DAKOTA™ TURF TENDER
OWNER / OPERATOR'S MANUAL

This manual is to be considered a permanent part of this Turf Tender and must remain with the Turf Tender at all times. Replacement manuals may be ordered through an Authorized Dakota dealer.

p/n 13750

WARRANTY

DAKOTA PEAT & EQUIPMENT is hereinafter called DAKOTA™.

(A) Warranty.

DAKOTA™ warrants all products manufactured by it to be free from defects in material and manufactured at the time of shipment and for twelve (12) months from date of delivery to customer. DAKOTA™ will furnish to the dealer, without charge, f.o.b. East Grand Forks, Minnesota, replacements for such parts as DAKOTA™ finds to have been defective at the time of shipment; or at DAKOTA™'s option, will make or authorize repairs to such parts, provided that, upon request, such parts are returned, transportation prepaid, to the factory at East Grand Forks, Minnesota.

This warranty shall not apply to any product that has been subjected to misuse, misapplication, neglect (including but not limited to improper maintenance), accident, improper installation, modification (including but not limited to use of unauthorized parts or attachments), adjustment, or repair. Engines, motors, and any accessories furnished with DAKOTA™'s products, but which are not manufactured by DAKOTA™, are not warranted by DAKOTA™ but are sold only with the express warranty, if any, of the manufacturers thereof. THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED (INCLUDING THOSE OF MERCHANTABILITY AND FITNESS OF ANY PRODUCT FOR A PARTICULAR PURPOSE), AND OF ANY OTHER OBLIGATION OF LIABILITY ON THE PART OF DAKOTA.

(B) Limitation of Liability.

It is expressly understood that DAKOTA™'s liability for its products, whether due to breach of warranty, negligence, strict liability, or otherwise, is limited to the furnishing of such replacement parts, and DAKOTA™ will not be liable for any other injury, loss, damage, or expense, whether direct or consequential, including but not limited to loss of use, income, profit, or production, or increased cost of operation, or spoilage of or damage to material, arising in connection with the sale, installation, use, or inability to use, or the repair or replacement of, DAKOTA™'s products.

Any operation expressly prohibited in the operating instructions or manuals furnished with the machine, or any adjustment, or assembly procedure not recommended or authorized in the operating or service instructions shall void such warranty.

(C) Registration.

THIS WARRANTY IS VOID UNLESS YOUR DEALER COMPLETED AND RETURNED A "NEW PRODUCT REGISTRATION AND WARRANTY" CARD TO DAKOTA™ WITHIN 30 DAYS AFTER DELIVERY OF UNIT TO CUSTOMER.

PLEASE COMPLETE AND RETURN THE NEW PRODUCT REGISTRATION AND WARRANTY CARD, LOCATED AT THE END OF THIS MANUAL, IF YOU FEEL YOUR DEALER MAY NOT HAVE COMPLETED ONE FOR YOU AT THE TIME OF DELIVERY.

No Parts shall be returned under warranty unless a Return Goods Authorization (RGA) is obtained from DAKOTA™.

ALWAYS GIVE PART NAME, NUMBER AND MACHINE SERIAL NUMBER WHEN ORDERING PARTS.

NOTE: DAKOTA reserves the right to make changes to design or construction without obligation to incorporate such changes in equipment previously sold.

The tire manufacturer's warranty supplied with your Turf Tender may not apply outside the U.S.

YOUR DEALER IS RESPONSIBLE FOR COMPLETION OF THE PRODUCT REGISTRATION CARD AND RETURNING IT TO DAKOTA *AS SOON AS YOU TAKE DELIVERY OF YOUR TURF TENDER. PLEASE REFER TO THE "WARRANTY" SECTION FOR ADDITIONAL INFORMATION.*

D) Parts, Service, and Warranty

Contact your local dealer for parts, service, and warranty.

Warranty will be denied if the registration and warranty card is not sent in within 30 days after delivery.

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CE DECLARATION OF CONFORMITY

Manufacturer's Name: DAKOTA, Inc.
Manufacturer's Address: 833 Gateway Drive N.E.
East Grand Forks, Minnesota 56721

Declares that the machinery described below complies with applicable essential health and safety requirements of Parts 1 and 4 and related clauses of Part 3 of Annex 1 of the Machinery Directive 98/37/EC.

Description: DAKOTA TURF TENDER

Model Numbers: Type 410, 411, 412, 414, 420, and 440

Options: Rear-Mount Spreader w/ Spinners, Electric Rear Door, 2 or 4 Electric Brakes, Vibrator, Turf Tires, Rear-Swing Conveyor

Serial Number: _____

The following standards have either been referred to or been complied with, in part or in full, as relevant:

EN 292 - 2	Machinery Safety -	Basic concepts, general principals for design – Part 2: Technical principals and specifications.
EN 294	Machinery Safety -	Safety distances to prevent danger zones being reached by the upper limbs.
EN 811	Machinery Safety -	Safety distances to prevent danger zones being reached by the lower limbs.
EN 953	Machinery Safety -	General requirements for the design and construction of guards.
EN 954-1	Machinery Safety -	Safety Related Parts of Control Systems – Part 1: General Principals for Design.
EN 60204-1	Machinery Safety -	Electrical Equipment of Machines.
EN60947-3-1	Electrical Safety -	Switches
SAE J1128	Electrical Safety-	Wire
ASAE	Machine Safety-	Tip Over Testing
ASAE	Machine Safety-	Brake Testing of Trailers

Full Name of responsible person.

Kevin Pierce **Position:** ***President, DAKOTA, Inc***.

Signature:_____ **Date:**_____

Full Name of Authorized European Representative.

_____ (Typed). **Position** _____ (Typed).

Signature:_____ **Date:**_____

Original must remain with machine owner. EU representative (Dealer) must fax or send fully completed copy to DAKOTA, Inc. Fax number is 218-773-0701.

YOUR DEALER IS RESPONSIBLE FOR COMPLETION OF THE NEW PRODUCT REGISTRATION CARD AND RETURNING IT TO **DAKOTA™** ***AS SOON AS YOU TAKE DELIVERY OF YOUR MACHINE. PLEASE REFER TO THE "WARRANTY" SECTION FOR ADDITIONAL INFORMATION.***

IF YOU FEEL THAT A NEW PRODUCT REGISTRATION AND WARRANTY CARD WAS NOT COMPLETED AND MAILED IN, PLEASE COMPLETE THE WARRANTY CARD LOCATED AT THE BACK OF THIS MANUAL WITHIN 30 DAYS OF ACCEPTING DELIVERY.

DAKOTA PEAT & EQUIPMENT
833 Gateway Drive NE
East Grand Forks, Minnesota 56721
United States of America

SPECIFICATIONS

ITEM	Model 410	Model 411	Model 412	Model 414	Model 420	Model 440
Dimensions:						
Height:	54 in. (1.37 m)	54 in. (1.37 m)	67 in. (1.68 m)	79 in. (2.00 m)	67 in. (1.68 m)	79 in. (2.00 m)
Length:	144 in. (3.66 m)*	144 in. (3.66 m)	144 in. (3.66 m)	188 in. (4.78 m)	172 in. (4.37 m)	192 in. (4.87 m)
Width:	60 in. (1.52 m)*	60 in. (1.52 m)	81 in. (2.06 m)	96 in. (2.44 m)	81 in. (2.06 m)	96 in. (2.44 m)
Hopper Capacity (level)						
	0.85 yd^3 (0.65 m^3)	0.85 yd^3 (0.65 m^3)	2 yd^3 (1.53 m^3)	4.2 yd^3 (3.21 m^3)	2 yd^3 (1.53 m^3)	4.2 yd^3 (3.2 m^3)
	2,250 lb (1023 kg)	2,250 lb (1023 kg)	6,000 lb (2700 kg)	12,000 lb (5727 kg)	6,000 lb (2700 kg)	12,000 lb (5727 kg)
Rear Spinners:						
← Dual 24 in. (61 cm) Quick Change spinners →						
← Sand Spinners (white) →						
← Fertilizer Spinners (black) →						
← Grass Spinners (green) →						
Spreading Width:						
Sand/Top Dressing Material ← 12-40 ft (3.7-12.2 m) →						
Fertilizer: ← 12-40 ft (3.7-12.2 m) →						
Seed: ← 25 ft (2.2 m) →						
Top Dressing Speed:						
← Variable to desired application rate →						
← 2 to 8 mph (3 to 13.9 kph) →						
Maximum Transport Speed						
← Empty: 15 mph (24 kph) - Not for highway use. →						
← Loaded: Dependent on terrain conditions for safe operation. →						
Hopper Conveyor:						
← Rear Discharge →					← Front and Rear Discharge →	
← Variable hydraulic speed control →						
← Spliced belt →					← Endless belt →	
← 18 in. (45.7 cm) wide belt →						
Metering Gate(s):						
← Rear manual sliding →					Front & Rear sliding	
Tires (Trailer-Type Models):						
← 26.5x14x12** →				33x20x16.1**	26.5x14x12**	33x16x16.1**
Hydraulic System:						
← 3-7 GPM (11.3-26.4 LPM) →			← 4-11 GPM (15.1-41.64 LPM) →			
← 2,000-2,500 PSI (138-172 Bar) Max. →			← 2,500 PSI (172 Bar) Max. →			
Shipping Weight (with standard equipment):						
920 lb (418 Kg)	1400 lb (636 Kg)	1,825 lb (827)	3,000 lb (1361)	2,840 (1280 Kg)	3,300 lb (1500 Kg)	
Gross Vehicle Weight:						
3,170 lb (1441 Kg)	3,170 lb (1441 Kg)	7,825 lb (3549 Kg)	13,000 lb (5897 Kg)	8,840 lb (4020 Kg)	15,900 lb (7227 Kg)	

*** 410 mounted-type dimensions are: length - 103 in. (2.61 m); width - 54 in. (1.37 m); shipping weight - 780 lb (354 Kg). Trailer-type models with optional power unit, shipping weight - 1240 lb (563 Kg); gross vehicle weight - 3030 lb (1377 Kg).**

**** 4 ply, turf tread. Maximum Inflation Pressure of 18 PSI (124 kPa) for 26.5 in. tires and 22 PSI (152 kPa) for 33 in. tires. May be adjusted downward by user for specific application and loads. Ground Pressure: Approximately equal to tire's inflation pressure plus 1 to 2 psi (this is the industry standard method for determination of ground pressure)**

MODEL #_____ SERIAL#_____

SAFE OPERATIONAL PRACTICES

BEFORE OPERATING

Read Operator's Manuals

Prior to operating the Turf Tender, read and understand the contents of this Operator's Manual and the Operator's manual of vehicle either towing or carrying the Turf Tender. Become familiar with all control functions and know how to turn the vehicle off and stop effectively.

REPLACEMENT MANUAL

A replacement manual is available by sending complete Model and Serial Number to

Dakota, Inc.
833 Gateway Drive, North East
East Grand Forks, Minnesota 56721

Unauthorized Operators

Never allow children to operate the Turf Tender. Do not allow anyone to operate the Turf Tender without proper instruction or training. Only trained and authorized persons should operate the Turf Tender.

The operator is defined as being the person responsible for supervising the operation of the Turf Tender and driving the vehicle that either tows it or carries it.

Drugs And Alcohol

Never operate the Turf Tender when under the influence of drugs or alcohol.

Shields And Safety Devices

Keep all shields, guards, and safety devices in place. If a shield, guard, or safety device is damaged, replace or repair it prior to operating the Turf Tender. If a decal is illegible, order and install a new one.

Loose Fasteners And Fittings

Although the Turf Tender has been designed so that components will not come loose during normal operation of the Turf Tender, always check the Turf Tender prior to start up and after each use for loose fasteners, fittings, connectors and other components. Tighten, repair, or replace as necessary. This includes electrical and hydraulic system components, also. Only use original **DAKOTA** replacement parts.

Modifications To Turf Tender

Do not modify the Turf Tender in any way. Modifying the Turf Tender will void the warranty.

Safe Attire

Do not operate the Turf Tender while wearing sandals, tennis shoes, sneakers, or shorts. Always wear long pants and substantial shoes. Do not wear loose fitting clothing which could get caught in control switches or moving parts. The wearing of safety glasses, safety shoes, hearing protection, and a hard hat is recommended and may be required by some ordinances and insurance regulations.

Electronic Controller

Some models (410, 412 and 414) now come with an elctronic controller. All necessary information for this controller is located in the back of this manual. If your Turf Tender is so equipped. refer to the section in the back of the manual as often as necessary.

WHILE OPERATING

Vehicle Instructions

Mounted-type Turf Tenders are designed to installed on either the Toro Workman® or the John Deere ProGator®. Refer to the Operator's Manual for capacities, instructions, and precautions.

WARNING

Do not attempt to mount the Turf Tender on a model other than those listed. Never mount a Turf Tender on a vehicle that does not have the brakes, suspension, or frame strength to handle the load.

Trailer-type Turf Tenders can be towed by most utility tractors with adequate brakes. The tractor pulling 410, 411, 412, and 420 models must have a drawbar hitch capacity to handle a 7825 lb (3556 Kg) trailer. The tractor pulling 414 and 440 models must have a drawbar hitch capacity to handle a 13,000 lb (5909 Kg) trailer. Refer to your Tractor Operator's Manual for towing capacities, instructions, and precautions.

WARNING

Do not attempt to tow a loaded Turf Tender with a light utility vehicle or runabout. Never tow a Turf Tender with a vehicle that does not have the brakes, suspension, or frame strength to handle the load.

When operating a Turf Tender equipped with electric brakes on hilly terrain, it is recommended to use the Turf Tender's brakes in conjunction with the tow vehicle's brakes. The fully loaded weight of the Turf Tender may be beyond the capacity of the just the tow vehicle's brakes.

Confined Space Operation

Do not run the vehicle's engine in a confined area without sufficient ventilation. Exhaust fumes are hazardous and could possibly be deadly.

Danger Zones

The following danger zones exist in and around the Turf Tender:

1. A crush hazard exists in any area beneath the Turf Tender.
2. A hydraulic jet puncture hazard and hot oil burn hazard exists in any area within 6 feet (2 m) of a hydraulic hose due to the possibility of a puncture in a hose.
3. A projectile hazard exists in any area within a 100 foot (30 m) radius of the rear and sides of the Turf Tender. Rocks travel farther than sand during normal top dressing operations.
4. Entanglement, pinch, and cut hazards exist in any areas close to rotating and moving components such as conveyors and spinners.
5. A potential entrapment hazard exists within the hopper.
6. On trailer-type Turf Tenders, a crush hazard exists at the rear and an impact hazard exists at the front of the Turf Tender during loading or uncoupling if the load is not evenly distributed and balanced in front of the wheels due to the rear tipping down. Never load the Turf Tender when it is uncoupled from its tow vehicle. Never uncouple the Turf Tender when there is a load in the hopper. There is potential of the Turf Tender tipping backwards which could cause damage to the Turf Tender or injury or even death.

7. A crush hazard exists around the perimeter of the Turf Tender if operated on a slope exceeding either the vehicle's or Turf Tender's recommended maximum speed and operational angle (10° side to side and 26° front to back).
8. On the trailer-type Turf Tenders, a crush hazard exists due to the Turf Tender rolling if uncoupled from its tow vehicle. Always solidly chock both the front and rear of the outermost wheels before uncoupling from the tow vehicle.
9. On mounted-type Turf Tenders, a crush hazard exists beneath the hopper when it is raised to do maintenance on the vehicle. Always install the Safety Bar on the hoist ram to secure the hopper in the raised position.
10. On mounted-type Turf Tenders, a crush hazard exists beneath the hopper when removed from the vehicle in the storage position. Be sure the stands are properly installed and that no one is allowed beneath the hopper when in the storage position.

For these reasons, the only person that is allowed to be near a loaded or operating Turf Tender is the operator seated in the driver's position of the vehicle.

