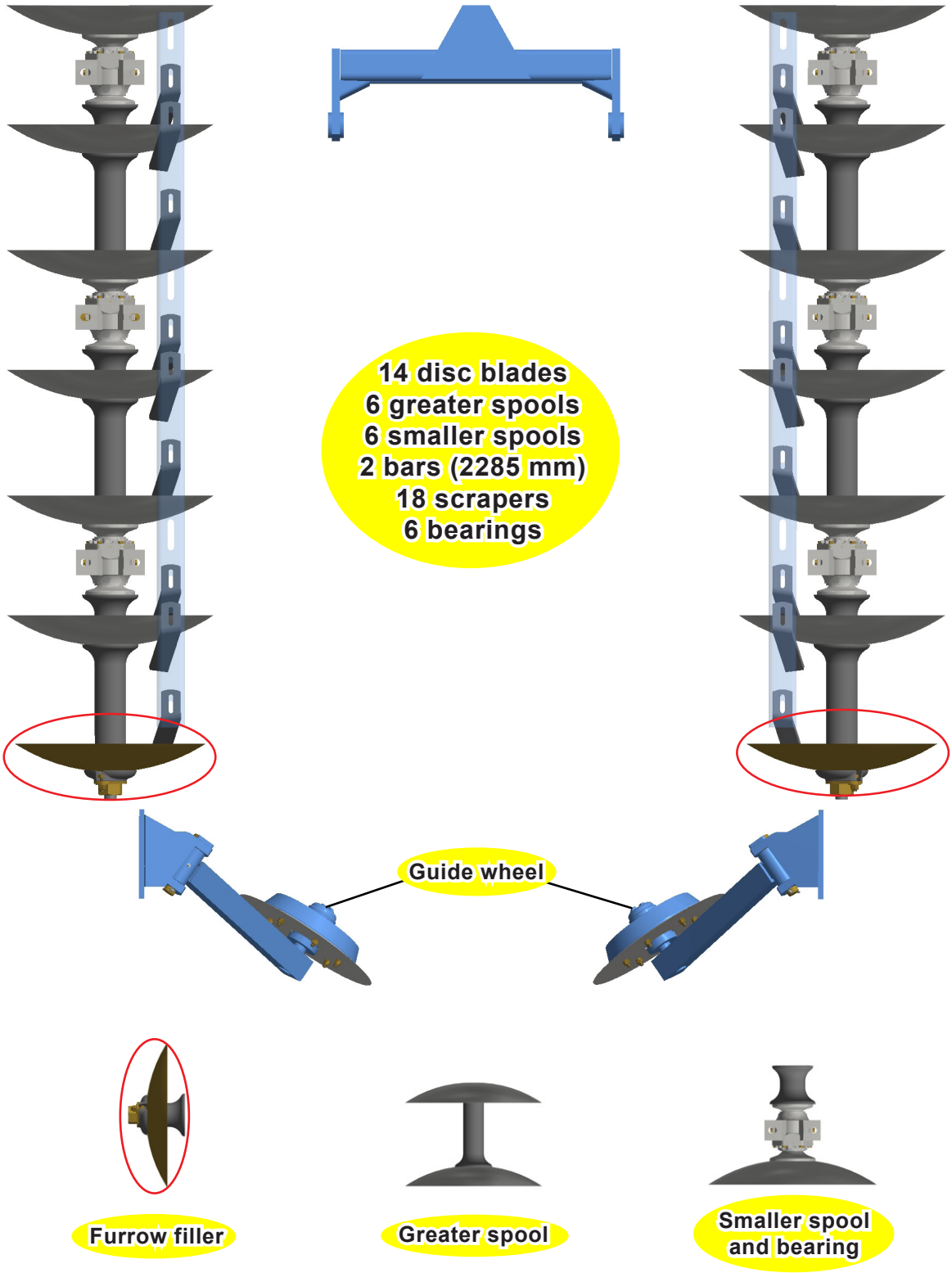
• The box ended wrench (C) is used to tighten the disc gangs fixing bolts on the side frames.



NOTE **It is recommended to wear gloves, especially while assembling the disc gangs.**

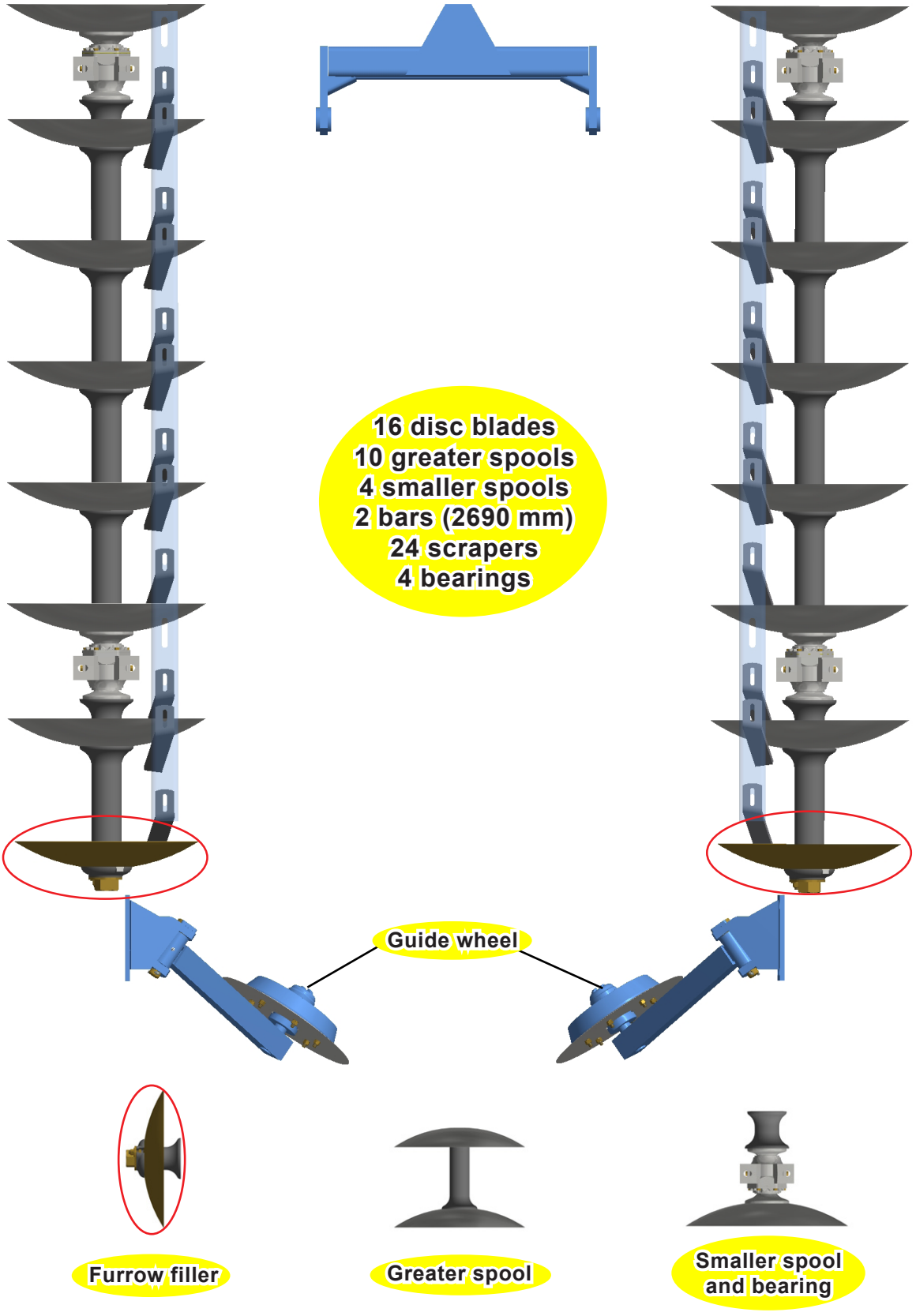
Assembly scheme (disc gang with 14 disc blades)

Before starting to assemble the disc gangs, check the correct position of the bearings, spacer spools and scrapers, as shown on the next pages.



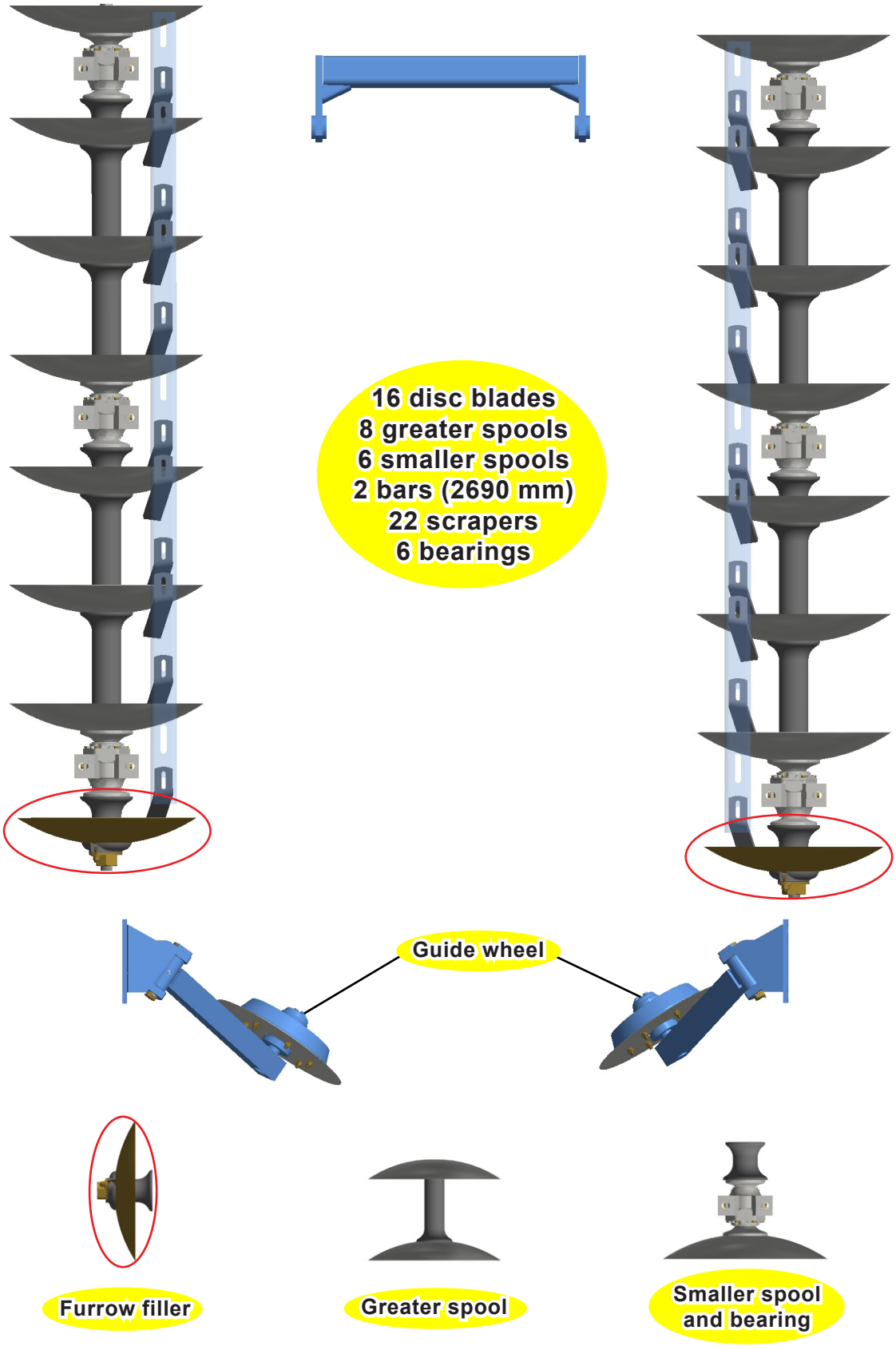
NOTE Fasten the scraper bars to the bearing hanger using the greater slots.

Assembly scheme (disc gang with 16 disc blades and 4 bearings)



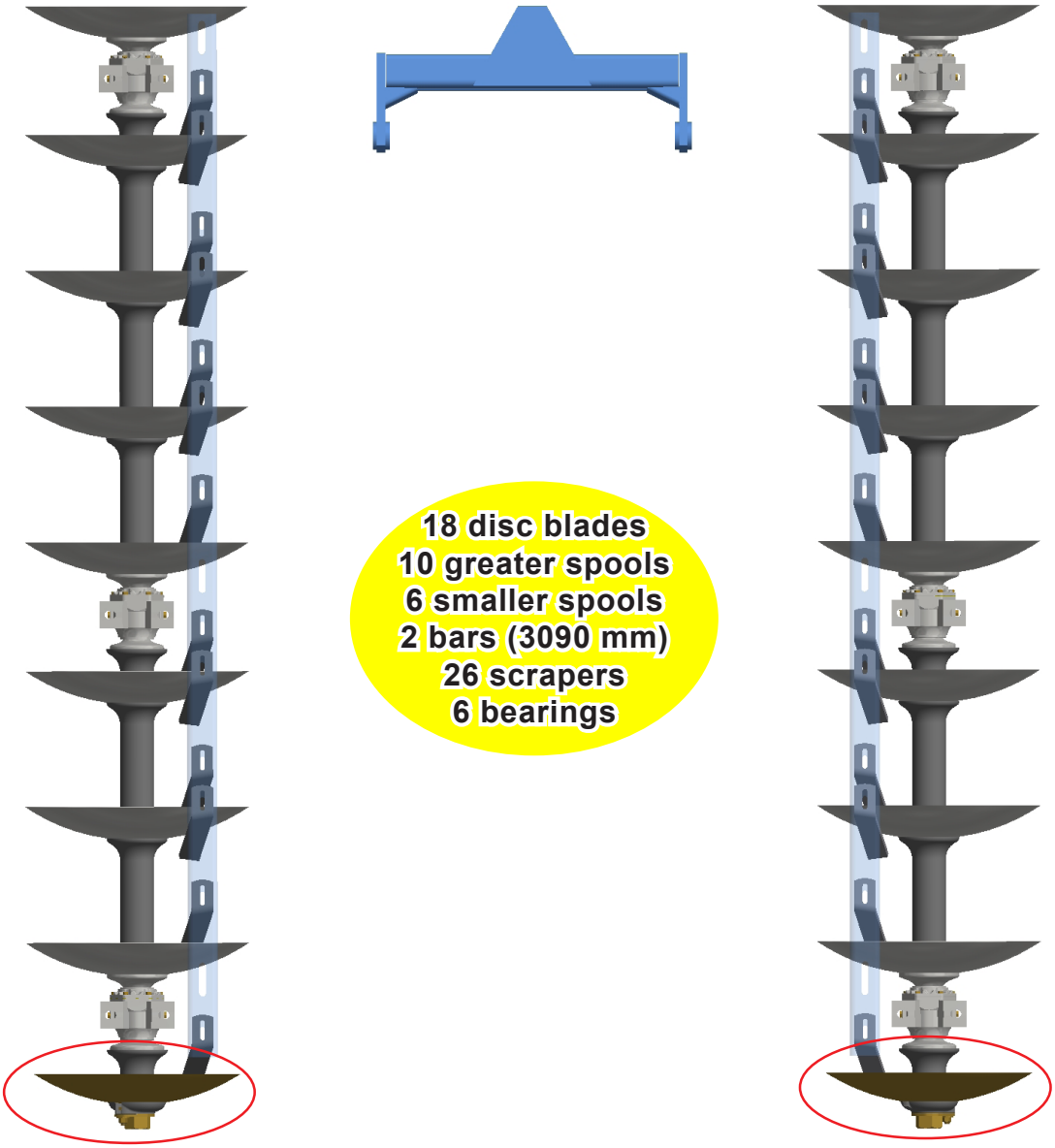
NOTE Fasten the scraper bars to the bearing hanger using the greater slots.

