EURO TWISTER
30 SERIES

OPERATORS MANUAL

LIMITED WARRANTY:

Mandako Agri Marketing (2010) Ltd. ("MANDAKO") warrants for a period of one (1) year from the date of delivery to the purchaser that any new machinery purchased from MANDAKO (the "Product") will be free of manufacturing and materials defects (the "Covered Defects"). Before using the Product, the purchaser shall determine the suitability of the Product for its intended use. This Limited Warranty is non-transferable and valid to the purchaser of the Product only.

Except for the Covered Defects, this Limited Warranty shall not apply to any other defects or problems in the Product, including without limitation: (i) alterations, changes, replacements or repairs to the Product made by anyone other than MANDAKO or MANDAKO authorized Dealers; (ii) accessories, attachments, tools or parts sold or operated with the Product, if they have not been manufactured by MANDAKO; (iii) application or installation of accessories, attachments, tools or parts not completed in accordance with MANDAKO's operator's manual, specifications or printed instructions; (iv) defects or problems caused by misuse, abuse, neglect, improper testing, improper storage, improper handling or abnormal conditions; and (v) defects caused by wear and tear from ordinary use of the Product.

During the one (1) year warranty period, provided that written notice of the Covered Defects is given to MANDAKO within seven (7) days from the date that the defect was, or ought to have been, discovered, the liability of MANDAKO under this Limited Warranty shall be limited to the repair or replacement of any defective Product. For clarity, the purchaser shall be responsible for all expenses incurred as a result of any repairs, labour, parts, transportation or any other work, unless MANDAKO has otherwise authorized reimbursement of such expenses. In order to obtain repair or replacement, the written notice provided by the purchaser must contain full details of the Covered Defects and submitted online at www.mandako.com/warranty-claim or be sent to:

Mandako
Box 379, 12159B, Hwy 306
Plum Coulee, Manitoba, R0G 1R0

MANDAKO reserves the right to inspect the defective Product prior to repair or replacement. If MANDAKO determines that a defect in the Product is not a Covered Defect, it shall not have any obligation to repair or replace the Product.

No one is authorized to make oral warranties or representations on behalf of MANDAKO regarding the Product. The Product is subject to design changes and MANDAKO shall not be required to retro-fit or exchange items on previously sold Product, except at its own option.

THIS LIMITED WARRANTY IS DEEMED ACCEPTED BY YOU UPON YOUR PURCHASE OF THE PRODUCT. TO THE EXTENT PERMITTED BY LAW, THIS LIMITED WARRANTY IS EXCLUSIVE, AND IN LIEU OF ANY AND ALL OTHER WARRANTIES, CONDITIONS OR REPRESENTATIONS RESPECTING THE PRODUCT, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT, SUITABILITY, OR ANY OTHER WARRANTIES, REPRESENTATIONS OR CONDITIONS THAT MAY ARISE FROM USAGE OF TRADE OR COURSE OF DEALING.

MANDAKO'S OBLIGATION SHALL NOT EXTEND BEYOND THE OBLIGATIONS EXPRESSLY UNDERTAKEN ABOVE AND IN NO EVENT SHALL MANDAKO OR ITS SUPPLIERS, AGENTS, OFFICERS, DIRECTORS, CONTRACTORS AND EMPLOYEES BE LIABLE TO THE PURCHASER OR ANY THIRD PARTY FOR ANY INDIRECT, PUNITIVE, EXEMPLARY, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES OR LOSSES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF BUSINESS, LOSS OF PROFITS OR SALES, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION, LOSS OF GOODWILL, WORK STOPPAGE, COMPUTER FAILURE OR MALFUNCTION OR ANY OTHER PECUNIARY LOSS OR COMMERCIAL DAMAGE OR LOSS) ARISING FROM ANY CLAIM WHATSOEVER, INCLUDING ANY TORT, EQUITY, NEGLIGENCE, GROSS NEGLIGENCE, WILFUL MISCONDUCT OR STRICT LIABILITY CLAIM, EVEN IF MANDAKO HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES OR LOSSES OR THEY ARE FORESEEABLE. THE PURCHASER WAIVES ANY CLAIM AGAINST MANDAKO FOR PUNITIVE OR EXEMPLARY DAMAGES.

WARRANTY VOID IF NOT REGISTERED
PLEASE REGISTER AT www.mandako.com/registration

SERIAL NUMBER LOCATION

Always give your dealer the serial number of your Mandako Agri Marketing (2010) Ltd. Mandako Twister when ordering parts or requesting service or other information.

The serial number plate is located where indicated. Please mark the number in the space provided for easy reference.

SERIAL NUMBER LOCATION

Model Number _____

Serial Number _____

TABLE OF CONTENTS

1 INTRODUCTION

Congratulations on your choice of an Mandako Agri Marketing (2010) Ltd. Mandako Twister to compliment your operation. This equipment has been designed and manufactured to meet the needs of a discerning agricultural industry.

Safe, efficient and trouble free operation of your Mandako Agri Marketing (2010) Ltd. Mandako Twister requires that you and anyone else who will be using or maintaining the Twister, read and understand the Safety, Operation, Maintenance and Trouble Shooting information contained within the Operator's Manual.

This manual covers the Mandako Agri Marketing (2010) Ltd. Mandako Model 12, Series 3. Use the Table of Contents or Index as a guide to locate required information.

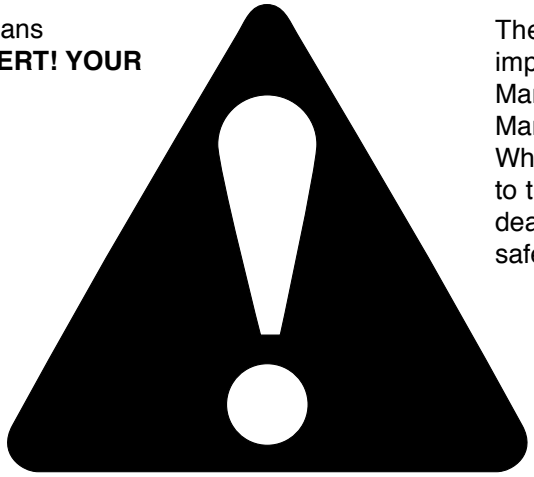
Keep this manual handy for frequent reference and to pass on to new operators or owners. Call your Mandako Agri Marketing (2010) Ltd. dealer if you need assistance, information or additional copies of the manuals.

OPERATOR ORIENTATION - The directions left, right, front and rear, as mentioned throughout this manual, are as seen from the tractor driver's seat and facing in the direction of travel.

2 SAFETY

SAFETY ALERT SYMBOL

This Safety Alert symbol means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!**



The Safety Alert symbol identifies important safety messages on the Mandako Agri Marketing (2010) Ltd. Mandako Twister and in the manual. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.

Why is SAFETY important to you?

3 Big Reasons

Accidents Disable and Kill
Accidents Cost
Accidents Can Be Avoided

SIGNAL WORDS:

Note the use of the signal words **DANGER, WARNING** and **CAUTION** with the safety messages. The appropriate signal word for each message has been selected using the following guide-lines:

DANGER - Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations typically for machine components which, for functional purposes, cannot be guarded.

WARNING - Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.

CAUTION - Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

If you have any questions not answered in this manual or require additional copies or the manual is damaged, please contact your dealer or Mandako Agri Marketing (2010) Ltd. Box 379, Highway 306, Plum Coulee, Manitoba, Canada, R0G 1R0. Phone: (204) 829-3348, Fax: (204) 829-7712, Toll Free: 1-888-525-5892

SAFETY

YOU are responsible for the SAFE operation and maintenance of your Mandako Agri Marketing (2010) Ltd. Mandako Twister. **YOU** must ensure that you and anyone else who is going to use, maintain or work around the Mandako Twister be familiar with the using and maintenance procedures and related **SAFETY** information contained in this manual. This manual will take you step-by-step through your working day and alerts you to all good safety practices that should be used while using the Mandako Twister.