You, the operator in control, are responsible for using good, safe judgment in the operation of the Turf Tender and ensuring that no one will be injured by it's operation.

Passengers

Never carry passengers on this Turf Tender. The Turf Tender is not designed to carry anybody.

Drive Carefully

Using the Turf Tender demands attention to operation. Failure to operate the Turf Tender safely may result in an accident, tip over, or serious injury or death. To prevent tipping or loss of control:

1. Never exceed the tow (or carrier's) vehicle's load capacity. One of the most dangerous operations associated with the Turf Tender is attempting to haul or tow it with an undersized vehicle due to the vehicle's limited traction and braking capacity. Exceeding the vehicle's capacity may result in loss of control, damage, serious injury, or even death. Refer to your vehicle's manual for load capacities and restrictions. Do not use the Toro Workman® and John Deere ProGator® for the trailer-type Turf Tenders with hoppers larger than 1 cubic yard (410 & 411 models).
2. Use extreme caution, reduce speed, and maintain a safe distance when operating around sand traps, ditches, creeks, trees, ramps, unfamiliar areas, or other hazards.
3. Be alert for severe ground depressions, holes, or other hidden hazards. If an outside wheel (on trailer-type Turf Tenders) drops into a hole, it may cause the Turf Tender to tip over.
4. Use caution when operating the Turf Tender on slopes. Normally travel straight up or down slopes. Shift the vehicle into a lower gear before attempting to either go up or down a slope.
5. Avoid making turns on slopes.
6. Reduce speed when making turns.
7. Use extra caution when operating on wet surfaces, at high speeds, or with a full load. Stopping time increases with a full load.

NOTE: A worst-case control scenario exists when the Turf Tender is being driven down a wet slope at an angle to the slope and the operator is attempting to turn and/or brake. Loss of control could result in an accident, tip over and serious injury or death.

8. Avoid sudden stops and starts. Do not go from forward to reverse or from reverse to forward without coming to a complete stop.
9. Do not attempt sharp turns or abrupt maneuvers or other unsafe driving actions which may cause loss of control.
10. If the vehicle's engine stalls or loses headway on a hill, never attempt to turn the vehicle around. Always back straight down the hill in reverse. Never back down a hill in neutral or with the clutch depressed using only the brakes.
11. Make sure the area is clear prior to backing up. Back up slowly as the visibility behind the Turf Tender hopper is limited.
12. Always avoid low hanging objects such as tree limbs, doorways, door jambs, power lines, etc. Ensure there is enough clearance for both you and the machine(s) you are operating.
13. Always avoid objects, which may "hook" the wheels such as trees, posts, etc. Be constantly aware of the width and turning radius of the Turf Tender. Failure to do so may result in damage to the vehicle or Turf Tender.
14. Watch out for traffic when near or crossing roads. Always yield the right of way to pedestrians and other vehicles. This vehicle was not designed for travel on streets or highways. Obey all traffic rules and regulations pertaining to controlled and uncontrolled traffic areas.
15. Limit load size if working on steep or rough terrain.
16. STOP and ask your supervisor if you are ever unsure about safe operation.

LOADING

WARNING

Never load a trailer-type Turf Tender when it is uncoupled from its tow vehicle.

When loading material, distribute the load evenly to keep it from shifting. Operate the Turf Tender with extra care when the hopper is full of heavy material.

Slowly fill the hopper over a few seconds of time with the loader bucket as low as possible. Avoid "dropping" the load into the hopper from an excessively high loader bucket. This is safer in terms of maintaining a balanced load and will also extend the life of the Turf Tender.

Make sure the material you are loading has uniform properties. Material that has few small rocks in it poses a projectile hazard. Material that has varying composition or moisture may result in widely varying application rates.

Do not exceed the load capacity of the Turf Tender or vehicle. Refer to the Specifications section to determine the maximum load capacity of the Turf Tender.

Never add sideboards to the hopper to increase its capacity for dense or heavy materials. The additional weight will increase the chance of tipping or rolling over. The hopper capacity of the may be increased for low-density materials such as peat.

GENERAL INFORMATION

Owners and operating personnel must thoroughly read and understand this manual in order to properly operate, lubricate, and maintain the Turf Tender. Failure to do so could result in personal injury or equipment damage. Refer to this manual as frequently as necessary.

LABELING AND TERMINOLOGY

The Turf Tender and this manual use the following terms and symbols to bring attention to the presence of hazards of various risk levels and important information concerning the use and maintenance of the Turf Tender.

WARNING: Indicates presence of a hazard which can cause severe personal injury, death, or substantial property damage if ignored.

CAUTION: Indicates presence of a hazard which will or can cause minor personal injury or property damage if ignored.

NOTE: Indicates supplementary information worthy of particular attention relating to installation, operation, or maintenance of the Turf Tender but is not related to a hazardous condition.

Be sure to follow all instructions and related precautions as they are meant for your safety and protection.

This manual is considered a permanent part of the Turf Tender and must remain with the Turf Tender when sold.

Use only the correct replacement parts and fasteners. Right and left-hand sides are determined by facing in the direction of forward travel.

Record the model and serial numbers in the specifications section so they are readily available when contacting a dealer for parts or service. Many owners employ the dealer's Service Department for all work other than routine care, cleaning, and adjustments. We strongly urge the use of genuine **DAKOTA** parts to protect the investment in your Turf Tender.

Our warranty is provided to support customers who operate and maintain their equipment as described in this manual. This warranty provides you the assurance that **DAKOTA** will back its products where defects appear within the warranty period. Should the equipment be abused, or modified to change its performance beyond the original factory specifications, the warranty will become void and field improvements will be denied.

AUTHORIZED MAINTENANCE

Perform only the maintenance described in this manual that you are qualified to perform. If major repairs are ever needed or assistance is desired, contact an Authorized **DAKOTA** Dealer for their professional service.

UNLOAD HOPPER PRIOR TO DOING MAINTENANCE

Any material in the hopper must be removed prior to performing maintenance on or beneath the Turf Tender.

POWER OFF MAINTENANCE AND ADJUSTMENTS

All maintenance and adjustments to the Turf Tender must be made with the vehicle's parking brakes set and engine off. On trailer-type Turf Tenders the vehicle must remain coupled to the Turf Tender. Failure to do so could result in injury or even death.

TIRES

Check the tires frequently for cracks, checks, and proper inflation. An under inflated tire poses a significant tipping and braking hazard and may cause an accident, injury and death. Do not attempt to jack or perform tire maintenance with material in the hopper. For trailer-type Turf Tenders, the recommended tire pressure operating range is 13-18 psi (90-124 kPa) for 26.5 in. tires and 15-22 psi (115-169) for 33 in. tires. Do not exceed the maximum tire pressure listed. Tire pressure is an indication of the ground pressure the Turf Tender has on turf; however, using a tire pressure which is too low may cause tire problems and also result in nonuniform ground pressure at the tire's face.

NOTE: For mounted-type Turf Tenders, follow the tire inflation guidelines found in the vehicle's Operator's Manual or on the sidewall of the tire.

MAINTAIN SAFE OPERATING CONDITIONS

Grease all fittings as described in this manual. Proper lubrication is essential for the safe operation and longevity of the Turf Tender.

Check the conveyor belt(s) for stretch and proper alignment; adjust accordingly. Each conveyor belt has a V-belt vulcanized to the back side of the belt to help maintain proper alignment and carry most of the load; however, it is still necessary to check and adjust (if necessary) belt alignment.

Do not allow hydraulic fluid to come in contact with the belt. The PVC belt material is resistant to fertilizers, but hydraulic fluid causes the PVC coating on the belt to decompose. One of the most common causes of hydraulic fluid on the belt is the placing of uncoupled hose-ends in the hopper. Under no conditions should this be done.

RELIEVE HYDRAULIC PRESSURE

Before disconnecting or performing any work on the hydraulic system, all pressure in the system must be relieved by turning all Turf Tender control switches to their OFF position, placing the hydraulic supply valve in the float position, and stopping the engine of the vehicle.

Residual hydraulic pressure may still be present, so care must be taken. Make sure parts of the Turf Tender actuated by hydraulic pressure are supported or otherwise restrained to prevent movement prior to relieving hydraulic pressure. Failure to do so could result in damage, injury or even death.

KEEP TURF TENDER CLEAN

Keep the Turf Tender free of excessive grass, leaves, and accumulations of dirt and sand. Materials such as this can compromise seals and bearings.

REPLACEMENT PARTS

To ensure optimum performance and safety, always purchase genuine **DAKOTA** replacement parts and accessories. NEVER USE "WILL-FIT" REPLACEMENT PARTS AND ACCESSORIES MADE BY OTHER MANUFACTURERS. Using unapproved replacement parts and accessories voids the warranty of the **DAKOTA** Turf Tender.

SAFETY AND INSTRUCTION DECALS

The following decals are installed on the Turf Tender. If one should become damaged or illegible, replace it. The decal part numbers are listed below. Replacement decals may be ordered from an Authorized **DAKOTA** dealer.

Side Crush Hazard

Location - top of side conveyor, each side lower end of side conveyor
p/n 11464

Cutting Finger/Hand Hazard

Location - outer corners of shield over twin spinners
p/n 11466

Hand Crush Hazard

Location - electric front door, lower end side conveyor, conveyor rest, rear door
p/n 11468

Entrapment Hazard

Location - front and rear of hopper, near top
p/n 11465

Hand Entanglement Hazard

Location - Inside front door, outside front door, top of side conveyor
p/n 11467

Hydraulic Puncture Hazard

Location - front side of hopper, near top
p/n 11469

Tip Or Roll Hazard

Location - front of hopper near top
P/N 11435

Do Not Run Without Guards

Location - spinner package on shield, front side of hopper
p/n 11471

Stay Clear

Location - spinner left and right sides
p/n 11475

Consult Service Manual

Location - front of hopper near top
p/n 11470

Do Not Stand Here

Location - fender left side, fender right side, spinner shield each side
p/n 11476

No Maintenance When In Use

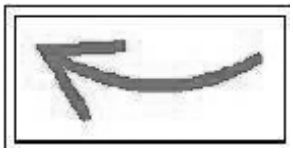
Location - near drive motor on main conveyor, front of hopper
p/n 11472

Blade Running Counterclockwise

Location - top side of right spinner
p/n 11474

Blade Running Clockwise

Location - top side of left spinner
p/n 11473



SETUP

TRAILER-TYPE TURF TENDERS

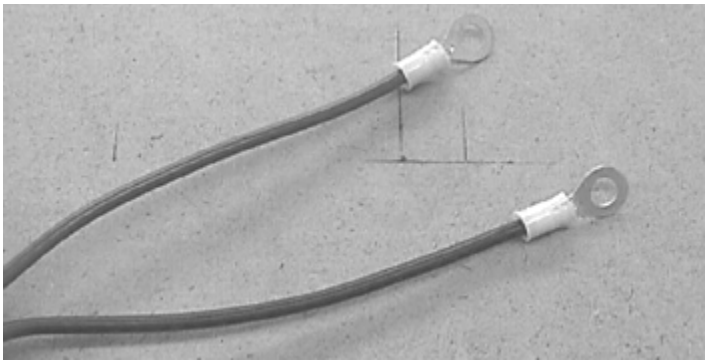
To properly setup the Turf Tender, several items will need to be performed in conjunction with the tow vehicle. You will need to install the power cord and control box mount on the tow vehicle. The power cord supplies electrical power to the control box from the tow vehicle. This power cord should be left in place after the initial installation.

CAUTION

Always complete a safety inspection before hooking to the tractor and before using the Turf Tender. This safety inspection "walk around" is described in the safety section of this manual.

Main Power Cable

1. Route the power cord from the battery, beneath the tractor platform, and over to the right rear fender of the tractor. Make sure the cord does not contact any hot or moving parts and will not be pinched under the fender. Leave some slack in the cord at the control box end so that the cord will not pull loose if the control box shifts or moves.
2. Using cable ties, attach the cord to the tractor in several places. Make sure the cord will not come loose and move into a position to become pinched or cut.
3. Attach the red wire eyelet to the positive terminal and the black wire eyelet to the negative terminal on the tractor battery.



Mounting The Control Box

The mounting bracket for the control box is to be mounted in a position convenient for the operator (either on the right rear fender, on the dash, or to the roll bar of the tractor). Select a location for mounting the bracket making sure you will be able to remove and install the control box from the bracket without interference. To mount the bracket to the fender, use the following procedure:

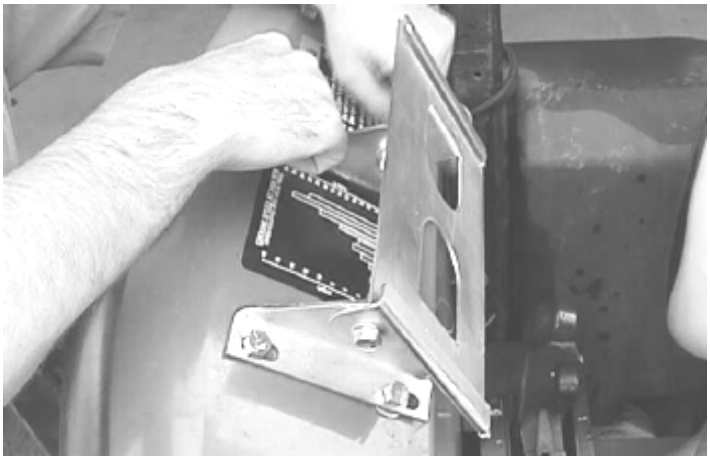
NOTE: If it is desired to mount the control box to the roll bar of the tractor, a bracket must be designed and built.

CAUTION

Do not drill holes in the roll bar to mount the control box bracket to the roll bar. Holes in the roll bar may weaken the structure.

Hold the bracket in the desired mounting location making sure there are no electrical wires in the area (above and below the fender). Using the bracket as a template, mark the location for the four mounting holes on the fender; then center punch the holes. Remember to allow room for removal and installation of the control box from the bracket without interference since the control box stays with the Turf Tender when unhooked from the tractor.

Using a 1/4 in. drill bit, drill the holes in the fender. Using the hardware included, secure the bracket to the fender; tighten securely. Remove the 7/16 in. nut securing the control box to the Turf Tender. It is for shipping purposes only and is not needed for regular use or storage.



CAUTION

Before using Turf Tender for the first time, check the wheel bolts to make sure they are tight. They must be torqued to 90 ft-lb (12.4 kg-m).

WARNING

Recheck each wheel bolt's torque within the first 1 hour of use and every 10 hours thereafter until the bolts maintain the proper torque. Failure to do so may result in a serious accident.

CAUTION

It is the operator's responsibility to inspect and torque the lug bolts upon delivery and during normal usage.

WARNING

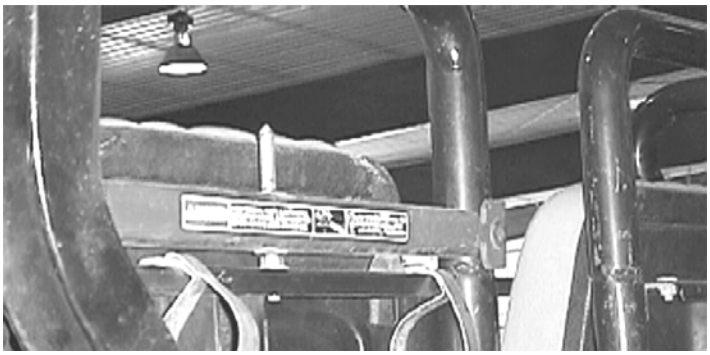
Check the tire pressure on all tires and look for any obvious leaks in the hydraulic system prior to each use. Failure to do so may result in a serious accident.

