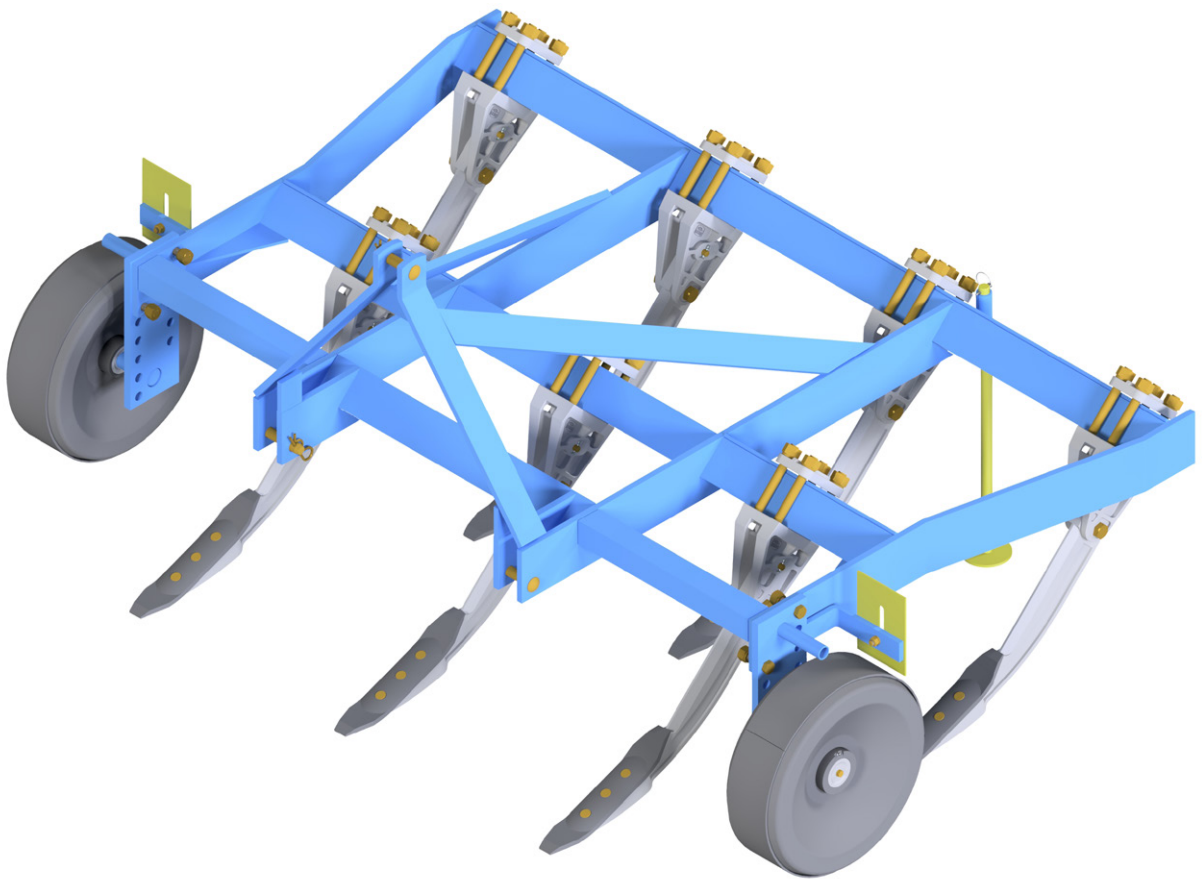


MARCHESAN

OPERATOR'S MANUAL



AST

Introduction

The AST subsoiler plow was specially designed to eliminate compacted layers up to 45 cm of depth or shallower, carrying out the subsoiling job on the soil.

Since it is an essential equipment to preserve the soil, this plow prevents erosion and maintain a high humidity, thus providing a better development of the plants roots, which use the saved water and take as many nutrients as they can on dry periods.

The equipment features a three-point hitch and variable shanks. It also has reversible points, being possible to use both ends of them.

The plow high resistance and performance comes from the quality of its parts and special manufacturing techniques, something common on every TATU equipment.

This operator's 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 subsoiler plow.



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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, 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.

MODELO MODEL	<input type="text"/>
Nº SÉRIE SERIAL NR	<input type="text"/>
DATA DATE	<input type="text"/>
PESO WEIGHT	<input type="text"/>
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 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.

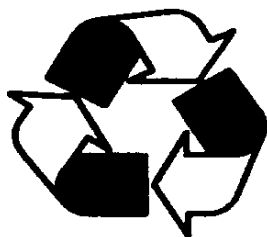
To the operator

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, thus 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 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 AST 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 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.

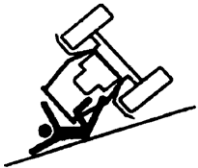
To the operator



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.



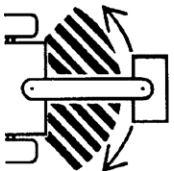
Be careful while driving on slopes. Risk of overturn.



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. Avoid that the tractor wheels touch the drawbar in sharp turns.



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



Have extreme caution when driving under electrical power lines.



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.
- When setting the equipment to transport position, check if there are no people or animals close or under the equipment.
- 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.
- Wear protective gloves to work near the cutting parts.
- Never operate the equipment without its **protective devices**.
- 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.
- Carefully check the transport width on narrow locations.
- Be careful when hitching the equipment to the tractor.
- 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.
- In case of emergency, know how to stop the tractor and equipment quickly.
- Always shut down the engine, remove the key and activate the brake before leaving the tractor seat.
- Never attempt to change the adjustments, clean or lubricate the equipment while it is moving.
- Whenever you unhitch the equipment, either in the field or shed, do it on a flat and firm surface. 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.

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 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 authorities 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. If necessary use banners, lights and other devices in order to give adequate warning to the other drivers.