Remember, **YOU** are the key to safety. Good safety practices not only protect you but also the people around you. Make these practices a working part of your safety program. Be certain that **EVERYONE** using this equipment is familiar with the recommended using and maintenance procedures and follows all the safety precautions. Most accidents can be prevented. Do not risk injury or death by ignoring good safety practices.

- Mandako Twister owners must give operating instructions to operators or employees before allowing them to operate the machine, and at least annually thereafter.

- The most important safety device on this equipment is a SAFE operator. It is the operator's responsibility to read and understand ALL Safety and Operating instructions in the manual and to follow these. Most accidents can be avoided.

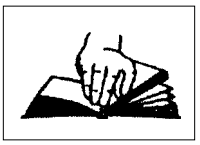
- A person who has not read and understood all using and safety instructions is not qualified to use the machine. An untrained operator exposes himself and bystanders to possible serious injury or death.

- Do not modify the equipment in any way. Unauthorized modification may impair the function and/or safety and could affect the life of the equipment.

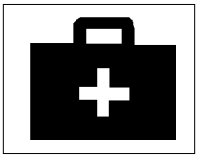
- Think SAFETY! Work SAFELY!

2.1 GENERAL SAFETY

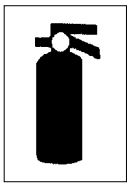
1. Read and understand the Operator's Manual and all safety signs before using, maintaining, adjusting or cleaning the Mandako Twister.



2. Have a first-aid kit available for use should the need arise and know how to use it.



3. Have a fire extinguisher available for use should the need arise and know how to use it.

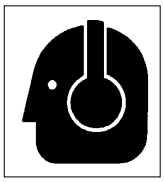


4. Do not allow riders.

5. Wear appropriate protective gear. This list includes but is not limited to:

   - A hard hat
   - Protective shoes with slip resistant soles
   - Protective glasses, goggles or face shield
   - Heavy gloves
   - Wet weather gear
   - Hearing Protection
   - Respirator or filter mask

6. Install and secure all guards before starting.



7. Wear suitable ear protection for prolonged exposure to excessive noise.

8. Lower machine to ground, place all controls in neutral, set park brake, remove ignition key and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.

9. Clear the area of people, especially small children, before using the unit.

10. Review safety related items annually with all personnel who will operating or maintaining the Mandako Twister.

2.2 EQUIPMENT SAFETY GUIDELINES

1. Safety of the operator and bystanders is one of the main concerns in designing and developing equipment. However, every year many accidents occur which could have been avoided by a few seconds of thought and a more careful approach to handling equipment. You, the operator, can avoid many accidents by observing the following precautions in this section. To avoid personal injury or death, study the following precautions and insist those working with you, or for you, follow them.

2. In order to provide a better view, certain photographs or illustrations in this manual may show an assembly with a safety shield removed. However, equipment should never be used in this condition. Keep all shields in place. If shield removal becomes necessary for repairs, replace the shield prior to use.

3. Replace any safety sign or instruction sign that is not readable or is missing. Location of such safety signs is indicated in this manual.

4. Never use alcoholic beverages or drugs which can hinder alertness or coordination while using this equipment. Consult your doctor about using this machine while taking prescription medications.

5. **Under no circumstances should young children be allowed to work with this equipment. Do not allow persons to use or assemble this unit until they have read this manual and have developed a thorough understanding of the safety precautions and of how it works.** Review the safety instructions with all users annually.

6. This equipment is dangerous to children and persons unfamiliar with its operation. The operator should be a responsible, properly trained and physically able person familiar with machinery and trained in this equipment's operations. If the elderly are assisting with work, their physical limitations need to be recognized and accommodated.

7. Use a tractor equipped with a Roll Over Protective Structure (ROPS) and a seat belt.

8. Never exceed the limits of a piece of machinery. If its ability to do a job, or to do so safely, is in question - **DON'T TRY IT.**

9. Do not modify the equipment in any way. Unauthorized modification may result in serious injury or death and may impair the function and life of the equipment.

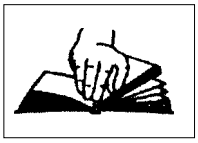
10. In addition to the design and configuration of this implement, including Safety Signs and Safety Equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence, and proper training of personnel involved in the operation, transport, maintenance, and storage of the machine. Refer also to Safety Messages and operation instruction in each of the appropriate sections of the engine and machine manuals. Pay close attention to the Safety Signs affixed to the tractor and the machine.

2.3 SAFETY TRAINING

1. Safety is a primary concern in the design and manufacture of our products. Unfortunately, our efforts to provide safe equipment can be wiped out by a single careless act of an operator or bystander.

2. In addition to the design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence and proper training of personnel involved in the operation, transport, maintenance and storage of this equipment.

3. It has been said, "The best safety feature is an informed, careful operator." We ask you to be that kind of an operator. It is the operator's responsibility to read and understand ALL Safety and Using instructions in the manual and to follow these. Accidents can be avoided.



4. **Working with unfamiliar equipment can lead to careless injuries. Read this manual before assembly or using, to acquaint yourself with the machine. If this machine is used by any person other than yourself, or is loaned or rented, it is the machine owner's responsibility to make certain that the operator, prior to using:**

   a. Reads and understands the operator's manuals.

   b. Is instructed in safe and proper use.

5. Know your controls and how to stop tow unit, engine and machine quickly in an emergency. Read this manual and the one provided with your engine.

6. Train all new personnel and review instructions frequently with existing workers. Be certain only a properly trained and physically able person will use the machinery. A person who has not read and understood all using and safety instructions is not qualified to use the machine. An untrained operator exposes himself and bystanders to possible serious injury or death. If the elderly are assisting with the work, their physical limitations need to be recognized and accommodated.

2.4 SAFETY SIGNS

1. Keep safety signs clean and legible at all times.

2. Replace safety signs that are missing or have become illegible.

3. Replaced parts that displayed a safety sign should also display the current sign.

4. Safety signs displayed in Section 3 each have a part number in the lower right hand corner. Use this part number when ordering replacement parts.

5. Safety signs are available from your authorized Distributor or Dealer Parts Department or the factory.

How to Install Safety Signs:

- Be sure that the installation area is clean and dry.

- Be sure temperature is above 50°F (10°C).

- Determine exact position before you remove the backing paper (See Section 3).

- Remove the smallest portion of the split backing paper.

- Align the sign over the specified area and carefully press the small portion with the exposed sticky backing in place.

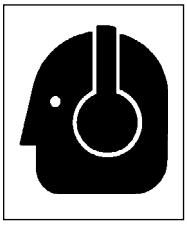
- Slowly peel back the remaining paper and carefully smooth the remaining portion of the sign in place.

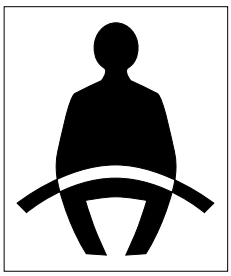
- Small air pockets can be pierced with a pin and smoothed out using the piece of sign backing paper.

2.5 PREPARATION

1. Never use the engine and machine until you have read and completely understand this manual, the Engine Operator's Manual and each of the Safety Messages found on the safety signs on the tractor and machine.

2. 
Personal protection equipment including hard hat, safety glasses, safety shoes, and gloves are recommended during assembly, installation, operation, adjustment, maintaining, repairing, removal, cleaning, or moving the unit. Do not allow long hair, loose fitting clothing or jewelery to be around equipment.