MOUNTED-TYPE 410T TURF TENDERS

WARNING

Do not allow anyone to work beneath an elevated lift frame unless a safety bar is in place on one or both of the lift cylinder shaft(s). For the John Deere ProGater, install the standard John Deere Safety Bar. For the Toro Workman, install the DAKOTA Safety Bar.

NOTE: The Safety Bar may be stowed above the standard Toro Safety Bar.



NOTE: Prior to mounting the Turf Tender 410T on the Toro Workman, it is required to install the proper Auxiliary Hydraulic Kit. Order the proper kit (gasoline or diesel engine) for your machine; then using the installation instructions included with each kit, install the kit.

Removing Components From Skid

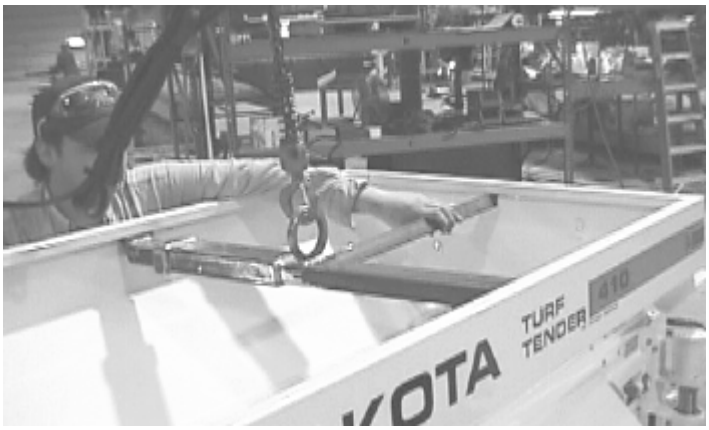
1. To avoid damage, transport the hopper/skid carefully.

2. While wearing gloves and safety glasses, hold the longest free side of each band; then carefully cut each of the bands (as close as possible to a corner) securing the hopper to the skid.

CAUTION

The bands are under tension. Wear gloves and safety glasses. Cut as close as possible to a corner while holding the longest free side of each band.

3. Insert the Dakota Lift Bar (p/n 11361) beneath the sides and rear lip of the hopper.



4. Lift the hopper straight up until clear of the pedestal on the skid. Hold securely until ready to place on either the vehicle or hopper legs.

WARNING

Do not allow anyone beneath the raised hopper.

5. Remove the two front legs and two jack legs from the skid.
6. Lift hopper just high enough to insert the front legs into the receivers on the front cross member beneath the fenders.
7. Insert the jack legs (with jack handles facing outward) into the receivers at the rear of the hopper. Secure the jack legs with the quick pins provided.
8. Set the hopper down onto the legs; then remove the lift bar.

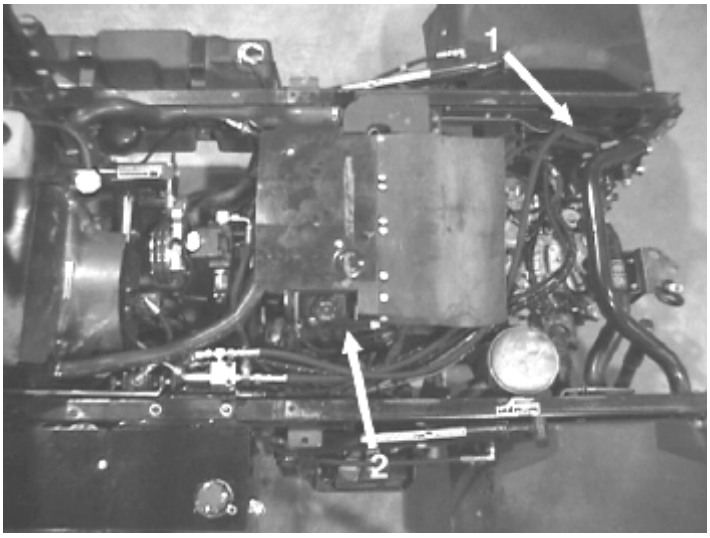
9. Remove the remaining components from the skid.

NOTE: The electrical harness and miscellaneous loose parts are stowed inside the pedestal.

Installing Harness And Control Box

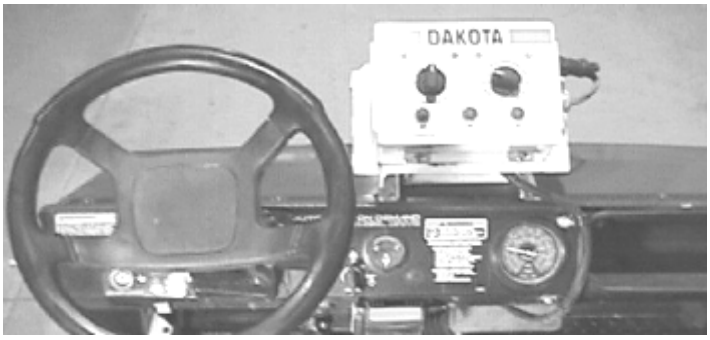
TORO WORKMAN MODELS

1. Route electrical harness from the right rear hinge (1) along hydraulic hoses above trans-axle to the left side near the battery (2).



2. Continue along left side below the cab to the steering shaft opening.
3. Route the harness up through the opening behind the brake pedal.

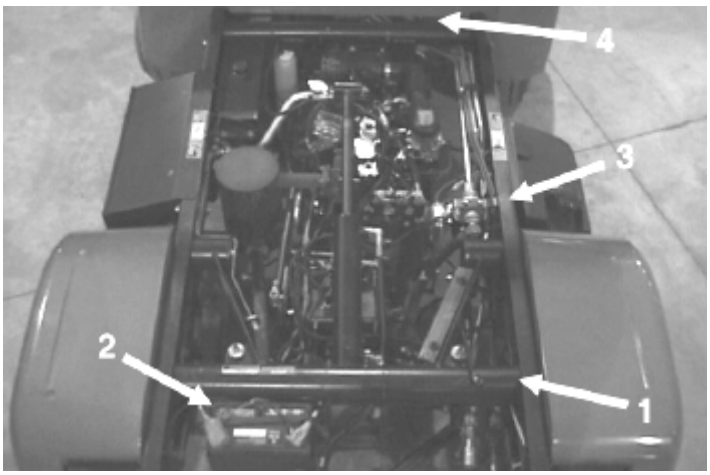
4. Place the control box bracket in the desired mounting location (within easy reach and view of the operator) on the dash making sure there are no electrical wires in the area (below the dash). Using the bracket as a template, mark the location for the four mounting holes; then center punch the holes.
5. Using a 1/4 in. drill bit, drill the holes in the dash. Using the hardware included, secure the bracket to the dash; tighten securely.
6. Place the control box onto the bracket and secure.



7. Attach the red wire eyelet to the positive terminal and the black wire eyelet to the negative terminal of the battery and pump/cooler harness; then connect the wiring harness to the control box.
8. Using cable ties, secure the harness along its route to prevent abrading, pinching, and contact with hot surfaces.

JOHN DEERE PROGATOR MODELS

1. Route the electrical harness from the right rear hinge (1); to the battery area (2); over to the right frame rail (3); then follow hydraulic tube lines beneath the passenger seat (4).

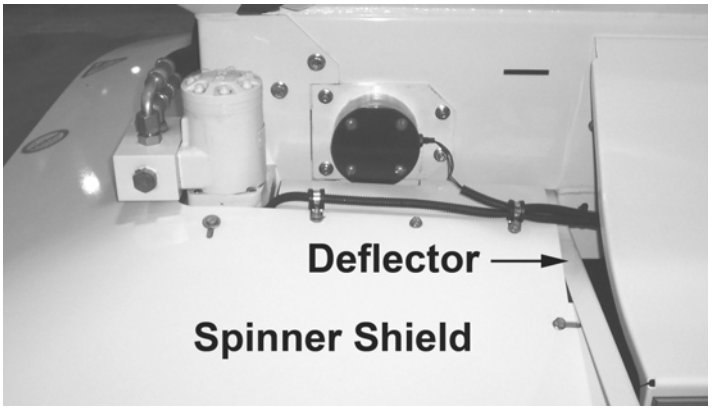


2. Enter the cab through rubber grommet located in the center of the floorboard.

3. Place the control box bracket in the desired mounting location on the dash making sure there are no electrical wires in the area (behind the dash). Using the bracket as a template, mark the location for the four mounting holes; then center punch the holes.
4. Using a 1/4 in. drill bit, drill the holes in the dash. Using the hardware included, secure the bracket to the dash; tighten securely.
5. Place the control box onto the bracket and secure.
6. Attach the red wire eyelet to the positive terminal and the black wire eyelet to the negative terminal of the battery; then connect the wiring harness to the control box.
7. Using cable ties, secure the harness along its route to prevent abrading, pinching, and contact with hot surfaces.

Installing Deflector And Spinner Shield

1. Place deflector across the bottom of the hopper and secure to the hopper frame with two bolts and nuts. Tighten securely.



2. Remove two rear screws securing each hydraulic motor.
3. Place the angles on the deflector and secure.
4. Place the spinner shield into position and secure using the angles and rear screws of each hydraulic motor mount.

Installing Hopper

1. Carefully back under the hopper until the rear hinges line up with pivots on hopper frame.
2. Using the jacks, align the pivots and hinges; then insert the hinge pins and secure.
3. Lower and remove the jacks.
4. For each cylinder, align the lift cylinder end with the cylinder frame mount; then install the lift cylinder rod-end pin.
5. Fully extend the lift cylinder; then install the safety bar on cylinder rod.

WARNING

Do not allow anyone to work beneath the hopper unless the safety bar is in place on lift cylinder rod.

6. Remove front legs.
7. Connect the electrical harness at right rear.
8. Noting the supply and return hydraulic couplings for both the utility vehicle and hopper and making sure the couplings are clean, connect the two hydraulic hoses. The hoses must be attached to the proper couplings for the Turf Tender to operate properly.

NOTE: The hose that goes to the supply coupling is marked at the factory with a plastic zip tie.

CAUTION

Make sure that the hose ends and utility vehicle couplings are clean before hooking up hydraulic hoses. Contamination of the hydraulic system may cause failure of components on the Turf Tender and utility vehicle.

9. Remove the safety bar and completely lower the hopper.
10. Test run to confirm proper operation and check for any hydraulic leaks.

REMOVING HOPPER

WARNING

The hopper must be completely empty prior to removing. Failure to empty the hopper prior to removal may result in a tipping hazard resulting in damage, injury, or even death.

1. Find a level, dry, firm place to store the Turf Tender.
2. Disconnect the hydraulic hoses from the hopper. Cap ends to keep dirt from contaminating the hydraulic system.
3. Disconnect two electrical connectors near the right hinge point.
4. Raise hopper sufficiently to install front legs; then install the front legs. Lower hopper so legs are resting on the ground and each cylinder rod pin is loose.
5. Remove the pin from rod end of each lift cylinder; then lower the cylinder. Place the cylinder rod end pin(s) back into position.
6. Insert the jack legs (with jack handles facing outward) into the receivers at rear. Secure the jack legs with the quick pins provided.

7. Jack up the rear of the hopper to take pressure off the hinge pins; then remove them. Keep hinge pins with the vehicle for the mounting of other units.
8. Drive straight ahead to clear hopper.

SELF-CONTAINED TURF TENDERS

Self-contained Turf Tenders have their own power supply and hydraulic system. The power supply used is a Honda 11 hp engine. The engine provides power to the hydraulic pump which draws hydraulic fluid from the reservoir and circulates the fluid to the drive motors on the Turf Tender.

In addition to following the setup information for trailer-type Turf Tenders, the following information must also adhered to.

Before Operating For The First Time

1. Check the level of the hydraulic fluid. A sight gauge is built into the front side of the reservoir. Fill as required.
2. Check the oil and gasoline levels in the engine. Fill as required.

NOTE: The engine has oil fill/check caps and drain plugs on both sides. The gray plug is the dipstick and is located on the front side of the engine.

3. Read and understand all information in the Honda engine Operator's Manual.

Note: This engine has no Transmission/centrifugal clutch; therefore, ignore pages 29-30 in the Honda engine Operator's Manual.

Before Starting Engine

1. Using the sight gauge, check the oil level in the hydraulic reservoir.

2. Check engine oil and gasoline levels.

3. Check the position of the choke, fuel valve, throttle and key switch. See the engine manual for proper use of each.
4. Ensure master switch on control box is in the OFF position. Be sure all persons are clear of conveyor and spinner areas; then using the key switch on the control box, start the engine.

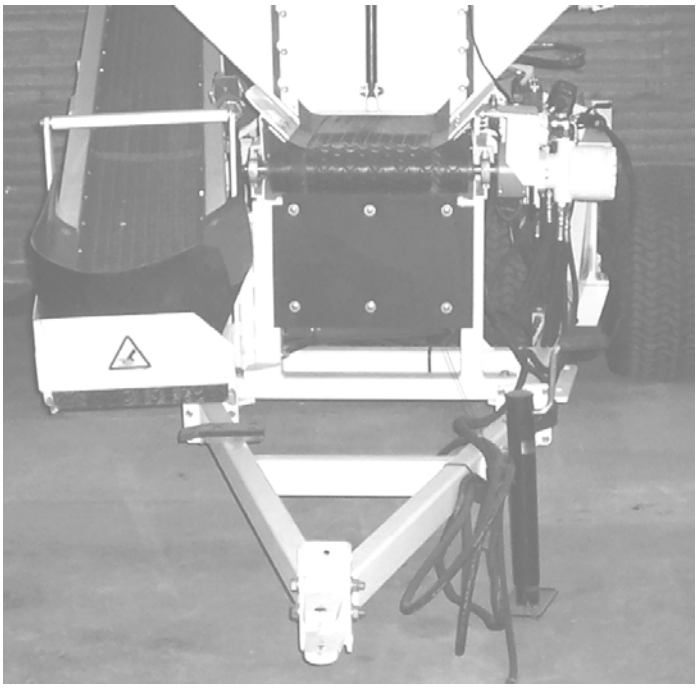
OPERATION

SAFETY INSPECTION

Introduction

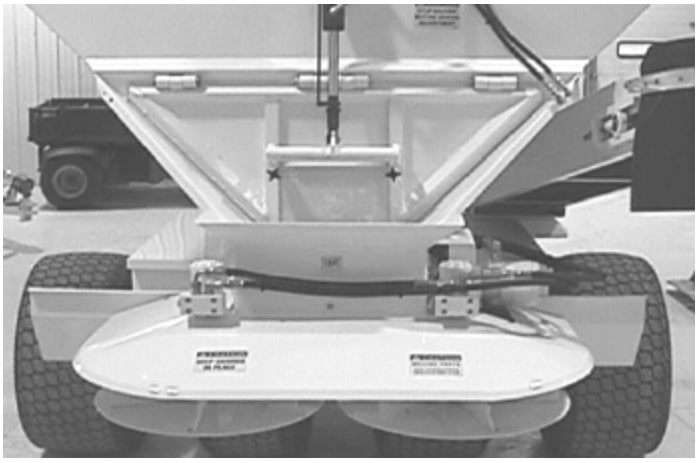
Every day before operating the Turf Tender, it is important to perform a safety inspection "walk around" of the Turf Tender. The purpose of the safety inspection is to inspect the Turf Tender for any unsafe conditions and maintenance concerns. Finding these conditions before using the Turf Tender can save time, money, and the possibility of injuries. Check for loose nuts or bolts, broken or cracked metal and welds, bent or damaged components, under-inflated tires and leaking hydraulic components and hoses. Any of these conditions may indicate a potentially serious situation. All Turf Tender models require the same basic safety inspection procedure.

On trailer-type models, start the inspection at the hitch. Check the hitch for excessive wear or cracks. Check the tongues of the hitch coupler (the part that directly hitches to the tractor drawbar). The coupler is made of cast iron and designed to break away in case the Turf Tender is driven on an unsafe slope and rolls. The cast iron tends to wear faster than steel and does wear out. This coupler may be turned over to allow wear on both tongues before replacement is necessary. Make sure the bolts attaching the hitch are not loose. On models with a front door, check to make sure the track is not full of material and that it has not been damaged.