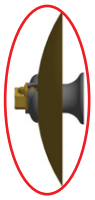
Assembly scheme (disc gang with 16 disc blades)



NOTE Fasten the scraper bars to the bearing hanger using the greater slots.

Assembly scheme (disc gang with 18 disc blades)





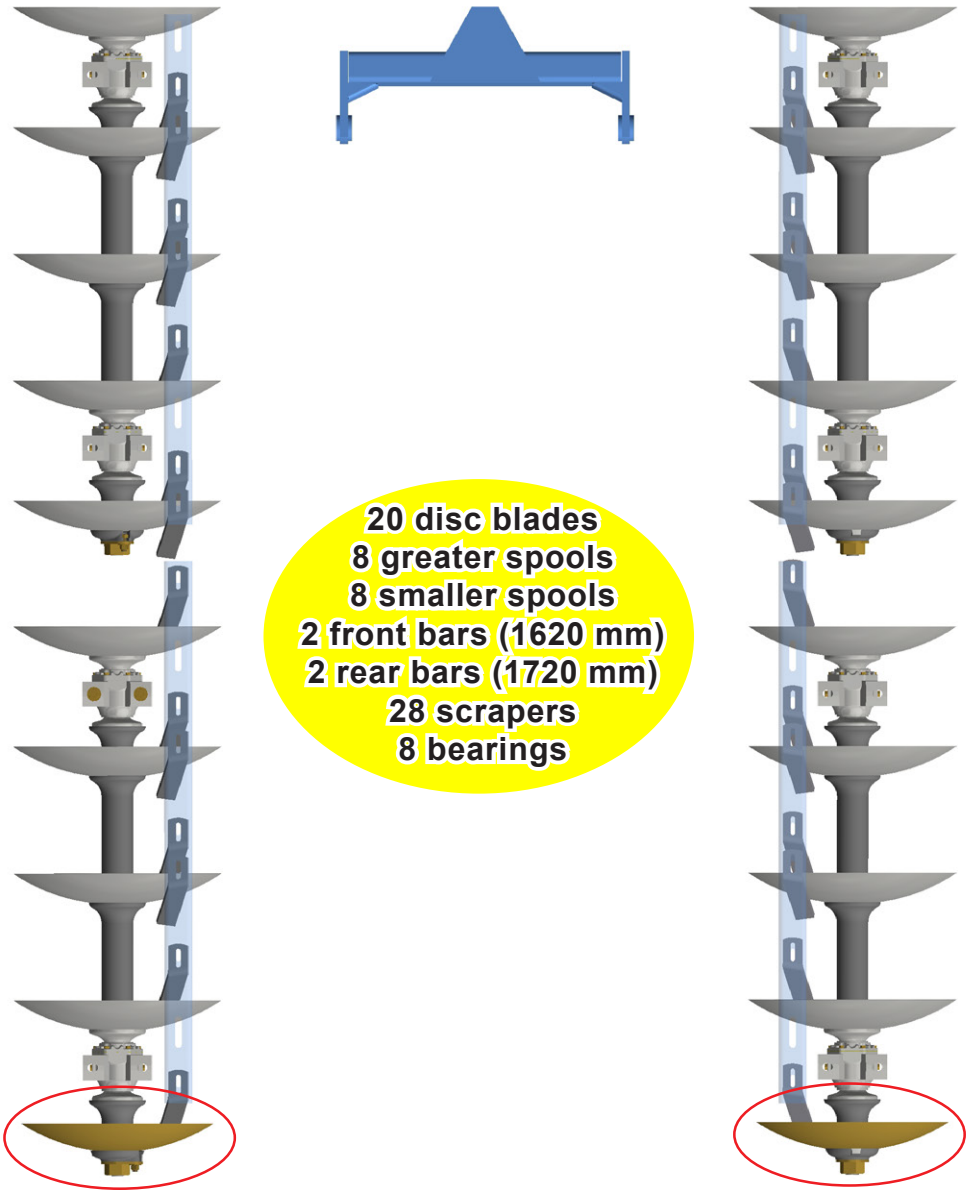
Furrow filler

Greater spool

Smaller spool and bearing

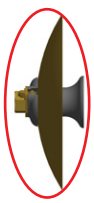
NOTE Fasten the scraper bars to the bearing hanger using the greater slots.

Assembly scheme (disc gang with 20 disc blades)



20 disc blades
8 greater spools
8 smaller spools
2 front bars (1620 mm)
2 rear bars (1720 mm)
28 scrapers
8 bearings

Guide wheel



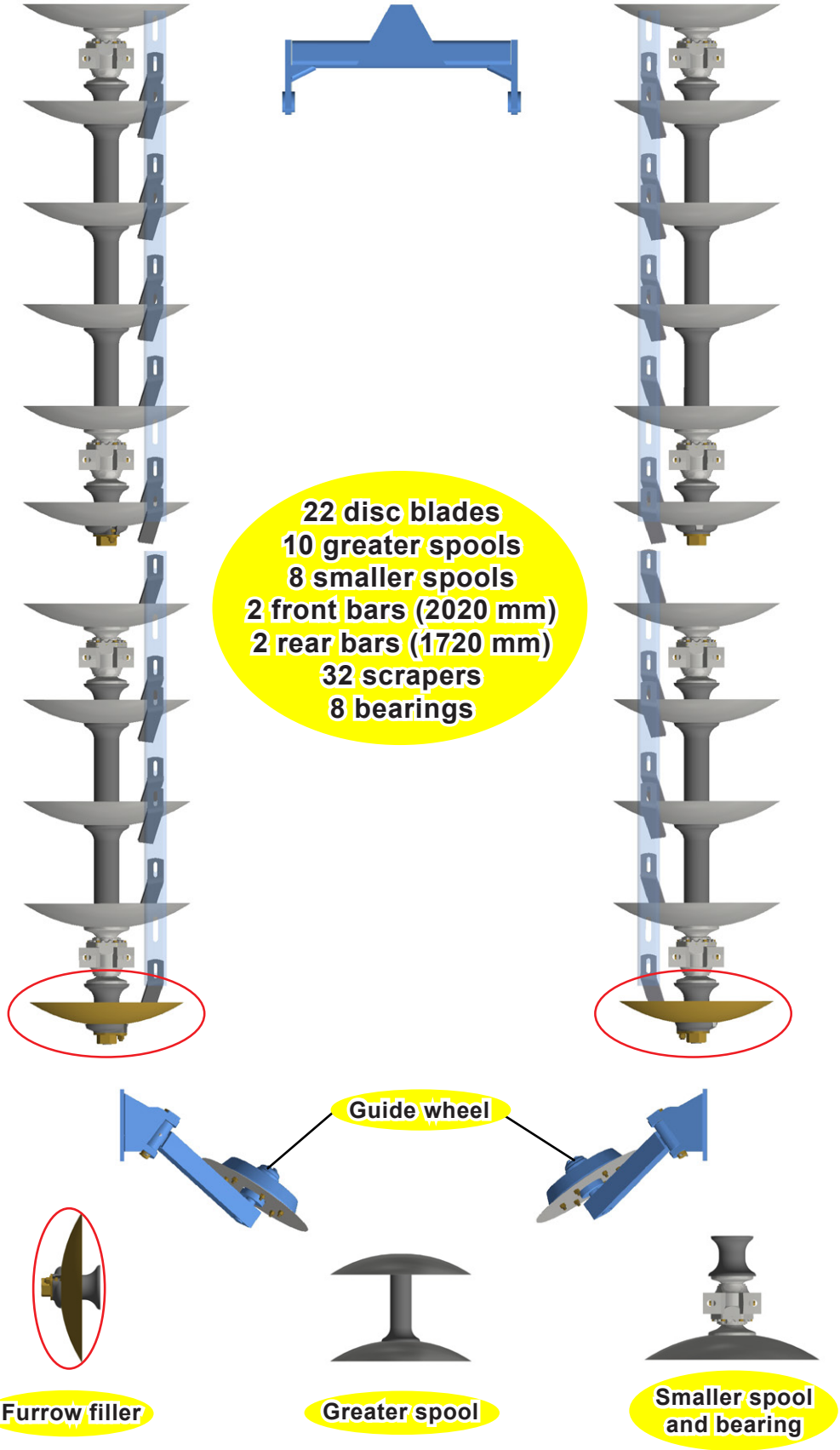
Furrow filler

Greater spool

Smaller spool and bearing

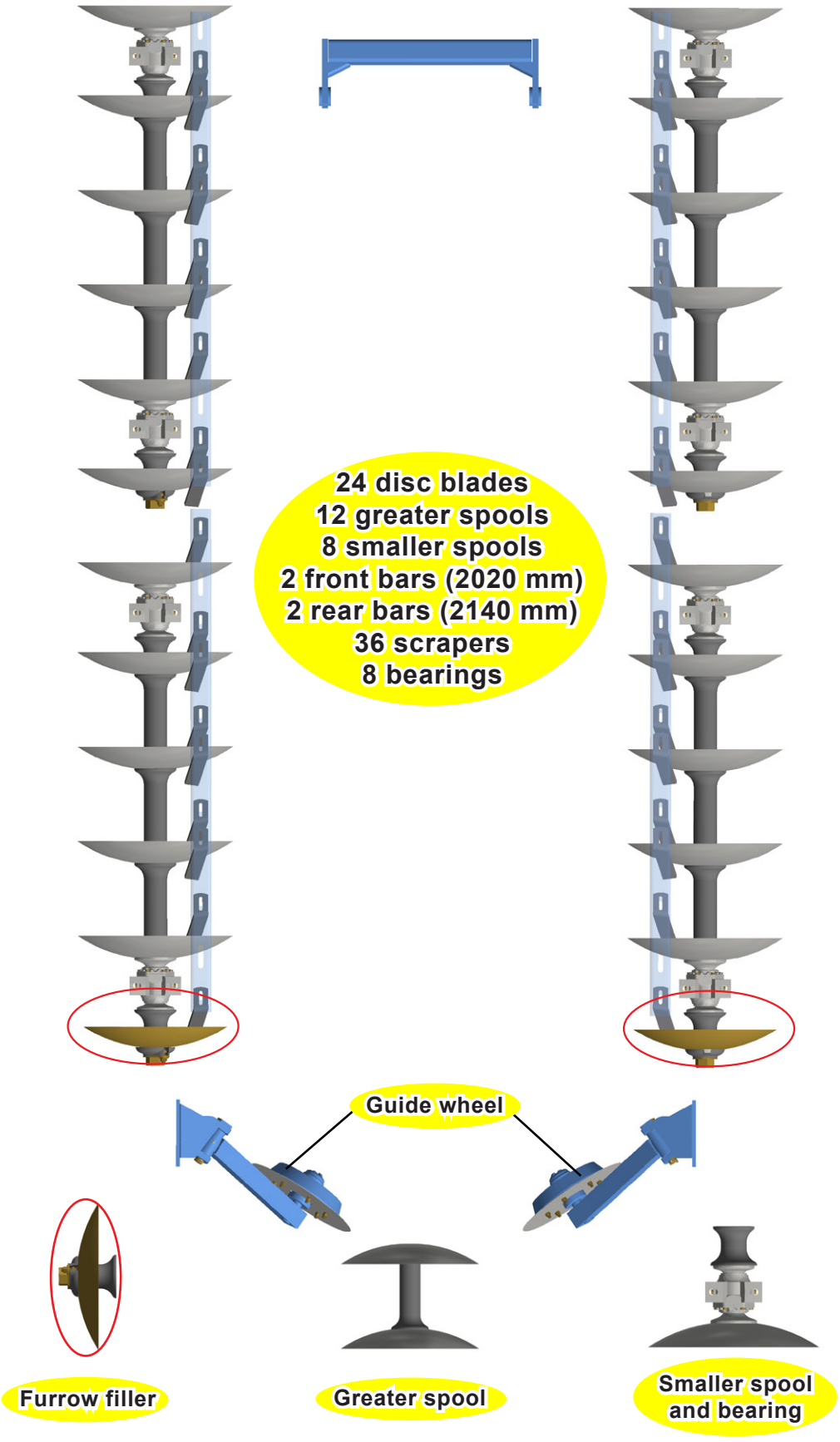
NOTE Fasten the scraper bars to the bearing hanger using the greater slots.

Assembly scheme (disc gang with 22 disc blades)



NOTE Fasten the scraper bars to the bearing hanger using the greater slots.

Assembly scheme (disc gang with 24 disc blades)



NOTE Fasten the scraper bars to the bearing hanger using the greater slots.

Disc gangs assembly sequence

• Position the outer washer (A) together with axle (B).

• Then, tighten the nut (C) until when it is 5 mm from the axle end.

• Position the furrow fillers, disc blades (D), bearings (E) and spacer spools (F and G), following the instructions on previous pages.

• Insert the inner lock (H) and the other nut (C-1).

• Position the bolt (I), which holds the nut lock (J), along with the flat washer and spring washer (only on the outer side of the disc gangs).

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

1) Position one of the wrenches on the outer side of the gangs (locked side), and let the handle supported on the ground. (As shown on the next page).

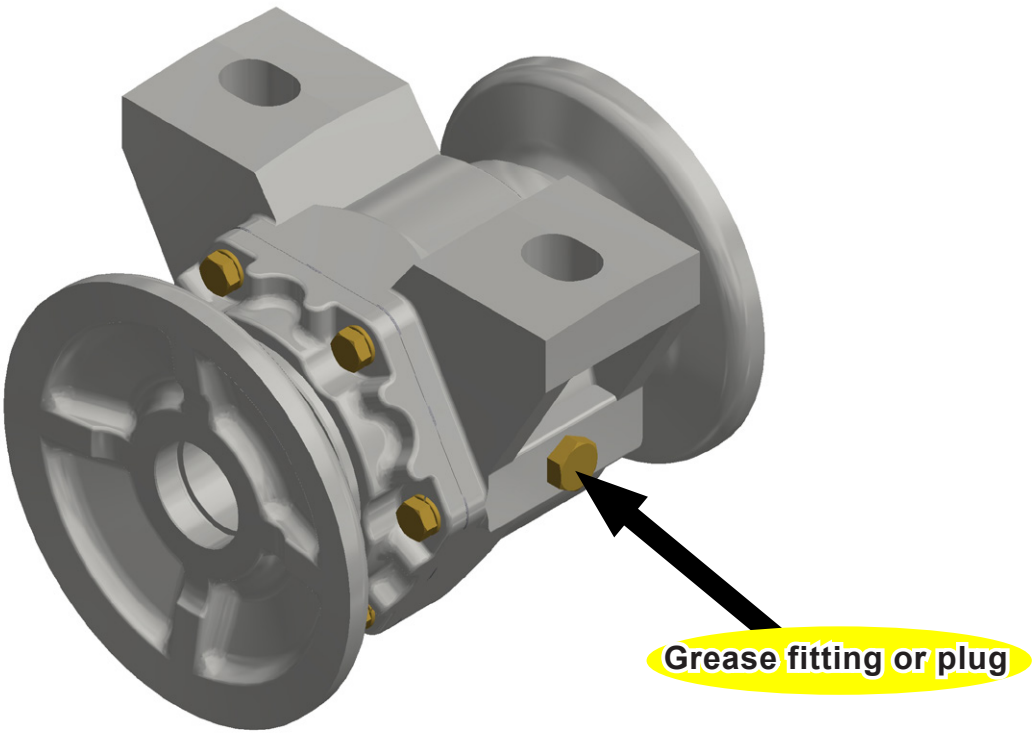
2) On the inner side, use the other wrench and tighten the gangs to the maximum torque.