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



Decal set

Model	Serial number
AST	05.03.06.0796

Data sheet

Type:Plow

Model:AST - Mounted Type Subsoiler Plow

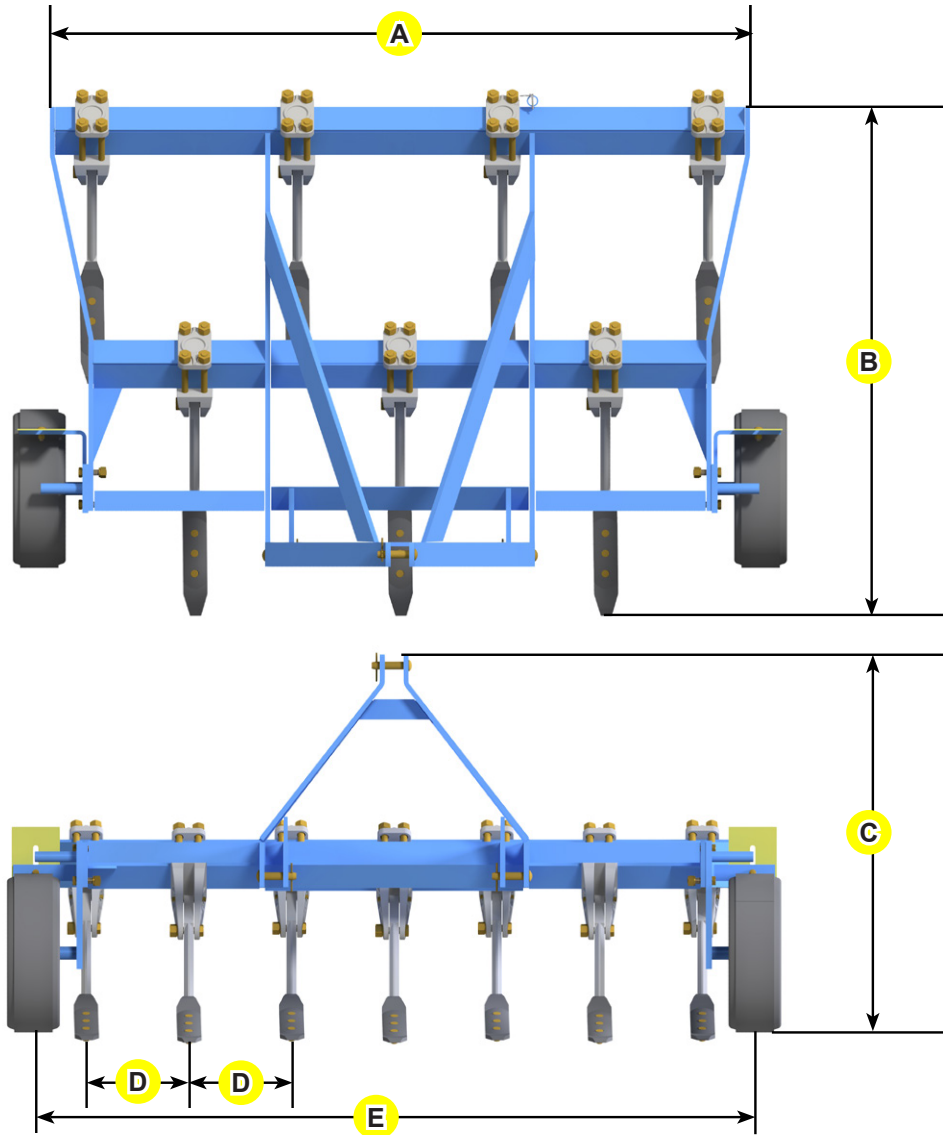
Hitching type: Three-point hitch

Working speed:..... 4 to 4.5 Km/h

Model	Number of shanks	Spacing (mm)	Working width (mm)	Net weight (Kg)	Tractor required (hp)	
					Superficial	Deep
AST 3/3	03	345	690	292	40 - 45	55 - 65
AST 5/3	03	780	1560	332	40 - 45	55 - 65
AST 5/5	05	390	1560	390	55 - 60	70 - 80
AST 9/5	05	500	2000	472	55 - 60	70 - 80
AST 9/7	07	320	1920	530	70 - 80	90 - 105
AST 9/9	09	250	2000	630	90 - 105	115 - 130
AST 11/9	09	310	2480	706	90 - 105	115 - 130
AST 11/11	11	265	2650	730	110 - 120	140 - 150

Data sheet

Dimensions for transportation and storage



Model	Number of shanks	A	B	C	D	E
AST 3/3	3	982	1590	1170	345	1290
AST 5/3	3	1755	1590	1170	780	1290
AST 5/5	5	1755	1590	1170	390	1290
AST 9/5	5	2180	1590	1170	500	2250
AST 9/7	7	2180	1590	1170	320	2250
AST 9/9	9	2180	1590	1170	250	2250
AST 11/9	9	2880	1590	1170	310	2950
AST 11/11	11	2880	1590	1170	265	2950

NOTE/ Measures in millimeters.