Check the left side of the Turf Tender for any unsafe conditions. Much of the hydraulic system is based on this side. Check for any hydraulic leaks. Visually, make sure the tire(s) are inflated properly. If in doubt, use a tire gauge and check the tire pressure. Check for loose wires. All wiring should be secured to the Turf Tender and should not be hanging loose.

At the back of the Turf Tender, continue to look for hydraulic leaks and other unsafe conditions. Check the conveyor belt for damage and proper alignment. Make sure the shield over the twin spinners is not bent or interfering with the operation of the spinners. Make sure the rear door and gate are not bent or damaged and are closed as much as needed for the materials you will be hauling. By hand, rotate each spinner to ensure that it is not bent and clears other parts of the spinner/chute assembly.



On the right side of the Turf Tender, visually, make sure the tire(s) are inflated properly. On models with a side conveyor, check the side conveyor for damage and proper alignment. Check for any signs of hydraulic leaks.

When finished with the safety inspection and any repairs or adjustments that need to be made, the Turf Tender is ready for operation.

HOOKING TO THE TRACTOR (TRAILER MODELS)

It is required that the tractor be equipped with a regular drawbar. Set the drawbar length to the longest position for maximum turning clearance between the tractor and the Turf Tender. Do not use either a 3-point drawbar or any type of clevis hitch.

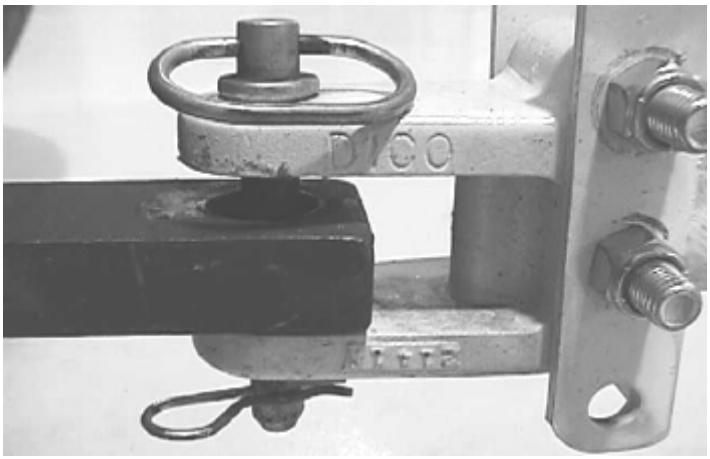
CAUTION

Do not use a 3-point drawbar since it limits maneuverability. It may also damage the hitch on the Turf Tender.

Back the tractor up to the Turf Tender so that the tractor drawbar lines up with the hitch on the Turf Tender. Set the parking brake and shut off the tractor. Using the Turf Tender jack stand, level the Turf Tender; then compare the height of the tractor drawbar with the height of the hitch. If necessary, adjust the height of the hitch coupler so that the Turf Tender, when pulled, will be level. To adjust hitch coupler height, remove the bolts and nuts securing the coupler, move the coupler either up or down as necessary, and secure with the bolts and nuts. Tighten securely. Using the jack stand on the Turf Tender, raise or lower the hitch as needed to align the tractor drawbar and hitch. Start the tractor, release the parking brake, and back into position.

NOTE: Adjustment of the hitch coupler height will only have to be made the first time the Turf Tender is to be hooked up to the tractor.

Set the parking brake and shut off the engine. Secure the Turf Tender to the drawbar using a 5/8 inch pin. Secure the pin with either a hitch pin or cotter key.

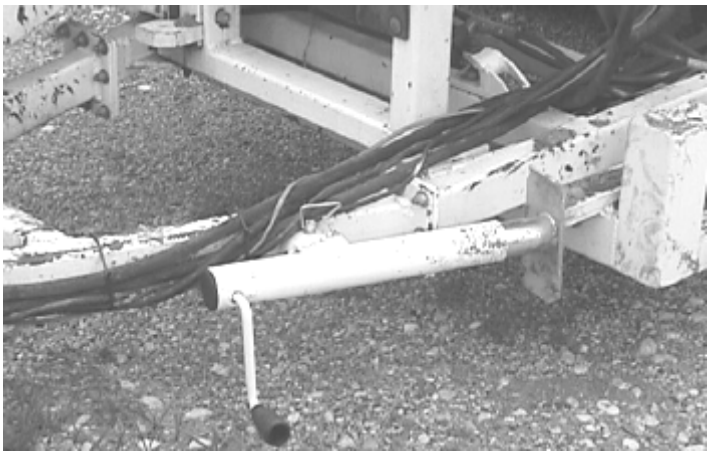


CAUTION

Do not use bolts or other substitutes for a hitch pin. These may not be strong enough and may cause the Turf Tender to disconnect.

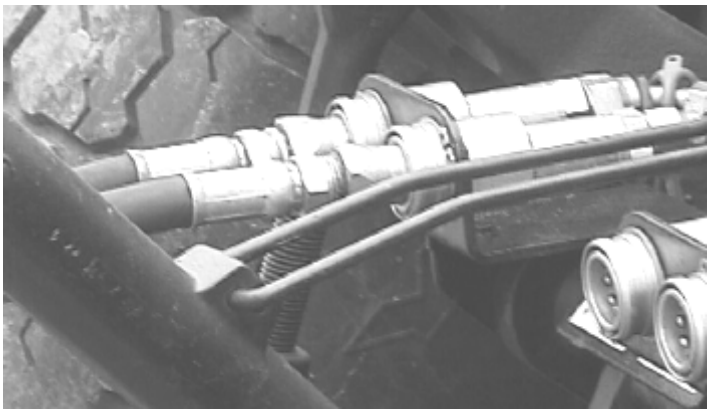
Using the jack stand, lower the hitch of the Turf Tender until all Turf Tender weight is on the drawbar of the tractor and the jack stand is loose. Remove the pin securing the jack stand, turn the jack stand 90 degrees counterclockwise (putting the bottom of the jack stand toward the rear of the Turf Tender) and install the pin. This is the stow position for the jack stand and will keep it out of the way during all operations.

NOTE: The jack stand can also be removed completely and stored in the toolbox if that is desired. The jack stand should always be kept near the Turf Tender if it becomes necessary to unhook quickly.



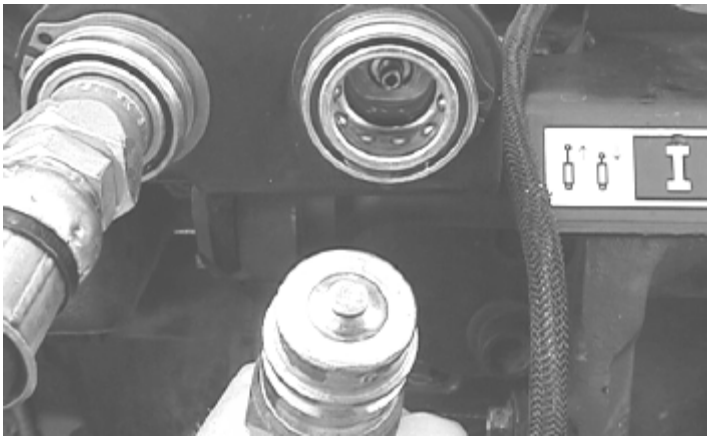
Noting the supply and return hydraulic couplings for both the tractor and Turf Tender and making sure the couplings are clean, hook up the two hydraulic hoses to the tractor couplings. The hoses must be attached to the proper couplings for the Turf Tender to operate properly.

NOTE: The hose that goes to the supply coupling on the tractor is marked at the factory with a plastic cable tie. The tractor supply coupling will vary from tractor to tractor.

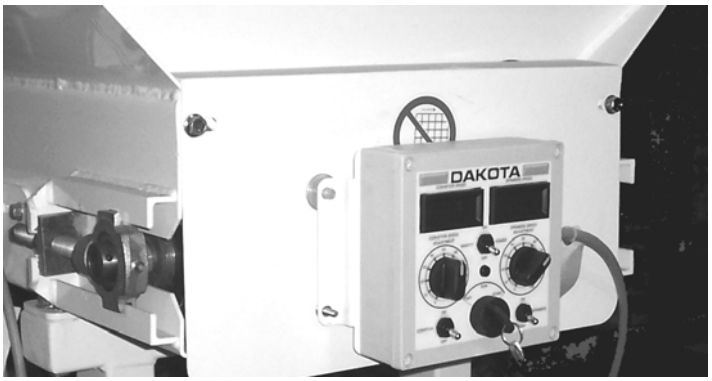


CAUTION

Make sure that the hose ends and tractor couplings are clean before hooking up hydraulic hoses. Contamination of the hydraulic system may cause failure of components on the Turf Tender and tractor.



Remove the control box from the front of the Turf Tender.



Slide the control box into the mounting bracket on the tractor. Secure by tightening the screws on the back of the bracket.

Inspect the 2-wire power cord connector to make sure it is clean and not worn or damaged. Good electrical connections are important so all functions, especially if equipped with electric brakes, are working properly.

Connect the 2-wire power cord to the control box.

CAUTION

Do not allow the hoses or wiring harness to wrap around or fasten to any part of the tractor other than the connectors at the tractor. The hoses and wiring harness are designed to pull loose if the Turf Tender disconnects.

Excess hose and wiring harness length should be coiled and secured to the top of the Turf Tender's hitch frame. If the same tractor is used with the Turf Tender every time, the excess hose and harness length coil my be left secured to the hitch. Leave some slack in both the hoses and the wiring harness for turning and maneuvering the Turf Tender.

CAUTION

Do not allow the hoses or wiring harness to wrap around any parts of the tractor or to drag on the ground.

Start the tractor engine; then engage the tractor hydraulic system. Test all functions of the Turf Tender. If the hydraulic functions of the Turf Tender are not operating properly, more than likely the hoses are hooked up backwards. If everything works properly, the Turf Tender is ready for operation.

NOTE: If necessary to switch the hose connections, set the parking brake, if you have released it, and shut off the tractor engine. Relieve the pressure on the hydraulic system by moving the tractor hydraulic valve to the neutral position; then switch the hydraulic hose connections. Start the tractor engine and test the hydraulic functions of the Turf Tender.

UNHOOKING FROM THE TRACTOR (TRAILER MODELS)

WARNING

The Turf Tender must not have any material in the hopper when uncoupling. Failure to empty the hopper prior to unhooking from the tractor may result in a rear tipping hazard resulting in damage, injury or even death.

Find a level, dry place to park the Turf Tender. Set the parking brake on the tractor and shut off the engine.

WARNING

Park the Turf Tender on a flat, solid surface. Parking the Turf Tender on an incline may create an unsafe condition. It may be necessary to chock the Turf Tender wheels to remove the possibility of it rolling from its parked position.

Relieve the pressure on the hydraulic system by moving the tractor hydraulic valve to the neutral position.

Unplug the control box from the 2-wire power cord. Loosen the screws on the back of the bracket; then remove the control box from the mounting bracket. Place the control box in the storage position on the front of the Turf Tender. Make sure the wiring harness is not wrapped around any part of the tractor during the transfer of the control box to its storage position.

Disconnect the hydraulic hoses. Coil and cap them and place them on the top of the hitch frame for storage. Do not allow the hoses to fall in the dirt. Also, do not set the hoses in the hopper or on the conveyor belting.

CAUTION

Do not allow hydraulic oil from the hoses to come into contact with the conveyor belt. The belt is made of a PVC compound to resist damage by fertilizers but it can be damaged by hydraulic oil.

Remove the pin securing the jack stand in the stow position; then turn the jack stand upright and install the pin. Using the jack stand, lift the hitch of the Turf Tender until it is no longer putting weight on the tractor drawbar.

Chock the Turf Tender wheels to prevent movement; then remove the pin from the hitch.

Make sure there is no further connection between the tractor and the Turf Tender. Get on the tractor, start the engine, release the parking brake and drive away.

WARNING

The Turf Tender must be hooked up to the tractor prior to loading. Failure to do so may result in damage, injury or even death.

HOPPER CONVEYOR BELT SYSTEM

Overview

The conveyor running along the bottom of the hopper on the Turf Tender is used to unload the hopper. It is generally run backward to unload material from the back of the hopper. On models with a front door, the conveyor may be reversed to run material out the front. The conveyor controls are located on the control box, which should be mounted on the towing vehicle.

Two types of belts are used (depending upon model) for the hopper conveyor. Spliced and endless belts are the two types of belts used. Each conveyor belt has a center V-belt vulcanized on the inner side to help keep the belt centered on the rollers. Instructions for tightening of the belt and belt replacement follows later in the Maintenance section.

On larger models (414, 420, and 440), the conveyor has drive motors on each end. The dual drive motor design gives additional power in each direction and also helps limit the chances of belt slipping off track.

On the 420 and 440 models, a diamond wiper system is located between the belts in the center of the hopper. This wiper is used to help eliminate a buildup of materials on the inner side of the belt. A material buildup could cause the belt to run off track or jam. The diamond wiper generally prevents these problems.

Turf Tender models are equipped with either an electric or manual control to adjust the speed of the conveyor belt. On all models (except the self-contained models, the **master switch must be turned on first to allow the other controls to function.** The red light on the control box will be illuminated when the master switch has energized the rest of the control box functions.

NOTE: To prevent battery discharge, remember to turn the master switch and the towing vehicle's ignition switch to the OFF position when not using the Turf Tender.

On models with only a rear gate, the conveyor switch is a two position switch (ON and OFF). On models with front and rear gates, the conveyor switch is a three position switch (REARWARD-OFF-FORWARD). Moving the switch from the OFF position, will engage the belt in the direction as indicated on the switch decal. To unload the hopper, be sure to open the appropriate gate before running the conveyor. The gate(s) may be left open a limited amount if the material being hauled does not leak out when the conveyor is not running.

NOTE: Before starting the main conveyor belt when unloading from the rear, always first activate the spinners. Failure to due so will result in material piling up on the spinners.

The speed of the spinners may be adjusted to control the spread width of the Turf Tender. There are two methods to adjust hydraulic flow to the Turf Tender. Increasing the speed of the conveyor increases the amount of material being unloading. Use the appropriate section below to adjust conveyor belt speed.

NOTE: Conveyor belt speed may also be adjusted by changing the throttle speed on the vehicle (or engine) supplying the hydraulic power. Speeding up the engine will speed up hydraulic flow to the machine. This will speed up the operation of all features of the Turf Tender.

ELECTRIC-CONTROL MODELS

The master switch on the control box activates the hydraulic valve. Once the master switch is in the ON position, the switch marked "conveyor" will turn the conveyor ON and OFF. The conveyor speed dial controls the belt speed (flow rate) of material. Faster belt speeds result in higher application rates. The numbers on the dial's scale do not represent any particular units, they are simply reference numbers to allow you to set the speed the same each time. The relationship between flow rate and dial scale are fairly linear; therefore, if the dial was initially set at 40, raising the setting to 80 would roughly double the material application rate.

MANUAL-CONTROL MODELS

Hydraulic flow to the Turf Tender is controlled by the hydraulic controls of the tow vehicle. As soon as the tow vehicle's hydraulic system is activated, the spinners will spin. Once the hydraulic system is ON, the switch on the control box marked "conveyor" controls the ON/OFF function of the hydraulic valve. On the manual-control system, conveyor speed adjustments are made on the valve located on the side of the Turf Tender. The speed of the conveyor is not to be adjusted while the Turf Tender is running. The scale on the speed control valve is not calibrated to represent any particular units, however much like the electric-control model, the scale is fairly linear. Upon completing an adjustment on models using a diverter valve, secure the adjustment by tightening the thumb screw securely.