3) Please note that in order to tighten the gangs they must be underpinned with a piece of wood or another object, preventing them from moving. (As shown on the next page).

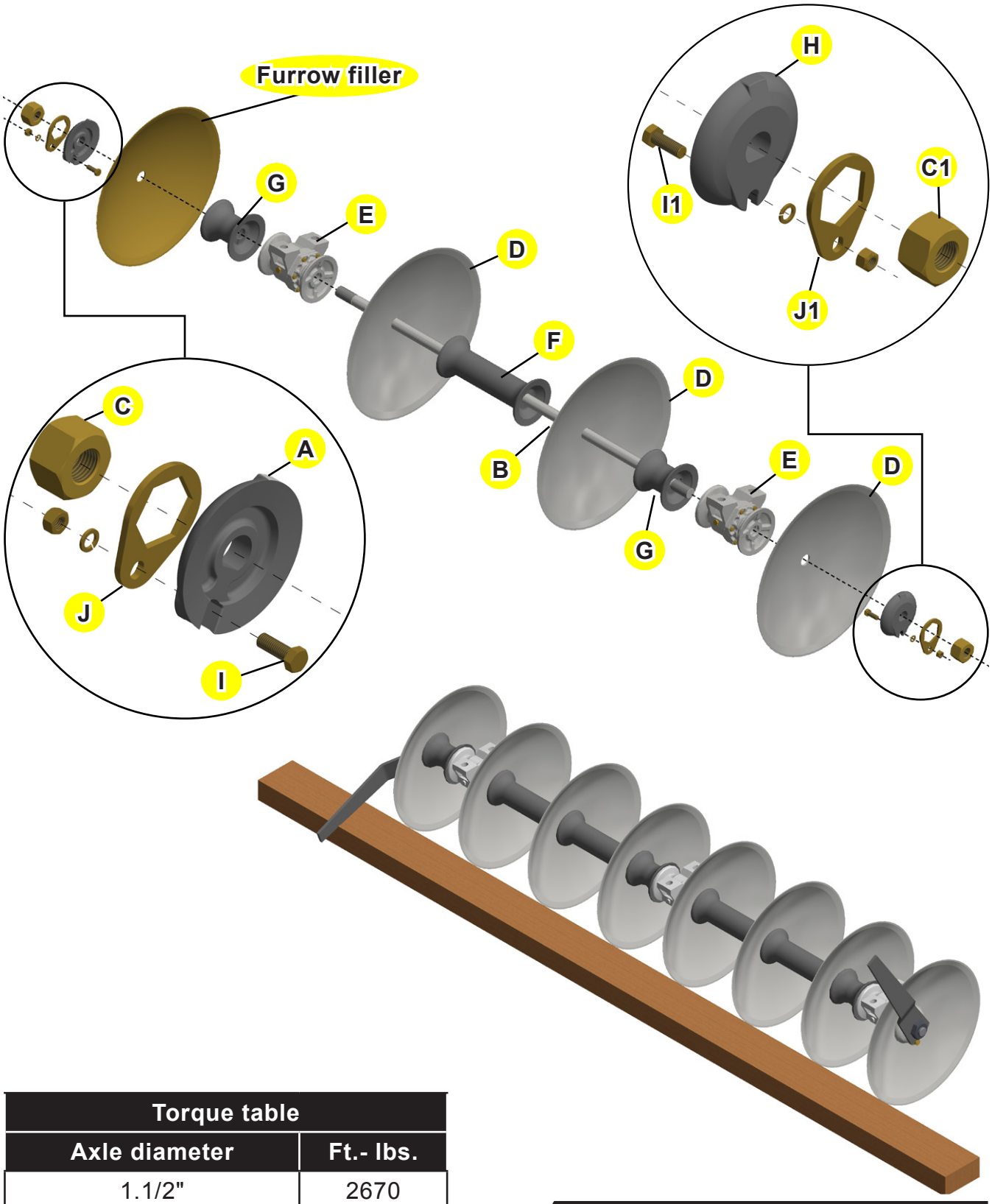
• Finally, insert the bolt (I-1) and position the nut lock (J-1), attaching it with the spring washer and nut.

IMPORTANT

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



Disc gangs assembly sequence



Torque table	
Axle diameter	Ft.- lbs.
1.1/2"	2670
1.5/8"	2890
2.1/8"	3300
2.1/2"	3500

NOTE The axle (B) threads must be greased before their assembly.

See torque table on the 'important data' section.

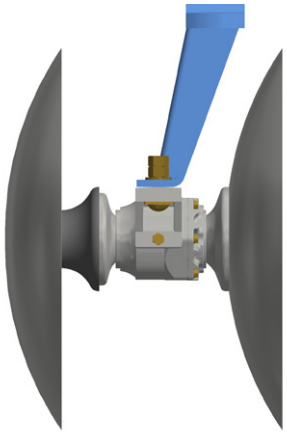
Assembling the bearing hangers to the bearings

Before assembling the left and right hand side bearing hangers to the bearing, you should observe the equipment from behind in order to assemble them properly.

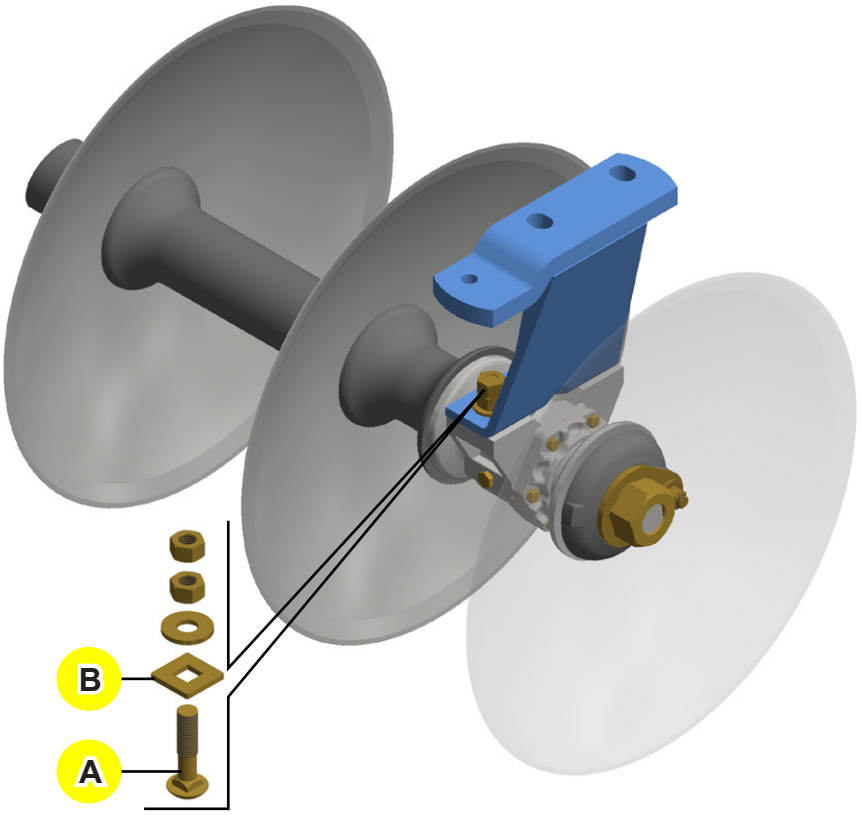
• Assemble the left/right bearing hanger to the bearing using the bolt (A), square washer (B), inserting the bolt through the bearing housing and bearing hanger hole.

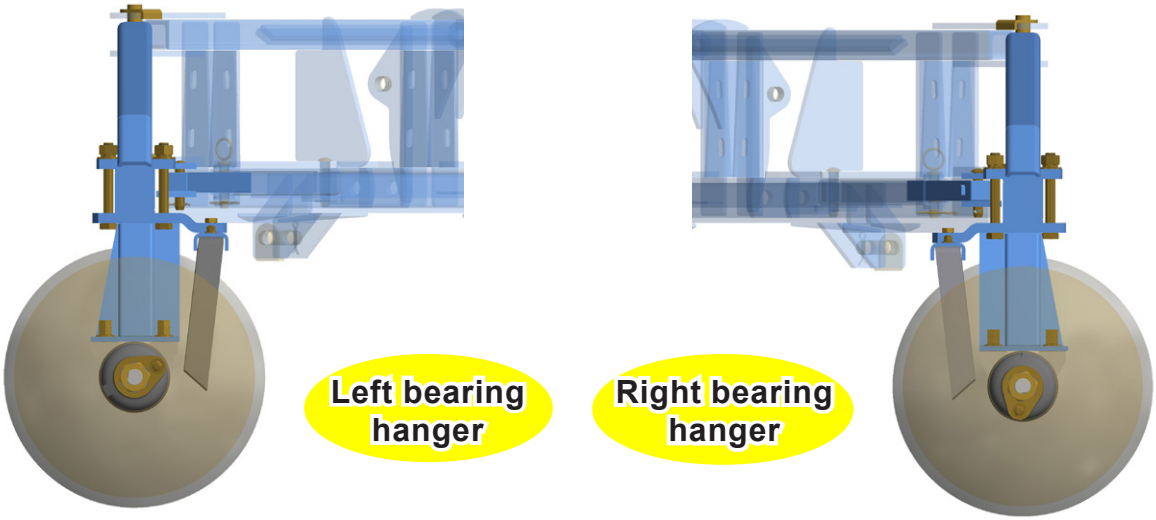
• From above the bearing hanger, place the flat washer, nut and locknut.

• Repeat the same operation for the other bearings.



For the disc gangs fixation, the bearing hangers should remain facing the disc blades concavity.





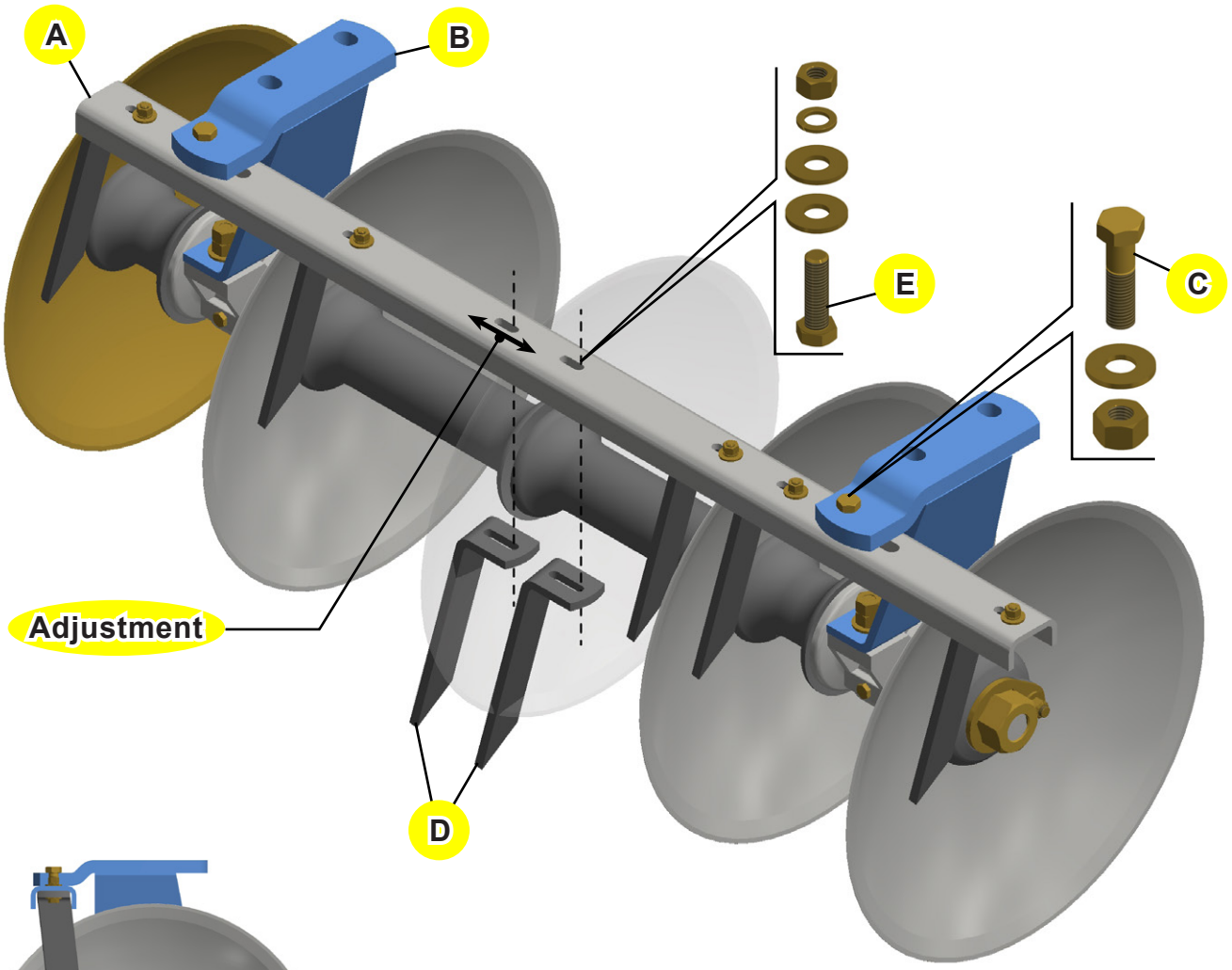
Assembling the scrapers

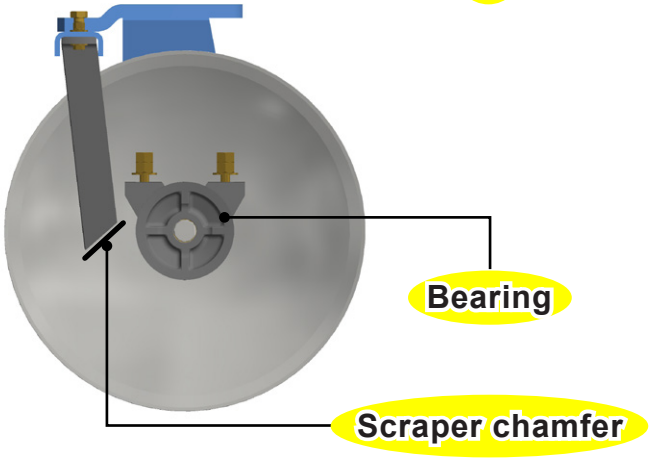
• Mount the supporting bars (A) to the bearing hangers (B) using bolts (C), flat washers and nuts.

• Mount the scrapers (D) to the respective bars (A), using the bolts (E), flat washers, spring washers and nuts.