Components

AST - Mounted Type Subsoiler Plow

01 - Frame

02 - Drawbar

03 - Hitch pins

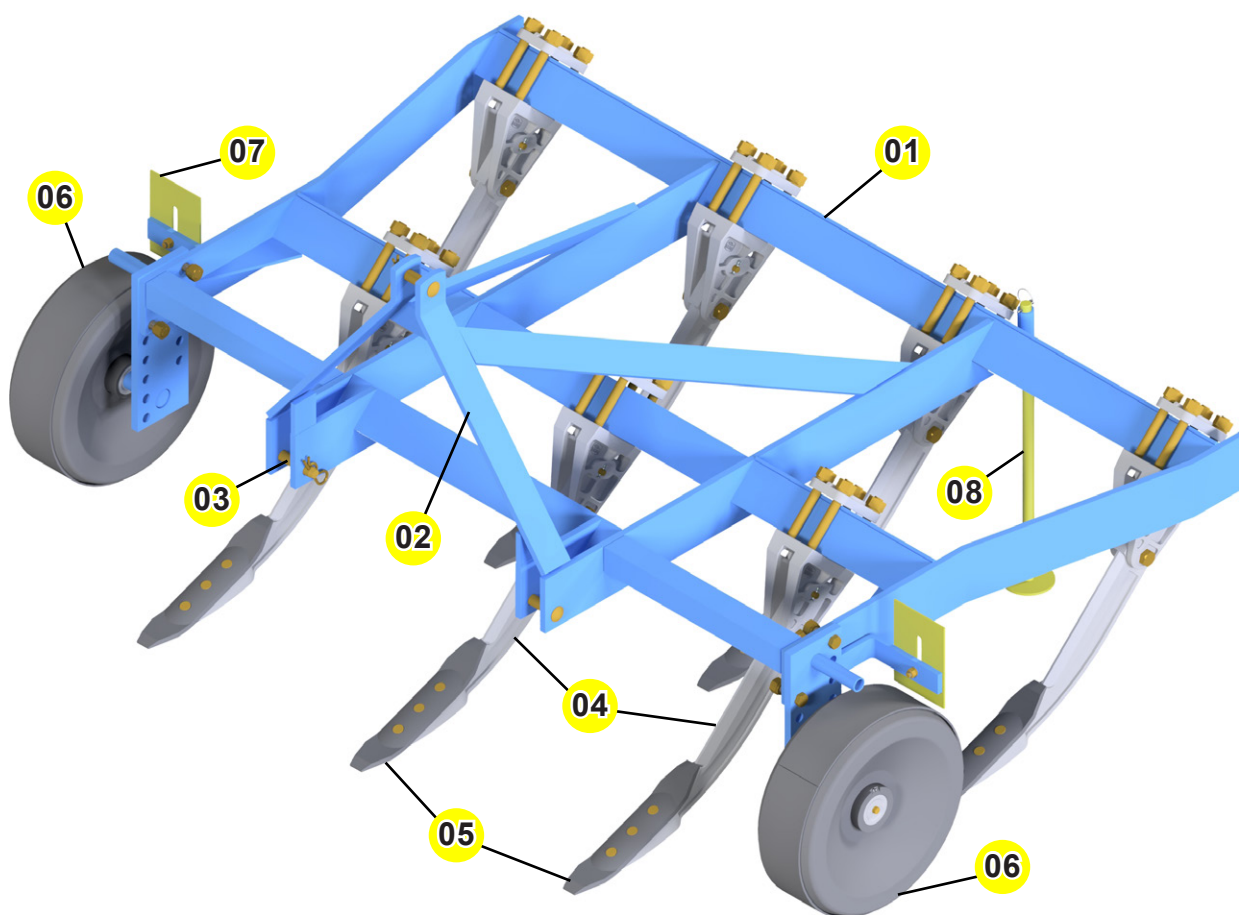
04 - Shanks

05 - Subsoiler point

06 - Wheel

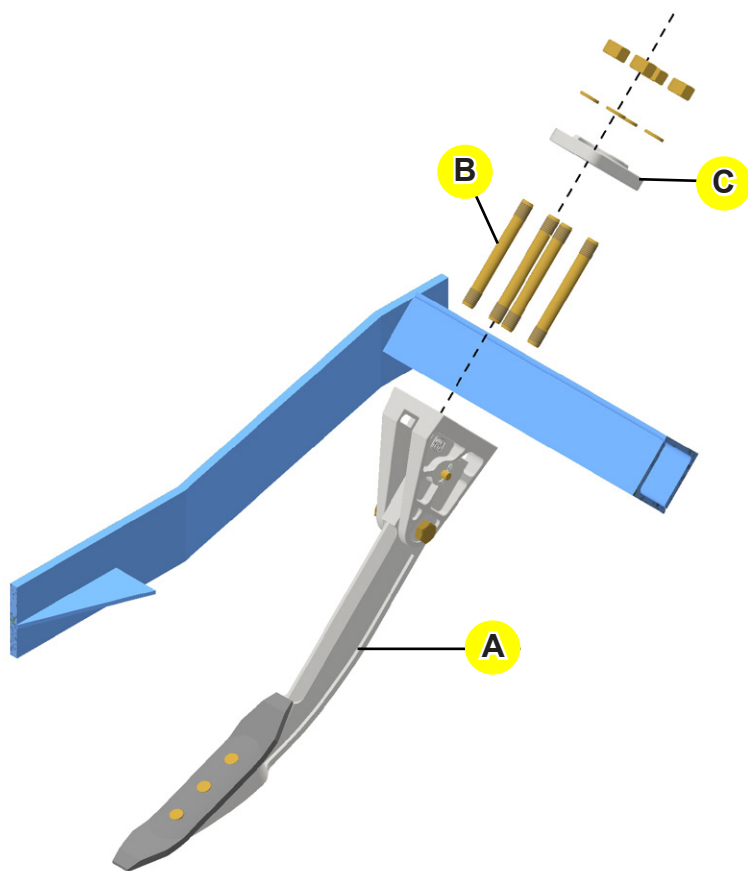
07 - Scraper

08 - Parking jack



Assembly

Shanks assembly

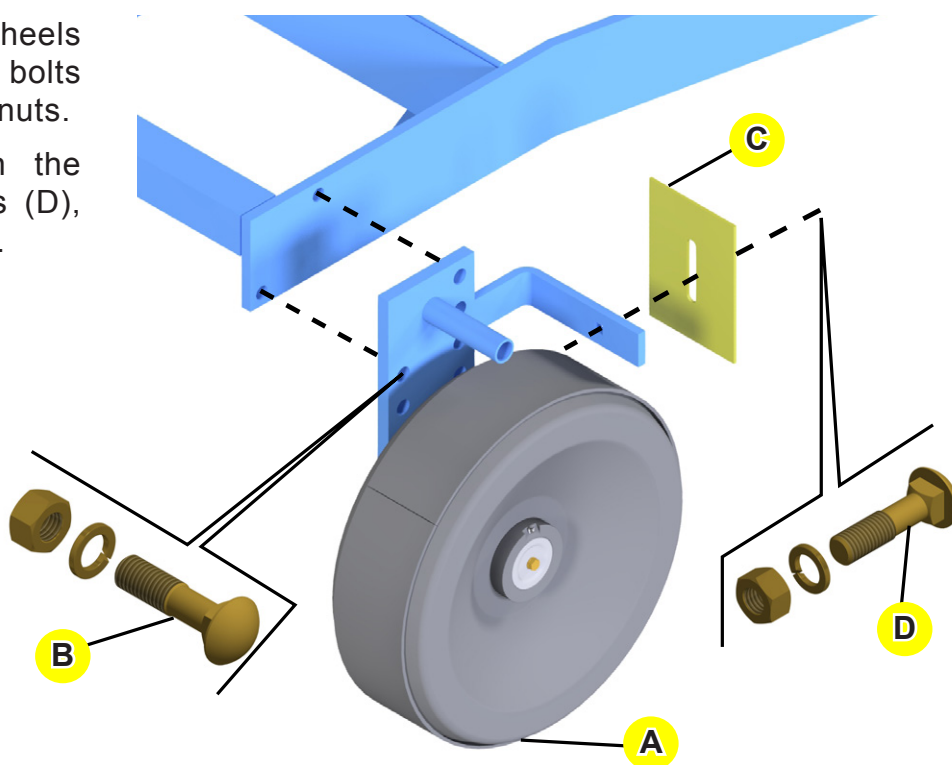


Couple the shanks (A) to the frame using bolts (B), plates (C), spring washers and nuts.

Gauge wheels assembly

Fasten the gauge wheels (A) to the frame using bolts (B), spring washers and nuts.

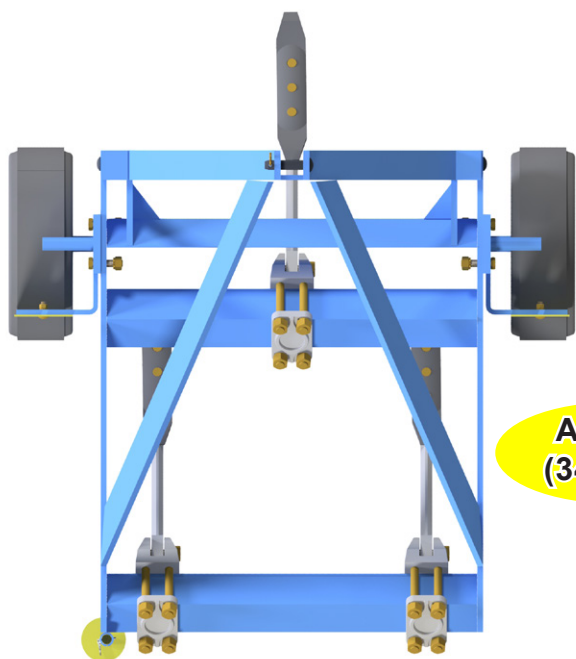
Right after, fasten the scrapers (C) using bolts (D), spring washers and nuts.