NOTE: On manual-control models, the control box switch marked "spinners" is a dummy switch. The spinners are only turned ON and OFF by activating or deactivating the tow vehicle's hydraulic system.

CAUTION

Do not adjust conveyor or spinner speeds on manual-control models while operating the Turf Tender. The operator should always remain seated on the vehicle when the engine is running and no other people should be near the Turf Tender while the engine is running. To safely adjust the hydraulic flow on all models except the electric-control models, Dakota recommends that:

1. **Operator sets parking brake.**
2. **Operator shuts off the engine.**
3. **Operator dismounts and adjusts flow.**
4. **Operator returns to vehicle and starts engine.**
5. **Operator tests Turf Tender using new setting.**
6. **Operator repeats process as often as necessary to obtain correct flow and conveyor speed.**

The normal operating procedure is to preset the conveyor speed; then as you pass onto the area you want to spread material, turn the conveyor switch to the ON position. As you travel off the area, turn the switch to the OFF position.

Generally it is recommended to run the conveyor at a fairly high speed and adjust the rear metering gate to control the application rate. Conveyor speed affects the placement of material on the spinners. Slow conveyor speeds result in the "holding" of material on the spinners longer resulting in more wrap around. With some materials, having too fast of a conveyor speed may result in a very narrow spread pattern (where all the material is discharged directly behind the Turf Tender).

SIDE CONVEYOR

Overview

The side unloading conveyor is a unique option of the Turf Tender line of material handling systems. It allows the vehicle operator, while seated on the tractor, to control the unloading of materials with a complete view of the operation. The side conveyor may be used to fill other smaller Turf Tenders, sand bunkers, trenches or almost anything else you may want to unload material into. Keep the small top dressers busy by filling them out on the job site rather than pulling them back to the supply pile.

There are two positions for the side conveyor. The **traveling position** is when the side conveyor is retracted and rests against the side of the hopper. The **operating position** is when the side conveyor is fully extended to the side.

Traveling Position **Operating Position**

The conveyor must be fully extended to the operating position to be used. If it is not fully extended, the material from the main conveyor will spill before being unloaded onto the side conveyor; thereby, dumping most, if not all, of the material in front of the Turf Tender rather than unloading onto the side conveyor.

Three switches control the functions of the side conveyor. The side conveyor IN/OUT switch swings the conveyor in and out. The UP/DOWN switch raises and lowers the side conveyor. A third switch on the control box activates either the side conveyor or the spinners. Pushing the switch one way activates the side conveyor; pushing the switch the other way activates the spinners. All three switches have a center position which is the OFF position.

Lifting the side conveyor to its highest position and lifting the hood makes it more effective for filling bunkers or holes as the material can be thrown further. Varying the throttle speed of the tractor while unloading allows the material to be spread over a wider area.

The electric hood position is controlled by one switch. Push the switch away from the tractor operator and hold to lift the hood. Pull the switch toward the operator and hold to lower the hood. Releasing the switch at any point will stop the hood at whatever position it is in.

Lowering the side conveyor to its lowest position makes it easier and more accurate for filling trenches, pots, or areas that require some degree of unloading accuracy. With the hood at the end of the conveyor in the down position it forms a spout that helps keep the unloading materials in more of a controlled space and results in less time spent cleaning up.

Operation

To unload the hopper using the side conveyor, use the following procedure:

1. Open the front gate to the desired height.

NOTE: On models equipped with electrically activated front gate, use the switch on the control box to open the gate to the desired height.

2. Using the IN/OUT switch, move the side conveyor to the operating (fully extended) position.
3. Using the UP/DOWN switch, adjust the side conveyor to the desired height.

NOTE: If desired to throw the material further, use the HOOD switch to raise the side conveyor hood.

4. Activate the side conveyor; then start the hopper conveyor.

NOTE: Always activate the side conveyor before starting the main conveyor. This prevents the buildup of material on the side conveyor and limits excessive wear and belt-related problems.

5. If moving while unloading the hopper using the side conveyor, be sure to stay away from trees, poles and other obstacles which may come in contact with the side conveyor. Also, do not drive too closely to bunkers and other dropoffs.

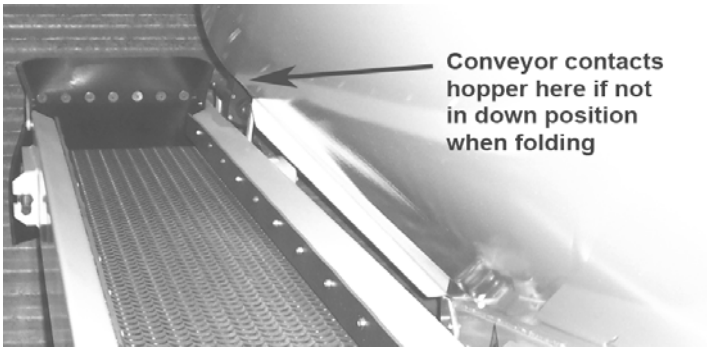
WARNING

Do not drive too close to edges of bunkers or other dropoffs. The Turf Tender may roll over if the edge collapses under the outside wheel or if it is maneuvered incorrectly. This could result in injury or death.

6. Shut off the hopper conveyor; then turn the side conveyor off so material does not build up on the side conveyor.
7. Using the UP/DOWN switch, lower the side conveyor to the fully down position; then using the IN/OUT switch, move the side conveyor to the traveling position.

CAUTION

The side conveyor must be in the fully down position prior to swinging it in to the travel position next to the hopper. Failure to do so will result in damage to the Turf Tender.

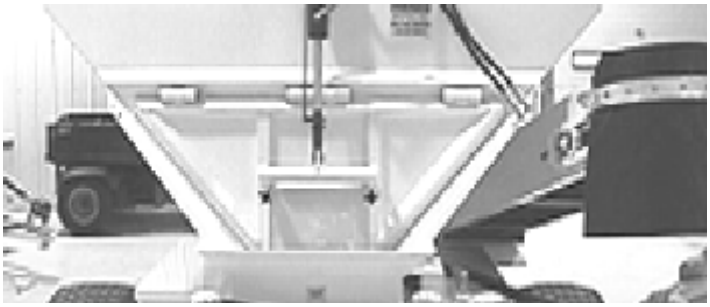


8. Close the front gate.

HYDRAULIC REAR DOOR (Optional)

The hydraulic rear door is designed to allow the operator to unload material quickly without leaving the seat of the tractor.

A switch on the control box operates the hydraulic rear door. Pushing the switch away from the operator opens the door; pulling the switch toward the operator closes the door. An indicator rod gives the operator an indication of how far the door is open.



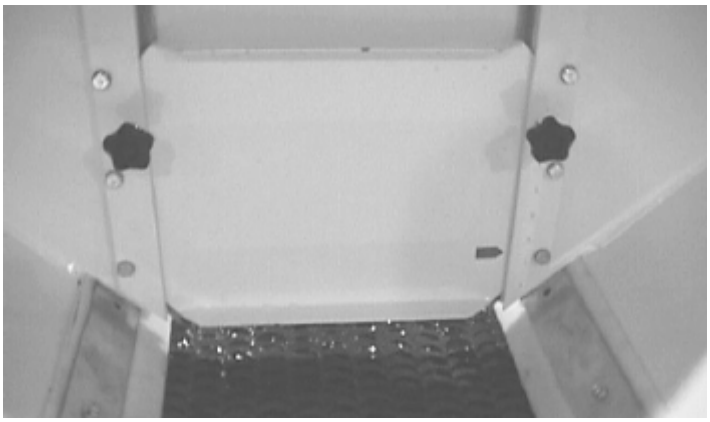
CAUTION

Never close the hydraulic rear door when the hopper is full of material. Trying to close the door when the hopper is full could result in damage to the door or to the rear of the hopper. The door should always be closed prior to filling the hopper.

The rear door is a structural component of the hopper assembly, and as such, **it must be kept tightly closed when the hopper contains material and the Turf Tender is being towed over rough terrain**. Failure to keep the door closed in these conditions may result in cracking of the hopper assembly.

NOTE: It is not uncommon for the hydraulic system to "bleed down" or lose pressure when not in use. Avoid leaving the hopper full of material when not in use since the material may push the rear door open as the hydraulic pressure bleeds down.

REAR METERING GATE



The rear metering gate is designed to regulate the flow of material out of the hopper. Two types of the metering gate are available: hand crank, or manual opening.

NOTE: Stainless steel inserts may be purchased and installed to limit the width of the gate opening on 412, 414, 420, and 440 models. Narrowing the gate opening gives a little better control over spread distribution with difficult material such as wet, sticky sand.

The rear metering gate may be left open a limited amount if the material you are hauling across your facility does not flow (leak) out when the conveyor is not running. Dry sand and fertilizers are especially bad for leaking out and we recommend the metering gate be fully closed when transporting these materials.

There is a scale beside the gate to show you how far the gate is open (general reference only). The gate opening height for each operation will need to be determined. For example, a light topdressing may require the gate to be open 1/8 in. (3 mm); whereas, for a heavy topdressing and core filling, the gate may have to be open 4-5 inches (10-12 cm). The operating speed also affects the amount of material you are dispensing.

If accurate calibration of material delivery rates is required, the actual gate opening should be determined using the following steps:

1. Make sure the conveyor belt is properly tensioned. Refer to belt adjustment in the Maintenance section.
2. Press down firmly on the gate so it depresses the belt as far as it will go; then lock in place with the hand screws. It requires about 40 to 50 pounds of force to set the metering gate in the fully closed position. This must be done since the belt drops slightly below the gate opening when material is in the hopper. Make sure the gate appears level.
3. Using a ball point pen, draw a line on the back wall of the hopper across the top of the metering gate. This is your "zero" gate opening reference line.
4. On both the right and left ends of the reference line, draw a scale (fractional inches or millimeters) going up from the line for an exact gate opening reference.

NOTE: When the metering gate is set to its "zero" position, material will still flow out the Turf Tender conveyor when the conveyor is in operation. The belt cups will actually allow about an 1/8 inch layer of material to come out the metering gate.

As you test the metering gate for material flow, you should also check for material leakage under the side wipers of the hopper.

Manual Rear Metering Gate

The metering gate is secured by the two turn-screws, one on each side. To adjust gate height, loosen the two turn-screws, adjust to the proper height (either by hand or by using the hand crank), and tighten the turn-screws to secure the adjustment.

Depending upon the material being applied, the gate may be left open 1-3 inches (2.5-7.5 cm) even when transporting materials. Sand and other large aggregate type materials will not flow out at these openings under normal conditions. Finer materials such as grass seed may tend to flow out even when the gate is open a small amount.

FRONT GATE

The electric front gate function adds both safety and convenience to the operation of the machine. The tractor operator can open and close the gate from the seat of the tractor so no one needs to get close to the machine when it is working. That also means that only one operator is required.

The electric front gate is easy to operate. One switch moves the gate either up or down. Push the switch away from the tractor operator and hold to open the gate. Pull the switch toward the operator and hold to close the gate. Releasing the switch will stop the gate at whatever position it is in.

The purpose of the front gate is control material flow out the front of the Turf Tender. Material may be unloaded directly in front of the machine or to the side using the side conveyor in the operating position.

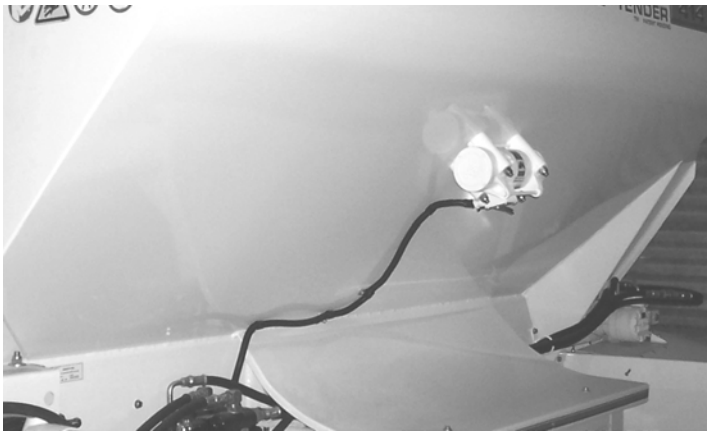
Depending on the material being hauled, the front gate may be left open a small amount. Because of the relative position of the gate opening to the end of the main conveyor, many materials will not leak out if the gate is left open 1-2 inches. If you plan to leave the gate open, monitor it while you are filling the hopper to see if you will have a problem.

Always close the gate to the position you need before filling hopper. Trying to force the gate closed when the hopper is full may damage the gate or the front of the hopper.

Keep the gate clean and keep the track free of debris. This limits excessive wear and potential damage from the gate jamming on the debris.

ELECTRIC VIBRATOR

An electric vibrator is an option available for all Turf Tender models. The vibrator is designed to help break up material bridging problems in the hopper. As the main conveyor belt pulls material out of the bottom of the hopper, some material (i.e. wet sticky sand) can bridge or form a hollow tunnel through the bottom of the hopper. The vibrations from the electric vibrator will normally shake the material loose so that it will drop onto the conveyor belt.



Activate the vibrator using the vibrator switch on the control box. Sometimes 2 or 3 short bursts are needed to break the material loose. The switch is a momentary switch and should never be held in the ON position for extended periods of time.

CAUTION

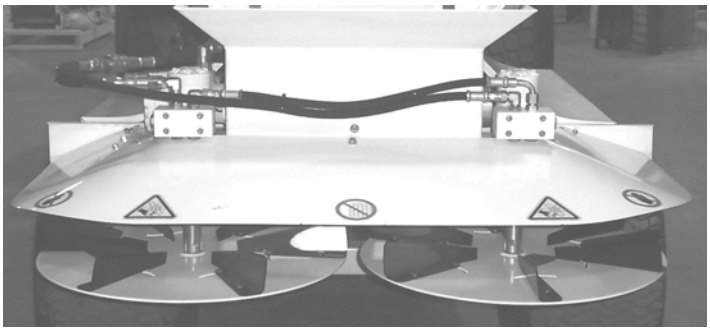
Do not operate the vibrator continually as excessive wear on the motor will result. Excessive compaction of material in the hopper can also result making it much more difficult to unload.

DUAL SPINNER SYSTEM

The dual spinner function of all Turf Tenders is the same. A variety of materials from sand and larger aggregates down to grass seed and fertilizer may be spread. Coverage widths may be as wide as 50 feet (15 m). It should be noted that "fine tuning" the system for the specific material being spread is essential.

Operation

The dual spinner system is very easy to operate. The "spinner" switch on the control box activates the spinners. Most operators leave the spinners on at all times while spreading a load and only turn the spinners off when the hopper is empty. The conveyor should be turned ON as you start a pass and OFF as you complete the pass and turn around.



For all models (except the self-contained models), the master switch must be turned to the ON position to allow all other controls to function. The red light will be illuminated when the master switch has energized the rest of the control box functions.

NOTE: To prevent battery discharge, remember to turn the master switch to the OFF position when not using the Turf Tender.

CAUTION

Always turn the spinners on before starting the main conveyor. Failure to due so will result in material piling up on the spinners.

Material discharged from the spinners can be very dangerous; therefore no other people should be near the Turf Tender when spreading and the operator should remain in the tractor's seat while the tractor is running. The velocity of discharged material can exceed 60 miles per hour.