IMPORTANT

- **The back part of the disc blades before the bearings are not provided with scrapers. Please note the hole pattern on the supporting bars (A).**
- **The supporting bars (A) feature adjustment in order to get the scraper closer or farther from the disc blades.**



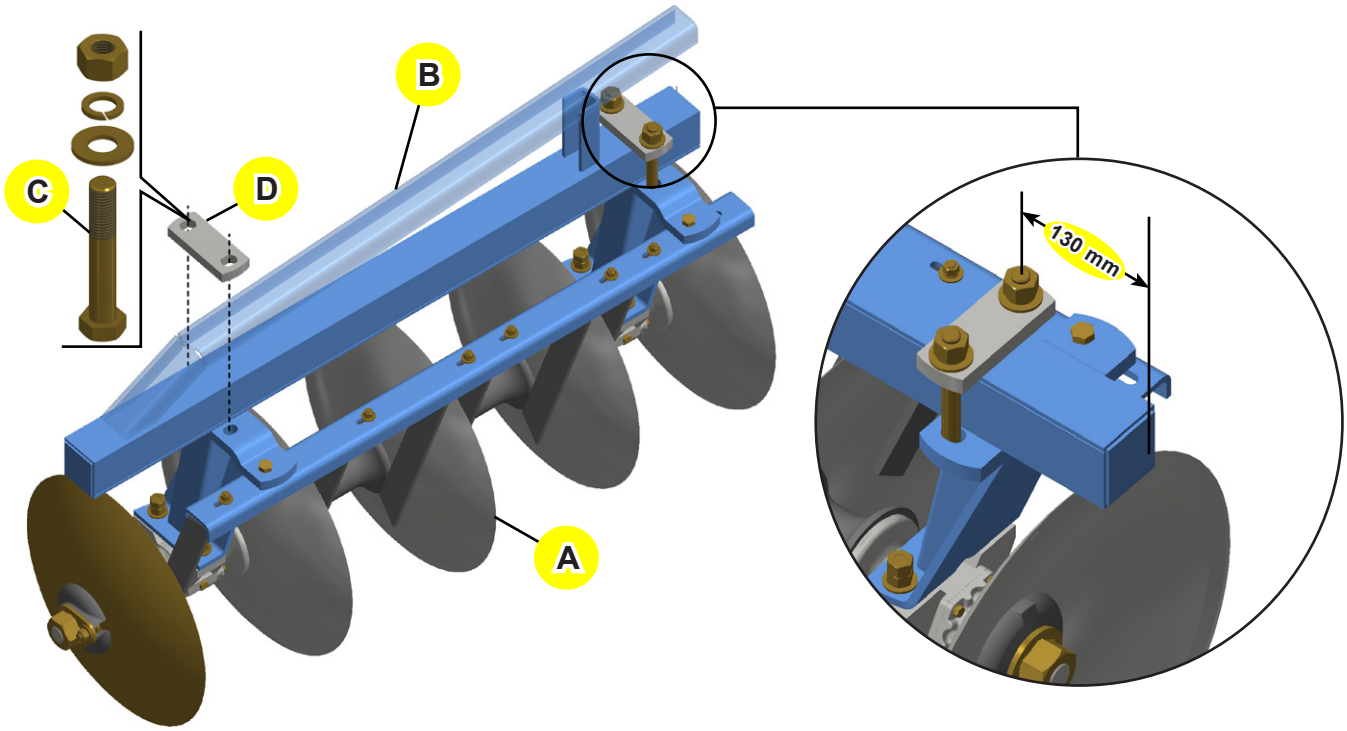


NOTE **The chamfer of the scrapers must be facing the bearings and spacer spools, as shown on the previous page.**

Assembling the gang arm to the frame

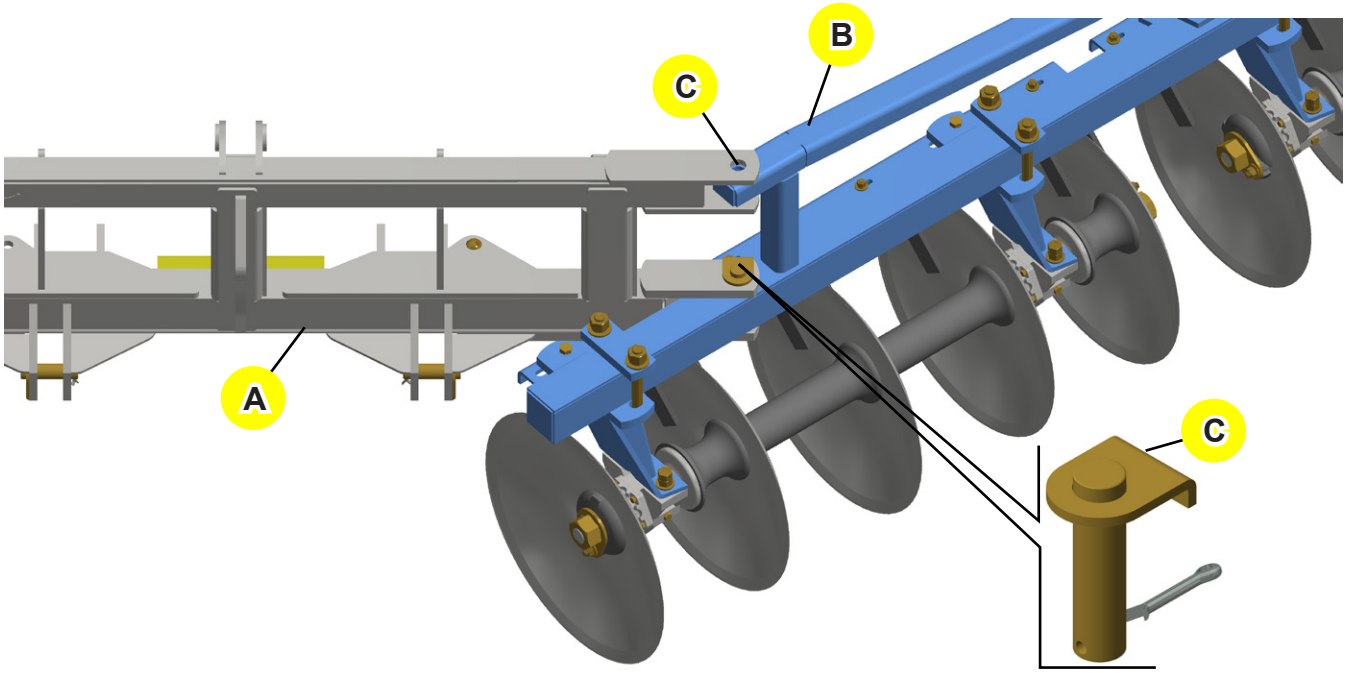
• Assemble the disc blade gang (A) to the frame (B) using bolts (C) underneath the bearing hanger and pass it through the fixation plate (D) using flat washer, spring washer and nut.

IMPORTANT **A 130 mm distance must be kept between the front end of the frame and the first bearing hanger.**



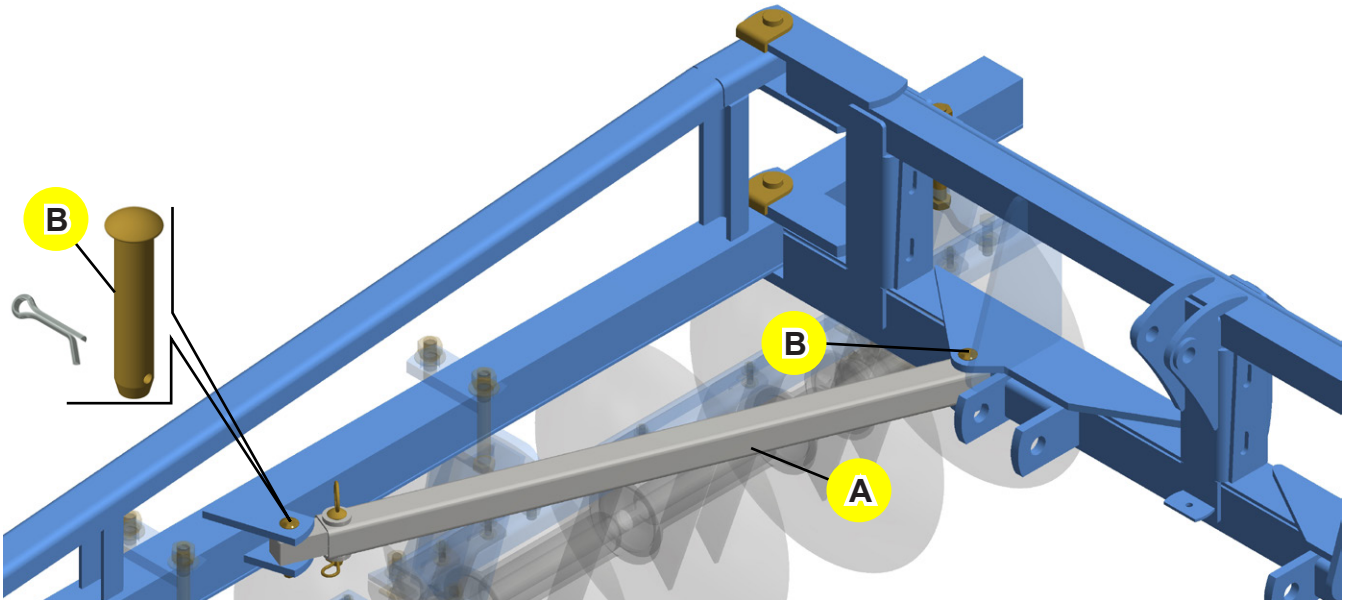
Front frame

Attach the front frame (A) to the side frames (already with the disc blades) (B) through the upper and lower holes using the junction pins (B) and cotter pins.



Assembling the telescopic arms

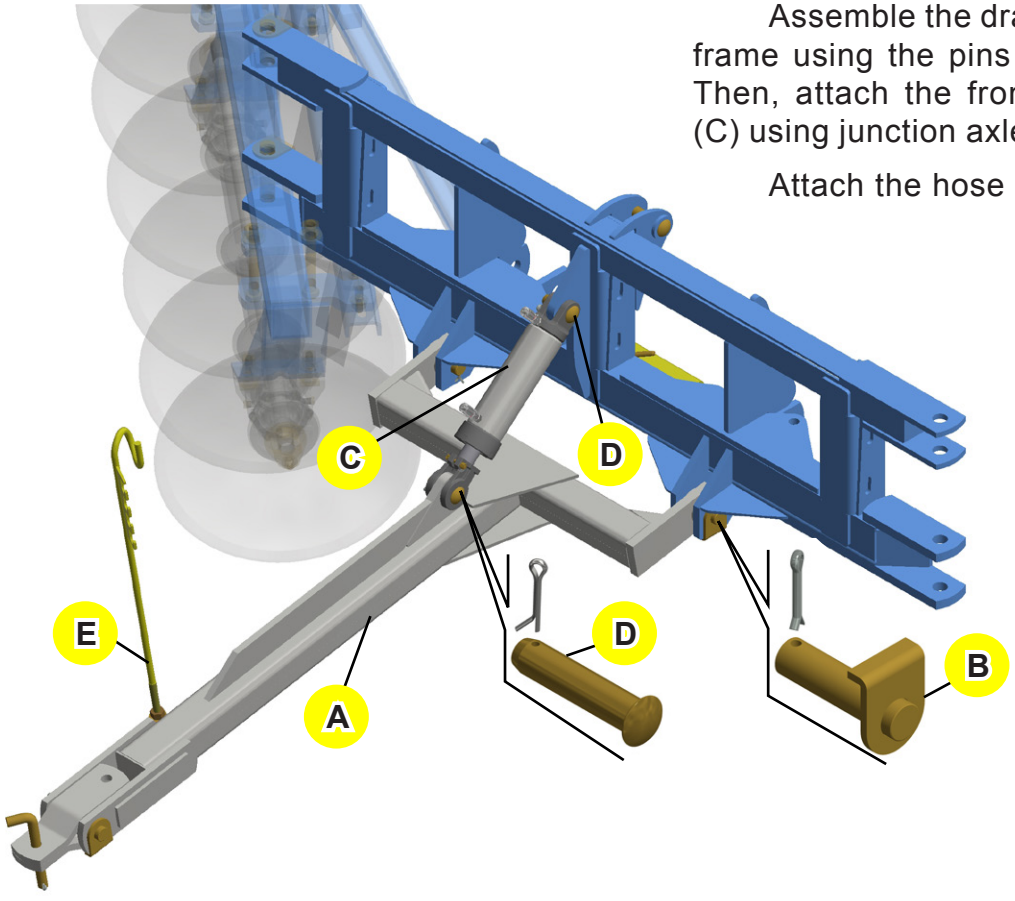
Assemble the telescopic arms (A) to the front and side frames, using the pins (B) and cotter pins.



Assembling the drawbar

Assemble the drawbar (A) to the front frame using the pins (B) and cotter pins. Then, attach the front hydraulic cylinder (C) using junction axles (D) and cotter pin.

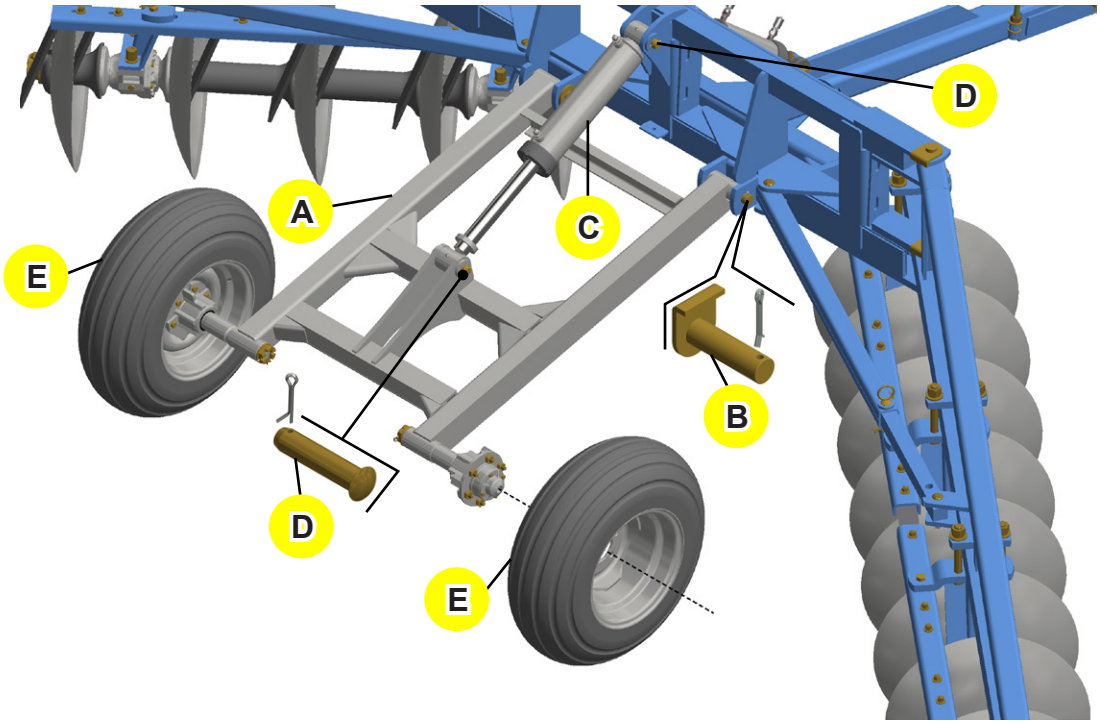
Attach the hose support (E).