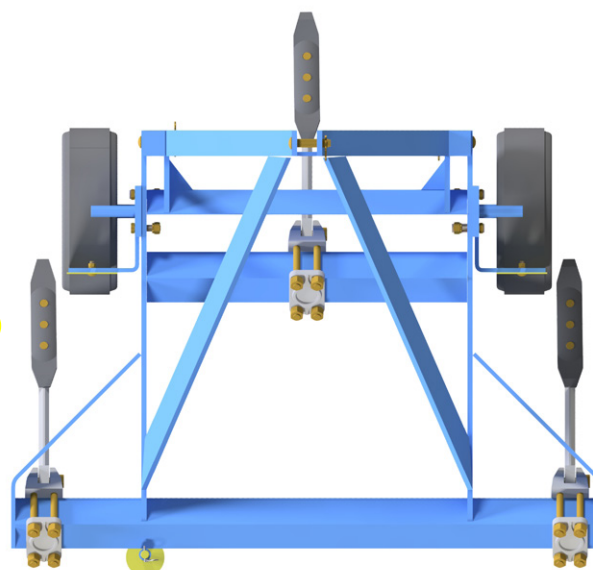
Assembly

Shanks assembly scheme

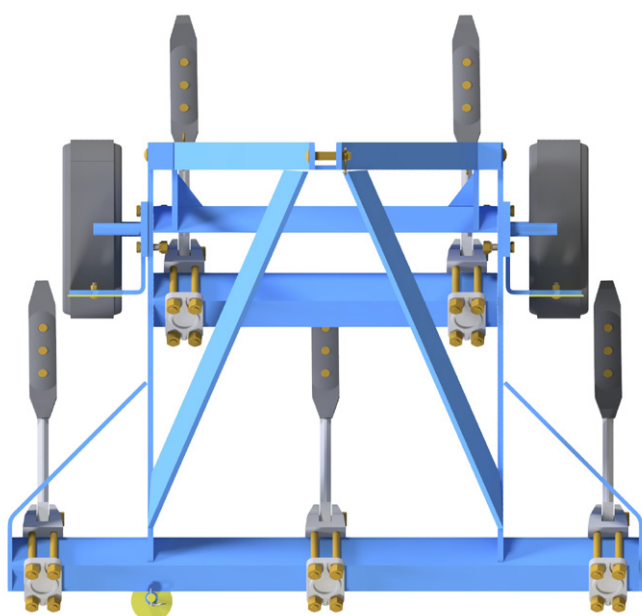
To place the shanks, first check their positioning on the frame as shown on the illustrations below:



**AST 3/3
(345 mm)**



**AST 5/3
(780 mm)**

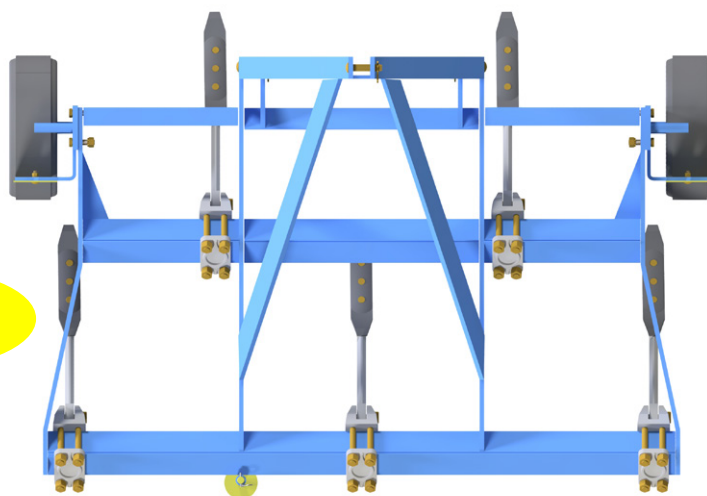


**AST 5/5
(390 mm)**

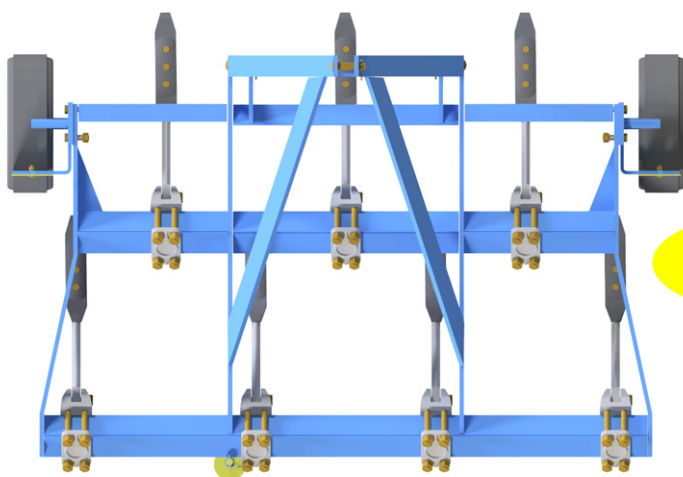
Assembly

Shanks assembly scheme

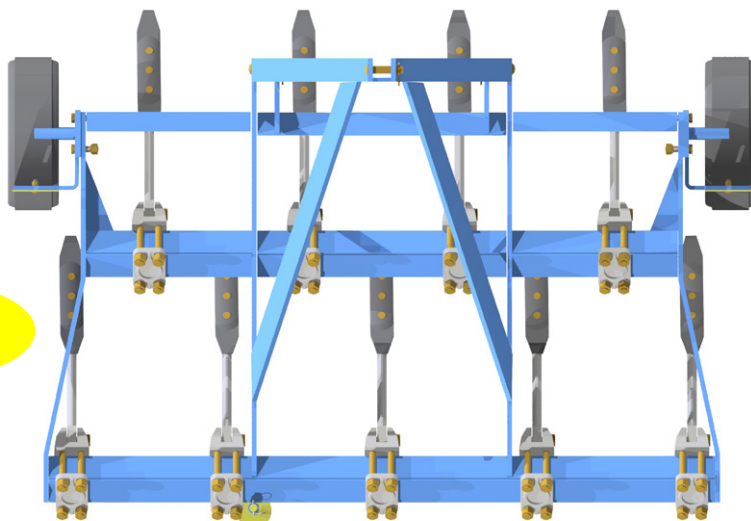
**AST 9/5
(500 mm)**



**AST 9/7
(320 mm)**

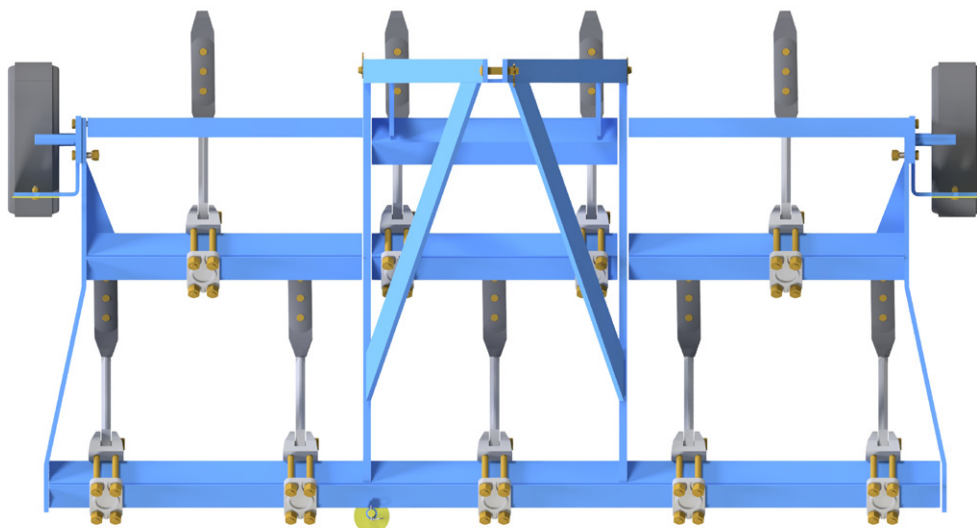


**AST 9/9
(250 mm)**

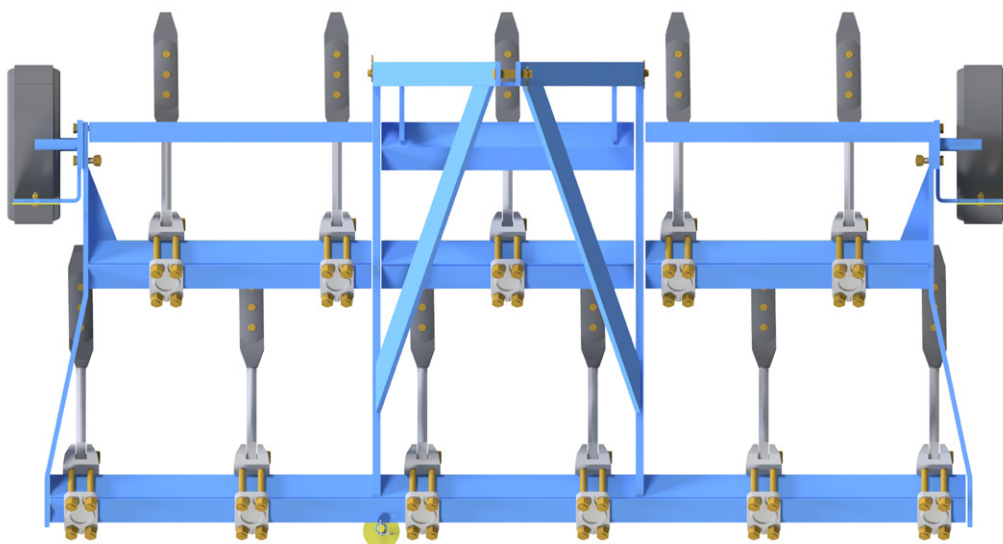


Assembly

Shanks assembly scheme



AST 11/9
(310 mm)



AST 11/11
(265 mm)

Set-up instructions

Before starting the operations, set up the tractor and equipment properly.

When the tractor receives the plow, a single set is formed to perform the job. Therefore, it is important to follow the recommendations below:

Preparing the tractor

First of all, check the general conditions to use the tractor; mainly regarding the good functioning of the hydraulic system.

The gauges of the front and rear wheels must be equal (by measuring the center-to-center of the tires); according to (A) on the 'Hitching to the tractor' page.

The common force of the tractors are applied on the rear wheels. So, if the tractors slip during the job, they will lose part of this force and ideal yield will not be achieved; also leading to a greater wear to the tires.

To avoid skidding, we recommend the proper ballasting. The addition of water ballasts on the tires, set of weights on the front part or on the rear wheels of the tractor are the most used means to increase soil traction and give greater stability to the tractor.

Tires	Distance between tires center (mm)
12.4/11-28	1420
13.6/12-38	
14.9/13-24	1520
14.9/13-28	
18.4/15-30	1620
18.4/15-34	
23.1/18-26	

Preparing the plow

Check the conditions of all parts and retighten nuts and bolts.

Lubricate all grease fittings appropriately. (Check the instructions on the 'lubrication' section).

Follow the tractor and plow operator's manual appropriately for the best performance of both.

Carefully note the instructions of right and left hand sides, considering the plow seen by its rear.



When transporting the plow or lifting it for maneuvers, check the tractor manual to be sure about the necessary weight to not affect the stability of the tractor-plow set. Without this proper weight distribution, serious accidents or even death may occur.

Marchesan is not responsible for the incorrect use of the equipment.

Set-up instructions

Hitching to the tractor

Choose a flat place for hitching.

Slowly drive the tractor in reverse gear in the plow direction and be ready to brake. When close enough, use the lever to control the hydraulic arm position, letting the left lower arm on the same level of the plow hitch.

1) Hitch the left lower arm and place the lock pin.

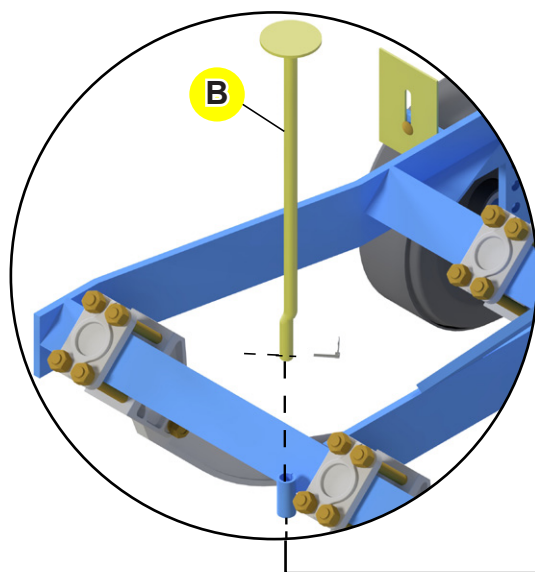
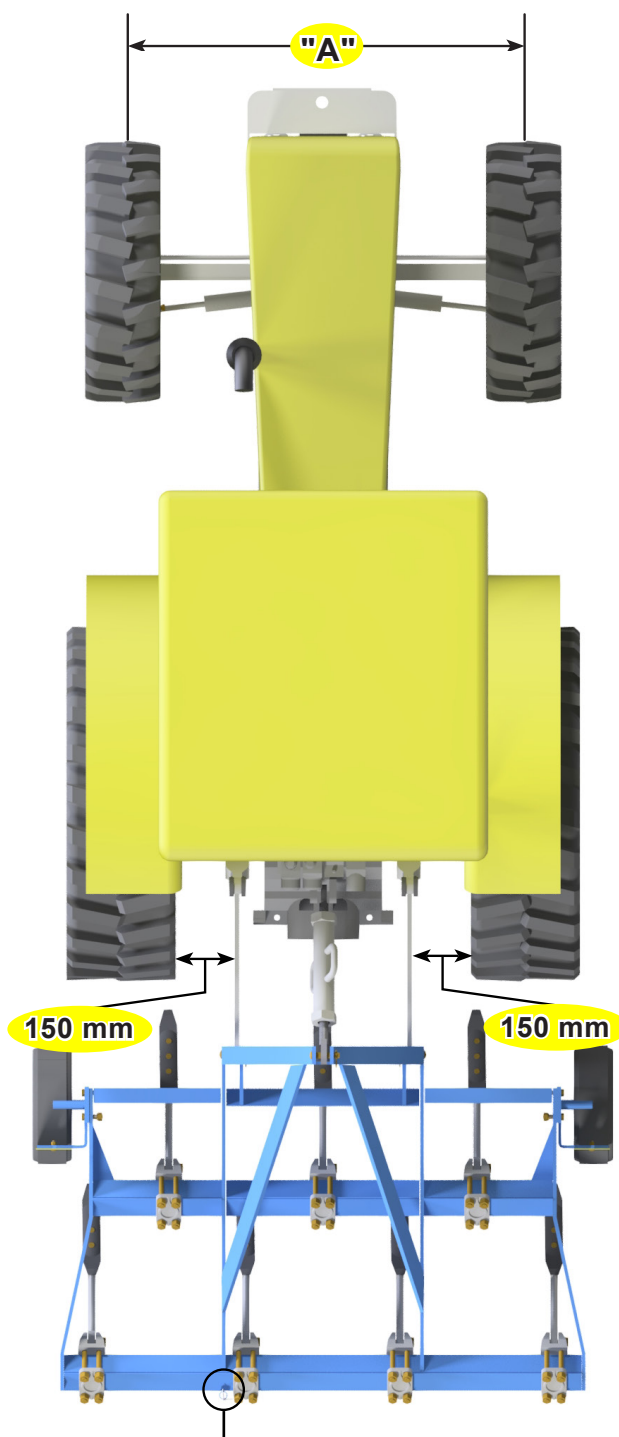
2) Hitch the upper arm of the third point of the tractor to the plow and put the clamps.