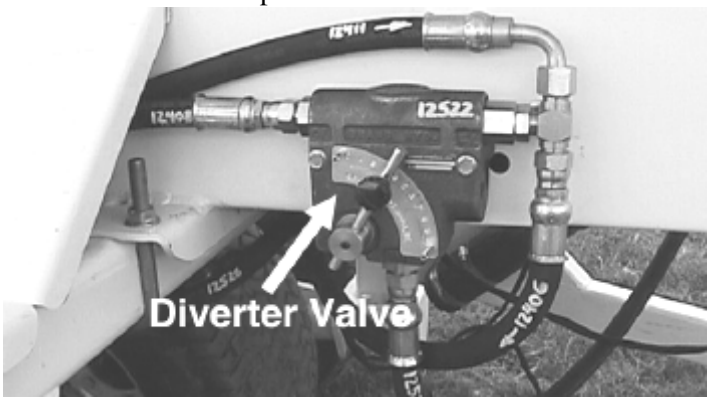
Electric-Control Models

The switch on the control box marked "spinner" controls the On/Off function of the hydraulic valve. The spinner speed dial controls the speed of the spinners. The numbers on the dial's scale do not represent any particular units, they are simply reference numbers to allow you to set the sinner speed the same each time. The relationship between spinner speed and dial scale are fairly linear; therefore, if the dial was initially set at 40, raising the setting to 80 would roughly double spinner speed.

Manual-Control Models

On the manual-control system, spinner speed adjustments are made on the valve located on the right side of the Turf Tender. The speed of the spinners is not to be adjusted while the Turf Tender is running. The scale on the speed control valve is not calibrated to represent any particular units, however much like the electric-control model, the scale is fairly linear. Upon completing an adjustment on models using a diverter valve, secure the adjustment by tightening the thumb screw securely. To adjust the spinner speed on your manual-control system, use the following procedure:

1. Operator sets parking brake.
2. Operator shuts off engine.
3. Operator dismounts and adjusts flow.
4. Operator returns to tractor and starts engine.
5. Operator tests Turf Tender using new setting.
6. Operator repeats process as often as necessary to get correct flow and correct speed.



SPINNER ASSEMBLY

Installation And Use

The spinner shafts are made of stainless steel to reduce the chance of corrosion. Applying Anti-Seize (a special type of grease) is recommended to facilitate greater corrosion resistance. Each time a spinner is removed or installed, apply Anti-Seize to the entire spinner shaft.

Each spinner is secured by a swift detach button (just like a power take off (PTO) shaft), so it can be removed and installed quickly. To remove and install a spinner, support the spinner; then press inward on the button to release the spinner from the shaft. Slide the spinner off the shaft. Apply Anti-Seize to the shaft; then slide the spinner onto the shaft. Press the button inward and continue to slide the spinner onto the shaft until the button pops back to the lock position. Make sure the button pops completely out to lock the spinner on the shaft. Push and pull the spinner up and down on the shaft to make sure it is secure.

CAUTION

Use care and firmly support the spinner when removing and installing. Also, be sure the spinner is firmly locked on the shaft.

Adjustments

OVERVIEW

A variety of materials from sand and larger aggregates down to grass seed and fertilizer can be spread with Turf Tenders. All Turf Tenders use the same spinner disk assemblies. The 410 Turf Tender models use smaller hydraulic motors and is designed for light and heavy topdressing, seeding, and fertilizer applications. All other Turf Tender models are designed for light to heavy application rates and use larger hydraulic motors. Coverage can be as wide as 50 feet (15 m). It should be noted that "fine tuning" the system for the specific material being spread is essential. The information presented here represents thousands of hours of design and testing, as well as feedback from people like you, the users of our products. Please read this information thoroughly to ensure that you have an understanding of it's content.

Different materials require different spread patterns. **DAKOTA** offers three (3) different colored spinners so you can have multiple sets with each set adjusted for a specific material. All sets have black blades. Suggested uses of the different colored disks are:

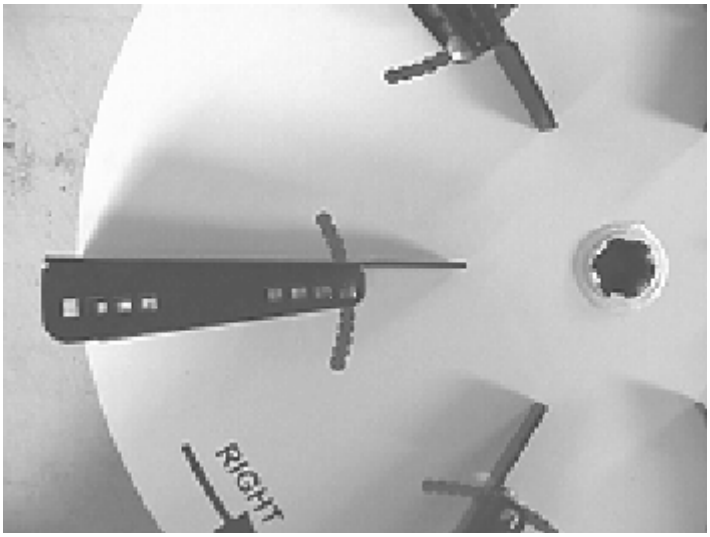
1. White spinner disks for sand (included with the Turf Tender).
2. Black spinner disks for spreading fertilizer.
3. Green spinners disks for grass seed.

The stock set could be used for all materials if you take the time to adjust them for each material. Contact a DAKOTA dealer for additional spinner disks.

BLADE ADJUSTMENTS

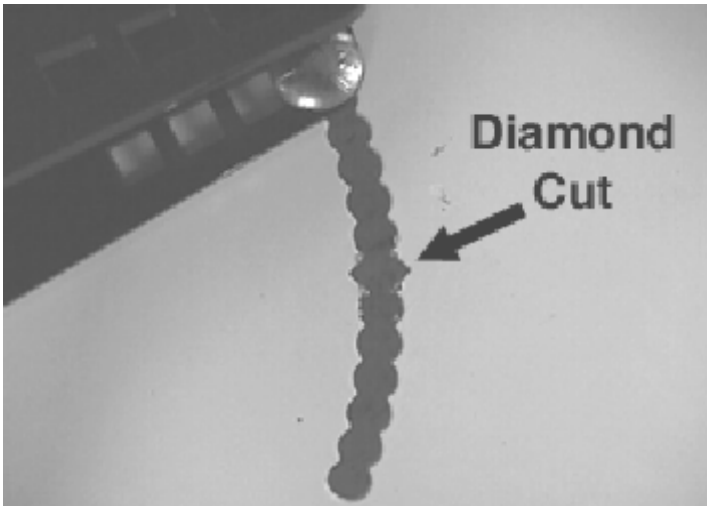
The following figure shows a white right-side spinner disk with black blades as assembled at the factory. Different application rates and types of material may warrant changing the blades from their "neutral" position. Also, gate opening, spinner speed, and conveyor speed will affect the pattern. In general for best application of material, **avoid running the conveyor too slowly and avoid running the spinners too fast.** The factory "neutral" setting was designed to yield the best spread pattern under the following conditions:

Material: moist sand (barely clumps when hand squeezed)
Gate Opening: 3/4 in. (from the flat of the belt)
Conveyor Speed: 70 RPM (about 70% dial setting)
Spinner Speed: 350 RPM (about 65% dial setting)



NOTE: Do not be too concerned about achieving the maximum spread width; instead, focus on getting a good distribution of your spread pattern.

The "neutral" blade setting, points the blades at the center of the spinner shaft. There is a diamond cut in the spinner disk indicating the "neutral" position bolt hole for each blade.



WARNING

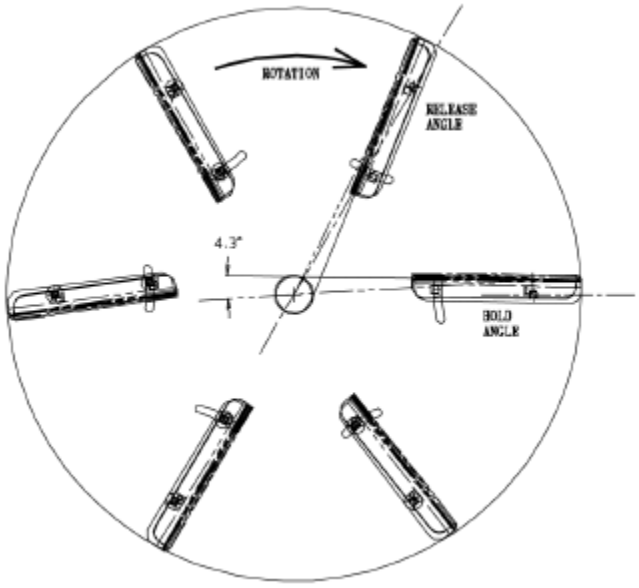
All spinner blade fasteners must be tightened after each adjustment. Failure to do so could result in injury or even death.

WARNING

The setting the spinner and conveyor speeds on some models, requires the use of a hand-held tachometer. Remove the spinners prior to measuring the spinner rpm. Failure to do so could result is serious injury or even death.

NOTE: Conveyor speed indicators are either located on the control box or on the left side of the Turf Tender.

The following illustration represents how three blades may be set to hold the material a little longer and three other blades are set to release material a little sooner. An overview on pattern distributions and blade settings follows.



SPREAD PATTERNS AND ADJUSTMENTS

Overview

Spread pattern is defined as the uniformity of material distribution. Calibration refers to controlling the amount of material deposited over a set area.

Prior to setting up the Turf Tender for calibration, the following items must be correct:

A. The conveyor belt rear roller must be positioned 5 1/4 in. (13.3 cm) from back wall of vertical chute.

NOTE: This is measured from the flat portion of the belt.

B. The conveyor belt must be properly aligned and tensioned. If adjustment is necessary, make the necessary adjustments at the front end of Turf Tender.

C. On trailer-type models, all tires must be properly inflated. Adjust tire inflation pressure so all tires are equal and suitably low to avoid excessive soil compaction. The recommended tire pressure operating range is 13-18 psi (90-124 kPa) for 26.5 in. tires and 15-22 psi (115-169 kPa) for 33 in. tires. Remember, the inflation pressure of the tire indicates how much compaction you are imparting on your soil. Running the tire pressure too low may however cause damage to the tire.

D. The spinner shafts must be vertical. If necessary, on trailer-type models, make the initial adjustment by changing the hitch height. If unable to bring the spinner shafts fully vertical by changing the hitch height, it may be necessary to adjust the spinner assembly until the spinner shafts are vertical.

E. The hopper wipers must be adjusted tightly down onto the conveyor belt. Failure to properly adjust the hopper wipers results in an adverse spread pattern and application rate. Adjust the hopper wipers by pushing the belt fully downward; then adjust the wipers tightly down to the belt and secure the adjustment.

F. Set the metering gate opening to the approximate material flow rate. Do not open the gate too far. Instead travel slower over the area to get a higher application rate. Opening the gate too high affects the controllability of the pattern. For most materials, 3-4 inches (7.6-10 cm) seems to be the point at which pattern controllability problems arise. Available hydraulic power from the tractor may also be a limiting factor in your gate setting.

G. Calibrate spinner speed to 325-350 RPM. Extensive testing has shown that excessive spinner speed results in uncontrollable patterns, material hitting the spinner shield and heavy material deposits in the center. Furthermore, increasing the spinner speed to 500 RPM, increases your spread pattern width by only 10-15 feet (3-5 m) and results in segregation of particulates such that fine ones only go a few feet and the larger ones travel to the outer region of the pattern. This causes detrimental results with precision topdressing and fertilizer application.

H. Calibrate conveyor speed to approximately 70 RPM. This will result in material just "skimming" the back wall of the vertical spinner chute. The placement location of material on the spinners has proven to be a critical variable in the adjustment and control of the spread pattern.

I. Take note of the material type, condition, and supplier. Material, which has varying moisture and/or clay content from one week to the next, may behave differently each time you spread it. Wet sand, with high clay content, is among the hardest materials to spread. For these reasons, try to maintain uniform material conditions. Sometimes it's as simple as talking with your supplier to arrange for uniform material to be supplied and covering the material pile with a tarp so it is not exposed to the elements. In direct contrast, dry graded silica sand (hour glass sand) is probably the easiest material to spread.

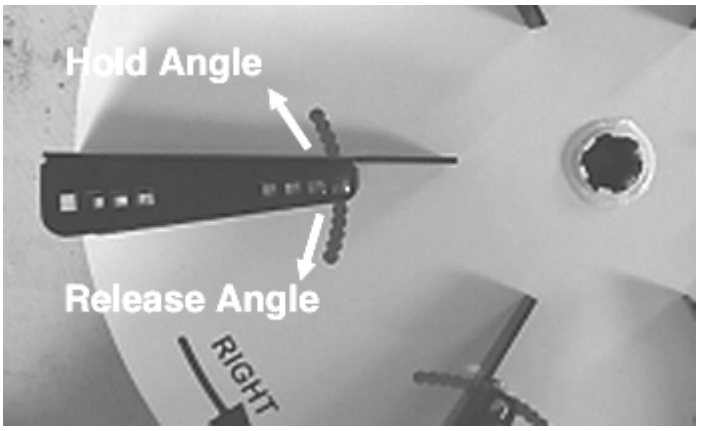
The establishment of these preliminary setup steps was developed through extensive testing and experience. For example, the conveyor belt's rear roller distance of 5 1/4 in. (13.3 cm) from the back wall of the vertical spinner chute was found to give the best control of spread pattern distribution with all of the various spinner blades. This applies to all models.

Basic Spinner Adjustments

If the spread pattern is heavy in the middle, adjust three of the six blades (every other one) on each spinner disk two notches in the hold direction; then test the spread pattern. If necessary, move the same blades two more notches in the hold position. If additional adjustments are desired, move the remaining three blades (that haven't been adjusted) two notches in the hold direction.

If the spread pattern is heavy on the outside, adjust three of the six blades (every other one) on each spinner disk two notches in the release direction; then test the spread pattern. If necessary, move the same blades two more notches in the release position. If additional adjustments are desired, move the remaining three blades (that haven't been adjusted) two notches in the release direction.

The following photo illustrates the hold and release angles for a right spinner disk which rotates counterclockwise.



Collection Methods

STANDARD PAN COLLECTION METHOD

The typical method of testing the spread pattern is to place collection pans in a row going across the direction of travel. Make one or more passes across the pans and measure the amount of material in each. This doesn't work with large broadcast spreaders.

The amount of material collected in each pan can be graphed to reveal the type of spread pattern you are producing. A perfect rectangular pattern is very hard to achieve and, in some cases such as fertilizer application, not desirable because you would have to drive impossibly precise to avoid skips or double application. The inherent limitation of this testing method is that particles coming out of a broadcast spreader have a very low trajectory angle with high velocity and usually skip across the surface. Most test runs will have sand sliding across the pan and launching out the opposite side. We have even tried using square "egg crate" inserts of varying sizes to provide better capture of material but we still had material skipping across the top. Therefore, the industry-standard pan collection method does not accurately reflect the true distribution of material.

STATIONARY TESTING METHOD

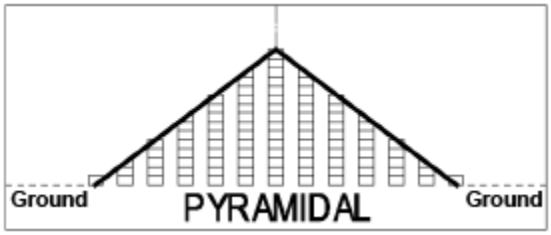
Although there are no references to doing this in industry, we have found that it is best to run several stationary tests of the system to quickly find the operational settings of the spinner blades. By spreading material in an empty parking lot or another area having a paved surface, you will be able to quickly clean up the discharged material for reuse as well as be able to observe the uniformity of the spread pattern. Record the general qualitative characteristics for pattern uniformity and wraparound (spreading ahead and/or to the sides of the Turf Tender's wheels).

We found that, initially, we needed to spread material from the stationary position and, when done spreading, push the material into a narrow row (long pile), running across the spread area. Looking at the amount of material in the strip-pile is a pretty good indicator of the distribution pattern. After a short period of time you will be able to look at the distribution (where it dropped) to determine how uniform the pattern is and eliminate the need to pile up the material in a row.