3. 
PROLONGED EXPOSURE TO LOUD NOISE MAY CAUSE PERMANENT HEARING LOSS!
Power equipment with or without equipment attached can often be noisy enough to cause permanent, partial hearing loss. We recommend that you wear hearing protection on a full-time basis if the noise in the Operator's position exceeds 80db. Noise over 85db on a long-term basis can cause severe hearing loss. Noise over 90db adjacent to the Operator over a long-term basis may cause permanent, total hearing loss. **NOTE:** Hearing loss from loud noise (from tractors, chain saws, radios, and other such sources close to the ear) is cumulative over a lifetime without hope of natural recovery.

4. 
Operate the machine only with a tractor equipped with an approved Roll-Over-Protective-Structure (ROPS). Always wear a seatbelt. Serious injury or even death could result from falling off the tractor---particularly during a turnover when the operator could be pinned under the ROPS or in the tractor.

5. Clear working area of stones, branches or hidden obstacles that might be hooked or snagged, causing injury or damage.

6. Be sure machine is properly attached, adjusted and in good operating condition.

7. Ensure that all safety shielding and safety signs are properly installed and in good condition.

2.6 MAINTENANCE SAFETY

1. Good maintenance is your responsibility. Poor maintenance is an invitation to trouble.

2. Follow good shop practices.

   - Keep service area clean and dry.
   - Be sure electrical outlets and tools are properly grounded.
   - Use adequate light for the job at hand.

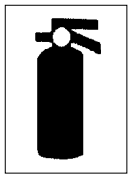
3. Lower machine to the ground, place all controls in neutral, stop engine, set park brake, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.

4. Place stand or blocks under the frame before working beneath the machine or when changing tires.

5. Always use personal protection devices such as eye, hand and hearing protectors, when performing any service or maintenance work.

6. Where replacement parts are necessary for periodic maintenance and servicing, genuine factory replacement parts must be used to restore your equipment to original specifications.

7. A fire extinguisher and first aid kit should be kept readily accessible while performing maintenance on this equipment.



8. Before applying pressure to a hydraulic system, make sure all components are tight and that steel lines, hoses and couplings are in good condition.

9. Relieve pressure from the hydraulic circuit before servicing or disconnecting from tractor.

10. When completing a maintenance or service function, make sure all safety shields and devices are installed before placing unit in service.

2.7 OPERATING SAFETY

1. Read and understand the Operator's Manual and all safety signs before using.

2. Lower machine to the ground, place all controls in neutral, stop engine, set park brake, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.

3. Install and secure all guards and shields before starting or operating.

4. Keep hands, feet, hair and clothing away from all moving and/or rotating parts.

5. Do not allow riders on the Twister or tractor during operation or transporting.

6. Clear the area of all bystanders, especially children, before starting.

7. Stay away from side wings when folding or extending frame. Keep others away.

8. Clean reflectors, SMV and lights before transporting. Be sure lights are working.

9. Stay away from overhead power lines when folding or extending wings. Electrocution can occur without direct contact.

10. Fold wings and install transport lock bracket with its retainers over the wheel lift cylinder before transporting.

11. Attach securely to towing unit using a hardened pin with a retainer and a safety chain.

12. Do not exceed a safe travel speed.

13. Use hazard flasher on tractor when transporting.

14. Before applying pressure to the hydraulic system, make sure all components are tight and that steel lines, hoses and couplings are in good condition.

15. Review safety instructions annually.

2.8 HYDRAULIC SAFETY

1. Always place all tractor hydraulic controls in neutral before dismounting.

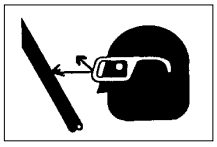
2. Make sure that all components in the hydralic system are kept in good condition and are clean.

3. Replace any worn, cut, abraded, flattened or crimped hoses and steel lines.

4. Relieve pressure from hydraulic circuit before servicing or disconnecting from tractor.

5. 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 fail suddenly and create a hazardous and unsafe condition.

6. Wear proper hand and eye protection when searching for a high-pressure hydraulic leak. Use a piece of wood or cardboard as a back stop instead of hands to isolate and identify a leak.



7. 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.

8. Before applying pressure to the system, make sure all components are tight and that lines, hoses and couplings are in good condition.

2.9 TRANSPORT SAFETY

1. Read and understand ALL the information in the Operator's Manual regarding procedures and SAFETY when operating the Twister in the field and/or on the road.

2. Check with local authorities regarding Twister transport on public roads. Obey all applicable laws and regulations.

3. Always travel at a safe speed. Use caution when making corners or meeting traffic.

4. Make sure the SMV (Slow Moving Vehicle) emblem 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.

5. Install additional lights on the rear of the machine to safeguard against rear end collisions. Daybreak and dusk are particularly dangerous and pilot vehicles are recommended.

6. Be sure that the machine is hitched positively to the towing vehicle and a retainer is used through the drawbar pin. Always attach a safety chain between the frame and the towing machine.

7. Keep to the right and yield the right-of-way to allow faster traffic to pass. Drive on the road shoulder, if permitted by law.

8. Do not exceed 20 mph (32 km/h). Reduce speed on rough roads and surfaces.

9. Always use hazard warning flashers on tractor when transporting unless prohibited by law.

10. Stay away from overhead power lines when raising wings. Electrocution can occur without direct contact.

11. Raise wings and install transport lock pins with retainers before transporting.

2.10 STORAGE SAFETY

1. Store the unit in an area away from human activity.

2. Lower wings and frame to the ground for storage.

3. Do not allow children to play on or around the stored machine.

4. Store the unit in a dry, level area. Support the discs with planks if required.

2.11 TIRE SAFETY

1. Failure to follow proper procedures when mounting a tire on a wheel or rim can produce an explosion which may result in serious injury or death.

2. Do not attempt to mount a tire unless you have the proper equipment and experience to do the job.

3. Have a qualified tire dealer or repair service perform required tire maintenance.

4. When replacing worn tires, make sure they meet the original tire specifications. Never undersize.

2.12 SIGN-OFF FORM

Mandako Agri Marketing (2010) Ltd. follows the general Safety Standards specified by the American Society of Agricultural and Biological Engineers (ASABE) and the Occupational Safety and Health Administration (OSHA). Anyone who will be using and/or maintaining the Twister must read and clearly understand ALL Safety, Usage and Maintenance information presented in this manual.

Do not use or allow anyone else to use this Twister until such information has been reviewed. Annually review this information before the season start-up.

Make these periodic reviews of SAFETY and OPERATION a standard practice for all of your equipment. We feel that an untrained operator is unqualified to use this machine.

A sign-off sheet is provided for your record keeping to show that all personnel who will be working with the equipment have read and understand the information in the Operator's Manual and have been instructed in the operation of the equipment.

SIGN-OFF FORM

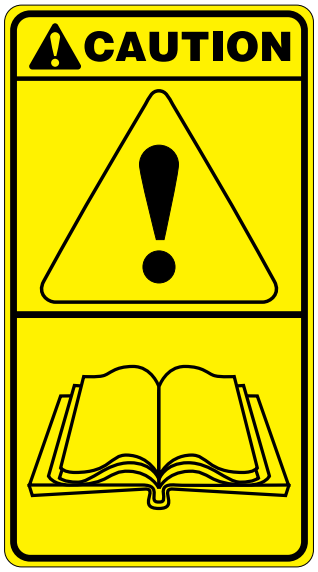
DATE	EMPLOYEES SIGNATURE	EMPLOYERS SIGNATURE

3 SAFETY SIGN LOCATIONS

The types of safety signs and locations on the equipment are shown in the illustrations that follow. Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!