NOTE **The front frame cylinder is smaller than the wheelset cylinder.**

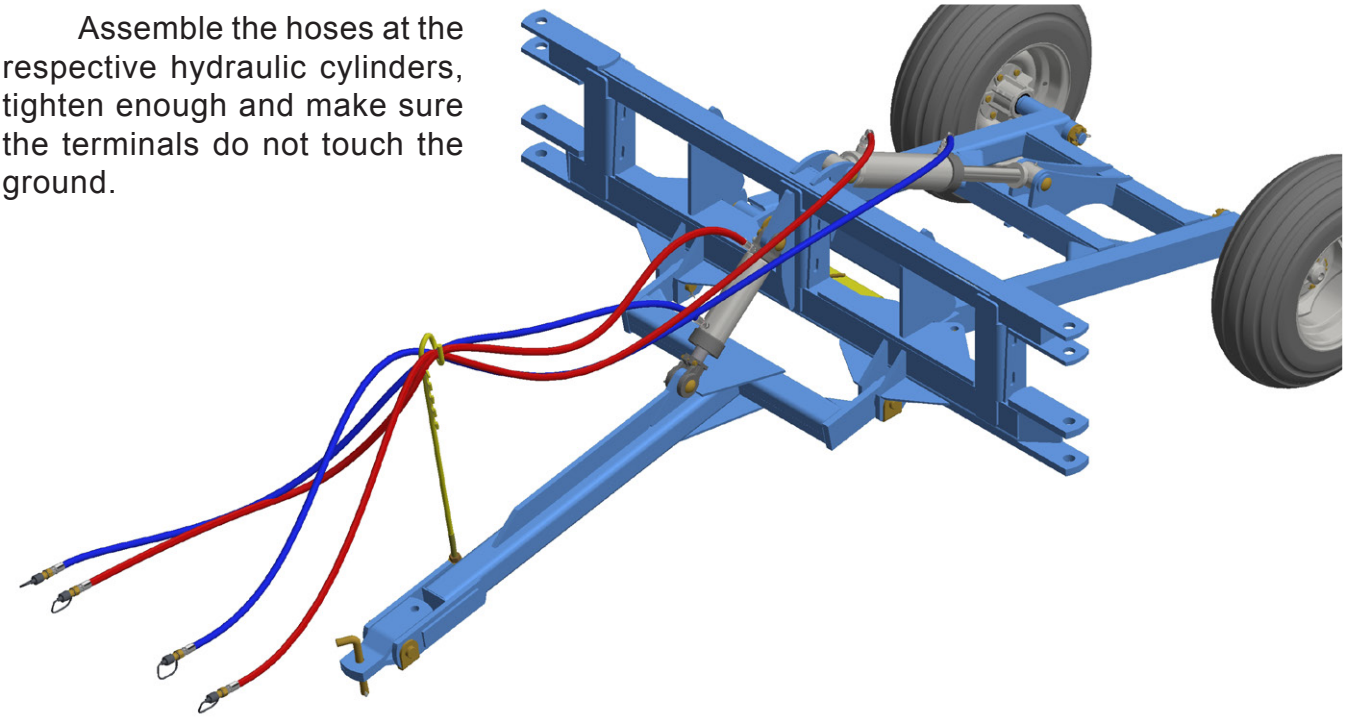
Assembling the wheelset system

Assemble the wheelset system (A) to the front frame using junction axles (B) and cotter pins. Then, couple the hydraulic cylinder (C) using junction axles (D) and cotter pins, along with the tires (E).



Assembling the hoses

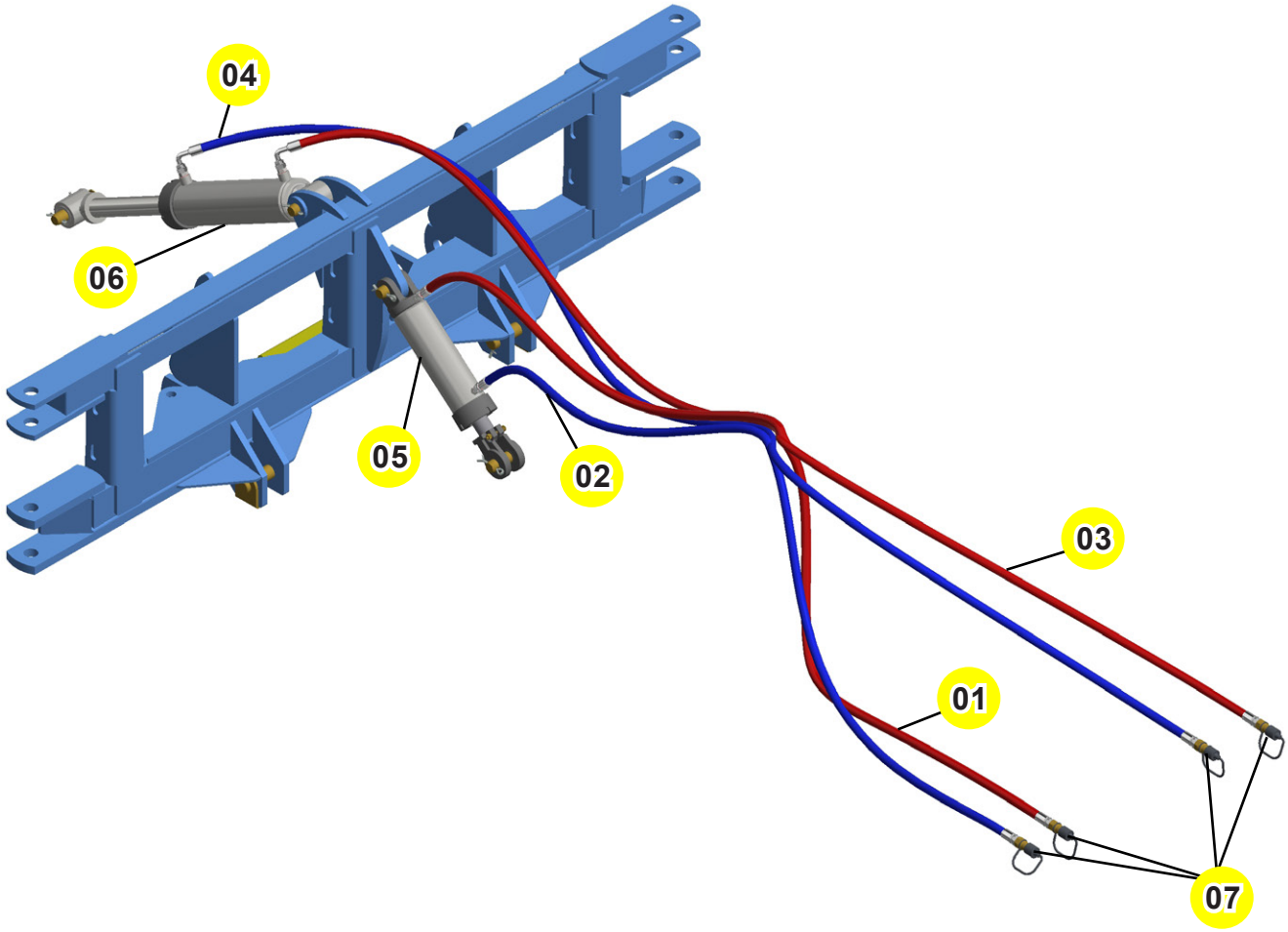
Assemble the hoses at the respective hydraulic cylinders, tighten enough and make sure the terminals do not touch the ground.



NOTE

- **The cylinder terminals should be facing upwards.**
- **Always use thread sealing tape to connect the male quick couplers to the hoses.**

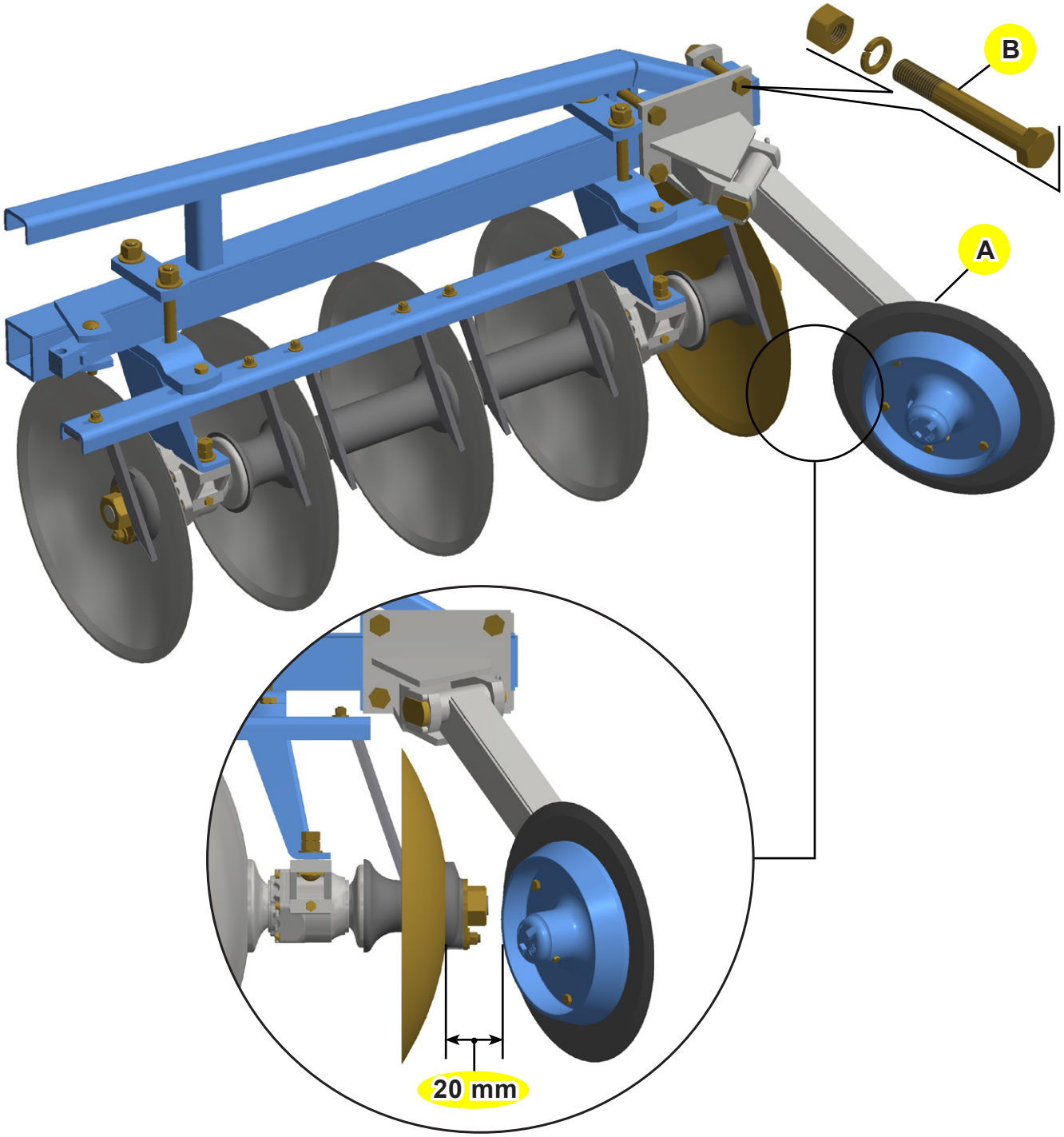
Hydraulic circuit



TSTA			
Item	**Description**		**Quantity**
01	3/8" x 3000 TR-TM hose	**Pressure**	01
02	3/8" x 3000 TR-TM hose	**Return**	01
03	3/8" x 3500 TC-TM hose	**Pressure**	01
04	3/8" x 3800 TC-TM hose	**Return**	01
05	Drawbar hydraulic cylinder		01
06	Wheelset hydraulic cylinder		01
07	Male quick coupler 1/2" w/ cap		04

Assembling the guide wheels

Attach the guide wheel (A) to the frame using bolts (B), spring washers and nuts.



NOTE

- **The guide wheels must face the inner part of the terrace and levee plow.**
- **When mounting the guide wheels, the distance between them and the back of the last disc blade of the gang must be 20 mm, when lifted from the ground.**

The following guidelines should be carefully adhered to as to achieve the best performance at work.

Preparing the tractor

The addition of water ballasts to the tires and counterweights to the front and rear wheels of the tractor are the most common methods used to increase traction on the ground and provide more stability to the tractor.

Preparing the terrace and levee plow

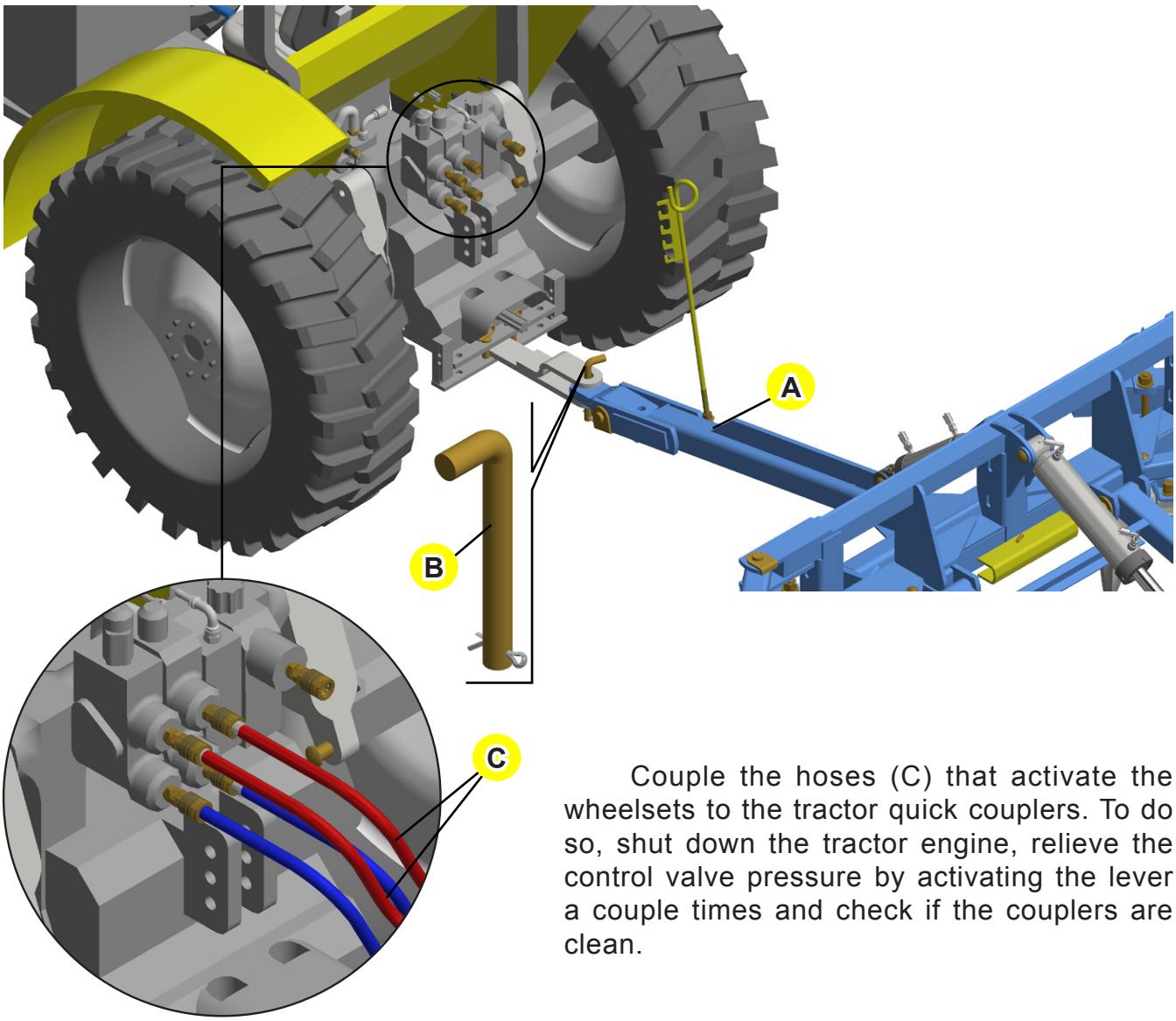
Check the conditions of every part and retighten nuts and bolts, especially the ones fastening the disc gangs, because they may damage axles and other components when working loose.