3) Lastly, hitch the right lower arm to the leveling crank. Right after, the extensor thread of the third point of the tractor can be used to approach or move away the plow in order to facilitate hitching.

For a perfect hitching, the plow must be centralized related to the longitudinal axle of the tractor, which is done as follows:

- Align the hitch post of the plow with the third point of the tractor and check if the distances of the hydraulic lower arms are the same related to the corresponding tires (example on the illustration = 150 mm), being the arms leveled.

4) After hitching, leave the parking jack on transport/operation position.



Adjustments and operations

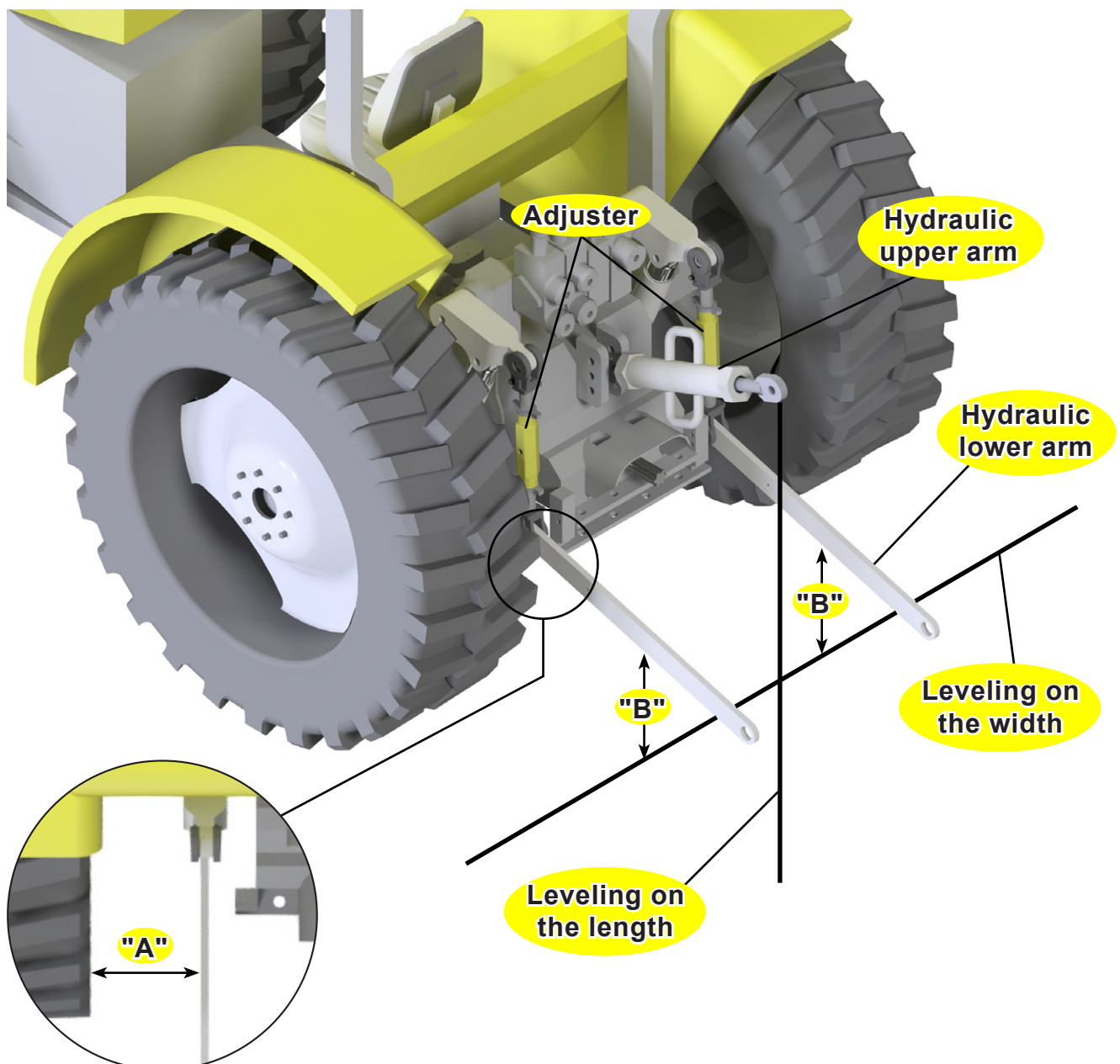
Plow leveling

To level the plow, proceed as follows:

Place the tractor in a flat place and level it on its width (transversal) and length (longitudinal).

On its width, the leveling is done using the leveling crank of the hydraulic right lower arm; let the plow drawbar in a vertical position (as in "B").

On its length, the leveling is done through the hydraulic upper arm (third point), letting the shanks parallel to the soil.