A



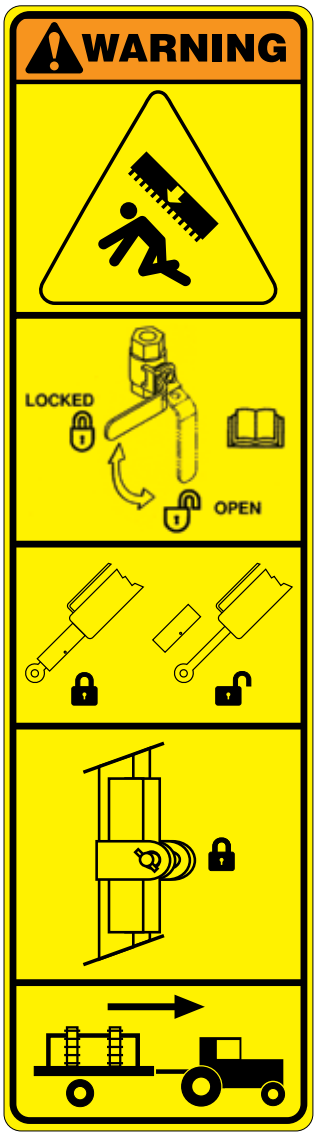
B

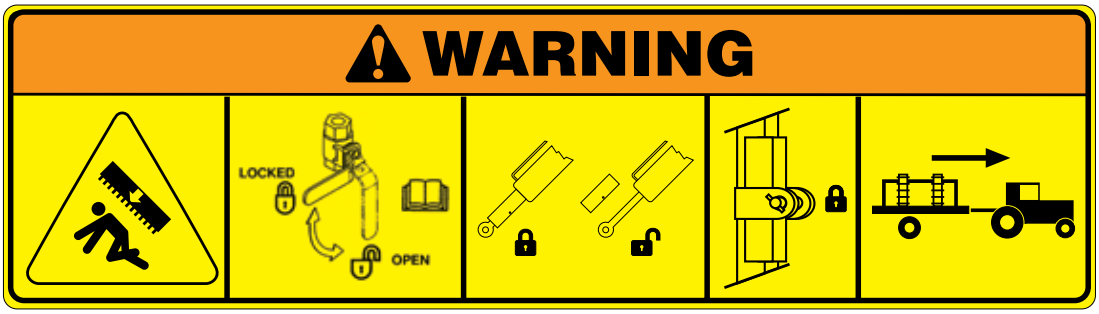
REMEMBER - If safety signs have been damaged, removed, become illegible or parts replaced without safety signs, new signs must be applied. New safety signs are available from your authorized dealer.

The types of safety signs and locations on the equipment are shown in the illustrations that follow. Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!

C





REMEMBER - If safety signs have been damaged, removed, become illegible or parts replaced without safety signs, new signs must be applied. New safety signs are available from your authorized dealer.

The types of safety signs and locations on the equipment are shown in the illustrations that follow. Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!

D

REMEMBER - If safety signs have been damaged, removed, become illegible or parts replaced without safety signs, new signs must be applied. New safety signs are available from your authorized dealer.

4 OPERATION

OPERATING SAFETY

- Read and understand the Operator's Manual and all safety signs before using. Review safety instructions annually.
- Lower machine to the ground, place all controls in neutral, stop engine, set park brake, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.
- Install and secure all guards and shields before starting or operating.
- Keep hands, feet, hair and clothing away from all moving and/or rotating parts.
- Do not allow riders on the Twister or tractor during operation or transporting.
- Clear the area of all bystanders, especially children, before starting.
- Stay away from wings when folding or extending frame. Keep others away.
- Clean reflectors, SMV and lights before transporting. Be sure lights are working.
- Stay away from overhead power lines when folding or extending wings. Electrocution can occur without direct contact.
- Fold wings and install transport lock bracket with its retainers over the wheel lift cylinder before transporting.
- Attach securely to towing unit using a hardened pin with a retainer and a safety chain.
- Do not exceed a safe travel speed.
- Use hazard flasher on tractor when transporting.
- Before applying pressure to the hydraulic system, make sure all components are tight and that steel lines, hoses and couplings are in good condition.

4.1 TO THE NEW OPERATOR OR OWNER

The Mandako Agri Marketing (2010) Ltd. Mandako Twister is a large solid or folding frame that is designed with large heavy duty discs for levelling the soil and cutting through the surface residue to work it into the soil.

It is the responsibility of the owner or operator to read this manual and to train all other operators before they start working with the machine. Follow all safety instructions exactly. Safety is everyone's business. By following recommended procedures, a safe working environment is provided for the operator, bystanders and the area around the worksite. Untrained operators are not qualified to operate the machine.

It is the responsibility of the owner or operator to read this manual and to train all other operators before they start working with the machine. Follow all safety instructions exactly. Safety is everyone's business. By following recommended procedures, a safe working environment is provided for the operator, bystanders and the area around the work site. Untrained operators are not qualified to operate the machine.

Many features incorporated into this machine are the result of suggestions made by customers like you. Read this manual carefully to learn how to operate the machine safely and how to set it to provide maximum field efficiency. By following the operating instructions in conjunction with a good maintenance program, your Twister will provide many years of trouble-free service.

4.2 MACHINE COMPONENTS

The Mandako Agri Marketing (2010) Ltd. Mandako Twister consists of a main frame with wings on each side that can fold up for transport or storage. Each wing is designed with hanging disc tool bars to engage the soil. The tool bars can be angled up from 0° to 7° to provide a more aggressive residue cutting, soil moving and residue burying action. It is the responsibility of the operator to monitor the job being done and adjust the angle of the tool bars to provide the desired performance. Each wing frame is designed with adjustable anchor pins to hold the tool bar in position when operating and remove the loading on the tractor hydraulic system.

Each wing folds up for transport. Install lock pins around wing frame before transporting. Use the wheels to set and control the depth of the discs penetrating the soil.

Optional harrows and rollers are available to mount on the back of each wing frame. The hydraulic system is designed with lock and a selector valve to select the hydraulic functions.

Fig. 1 PRINCIPLE COMPONENTS

4.3 MACHINE BREAK-IN

Although there are no operational restrictions on the Mandako Twister when used for the first time, it is recommended that the following mechanical items be checked:

A. **After operating for 1/2 hour:**

1. Re-torque all wheel bolts.
2. Re-torque all fasteners and hardware.
3. Check that no hydraulic lines are being pinched or crimped. Re-route as required.
4. Inspect all hydraulic lines, hoses, fittings and couplers for leaks. Tighten any leaking fitting.
5. Check for and remove all entangled material.
6. Lubricate all grease fittings.

B. **After 5 hours and 10 hours of operation:**

1. Re-torque all wheel bolts, fasteners and hardware.
2. Inspect all hydraulic lines, hoses, fittings and couplers for leaks. Tighten any leaking fitting.
3. Go to the normal servicing and maintenance schedule as defined in the Maintenance Section.

4.4 PRE-OPERATION CHECKLIST

Efficient and safe operation of the Mandako Agri Marketing (2010) Ltd. Mandako Twister requires that each operator reads and understands the using procedures and all related safety precautions outlined in this section. A pre-operation checklist is provided for the operator. It is important for both the personal safety and maintaining the good mechanical condition of the Mandako Twister that this checklist is followed.

Before operating Mandako Twister and each time thereafter, the following areas should be checked off:

1. Lubricate the machine per the schedule outline in the Maintenance Section.
2. Use only a tractor of adequate power and weight to operate the Mandako Twister. See section 4.5 for recommendations.
3. Be sure the machine is properly attached to the tractor. Be sure that a mechanical retainer is installed through the drawbar pin and that the safety chain is used.
4. Inspect all hydraulic lines, hoses, fittings and couplers for leaks. Tighten any leaking fitting.
5. Check the tires and ensure that they are inflated to their specified pressure.
6. Remove all entangled material.

4.5 EQUIPMENT MATCHING

To insure the safe and reliable operation of the Mandako Twister, it is necessary to use a tractor with appropriate specifications. As a guideline, insure that these requirements are met:

1. **Horsepower:**
   The Mandako Twister needs both power and mass to pull and stabilize the machine in all operating conditions. The lower levels of power are appropriate for hard, level terrain and the higher levels for soft and hilly land. Extra mass is also required to maintain stability when slowing down or travelling uphill.