Lubricate all grease fittings appropriately (see instructions on the 'maintenance' section)

Hitching to the tractor

Couple the hitch (A) to the tractor drawbar and fasten using an axle (B) and cotter pin.

Note that the tractor drawbar must remain fixed.



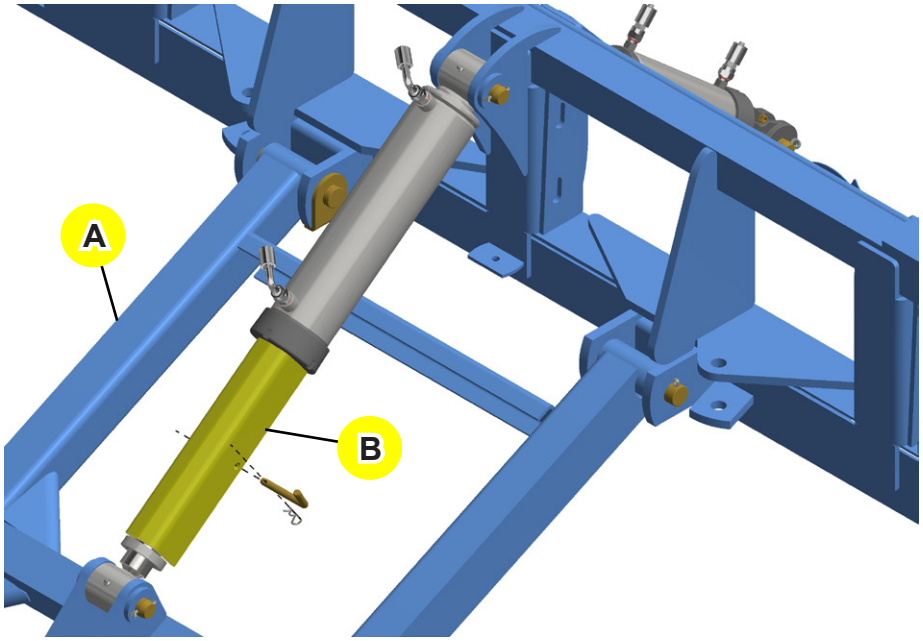
Couple the hoses (C) that activate the wheelsets to the tractor quick couplers. To do so, shut down the tractor engine, relieve the control valve pressure by activating the lever a couple times and check if the couplers are clean.

Procedures for transportation

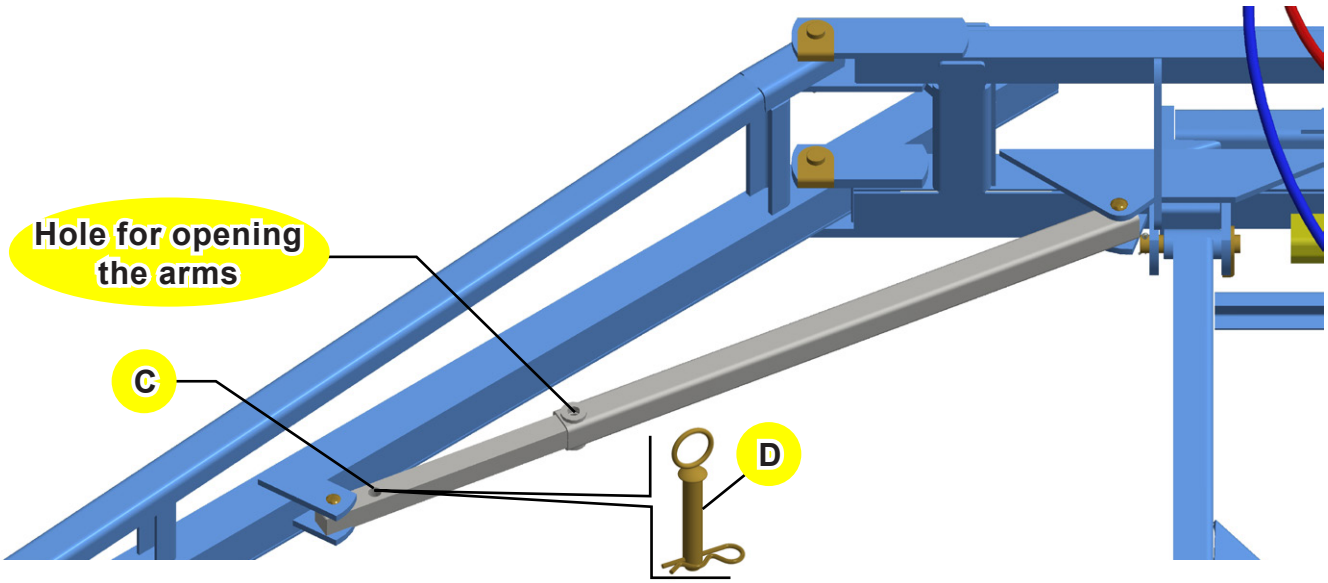
In order to transport the terrace and levee plow to greater distances, it is necessary to follow some safety procedures.

Before starting working, check the conditions of every part and retighten nuts and bolts, especially the ones fastening the disc gangs, because they may damage axles and other components when working loose.

- Lower the wheelset completely (A).
- Attach the lock for transportation (B) at the wheelsets articulation cylinder.

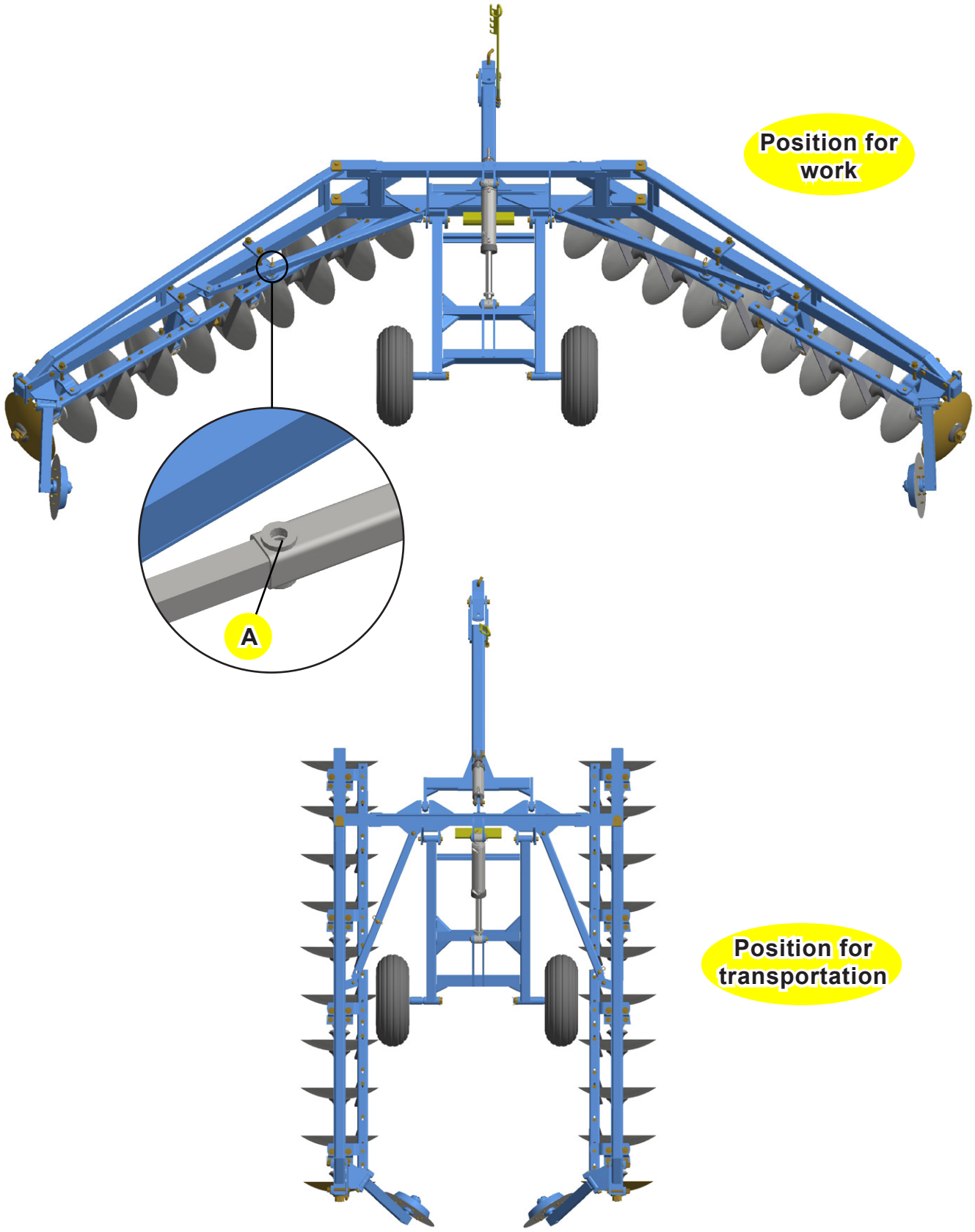


- Close the disc gangs using the telescopic arm holes (C) and lock using a pin (D) and cotter pin.
- Leave the disc gangs parallel to the ground, using the drawbar hydraulic cylinder.



Opening the frame

The frames should be opened when they are leveled, using the telescopic arm holes (A). Please note the position for transportation and work in the figure below.



Distance between terraces

The terrace inclination may vary from zero (0) to twelve (12) percent for certain crops on most cases. This inclination will efficiently protect the terrace from water erosion.

This efficiency, however, may increase when opting for broad-based terraces instead of a narrow one. The inclination on the sides of the field may be fully used on broad-based terraces.

The variation on the distance between the terraces are according to the soil type and inclination of the field.

The table shows spacing suggestions for fields leveled for annual crops, on both soil types and inclinations going from one (1) to twelve (12) percent.

Spacings table (m)		
Declivity (%)	Clayey soil	Sandy soil
01	35	34
02	29	28
03	24	23
04	20	19
05	17	16
06	15	14
07	14	13
08	13	12
09	12	11
10	11	10
11	10	09
12	09	08

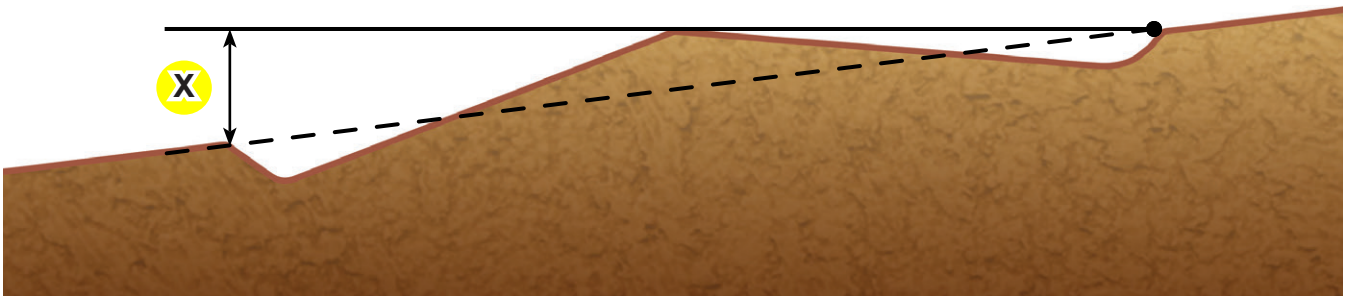
For the spacings recommended on the table, the size of the duct must be of at least 1 m; meaning that when multiplying the widths of the duct by half of its height, the result must be of at least 1 m.

Lower values may lead to a breaching risk on the field resulted from the accumulated water volume.

• The image below shows a practical way to measure the height of a broad-based terrace (9 - 20 m of width), without using a theodolite;

• After the field is ready, use a string on the end of the ravine, on the upper side of the field, touching the top of the already made terrace;

• The "X" measure is found by vertically measuring the distance of the string to the end of the ravine on the opposite side, that is, on the bottom side of the terrace, as shown below;



NOTE **"X" values for terraces from 9 to 20 m of width.**

- **Fields with 1 to 3% of inclination X= 0.70 m;**
- **Fields with 4 to 7% of inclination X= 0.90 m;**
- **Fields with 8 to 12% of inclination X= 1.10 m.**

Distance between terraces

• The terraces will be slightly oversized at first, but they settle and wither after the first curves are done, getting ideal shape and height;

• The following "X" measures are enough to assure a minimal size of 1 m and this is the required size for broad-based terraces, in accordance to the distances between each terrace;

• When terracing an area with known inclination, make a test to determine the number of necessary passes to reach the "X" measure, indicated for the inclination of the field;

• If the "X" measure found on the test is smaller than the indicated, the terracing operation must continue, raising a little in front of the equipment until the indicated height is reached. From this point on, repeat the number of necessary passes to reach the indicated height for the next terrace jobs.

• If the "X" measure found is greater than the indicated one, make a second test and lower the terrace a little in front of the equipment and decrease the number of passes, until the terrace height is the indicated for the field inclination. From this point on, repeat the number of passes used on the last terrace test;

• The soil must not be so moist that it will not allow plowing or harrowing operations, which are the jobs that the TSTA identifies to;

The soil with ideal moisture favors the earth flow, thus facilitating the terrace formation. One practical way to determine the soil moisture is to grasp a portion of the soil cut by the equipment after the first pass on your hand. If the formed earth clod hold its shape, without cracks and with the particles firmly united, then there is excess of moisture. Therefore, wait one or two sunny days to start the job. If the earth clod breaks with ease, the soil is too dry and ready to be worked on, since if it is not too compressed. The ideal moisture is characterized by the formation of an earth clod that form cracks but do not disrupts. Such condition will lead to the best yield using this equipment, as the soil will not get stuck on the disc blades and the earth will flow to the center of the terrace with ease, requiring less traction effort. It is possible to make a terrace on a compacted soil, as long as additional measures are being followed, such as:

• Subsoiling the soil with a depth between 40 - 50 cm on the band destined for the terrace, with a width of 10 m;

• Harrow the subsoiled band to break the clods.

• Such measures assure a better performance of the TSTA and also preserve it from unnecessary efforts during the job. After finishing the terracing job, it is recommended to subsoil its upper margin for a better water absorption, regardless of the soil type.

• If the field has a thick vegetal coverage, carry out a harrowing job on the bands destined for the terraces to avoid that the TSTA disc blades get stuck on the soil.