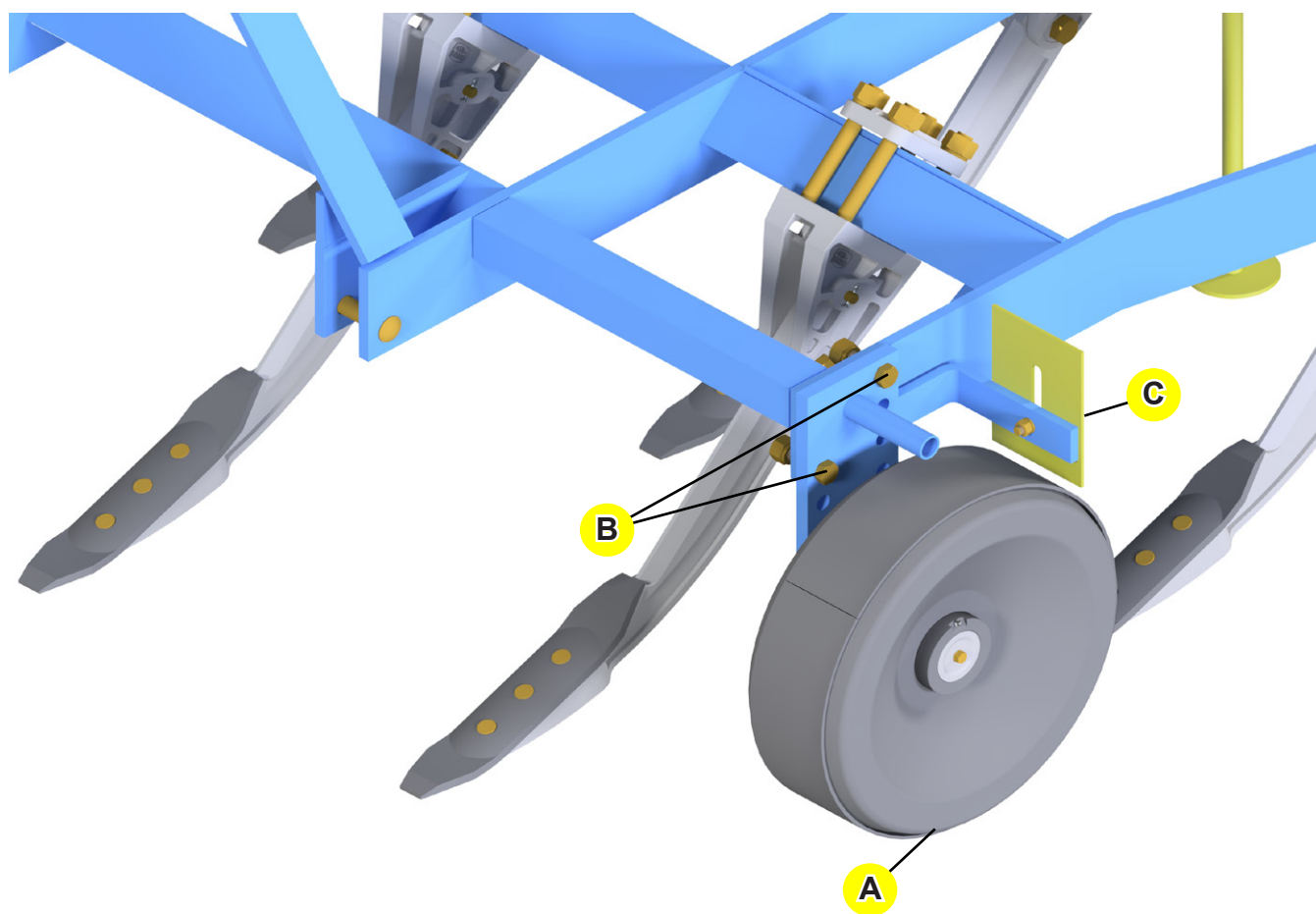
Adjustments and operations

Shank depth adjustment

The subsoiling depth is adjusted by the side wheels (A), which have holes (B) on their respective support arms.

The use of these wheels controls the penetration of all shanks in a uniform way and relieve the tractor hydraulic system.

The scrapers (C) also have adjustments and they must stay on a distance of 01 - 02 cm from the wheels.



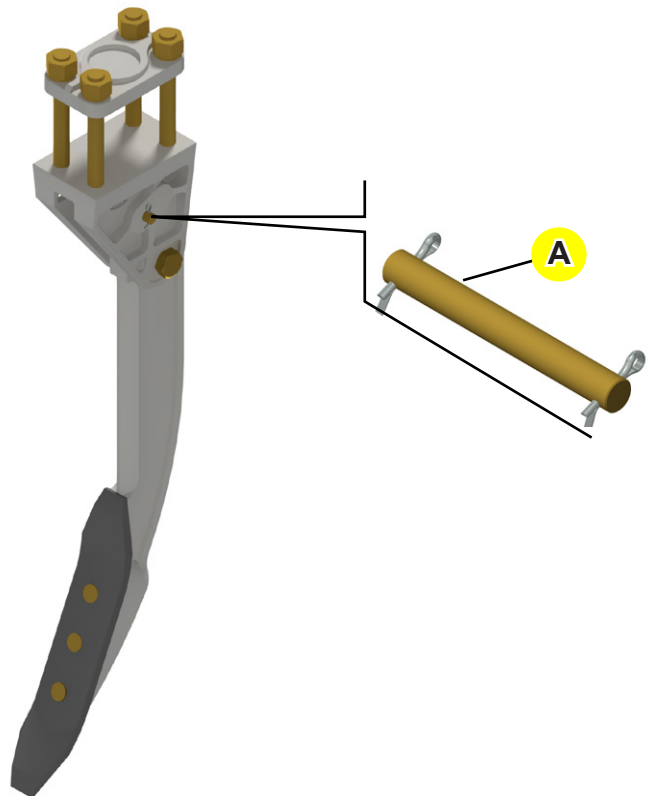
Spacing between shanks adjustment

The TATU subsoiler plows have spacing adjustments between the shanks and they are free to move on the frame. This adjustment will be defined according to the type of soil.

Adjustments and operations

Safety fuse

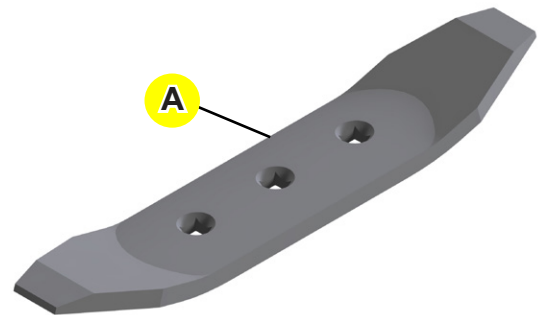
For a greater safety on the job, the subsoiler plow has a fuse pin (A) that will break with unpredictable impacts; thus avoiding damages to the equipment and to the tractor hydraulic system.



Subsoiler points

The subsoiler points (A) must be replaced as soon as excessive wear is noticed, so the action of breaking the compacted layer will not be affected.

Invert the points so both ends can be used.



Troubleshooting guide

PROBLEM	CAUSES	POSSIBLE SOLUTIONS
Twists or cracks on the equipment frame tubes.	Curves or finishing jobs done on too short radius, being the equipment lowered.	Perform the maneuvers only when the equipment is lifted.
	Low quality parts.	Replace these parts for original ones.
Shanks are not penetrating the soil.	Worn out subsoiler points.	Try using the other end of the point or replace it.