2. **Hydraulic System:**
   The tractor hydraulic system must be capable of a minimum of 10 gpm (38 lpm) at 2800 psi (19,320 kPa).

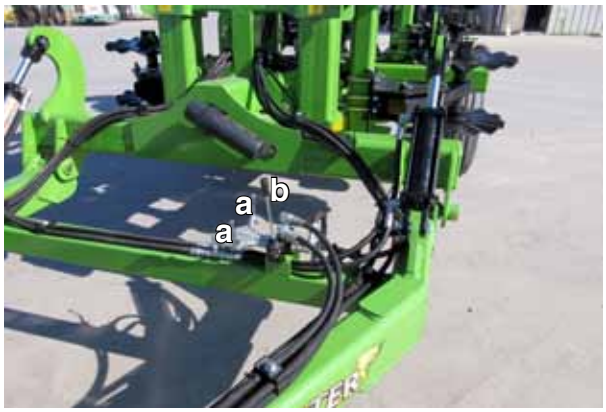
   The base machine requires 4 hydraulic circuits for the wheel, hitch and wing lift circuits plus circuits for adjusting the angles of the tool bars. System lock valves are mounted on the hitch.

   a. Lock valves.

   b. Selector valve.

Table 1: Model vs.Tractor HP

Model	Recommended Tractor Horsepower
12 Series 3	96-156



Valves

Wheels Up

Hitch Position

Fig. 2 HYDRAULIC CIRCUITS

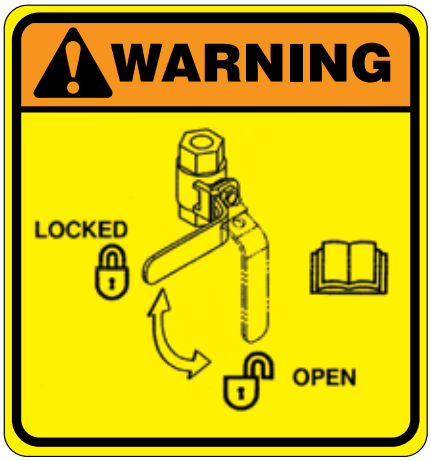
4.6 CONTROLS

Before starting to work, all operators should familiarize themselves with the location and function of all controls.

1. **Shut-Off Valves:**
   The wing raise/lower and hitch position circuits are designed with a valve to lock out or shut off these systems if required.

   a. **Unlocked:**
   Turn valve handle parallel to hydraulic line to unlock the circuit.

   b. **Locked:**
   Turn valve handle at right angles to hydraulic line to lock the circuit.



Unlocked

Locked

Fig. 3 LOCK VALVES

3. **Circuit Selector Valve:**
   The Twister requires 5 hydraulic outlets to operate all the circuits. If the tractor has only 4 outlets, the machine can be equipped with a selector valve to route the oil to the hitch cylinders circuit or the wing lift circuit.

   a. Move the lever toward the frame to direct the oil flow to the wing lift circuit.

   b. Move the lever forward to direct the oil flow to the hitch levelling circuit.

   The Twister is designed with 5 hydraulic circuits:

   a. Wheel frame.

   b. Front toolbar position.

   c. Rear toolbar position.

   d. Selector choice:

      - Wing raise/lower.

      - Hitch position.

   For selector choice, move the lower lever back and open the lock valves to raise and lower the wings. Move the lever forward to raise and lower the hitch. Move the lever to its center position and neither wing or hitch circuits will be operable.

Wing Lift Circuit

Hitch Position Circuit

Fig. 4 CIRCUIT SELECTOR VALVE

4.7 ATTACHING/UNHOOKING

Follow this procedure when attaching the disc twister to a tow unit:

4.7.1 ATTACHING TO TRACTOR

1. Clear the area of bystanders, especially small children.

2. Make sure there is enough room and clearance to safely back up to the machine.

Fig. 5 BACKING UP

3. While backing up, use the jack to align the hitch and drawbar.

4. Stop tractor, set park brake, remove ignition key and wait for all moving parts to stop before dismounting.

5. Use a drawbar pin with provisions for a mechanical retainer. Install the retainer.

Aligning

Pin/Retainer

Fig. 6 DRAWBAR PIN

6. **Safety Chain:**
   Attach the safety chain around the drawbar cage to prevent unexpected separation.

Fig. 7 SAFETY CHAIN

7. Connect the wiring harness to the tractor if transporting on a public road. Be sure to route the harness through the stand on the hitch and provide sufficient slack when turning.

Fig. 8 WIRING HARNESS

8. **Connect the Hydraulic System:**

   a. Use a clean cloth or paper towel to clean the dirt and build-up from around the couplers and male tips.

   b. Insert the male tips into the couplers. Make sure they are locked in place.

   c. Route the hoses though the stand on the hitch and secure in place with clips, tape or tie wraps. Be sure the hoses do not drop to the ground or get pinched when turning. Provide sufficient slack for turning.

   NOTE
   It is recommended that the wheel position circuit be connected into the valve that is the most convenient for the operator to use.

   d. Check the function of each circuit. Be sure they function according to expectations. Reverse hoses in case they do not.

Stored

Circuit 1

Circuit 2

Connected

Fig. 9 HYDRAULIC HOSES

9. **Jack:**
   Unpin, remove and store jack in a secure location.

Fig. 10 JACK

10. Reverse the above procedure when unhooking.

Fig. 11 ATTACHED

4.8.2 TRUCK

When attaching the machine to a truck, follow this procedure:

1. Clear the area of bystanders, especially small children.

2. Make sure there is enough room and clearance to safely back up to the machine.

Fig. 12 BACKING UP

3. While backing up, use the jack to align the hitch and machine.

4. Stop truck, set park brake, remove ignition key and wait for all moving parts to stop before getting out of cab.

Aligning

5. Use a hitch pin with provisions for a mechanical retainer. Install the retainer.

Pin/Retainer

Fig. 13 HITCH PIN

6. **Safety Chain:**
   Cross the safety chains under the hitch when attaching to support the hitch in the event of failure and to prevent unexpected separation.

Fig. 14 SAFETY CHAIN

7. Connect the wiring harness to the truck if transporting on a public road. Be sure to route the harness through the stand in front of the hitch and provide sufficient slack for turning.

NOTE

It may be necessary to use an electrical adaptor to bridge between the truck and Twister connectors.

Fig. 15 WIRING HARNESS

8. **Jack:**
Un-pin, remove jack and store in a secure location.

Installed

Removed

Fig. 16 HITCH PIN

9. Reverse the above procedure when unhooking from truck.

Fig. 17 ATTACHED

4.8 FIELD OPERATION

OPERATING SAFETY

- Read and understand the Operator's Manual and all safety signs before using. Review safety instructions annually.
- Lower machine to the ground, place all controls in neutral, stop engine, set park brake, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.
- Install and secure all guards and shields before starting or operating.
- Keep hands, feet, hair and clothing away from all moving and/or rotating parts.
- Do not allow riders on the Twister or tractor during operation or transporting.
- Clear the area of all bystanders, especially children, before starting.
- Stay away from wings when folding or extending frame. Keep others away.
- Clean reflectors, SMV and lights before transporting. Be sure lights are working.
- Stay away from overhead power lines when folding or extending wings. Electrocution can occur without direct contact.
- Fold wings and install transport lock bracket with its retainers over the wheel lift cylinder before transporting.
- Attach securely to towing unit using a hardened pin with a retainer and a safety chain.
- Do not exceed a safe travel speed.
- Use hazard flasher on tractor when transporting.
- Before applying pressure to the hydraulic system, make sure all components are tight and that steel lines, hoses and couplings are in good condition.