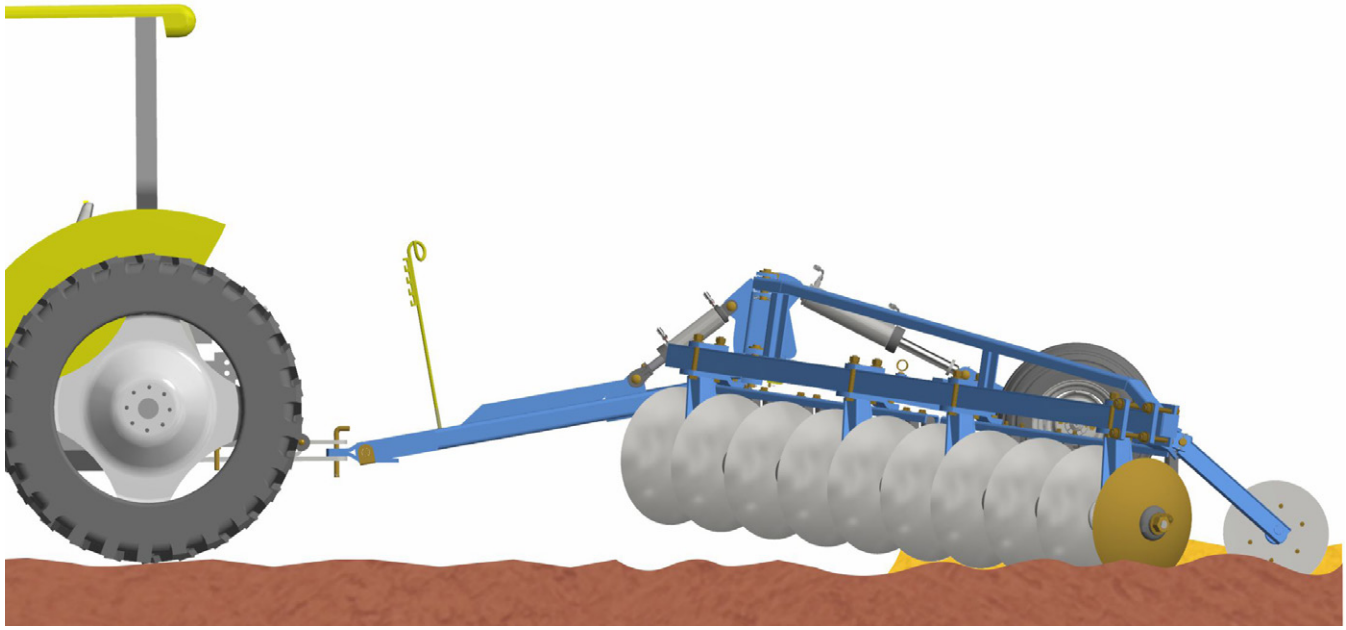
Constructing terraces

For more agility in the construction of terraces it is required to carry out the proper operation of the front hydraulic cylinder (connected to the terrace and levee plow drawbar) and note carefully the following instructions:

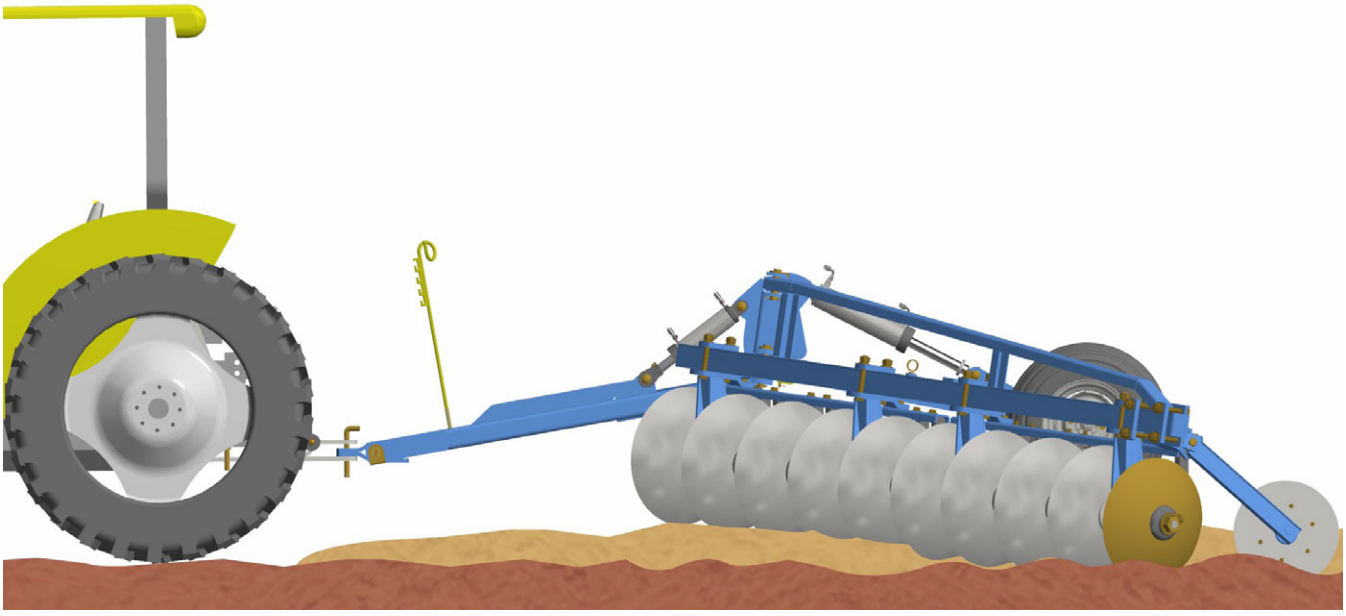
• On an unprepared land, start the terrace with the disc gangs parallel to the ground. This should be done in the first and second pass with the purpose to only stir up the soil.

• Such operation may be carried out previously with a disk harrow, or subsoiler plow with enough passes to cover the terrace base width.

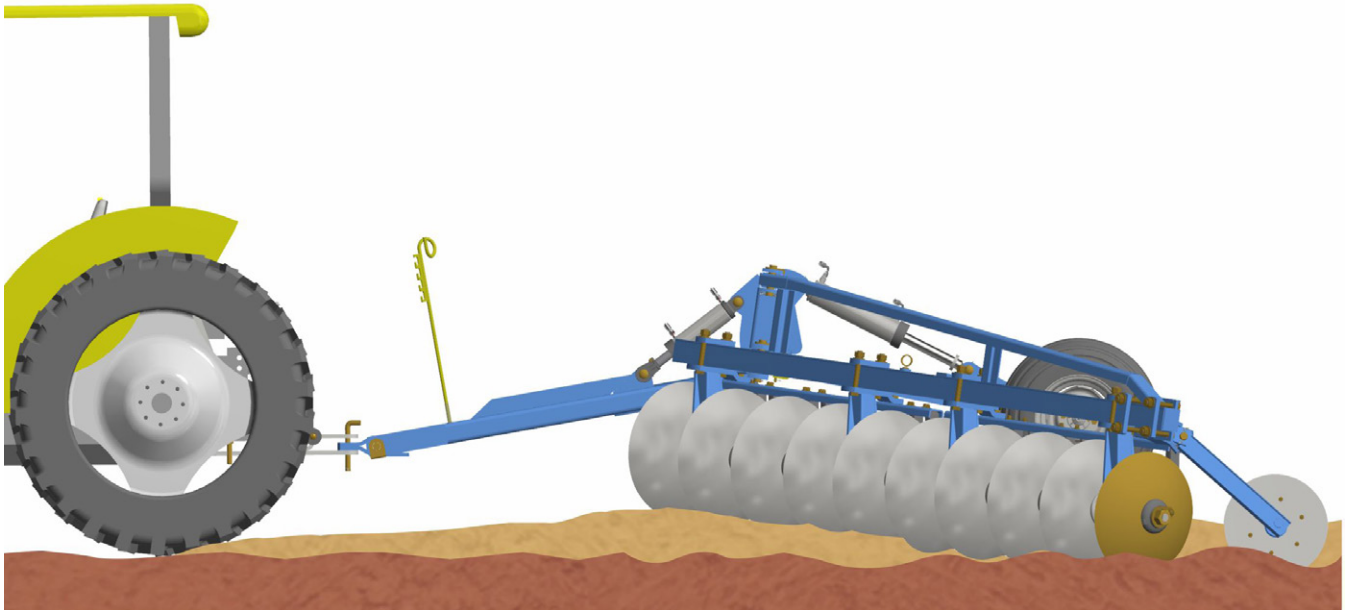
• On an already prepared land the terrace may be started with a small inclination of the disc gangs, i.e., with the front cylinder activated a little.



• On both cases, from the third and forth pass on, the hydraulic cylinder should be activated a little more, where it can be notice the actuation of all disc blades.



• On the other passes, gradually activate the hydraulic cylinder until the conclusion of the terrace, which will be ready from 10 to 12 passes on average.



ATTENTION **It is recommended to control the depth through the disc gang opening and using the tires only where the terrace and levee plow penetrates excessively.**

Finishing the terraces

Finishing the terraces is consisted in the elimination of furrows left by the last disc blades, and it should be made with disc plows or subsoilers, which increase even more the base width.

NOTE **The use of subsoilers to finish the terraces offers the advantage of infiltrating part of the water even before it gets close to the terrace, reducing the risks of breaching.**

Troubleshooting guide

PROBLEM	CAUSES	POSSIBLE SOLUTIONS
Defective tires.	Working area with stones, stumps or stubbles that may perforate the tires.	Eliminate any object that may cause damages to the tires before starting the job.
	Tires with wrong pressure.	Keep the proper pressure on the tires, as shown on the 'tires inflation' page.
Odd noise coming from the wheels.	Loose wheels.	Retighten the wheel nuts.
	Broken bearings.	Replace them.
Quick couplers do not adapt.	Different type of quick couplers.	Use male and female quick couplers from the same type.
Hydraulic hoses leaking.	Lack of sealing material.	Use thread sealing tape and retighten carefully.
	Insufficient tightening.	Retighten carefully.
	Damaged repairings.	Replace the repairings.
Quick couplers leaking.	Insufficient tightening.	Retighten carefully.
	Damaged repairings.	Replace the repairings.
Quick coupler not coupling properly.	Quick couplers from different brands.	Use quick couplers from the same brand.
	Pressure on the system.	Relieve the pressure for coupling.
Hydraulic cylinder leaking.	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.
	Oil with impurities.	Replace the oil, repairings and filter elements.

Operations - Important points

- Retighten nuts and bolts after the first day of work. Check the condition of all pins and cotter pins. Then, retighten every 24 operating hours.
- Special attention should be paid to the disc gangs, retightening daily in the first week of use. Then, retighten periodically.
- Observe lubrication intervals carefully.
- The tires inflation must be done with the aid of a contention device (tire inflation cage).
- The proper tire pressure is important, and it should be kept the same for both tires (Check the proper tire pressure on the 'tires inflation' page).
- Choose a gear that allows the tractor to maintain certain reserve of power, to prevent against unforeseen efforts.
- The working speed depends on the tractor gear and can only be determined by local conditions. We adopted an average from 6 to 8 km/h, which is not advisable to exceed in order to maintain working efficiency and prevent possible damages to the terrace and levee plow.
- Remove sticks or any object that get stuck on the disc blades.
- Do not use your bare hands to check for hydraulic leaks. High pressure can cause serious injuries. Use cardboard or other appropriate object.
- Only pull the equipment using a tractor with appropriate power.
- If necessary, use the tires to control the working depth.
- The tractor drawbar must always remain fixed.
- Check if the equipment is properly supported when unhitching it.
- Relieve the control valve pressure before uncoupling the quick couplers and when doing any verification on the hydraulic circuit.
- While at work or during transportation do not allow the presence of passengers either on the tractor or on the equipment.
- Only people who own a full knowledge of the tractor and equipment must operate them.
- As previously mentioned the terrace and levee plow TSTA model features many adjustments, however only the local conditions can determine the best adjustment for the equipment.

NOTE **Before retightening the disc gangs it is required to unscrew the bearings mounting bolts.**

Lubrication

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

1) Every 24 operating hours, lubricate the articulations through the grease fittings, as follows:

• Be sure about the lubricant quality, efficiency and purity, avoiding the use of products contaminated by water, earth, etc.

• Remove the remainder old grease around the joints.

• Clean the grease fitting with a cloth before inserting the lubricant and replace those ones which are defective.

• Insert a sufficient amount of fresh grease.

• Use medium consistency grease.

• Use lithium soap based grease (NLGI2-EP grade), which has a higher washing resistance and great stability to oxidation.

2) Lubrication of roller bearings should be carried out with the same frequency already mentioned. (24 hours).

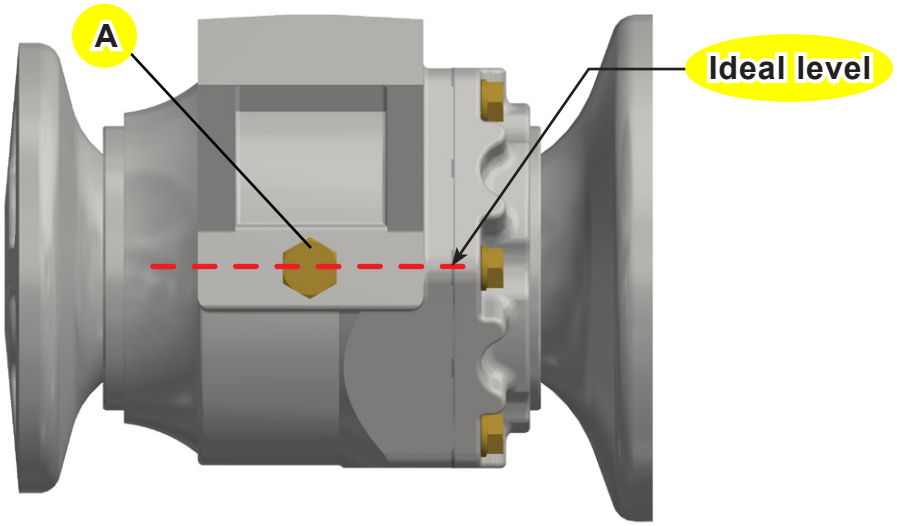
2.1) Oil bath roller bearings work with constant lubrication, but it is still required to pay attention to them as follows:

• On a flat location check the oil level of each bearing before using the terrace and levee plow for the first time and every day of the first week.

• Then start checking it weekly.

• Change the oil completely every 1,000 hours of service.