As an example of the differences between the two test methods' results, we found that when we had an obvious W spread pattern (heavy center and outside edges) using the stationary testing method, the pan method was indicating that we had a nearly perfect distribution. The problem is that the pan method did not accurately reflect where the material was actually deposited after it had hit the ground, bounced, rolled, and stopped.

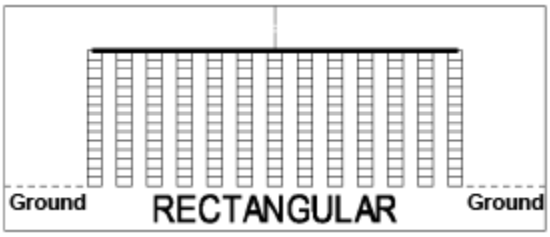
Pattern Adjustments

The pattern below shows the optimum distribution of material behind the spreader from one pass. On the next pass, the operator should drive at the edge of the pattern, which overlaps material to the center of the previous pass. This results in a uniform distribution of material across the ground. Most importantly, errors in driving cause minimal streaking from double spreading or gaps. The problem is that it is very hard to attain this pattern with broadcast spreaders.

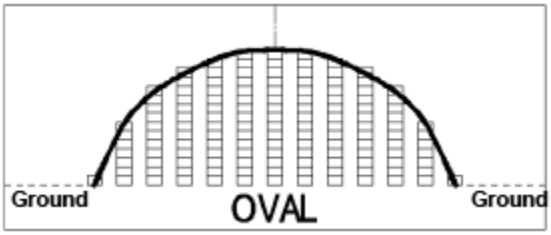


Some spreader manufacturers or users prefer to have a pattern like the following figure. This can give good results but requires more precise driving to achieve the exact interval needed. The pattern must be tested with pans to determine the point half way from the edge to the corner. Then the driving interval must be maintained or gaps and overspreading result.

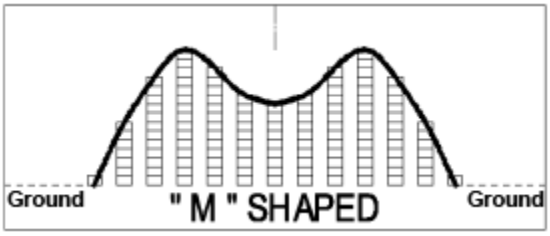
The rectangular pattern is best for sand and requires perfect driving to avoid gaps and overspreading. It is not recommended.



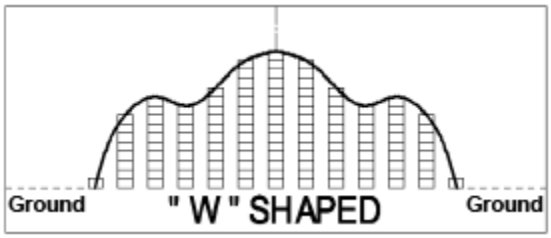
The oval or rounded pattern is common to many spreaders and can yield good results similar to the trapezoidal pattern. The same discussion applies. To get it close to a pyramidal pattern, increase the amount of release angle on the blades. This should cause more material to fall directly behind the spreader. Also, reducing the amount of hold angle should yield the same result.



The following pattern results from excessive hold angle. Too much material is staying on the blades too long. Reduce the hold angle and change half the blades to a release angle.



This pattern may also be caused by too much hold on half the blades. The heavy center may indicate excessively high spinner speeds. From a safe distance, watch how material is exiting the center of the spinners. If a lot of material is coming off each spinner in the center after hitting the shield and crossing over the center, the spinner speed is too fast. This is due to material bouncing off the blades of the spinners rather than siding along the blade. On the other hand, if the material streams crossing from each side are colliding and dropping straight down, the blades need to hold material a little longer. If there is little crossing of material at the center, reduce the hold angle to bring the edge humps toward the center.



APPLICATION RATES

Overview

Application rate refers to the amount of material spread over a given area. Often it's referred to pounds per acre or 1000 square feet.

To Achieve a Higher Application Rate:

1. Slow down the ground speed. This is the best option since your spread pattern will not be affected.
2. Increase the rear gate opening. Doing this may affect your spread pattern.
3. Decrease spinner speed (spread pattern width); then decrease the driving interval (overlap). This may also change the uniformity of spread.

To Achieve a Lower Application Rate:

1. Increase ground speed. This is the best option since your spread pattern will not affected.
2. Decrease the rear gate opening.
3. Increase the spinner speed; then decrease the driving interval (overlap).

Again, numbers 2 and 3 may affect the spread pattern.

Spread Calculator

To download our "Spread Calculator" containing information regarding application rates, please go to:

http://www.dakotapeat.com

ELECTRIC BRAKES

Overview

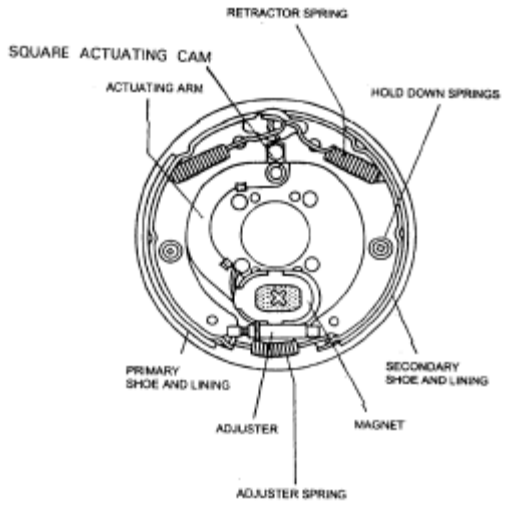
Most trailer-type Turf Tenders come equipped with electric brakes. Electrically actuated brakes have several advantages over other brake actuation systems.

1. They can be manually adjusted to provide the correct braking capability for varying terrain and load conditions.
2. They can be modulated to provide more or less braking force, thus easing the brake load on the towing vehicle.
3. They can provide braking independent of the tow vehicle.

Basics Of Operation

The electric brakes on the Turf Tender are similar to the drum brakes on an automobile. The difference is that automotive brakes are actuated by hydraulic pressure while electric brakes are actuated by an electromagnet. Electric brakes operate in the following manner:

1. When the electrical current is fed into the system by the controller, it flows through the electromagnets in the brakes.



2. The electromagnets are energized and are attracted to the rotating armature surface of the drums which moves the actuating levers in the direction that the drums are turning.
3. The resulting force causes the actuating cam block at the shoe end of the lever to push the primary shoe out against the inside surface of the brake drum.
4. The force generated by the primary shoe acting through the adjuster link then moves the secondary shoe out into contact with the brake drum.
5. As the current flow to the electromagnet is increased, it causes the magnet to grip the armature surface of the brake drum more firmly. This results in an increased pressure against the shoes and brake drums.

CAUTION

The Turf Tender will not have the correct amperage flow to the brake magnets to give you comfortable, safe braking unless the proper brake system adjustments have been made.

Varying load and driving conditions as well as uneven alternator and battery output can mean unstable current flow to your brake magnets. Therefore, it is imperative that a properly modulated brake controller be used and the brakes be maintained and adjusted according to the information in this manual.

It is important that the brake controller provide approximately 2 volts to the braking system when the brake switch is first activated. The longer the brake switch is held in the ON position (either left or right of center), the voltage to the brakes gradually increases up to a maximum of 12 volts. If the controller voltage jumps immediately to a high voltage output, even during a gradual stop, then the electric brakes will always be fully energized during brake activation and will result in harsh braking and potential wheel lockup.

Proper brake system setup adjustments can only be accomplished by road testing. Brake lockup, grabbiness, or harshness is quite often due to:

1. Improper setup of the Turf Tender.
2. Too high of a threshold voltage (over 2 volts).
3. Under adjusted brakes.

Before any brake setup adjustments are made (in the brake control box on the right side of the Turf Tender), the Turf Tender brake drums should be burnished-in by applying the brakes 20-30 times at 15 mph and coming to almost a complete stop. Allow ample time for brakes to cool between each application. This allows the brake shoes and magnets to slightly "wear-in" to the drum surfaces.

Operating the Electric Brake

The top switch on the left side of Turf Tender control box controls the activation of the brakes. It is a three position switch with the center position being the OFF position. Turning the switch either to the left or right, activates the brakes. The longer the switch is held in an ON position, the more pressure the brakes exert. Only hold the switch in the ON position until adequate braking is attained.

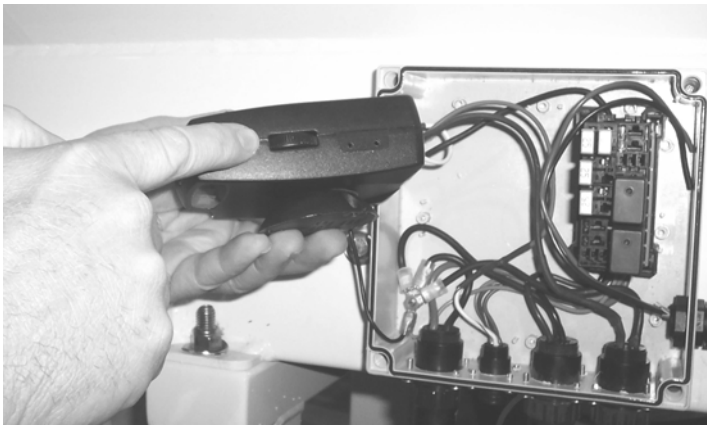
NOTE: Holding the switch in an ON position gradually increases the voltage (stopping power) of the brakes.

BRAKE CONTROLLER ADJUSTMENT

WARNING

Before making road tests, make sure the area is clear of vehicular and pedestrian traffic.

Tow the Turf Tender at slow speed (approximately 8 mph) on a hard, level, and dry road surface. Activate the brake switch and hold for a few seconds; then release. If the brakes lock up, remove the brake control box cover on the right side of the Turf Tender and back the GAIN knob off slightly. If the brakes are weak, turn the GAIN knob up until the brakes don't quite lock up. Repeat the procedure until the brakes operate properly. Place the cover back into position and secure.



WARNING

Gain should be turned down in wet or slippery conditions. Gain should never be set to a level high enough to cause the brakes to lock up. Skidding wheels can cause loss of directional stability of the Turf Tender and tractor possibly resulting in injury or even death.

The GAIN control may need to be reset to adjust for different load weights and terrain conditions. Braking performance may be sluggish in subfreezing temperatures. In subfreezing temperatures, allow adequate time for the control to warm up prior to use.

MAINTENANCE

WARNING

After all repairs and/or adjustments, always test the Turf Tender before operating. Failure to do may result in injury or even death.

RUNNING GEAR (TRAILER-TYPE MODELS)

Wheels

There is very little chance of a problem with your wheels unless you are driving on a flat tire or if the wheel bolts have loosened. If a problem should develop with a wheel, remove it; then repair or replace as needed.

Axles

Larger models of the Turf Tender have two (2) wheels on each side of the Turf Tender that are attached to independent "walking beam" axles. Smaller Turf Tender models have a single, solid axle on each side. The axles, if maintained properly, will give many years of service.

WARNING

Tire and wheel mounting and demounting can be dangerous and must only be done by trained personnel using proper tools and procedures. Failure to comply with safety procedures and information contained here can result in serious injury or even death.

Tires

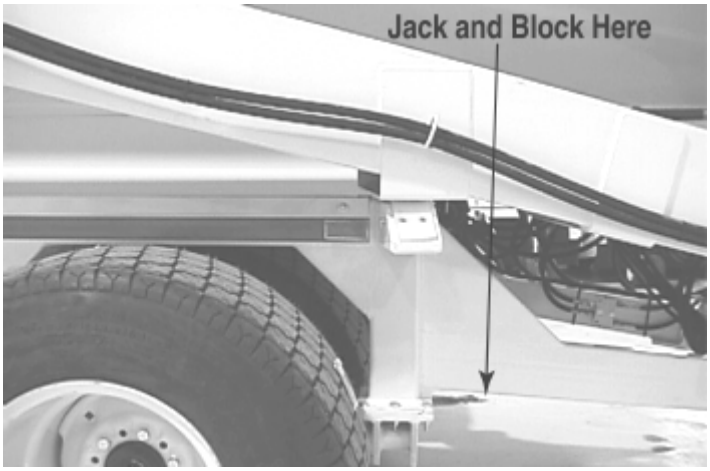
The tires on the Turf Tender are designed to provide good flotation (less compaction) under normal circumstances. It is important to check tire pressure on all tires periodically to ensure they are properly inflated. Proper inflation will extend wear and provide good flotation. The recommended tire pressure operating range is 13-18 psi (90-124 kPa) for 26.5 in. tires and 15-22 psi (115-169) for 33 in. tires. Do not exceed the maximum tire pressure listed.

WARNING

Operation of the Turf Tender with improperly inflated tires could result in serious injury or even death due to the potential rollover under certain conditions such as operating on a hillside.

CHANGING AN OUTSIDE TIRE

1. Empty all material from the hopper; then chock the wheel(s) on the opposite side of the Turf Tender.
2. With the Turf Tender hooked to a tractor that has the parking brake set, jack up the frame directly in front of the axle mount.



3. Using jack stands, support the frame so it is safe to work beneath. Under no conditions should cement blocks (cinder blocks) or unstable piles of wood blocks be used.

WARNING

Do not perform maintenance of any kind below the Turf Tender unless it is properly secured and stabilized.

4. Remove the wheel bolts; then remove the wheel.
5. Bring the wheel to a tire repair center to fix or replace the tire.

NOTE: Due to the specialized equipment necessary, tire removal, repair, and mounting should be only performed by a tire repair service shop.

6. Place the wheel back into position; then install the wheel bolts. Tighten until snug.

NOTE: Do not lubricate threads.

7. Using a crisscross pattern, tightening wheel bolts to 90 ft-lb (12.4 kg-m).

CAUTION

Do not under or over torque the wheel bolts. Inappropriate wheel bolt torque will result in wheels loosening and possibly falling off.

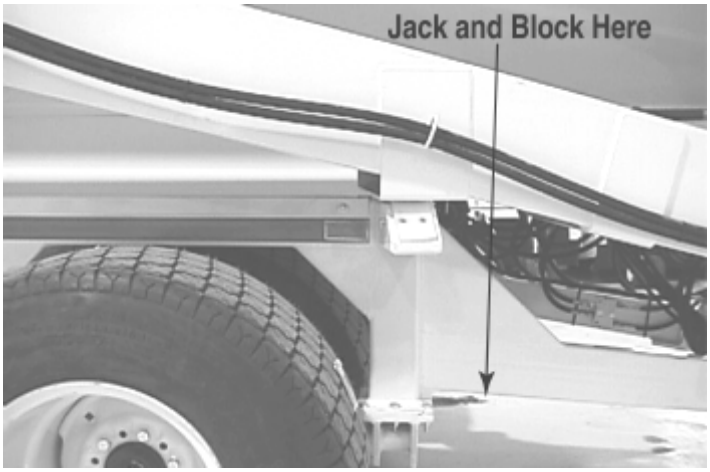
8. Remove the jack stands from beneath the Turf Tender; then lower the jack.

NOTE: Wheel bolt torque must be checked every 10 hours after mounting a wheel until the bolts maintain the proper torque.

CHANGING AN INSIDE TIRE (4-WHEEL MODELS)

Changing an inside tire is slightly more complicated than changing an outside tire since it involves removing the "walking beam" axle assembly and rolling it out from beneath the Turf Tender.

1. Empty all material from the hopper; then chock the wheel(s) on the opposite side of the Turf Tender.
2. With the Turf Tender hooked to a tractor that has the parking brake set, jack up the frame directly in front of the axle mount.



3. Using jack stands, support the frame so it is safe to work beneath. Under no conditions should cement blocks (cinder blocks) or unstable piles of wood blocks be used.

WARNING

Do not perform maintenance of any kind below the Turf Tender unless it is properly secured and stabilized.