Adjustments and operations

Operations - Important points



- Retighten nuts and bolts after the first day of work and check the conditions of all pins and cotter pins. Then, retighten every 24 operating hours.
- Carefully observe the lubrication intervals.
- Choose a gear that allows the tractor to maintain certain power reserve, assuring against unforeseen efforts.
- Speed is relative to the tractor gear and can only be determined by the local conditions. We adopted an average speed from 4 to 4.5 km/h, which is not advisable to overcome in order to maintain job efficiency and to avoid possible damages to the plow.
- Only people who own a complete knowledge of the tractor and plow must operate them.
- To hitch the plow, drive it in a slow gear and on a wide area. Be ready to brake.
- Remove pieces of wood or any object that may get stuck on the shanks.
- Only pull the equipment using a tractor with enough power.
- During working or transportation, never allow passengers on the tractor or on the plow.
- The subsoiling job must be done over dry soils after the plowing or harrowing process, in order to break the compacted layer and which can be found on the subsoil at approximately 35 cm deep.
- Keep the hydraulic lower arms of the tractor adjusted.
- Always keep the plow centralized related to the tractor and leveled related to the soil.
- To carry out any verification on the plow, lower it to the ground and shut down the tractor engine.
- Always carry out the subsoiling job being careful with the levels of the terrain.
- Whenever you unhitch the plow, do it on a flat and firm location and use the parking jack.
- Carry out the operations on a controlled and careful manner.

Maintenance

Lubrication

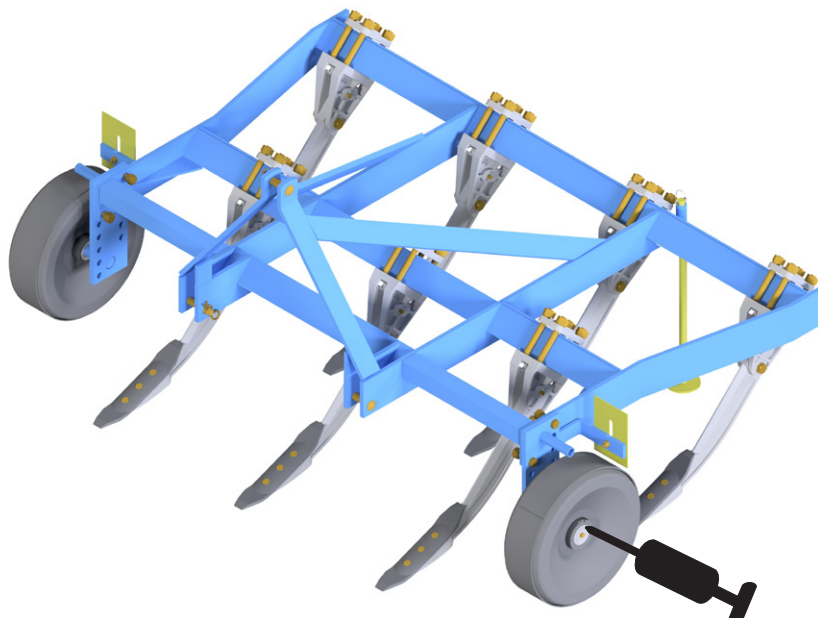
To reduce the wear caused by the friction between the moving parts of the equipment, it is necessary to carry out a correct lubrication, as indicated below:

Every 100 working hours, lubricate all the gauge wheels through the grease fittings.

- Make sure to use a good quality lubricant regarding its efficiency and purity, avoiding the use of products contaminated by water, earth, etc.
- Remove the remainder old grease around the articulations.
- 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.

Lubrication points

Lubricate every 100 working hours.



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

Maintenance

Plow maintenance

Shut down the tractor engine, apply the brakes and use chocks on the tires. Immobilize the equipment before carrying out any maintenance operation.

During offseason wash the plow, repair any damaged paintwork, lubricate all grease fittings and store the plow in a covered and dry place, avoiding the direct contact with the soil.

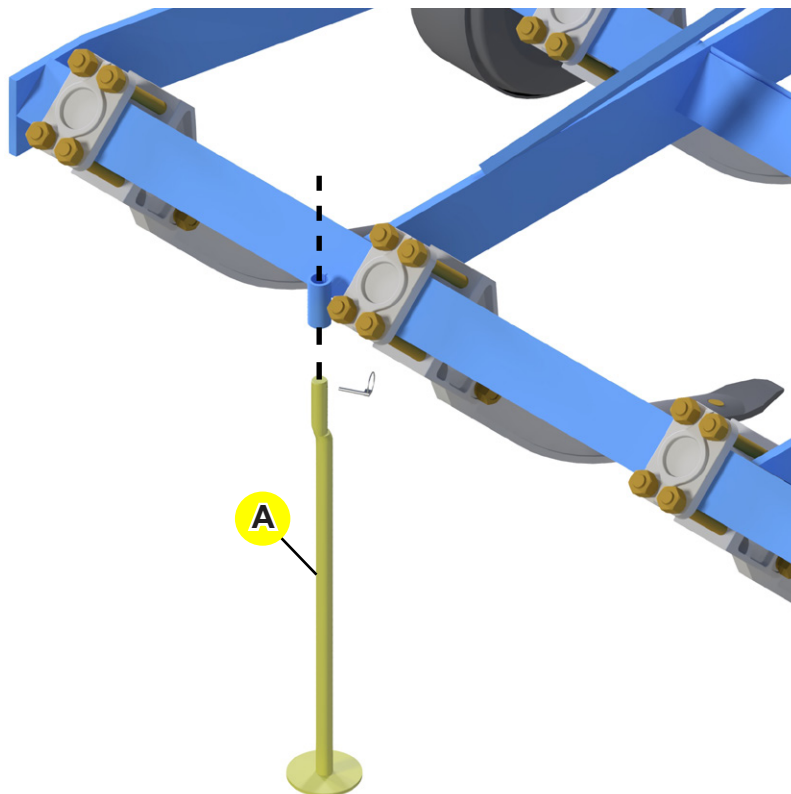
Place the parking jack (A) and underpin the equipment properly to avoid accidents.

The subsoiler points and shanks must be replaced as soon as an excessive wear is noticed, characterized mainly by the loss of cut or other damages that these parts may suffer during the job.

After some hours of operation, the bolts on the plow 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.

Important data

Calculation of hourly income

To calculate the hourly income, use the following calculation:

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

R = Hourly income;

L = Plow working width (meters);

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

E = Efficiency: 0.90;

X = Hectare value = 10,000 m².

Example: AST with 5/5 shanks:

R = ?

L = 1.56 m

V = 4,000 m/h

E = 0.90

X = 10,000 m²

$$R = \frac{1.56 \times 4,000 \times 0.90}{10,000}$$

R = The hourly income working with an AST plow that has 5 shanks will be of, approximately, 0.56 hectares per hour.

NOTE / The plow 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.

Important data

Average income table

Model	Number of shanks	Cutting width (m)	Hourly income	Daily income (09 hours)
			Hectare	Hectare
3/3	03	0.69	0.25	2.24
5/5	05	1.56	0.56	5.05
9/9	09	2.00	0.72	6.48
11/11	11	2.65	0.95	8.59

NOTE / An average speed of 4 km/h was assumed to prepare the table above.

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

Example: An area of 30 hectares to be worked with a plow that has 5 shanks (Hourly income = 0.56 hectare).

$$\text{So: } \frac{30}{0.56} = 53.57$$




Approximately will be spent 54 (Fifty-four) hours to work in an area of 30 hectares.

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 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.
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G:\VALSON\Manuais_Inglês\Torque

NOTE For metric conversion:

- Multiply inch-pounds by .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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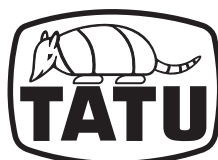
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