Although the Mandako Twister is easy to use, each operator should review this section to familiarize himself with the detailed safety and operating procedures. When using this machine, follow this procedure:

1. Clear the area of bystanders, especially small children.
2. Attach the machine to the tractor (See section 4.6).
3. Review and follow the Pre-Operation Checklist (see Section 4.4).
4. Transport to the working area.

Fig. 18 TRANSPORTING TO FIELD

5. Move selector valve rearward to open wing raise/lower circuit.

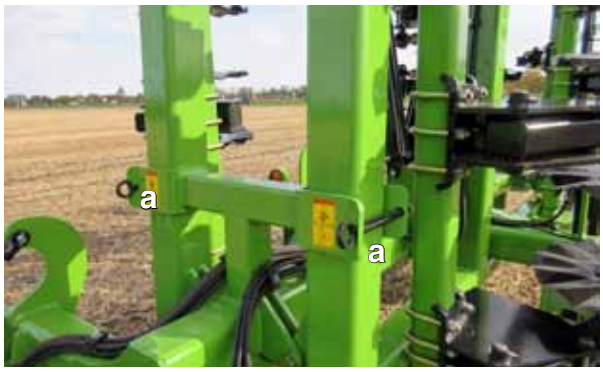
6. Open system lock valves by moving them parallel to lines.

Fig. 19 HYDRAULICS

7. Remove transport lock pins from wing lock brackets and stow.

   a. Lock pins installed.

   b. Lock pins removed.



Installed

Removing

Fig. 20 TRANSPORT LOCK PINS

8. Raise frame by extending wheel cylinders.

Fig. 21 FRAME RAISED

9. Convert to field configuration by lowering wings.

NOTE

Wing position cylinders are on a single hydraulic circuit. It is possible one wing may move more easily and start lowering first.

Folded

Extending

Continuing

One Wing Down

Fully Down

Fig. 22 LOWERING WINGS

10. Level the frame in the fore and aft (front and rear) directions:

    a. Move the selector valve rearward to open hitch position cylinder circuit.

    b. Use tractor hydraulics to level frame.

Selector Valve

Front Up

Front Down

Level

Fig. 23 FORE - AFT LEVELING

11. **Starting:**

    a. With the tractor engine at approximately 1/3 throttle position, release the clutch and move forward. Increase throttle position until desired engine RPM is reached.

    b. Lower machine into ground.

12. **Stopping:**

    a. Reduce engine RPM.

    b. Raise machine out of ground by lowering wheel frame.

    c. Depress clutch to stop forward motion of the Twister.

Fig. 24 STARTING/STOPPING

13. **Wing Leveling:**
    The wings are not designed to float or move up and down as the machine moves across a field. At 3.65 meters (12 feet) wide, the wings do not have to move to handle most terrain conditions. Always extend the cylinders fully when lowering the wings.

Fig. 25 WINGS LOWERED

12. **Tool Bar Angle:**
Each tool bar is pinned at the pivot end and is allowed to move in a slot in the wing frame on the other end. A cylinder on the tool bar moves the end in the slot. The front tool bars are pinned in the center of the frame and the rear tool bars at the sides.

Each tool bar angle can be adjusted up from 0° to 7.0° with a tractor hydraulic circuit. Set at 2° for minimum soil movement and residue burying action. Increase the angle to increase the soil movement and residue burying.

Adjust and set the tool bar angle appropriate for your application.

Pivot

Cylinder/Slot

7.0°

0°

Fig. 26 TOOL BAR ANGLE

13. **Tool Bar Anchor Pins:**
The machine is designed so the tool bar position is set and held in position by the tractor hydraulic system. To eliminate the load on the tractor hydraulic system, move the tool bar to its desired position and lock in place with the tool bar anchor pins.

0°

7.0°

Fig. 27 TOOL BAR ANCHOR PINS

14. **Soil Moisture:**
Although the Twister will work in most soil moisture conditions, it is the responsibility of the operator to monitor the condition of the soil after being tilled. Clay sinks that are wet will compress and compact during tilling and not be satisfactory. Sandy soils are less likely to compact during tilling. Allow the soil to dry out before tilling if compacting occurs.

Fig. 28 FIELD

15. **Disc Wear:**
All discs will wear as the Twister moves through the fields while working. The rate of wear depends on how abrasive the soil is.

Always replace the discs when they wear down to a 38 cm (15 inch) diameter. Operating when the the diameter is less will allow the wheel assembly to drag on the ground, damage bearing seals and cause bearings to fail. Always replace all the discs at the same time to keep performance the same on all tool bars.

Fig. 29 DISC SIZE

16. **Disc Style:**
The Mandako Twister is designed with a special fluted disc profile to move and mix the soil as they move through the soil. This profile also provides an aggressive way to cut through surface residue and work it into the soil.

Fig. 30 DISC STYLE

17. **Operating Depth:**
The discs on the tool bars cut into the soil or field as the wheels are raised off the ground. Use the position of the wheels to control the depth of the discs / tool bars cutting into the soil. The disc twister is designed to operate at depths of less than 12.7 cm (5 inches).

Wheel Down

Wheel Up

Fig. 31 OPERATING DEPTH

18. **Travel Speed:**
The operator must determine the appropriate speed for the terrain and field conditions but it is not recommended to travell faster than 12 mph (20 kph) in the field to prevent bouncing. Slow down for rough, hilly or rolling terrain. To be effective, the discs must remain on/in the ground during operation to allow for the cutting of the residue cover and working it into the soil. Select a speed that will keep the discs on ground.

Fig. 32 TRAVEL SPEED

20. **Field Operation:**
The following procedure should be used to monitor the tillage and residue work-up to get the best performance for the application. Monitor and adjust the machine per these steps:

a. Lower the wings and lower tool bars to the ground.

b. Set the tool bars at the 0° angle.

c. Start moving across the field at 3 - 4 mph (5 - 7 kph).

d. Lower the tool bars fully into the ground.

e. Drive 100 feet (30 m) and look at the ground in front of the Twister and behind it.

f. The residue on the surface should be cut/chopped-up and mostly worked into the soil.

g. Move the disc angle in 2 or 3 increments and monitor the job.

h. Adjust/set the angle of the tool bars in small increments to get the job done and minimize horsepower requirements.

i. Set tool bars so the machine follows directly behind tractor (not dogleg). To flow:

- Rear tool bars are set 2° less than front tool bars.
- Front and rear tool bars set the same then frame must be angled with hitch cylinder so front tool bar goes deeper than rear tool bar. The larger the tool bar angle, the deeper the front tool bar needs to be set.
- Monitor performance in the field at operating speed.

j. Move the tool bar anchor pins into position to anchor/support the tool bar and relieve the load on the hydraulic system if desired or if tractor hydraulics leak and will not maintain tool bar angle.

k. Monitor the job as the conditions change and adjust the tool bar angle as required.

Field

Angled

Anchors

Fig. 33 WORKING

l. The residue should be cut up and mostly worked into the soil if soil permits.

m. The operator has the responsibility to monitor the job being done and adjusting/setting the machine to obtain the desired results.

21. **Operating Hints:**

a. Be sure there is sufficient space and clearance to fully extend the wings. Do not stand next to frame when extending to prevent hitting something. Keep others away.

b. Stay away from overhead power lines when raising or lowering the wings to prevent electrocution. Remember, electrocution can occur without direct contact.

c. The end of the tool bars are equipped with moveable pins that can be positioned to:

- Set the tool bars in one position and keep them there and prevent movement.
- Set and relieve load on hydraulic system.

Fig. 34 ANCHOR PINS

d. Move selector valve back, open lock valves and place circuit in float to allow hitch to move and follow the contour of the field.

Fig. 35 SELECTOR VALVE

e. Always replace the discs when they wear down to a 38 cm (15 inch) diameter. Operating when the diameter is less will allow the wheel assembly to drag on the ground, damage bearing seals and cause bearings to fail. Always replace all the discs at the same time to keep performance the same on all tool bars.