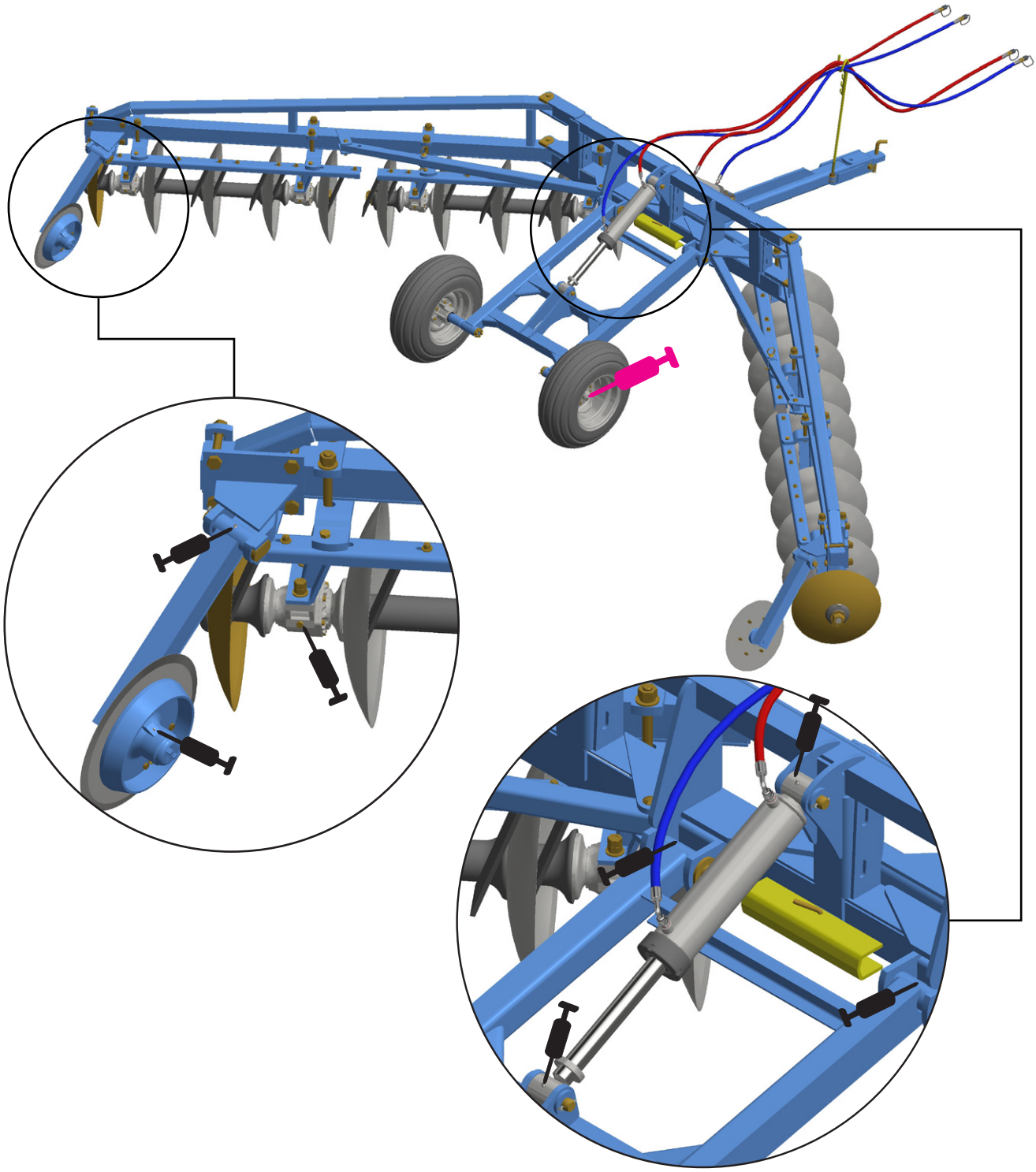
• Use only SAE 90 mineral oil.



NOTE **The proper level is when the oil reaches the plug hole (A), when the terrace and levee plow is on a flat location.**

The bearing oil volume is 190 ml.

Lubrication points



- Lubricate every 24 working hours

- Lubricate every 150 working hours

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

Wheelset hubs lubrication

The wheelset hubs must be lubricated every 150 hours. When the existence of any clearance is noticed, carry out a maintenance on the wheel hubs.

Disassemble the hubs and remove their internal components. Clean all parts using diesel oil or kerosene.

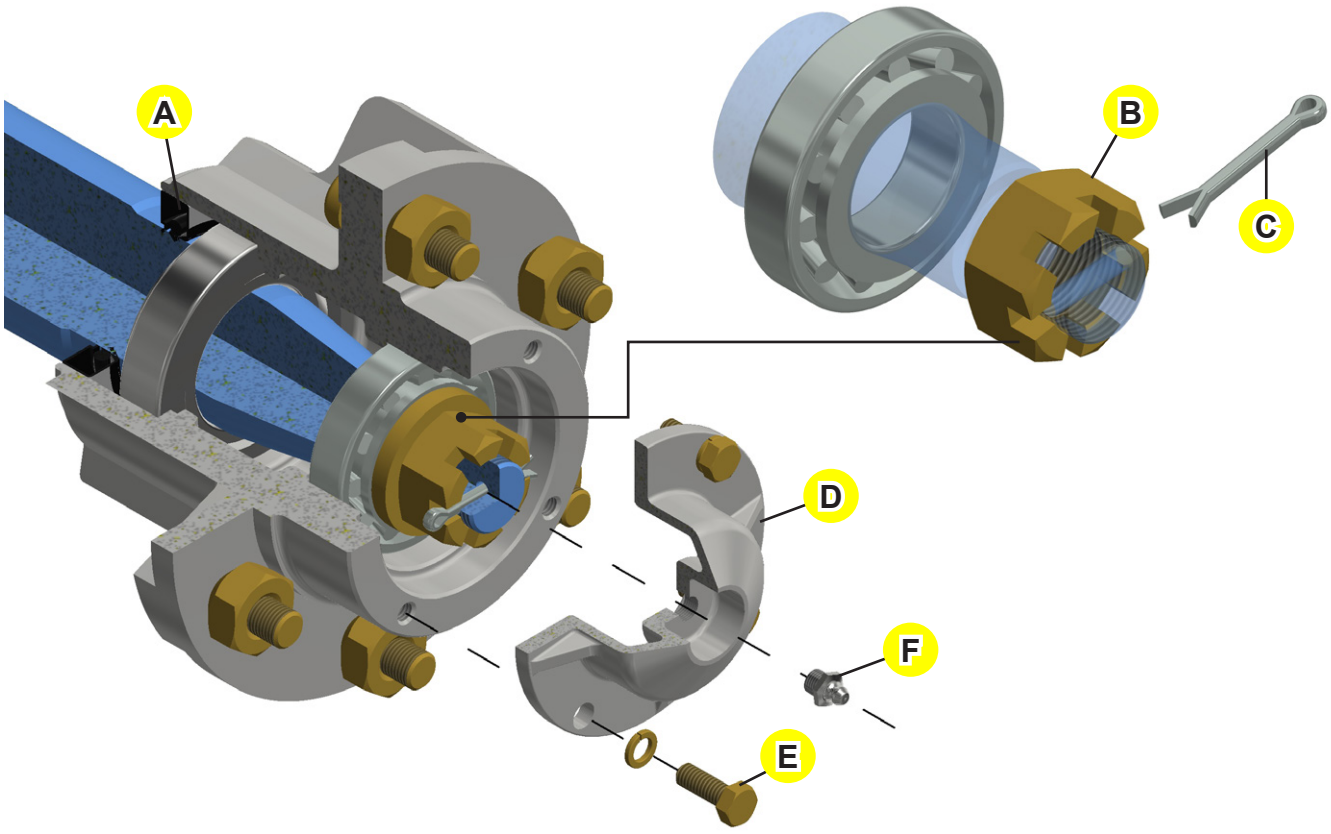
Check the existence of clearances, the condition of the bearings, retainers or bushings. If there is any part that shows excessive wear or damages, replace them.

The bearing must be replaced in a preventive manner, to avoid that it breaks and to avoid greater maintenance costs, since more parts of the set suffer damages when the bearing breaks during the job.

Check the retainer position (A) to let the excess of grease flow out of the hub and be careful to not damage the retainer.

Adjust the castle nut (B) on the hub using a wrench to get some resistance while turning the hub. Do not totally tighten it. Lock it using a cotter pin (C).

Place the hubcap (D) and lock using a bolt (E) and spring washer. Lastly, attach the grease fitting (F) on the hubcap.



Whenever the retainer is damaged, install a new one immediately.

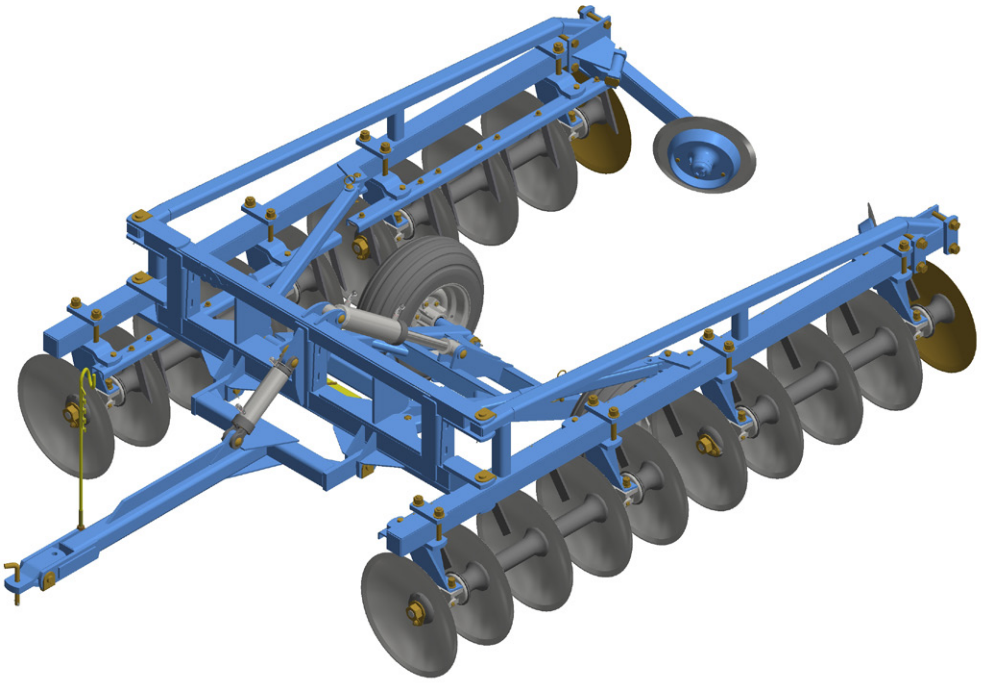
Do not forget to apply an specific grease (lithium soap grease NLGI 2 grade) with Extreme Pressure additive, anticorrosive and antioxidant.

Terrace and levee plow maintenance

When not in use, wash the terrace and levee plow, repair any damaged paintwork, protect the disc blades in oil, lubricate all grease fittings, and store your equipment in a sheltered and dry place, preventing it from directly touching the ground.

Disc blades should be replaced as soon as you notice they indicate low efficiency, characterized mainly by the reduction of their diameter, loss of cut efficiency and other damages they are subjected to while in operation.

Check all moving parts for wear. If required, replace the parts.



• 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.**

Tires inflation

• The tires must always be properly inflated to avoid premature wear for excess or lack of pressure.

• Do not attempt to mount the tires without experience and adequate equipment.

• Maintain the correct tire pressure. Never inflate the tires beyond the recommended pressure.

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

• Welding can compromise the structure of the wheel or distort it.

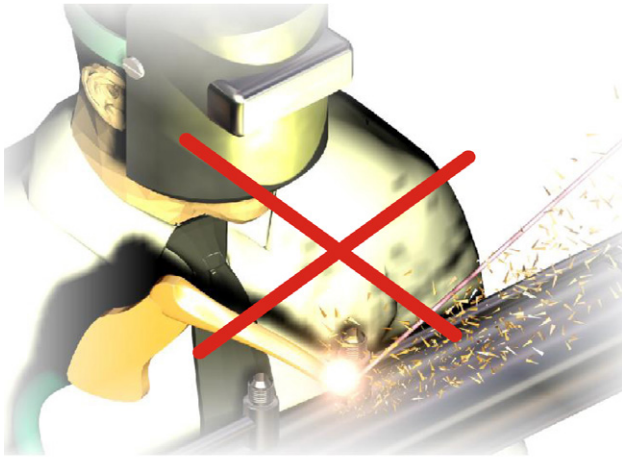
• When filling the tires, make sure the hose is long enough for you to stand. Also, do this process in a safety cage.

7.50 x 16 tires - 10 ply..... **(60 PSI)**

11L15 tires - 10 ply..... **(44 PSI)**

NOTE **For the cases where the maximum pressure is not specified on the tires, consult the tire manufacturer and adopt the pressure indicated by them.**

Hydraulic safety



Make sure that all components in the hydraulic system are kept in good condition and are clean. 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.

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.

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.

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.

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. Use a piece of wood or cardboard as a backstop instead of hands to isolate and identify a leak.

If injured by a concentrated high-pressure stream of hydraulic fluid, seek medical attention immediately. Serious infection or toxic reaction can develop from hydraulic fluid piercing the skin surface. If this doctor is not aware of this type of problem, ask for a reference or look for another one to find the proper treatment.

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

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.

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 VALUES CHART

Bolt Diameter	Grade 2		Grade 5		Grade 8	
	Coarse	Fine	Coarse	Fine	Coarse	Fine
1/4”	50 In. Lbs.	56 In. Lbs.	76 In. Lbs.	87 In. Lbs.	9 Ft. Lbs.	10 Ft. Lbs.
5/16”	8 Ft. Lbs.	9 Ft. Lbs.	13 Ft. Lbs.	14 Ft. Lbs.	18 Ft. Lbs.	20 Ft. Lbs.
3/8”	15 Ft. Lbs.	17 Ft. Lbs.	23 Ft. Lbs.	26 Ft. Lbs.	33 Ft. Lbs.	37 Ft. Lbs.
7/16”	25 Ft. Lbs.	27 Ft. Lbs.	37 Ft. Lbs.	41 Ft. Lbs.	52 Ft. Lbs.	58 Ft. Lbs.
1/2”	35 Ft. Lbs.	40 Ft. Lbs.	57 Ft. Lbs.	64 Ft. Lbs.	80 Ft. Lbs.	90 Ft. Lbs.
9/16”	50 Ft. Lbs.	60 Ft. Lbs.	80 Ft. Lbs.	90 Ft. Lbs.	115 Ft. Lbs.	130 Ft. Lbs.
5/8”	70 Ft. Lbs.	80 Ft. Lbs.	110 Ft. Lbs.	125 Ft. Lbs.	160 Ft. Lbs.	180 Ft. Lbs.
3/4”	130 Ft. Lbs.	145 Ft. Lbs.	200 Ft. Lbs.	220 Ft. Lbs.	280 Ft. Lbs.	315 Ft. Lbs.
7/8”	125 Ft. Lbs.	140 Ft. Lbs.	320 Ft. Lbs.	350 Ft. Lbs.	450 Ft. Lbs.	500 Ft. Lbs.
1”	190 Ft. Lbs.	205 Ft. Lbs.	480 Ft. Lbs.	530 Ft. Lbs.	675 Ft. Lbs.	750 Ft. Lbs.
1.1/8”	265 Ft. Lbs.	300 Ft. Lbs.	600 Ft. Lbs.	670 Ft. Lbs.	960 Ft. Lbs.	1075 Ft. Lbs.
1.1/4”	375 Ft. Lbs.	415 Ft. Lbs.	840 Ft. Lbs.	930 Ft. Lbs.	1360 Ft. Lbs.	1500 Ft. Lbs.
1.3/8”	490 Ft. Lbs.	560 Ft. Lbs.	1100 Ft. Lbs.	1250 Ft. Lbs.	1780 Ft. Lbs.	2030 Ft. Lbs.
1.1/2”	650 Ft. Lbs.	730 Ft. Lbs.	1450 Ft. Lbs.	1650 Ft. Lbs.	2307 Ft. Lbs.	2670 Ft. Lbs.

GRADE 2
No Marks.

GRADE 3
3 Marks.

GRADE 8
6 Marks.

[G:\VALSON\Manuais_Inglês\Torque]

NOTE **For metric conversion:**

- **Multiply inch-pounds by 0.113 to convert to Newton-meters (Nm).**
- **Multiply foot-pounds by 1.356 to convert to Newton-meters (Nm).**

Important

ATTENTION

MARCHESAN S/A reserves the right at any time to make improvements in the design, material or specifications of machinery, equipment or parts 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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