Fig. 36 DISC (TYPICAL)

4.9 TRANSPORTING

TRANSPORT SAFETY

- Read and understand ALL the information in the Operator's Manual regarding procedures and SAFETY when operating the Twister in the field and/or on the road.
- Check with local authorities regarding Twister transport on public roads. Obey all applicable laws and regulations.
- Always travel at a safe speed. Use caution when making corners or meeting traffic.
- Make sure the SMV (Slow Moving Vehicle) emblem 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.
- Install additional lights on the rear of the machine to safeguard against rear end collisions. Daybreak and dusk are particularly dangerous and pilot vehicles are recommended.
- Be sure that the machine is hitched positively to the towing vehicle and a retainer is used through the drawbar pin. Always attach a safety chain between the frame and the towing machine.
- Keep to the right and yield the right-of-way to allow faster traffic to pass. Drive on the road shoulder, if permitted by law.
- Do not exceed 20 mph (32 km/h). Reduce speed on rough roads and surfaces.
- Always use hazard warning flashers on tractor when transporting unless prohibited by law.
- Stay away from overhead power lines when raising wings. Electrocution can occur without direct contact.
- Raise wings and install transport lock pins with their retainers before transporting.

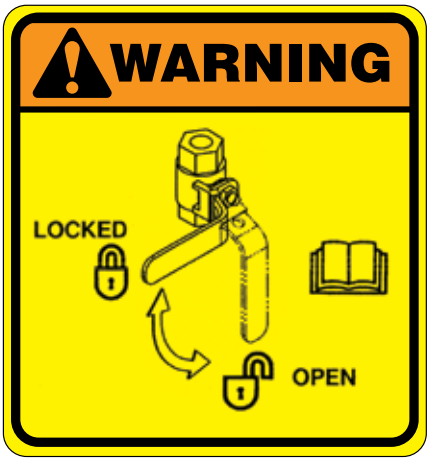
Mandako Agri Marketing (2010) Ltd. Mandako Twisters are designed to be easily and conveniently moved from field to field. When transporting, follow this procedure:

1. Be sure all bystanders are clear of the machine.
2. Be sure that the machine is hitched positively to the towing vehicle. Always attach the safety chain between the machine and the tractor and install a retainer through the drawbar pin.
3. Raise and wings.
4. Install transport lock pins and retainers.

Fig. 37 TRANSPORT LOCK PINS

6. Move selector Valve into its center position.

7. Close hydraulic circuit valves on hitch.



8. Keep to the right and yield right-of-way to allow faster traffic to pass. Drive on the road shoulder, if permitted by law.

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

10. It is not recommended that the machine be transported faster than 20 mph (32 kph). Table 1 gives the acceptable transport speed as the ratio of tractor weight to Twister weight.

11. Do not allow riders on the machine or tractor.

12. During periods of limited visibility, use pilot vehicles and use extra lights on the machine.

13. Always use hazard flashers on the tractor when transporting unless prohibited by law.

Table 1 Travel Speed vs. Weight Ratio

Road speed	Weight of fully equipped or loaded implement(s) relative to weight of tow vehicle
Up to 32 kph (20 mph)	1 to 1, or less
Up to 16 kph (10 mph)	2 to 1, or less
Do not tow	More than 2 to 1

Fig. 38 HYDRAULIC VALVES

Truck

Tractor

Fig. 39 TRANSPORTING

4.10 STORAGE

OPERATING SAFETY

- Store the unit in an area away from human activity.
- Lower wings and frame to the ground for storage.
- Do not allow children to play on or around the stored machine.
- Store the unit in a dry, level area. Support the discs with planks if required.

4.9.1 PLACING IN STORAGE

At the end of the season, the machine should be thoroughly inspected and prepared for storage. Repair or replace any worn or damaged components to prevent any unnecessary down time at the beginning of the next season.

Follow this procedure before storing:

1. Remove all entangled material.
2. Thoroughly wash the machine with a pressure washer or water hose to remove all dirt, mud or debris.
3. Lubricate all grease points. Make sure all grease cavities have been filled with grease to remove any water residue from washing.
4. Inspect all hydraulic hoses, couplers and fittings. Tighten any loose fittings. Replace any hose that is badly cut, nicked, abraded or is separating from the crimped end of a fitting.
5. Touch up all paint nicks and scratches to prevent rusting.
6. Move the machine to its storage area.
7. Select an area that is dry, level and free of debris.
8. Place the machine into its transport configuration with transport lock pins in place or lower the wings and rest the discs on the ground to relieve the pressure in the hydraulic circuit.
9. Place planks under the discs for added support if required.
10. Unhook the machine from the tractor (refer to section 4.7).
11. Apply a rust inhibitor or heavy grease to any exposed hydraulic cylinder rams to prevent rusting. Remove inhibitor or grease before using machine again.

Transport

Field

Fig. 40 STORED (TYPICAL)

4.10.2 REMOVING FROM STORAGE

When removing this machine from storage, follow this procedure:

1. Clear the area of bystanders, especially small children.

2. Attach the machine to the tractor (see section 4.6).

3. **Check:**
   a. Electrical harness connections and components.

   b. All hardware. Tighten as required.

   c. Tire pressure.

   d. All hydraulic lines, fittings and connections. Tighten as required.

4. Lubricate all grease fittings.

5. Clean rust inhibitor or grease from exposed cylinder ram ends.

6. Replace any worn or defective parts.

7. Go through the pre-operation checklist (See section 4.4) before using machine.

5 SERVICE AND MAINTENANCE

MAINTENANCE SAFETY

- Good maintenance is your responsibility. Poor maintenance is an invitation to trouble.
- Follow good shop practices.
  - Keep service area clean and dry.
  - Be sure electrical outlets and tools are properly grounded.
  - Use adequate light for the job at hand.
- Make sure there is plenty of ventilation. Never operate the engine of the towing vehicle in a closed building. The exhaust fumes may cause asphyxiation.
- Before working on this machine, shut off the engine, set the brake, and wait for all moving parts to stop.
- Never work under equipment unless it is blocked securely.
- Always use personal protection devices such as eye, hand and hearing protectors, when performing any service or maintenance work.
- Where replacement parts are necessary for periodic maintenance and servicing, genuine factory replacement parts must be used to restore your equipment to original specifications. The manufacturer will not be responsible for injuries or damages caused by use of unapproved parts and/or accessories.
- A fire extinguisher and first aid kit should be kept readily accessible while performing maintenance on this equipment.
- Periodically tighten all bolts, nuts and screws and check that all electrical connections are properly secured to ensure unit is in a safe condition.
- When completing a maintenance or service function, make sure all safety shields and devices are installed before placing unit in service.

5.1 SERVICE

5.1.1 FLUIDS AND LUBRICANTS

1. **Grease:**
   Use an SAE multipurpose high temperature grease with extreme pressure (EP) performance. Also acceptable is an SAE multipurpose lithium base grease.

2. **Storing Lubricants:**
   Your machine can operate at top efficiency only if clean lubricants are used. Use clean containers to handle all lubricants. Store them in an area protected from dust, moisture and other contaminants.

5.1.2 GREASING

Refer to section 5.1.1 for recommended grease.

Use the Maintenance Checklist provided to keep a record of all scheduled maintenance.

1. Use a hand-held grease gun for all greasing.
2. Wipe grease fitting with a clean cloth before greasing, to avoid injecting dirt and grit.
3. Replace and repair broken fittings immediately.
4. If fittings will not take grease, remove and clean thoroughly. Also clean lubricant passageway. Replace fittings if necessary.

5.1.3 SERVICING INTERVALS

The period recommended is based on normal operating conditions. Severe or unusual conditions may require more frequent lubrication or oil changes.

40 Hours or Weekly

1. Grease the wheel pivot (1 location each wheel).

Left

Right

Fig. 41 WHEEL PIVOT (TYPICAL)

2. Grease disc bearings until grease comes out around hub.

IMPORTANT

Remove the plug from the disc hub and install grease fitting. Grease disc bearing. Remove fitting and store in a clean, secure location. Re-install plug. Disc operates in a dirt-filled environment that can damage grease fittings and allow dirt to get into the hub. Dirt will damage bearings very quickly. Always install plugs in hub before operating.

Fig. 42 DISC BEARING HUB (TYPICAL)

3. Grease roller bearings.

Rollers - End

Rollers - All

Fig. 43 ROLLER BEARINGS (TYPICAL)

Annually

1. Grease disc bearings until grease is expelled from bearings.

IMPORTANT

Install grease fitting, grease bearing, remove fitting and install plug.

Fig. 44 DISC BEARINGS

2. Repack wheels bearings.

Fig. 45 WHEEL BEARINGS (Typical)

3. Clean and wash machine.

Transport

Field

Fig. 46 MACHINE (Typical)

5.1.4 SERVICE RECORD

See Lubrication and Maintenance sections for details of service. Copy this page to continue record.

ACTION CODE CL CLEAN G GREASE R REPACK

Hours																							
Serviced by																							
40 Hours or Weekly																							
G Wheel Pivots																							
G Disc Bearings																							
G Roller Bearings																							
Annually or 5000 Acres																							
G Disc Bearings																							
R Wheel Bearings																							
CL Machine																							

6 TROUBLE SHOOTING

The Mandako Agri Marketing (2010) Ltd. Mandako Twister is a large hinged frame with hanging disc tool bars for cutting up residue and working it into the soil. It is a simple and reliable system that requires minimal maintenance.

In the following section, we have listed many of the problems, causes and solutions to the problems that you may encounter.

If you encounter a problem that is difficult to solve, even after having read through this troubleshooting section, please call your local distributor, dealer or the factory. Before you call, please have this Operator's Manual from your unit and serial number ready.

PROBLEM	CAUSE	SOLUTION
Residue not cut up.	Disc tool bar angle too small.	Increase disc tool bar angle.
	Machine not deep enough.	Increase depth of discs.
		Replace worn discs.
	Disc tool bar angle decreasing.	Tractor hydraulics leaking - use tool bar anchor pins to maintain tool bar angle.
	Dull, worn discs.	Replace discs.
Wing not following ground contours.	Cylinder not fully extended.	Fully extend lift cylinder.
Machine lifts unevenly.	Cylinders not phased.	Extend rephasing lift cylinders fully for 5 - 30 seconds to allow resetting of cylinders (can be done regularly during operation). Important with a new machine to purge air from hydraulic system.
Not cutting evenly or "dog-legging".	Rear discs set a too aggressive an angle.	Set rear discs 2° to 4° less than front discs.
		Use machine hitch cylinders to set front discs to cut deeper than rear.

7 SPECIFICATIONS

7.1 MECHANICAL

MODEL	T0620	T0820	T1280	T1620	T2020	T2420	T2820	T3220	T3620	T4020
WIDTH	1.8 m 6'	2.4 m 8'	3.6 m 12'	4.8 m 16'	6.0 m 20'	7.3 m 24'	8.5 m 28'	9.7 m 32'	10.9 m 36'	12.1 m 40'
LENGTH (APPROX.)	7.3 m 12'	7.3 m 12'	7.3 m 12'	7.3 m 12'	7.3 m 12'	7.3 m 12'	7.3 m 12'	7.3 m 12'	7.3 m 12'	7.3 m 12'
TRANSPORT HEIGHT (APPROX.)	1.5 m 5'	1.5 m 5'	1.5 m 5'	1.5 m 5'	1.5 m 5'	2.9 m 9.8'	2.9 m 9.8'	3.6 m 11.8'	4.2 m 13.8'	4.8 m 15.8'
SOLID FRAME	√	√	√	√						
FOLDING FRAME					√	√	√	√	√	√

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

7.2 HYDRAULIC FITTING TORQUE

Tightening Flare Type Tube Fittings *

1. Check flare and flare seat for defects that might cause leakage.
2. Align tube with fitting before tightening.
3. Lubricate connection and hand tighten swivel nut until snug.
4. To prevent twisting the tube(s), use two wrenches. Place one wrench on the connector body and with the second tighten the swivel nut to the torque shown.

• The torque values shown are based on lubricated connections as in reassembly.

Tube Size OD	Nut Size Across Flats	Torque Value•		Recommened Turns To Tighten (After Finger Tightening)	
(in.)	(in.)	(N.m)	(lb-ft)	(Flats)	(Turn)
3/16	7/16	8	6	1	1/6
1/4	9/16	12	9	1	1/6
5/16	5/8	16	12	1	1/6
3/8	**11/16**	**24**	**18**	**1**	**1/6**
1/2	7/8	46	34	1	1/6
5/8	1	62	46	1	1/6
3/4	1-1/4	102	75	3/4	1/8
7/8	1-3/8	122	90	3/4	1/8

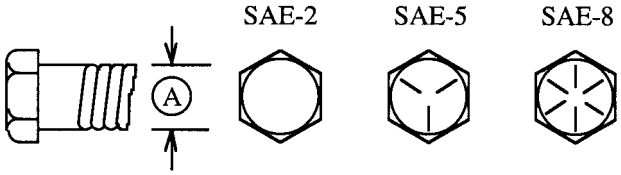
7.3 BOLT TORQUE

CHECKING BOLT TORQUE

The tables shown below give correct torque values for various bolts and capscrews. Tighten all bolts to the torques specified in chart unless otherwise noted. Check tightness of bolts periodically, using bolt torque chart as a guide. Replace hardware with the same strength bolt.

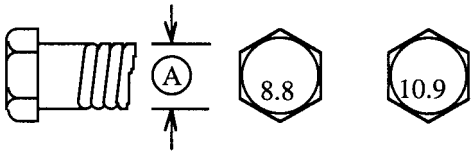
ENGLISH TORQUE SPECIFICATIONS

Bolt Diameter "A"	Bolt Torque*					
	SAE 2 (N.m)	(lb-ft)	SAE 5 (N.m)	(lb-ft)	SAE 8 (N.m)	(lb-ft)
1/4"	8	6	12	9	17	12
5/16"	13	10	25	19	36	27
3/8"	27	20	45	33	63	45
7/16"	41	30	72	53	100	75
1/2"	61	45	110	80	155	115
9/16"	95	60	155	115	220	165
5/8"	128	95	215	160	305	220
3/4"	225	165	390	290	540	400
7/8"	230	170	570	420	880	650
1"	345	225	850	630	1320	970



METRIC TORQUE SPECIFICATIONS

Bolt Diameter "A"	Bolt Torque*			
	8.8 (N.m)	(lb-ft)	10.9 (N.m)	(lb-ft)
M3	.5	.4	1.8	1.3
M4	3	2.2	4.5	3.3
M5	6	4	9	7
M6	10	7	15	11
M8	25	18	35	26
M10	50	37	70	52
M12	90	66	125	92
M14	140	103	200	148
M16	225	166	310	229
M20	435	321	610	450
M24	750	553	1050	774
M30	1495	1103	2100	1550
M36	2600	1917	3675	2710



Torque figures indicated above are valid for non-greased or non-oiled threads and heads unless otherwise specified. Therefore, do not grease or oil bolts or capscrews unless otherwise specified in this manual. When using locking elements, increase torque values by 5%.

* Torque value for bolts and capscrews are identified by their head markings.

8 INDEX

RELEASED: 01-AUG-2017
PART #: R9912007
REVISION: 1.0

MANDAKO AGRI MARKETING (2010) LTD.

Box 379 | 12159B Hwy 306
Plum Coulee, MB R0G 1R0
(888) 525-5892
info@mandako.com
www.mandako.com

Printed in Canada