4. Remove the walking beam axle mounting bolts and nuts (front & rear). Roll axle assembly out to the rear.
5. Stand the axle assembly on end and remove the wheel bolts; then remove the wheel.
6. Bring the wheel to a tire repair center to fix or replace the tire.

NOTE: Due to the specialized equipment necessary, tire removal, repair, and mounting should be only performed by a tire repair service shop.

7. Place the wheel back into position; then install the wheel bolts. Tighten until snug.

NOTE: Do not lubricate threads.

8. Using a crisscross pattern, tightening wheel bolts to 90 ft-lb (12.4 kg-m).

CAUTION

Do not under or over torque the wheel bolts. Inappropriate wheel bolt torque will result in wheels loosening and possibly falling off.

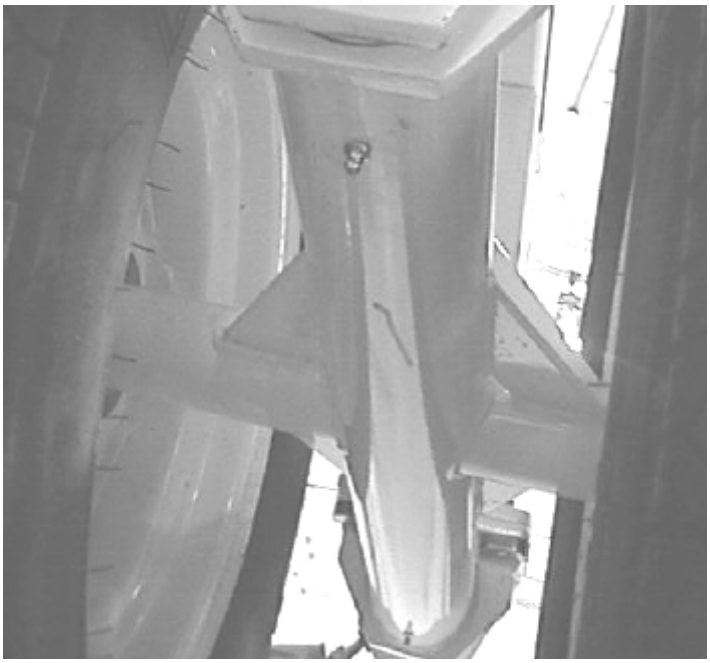
9. Roll the axle assembly back under the Turf Tender and install the eight bolts and nuts securing it to the frame. Tighten the hardware to 75 ft-lb (10.3 kg-m).
10. Remove the jack stands from beneath the Turf Tender; then lower the jack.

NOTE: Wheel bolt torque must be checked every 10 hours after mounting a wheel until the bolts maintain the proper torque.

Axle Lubrication

Larger Turf Tender models come equipped with 2 independent walking beam axles. These axles allow the Turf Tender to follow the contour of the ground better giving you more stability and less chance of damaging turf.

The walking beam axles need regular greasing maintenance. There are grease points on the front and rear of each axle assembly. General lithium grease may be used for a lubricant. See the lubrication schedule for proper lubrication application.

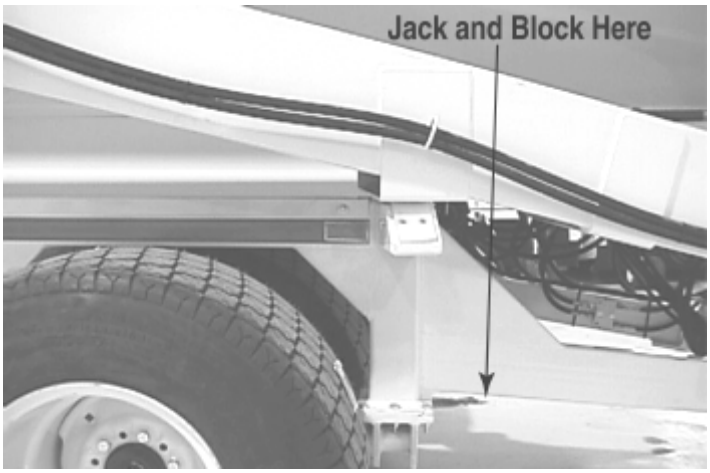


Wheel Bearings

The wheel bearings should be repacked with grease and the seals inspected annually under normal use and conditions. This procedure should be done more often if you are using the Turf Tender every day or if working with extremely abrasive materials or fertilizers.

NOTE: For Turf Tender models with only one wheel on each side, ignore the steps referencing the walking beam axles.

1. Empty all material from the hopper; then chock the wheel(s) on the opposite side of the Turf Tender.
2. With the Turf Tender hooked to a tractor that has the parking brake set, jack up the frame directly in front of the axle mount.



3. Using jack stands, support the frame so it is safe to work beneath. Under no conditions should cement blocks (cinder blocks) or unstable piles of wood blocks be used.

WARNING

Do not perform maintenance of any kind below the Turf Tender unless it is properly secured and stabilized.

4. Remove the eight walking beam axle mounting bolts and nuts (four at the front and four at the rear). Roll axle assembly out to the rear.
5. Stand the axle assembly on end and remove the wheel bolts; then remove the wheels.
6. For each wheel bearing, remove the grease cap.
7. Bend the cotter key straight and remove; then remove the spindle nut and washer.
8. Remove the hub from the spindle being careful not to allow the outer bearing to fall out. The inner bearing will be retained by the seal on the back side of the hub assembly.

NOTE: It is important to protect the wheel bearing bores (inside portion of the hub) from metallic chips and contamination. Ensure the wheel bearing cavities are clean and free of contamination before installing the bearings and seal.

9. Using a suitable solvent, wash all grease and oil from the bearings. Dry the bearing with a clean, lint-free cloth; then thoroughly inspect each bearing. If any pitting, spalling, or corrosion is present, the bearing must be replaced.

NOTE: Bearings must always be replaced in sets of inner and outer bearings.

10. Inspect the seal to assure that it is not nicked or torn and is still capable of sealing the bearing cavity.
11. Pack the bearings with a Lithium complex NLGI No. 2 grease.
12. Assemble the hub (seal, bearings, spindle washer, and spindle nut) back on the spindle being careful to not spill grease on the outside of the spindle (backside) where it could drop onto the brakes.
13. Rotate the hub assembly slowly while tightening the spindle nut to approximately 50 ft-lb (7 kg-m); then loosen the spindle nut to remove the torque. Without rotating the hub, finger tighten the spindle nut until just snug. Back the spindle nut out slightly until the first castellation (slot) lines up with the cotter key hole and insert the cotter key. Spread the legs of the cotter key.

NOTE: The nut should move freely with the only restraint being the cotter key.

14. Install the spindle cap.
15. Install the wheels; then install the axle assembly. Refer to the "Changing an Inside Tire" section for the procedure and proper torque specifications.

ELECTRIC BRAKES

Features

Electrically actuated brakes have several advantages over other brake actuation systems.

1. They can be manually adjusted to provide the correct braking capability for varying terrain and load conditions.
2. They can be modulated to provide more or less braking force, thus easing the brake load on the towing vehicle.
3. They can provide braking independent of the tractor.

Testing the Brake Controller

To perform a quick and easy test on the brake control, use a 12-volt test light (not a voltmeter) and the following procedure:

1. Connect the ground clip from the test light to a solid ground (WHITE wire) and pierce the brake wire (BLUE wire) with the point of the test light.
2. Activate the brake switch and hold. The test light should get steadily brighter in intensity. Release the brake switch and the test light should go out.

This test allows you to quickly see if the brake controller is functioning properly. If the controller tests good with a test light, but will not work properly with a Turf Tender connected, check for a poor connection or broken wire.

NOTE: Minimum vehicle stopping distances are achieved when the wheels approach lockup. Brake lockup should be avoided as it results in poor vehicle stability and control. Depending upon load, driving surface, wheels and tires, not all brakes are capable of wheel lockup under all conditions.

WARNING

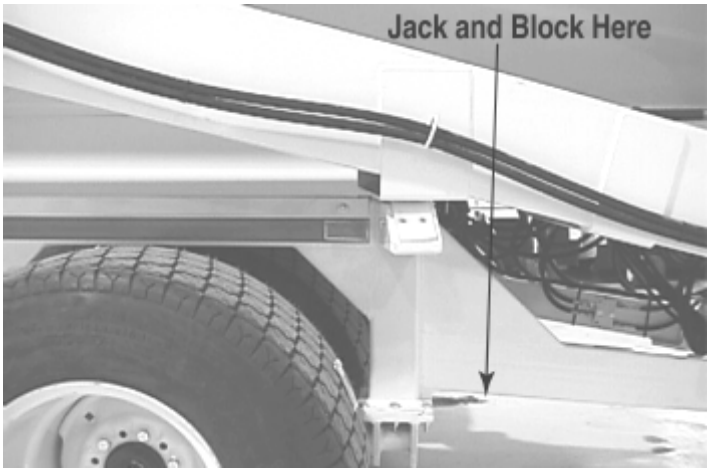
Do not adjust the controller outside the parameters outlined in these instructions.

General Maintenance

BRAKE ADJUSTMENT

Brakes should be adjusted: after the first 10 hours of operation when the brake shoes and drums have "seated," at 300 hour intervals thereafter, and as use and performance requires. To adjust the brakes, use the following procedure:

1. Empty all material from the hopper; then chock the wheel(s) on the opposite side of the Turf Tender.
2. With the Turf Tender hooked to a tractor that has the parking brake set, jack up the frame directly in front of the axle mount. Check that the wheel and drum rotates freely.



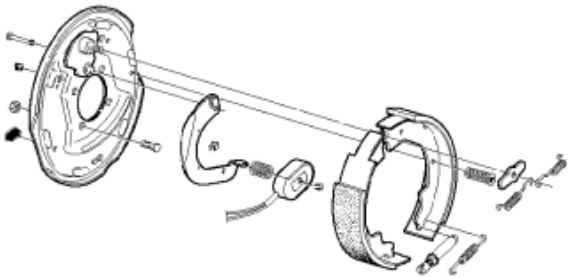
3. Using jack stands, support the frame so it is safe to work beneath. Under no conditions should cement blocks (cinder blocks) or unstable piles of wood blocks be used.

WARNING

Do not perform maintenance of any kind below the Turf Tender unless it is properly secured and stabilized.

CAUTION

Do not lift or support the Turf Tender on any part of the axle or the suspension system. All lifting and support must be done on the frame directly in front of the axle mount point.



4. Remove the cover from the adjusting slot on the bottom of the brake backing plate.
5. Using a screwdriver or standard brake adjusting tool, rotate the starwheel of the adjuster assembly to expand the brake shoes. Adjust the brake shoes out until the pressure of the linings against the drum makes the wheel very difficult to turn.
6. Rotate the starwheel in the opposite direction until the wheel turns freely with a slight lining drag.
7. Install the cover and lower the wheel to the ground. Repeat procedure on all brakes.

BRAKE CLEANING AND INSPECTION

The brakes must be inspected and serviced at yearly intervals (more often as use and performance requires). Magnets and shoes must be changed when they become worn or scored thereby preventing adequate braking. Be sure to clean the backing plate, magnet arm, magnet, and brake shoes.

Make certain that all the parts removed are installed in the same brake and drum assembly. Inspect the magnet arm for any loose or worn parts. Check shoe return springs, hold down springs, and adjuster springs for stretch or deformation; replace if required.

BRAKE LUBRICATION

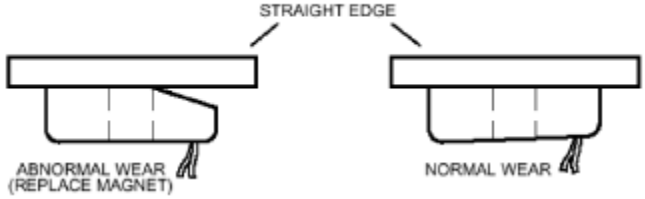
Before assembling, apply a light film of Lubriplate or Anti-Seize compound on the brake anchor pin, the actuating arm bushing and pin, and the areas on the backing plate that are in contact with the brake shoes and magnet lever arm. Apply a light film of grease on the actuating block mounted on the actuating arm.

CAUTION

Do not get grease or oil on the brake linings, drums, or magnets.

MAGNETS

The electric brakes are equipped with high quality electromagnets that are designed to provide the proper input force and friction characteristics. The magnets should be inspected and replaced if worn unevenly or abnormally. Check the magnets for wear using a straightedge.



Even if wear is normal as indicated by your straightedge, the magnets should be replaced if any part of the magnet coil has become visible through the friction material facing of the magnet.

NOTE: It is recommended that the drum armature surface be re-faced when replacing magnets.

Magnets should be replaced in pairs - both outer sets and/or both inner sets. Use only genuine DAKOTA replacement parts when replacing the magnets.

SHOES AND LININGS

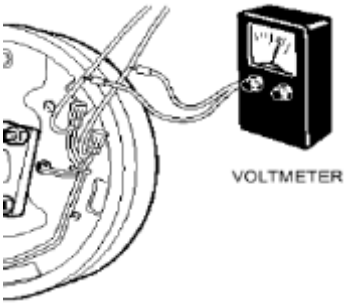
A visual inspection of your brake linings will indicate if they are in need of replacement. Replacement is necessary if the lining is worn to 1/16 in. (1.5 mm) or less, contaminated with grease or oil, or abnormally scored or gouged. Hairline heat cracks are normal in bonded linings and is not a cause for concern. To retain the "balance" of your brakes, it is important to replace both shoes on each brake and both brakes of the same set (inner and/or outer).

Troubleshooting

Most electric brake malfunctions that cannot be corrected by either brake or controller adjustments, can generally be traced to electrical system failure. Mechanical causes are ordinarily obvious, i.e. bent or broken parts, worn out linings or magnets, seized lever arms or shoes, scored drums, loose parts, etc. A voltmeter and ammeter are essential tools for proper troubleshooting of electric brakes.

MEASURING VOLTAGE

Brake system voltage is measured at the magnets by connecting the voltmeter to the two magnet lead wires at any brake. This is accomplished using pin probes inserted through the insulation of the wires dropping down from the chassis. The engine of the towing vehicle should be running when checking the voltage so that low battery voltage will not adversely affect the readings.



Voltage in the brake system is designed to modulate (begin at 0 volts and, as the brake switch is held in the ON position, gradually increase [modulate] to about 12 volts). If no modulation occurs (immediate high voltage applied to the brakes just when the controller begins to apply voltage), adjust and/or troubleshoot the brake system.

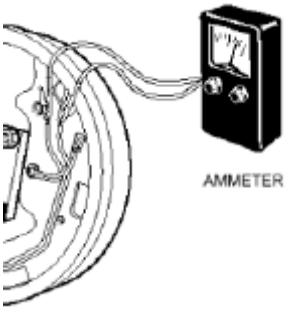
The threshold voltage of the controller is the voltage applied to the brakes when the controller is first applied. The lower the threshold voltage, the smoother the brakes will operate. Too high of a threshold voltage (in excess of 2 volts as quite often found in heavy duty controllers) can cause grabby, harsh brakes.

MEASURING AMPERAGE

System amperage is the amperage being drawn by all brakes on the Turf Tender. The engine of the towing vehicle should be running when checking amperage.

Measure system amperage at the BLUE controller wire (the output to the brakes). The BLUE wire must first be disconnected and the ammeter put in series into the line. Make sure the ammeter has sufficient capacity to handle the current draw of about 6 amps. To prevent damaging the ammeter, be sure to observe polarity.

Individual amperage draw can be measured by inserting the ammeter in the line at the magnet you want to check. Disconnect one of the magnet lead wire connectors and attach the ammeter between the two wires. Make sure that the wires are properly connected and sealed after the testing is completed.



By far, the most common electrical problem is either low or no voltage and amperage at the brakes. Common causes of this condition are:

1. Poor electrical connections
2. Open circuit(s)
3. Insufficient wire size
4. Broken wires
5. Damaged circuit breaker (use of a fuse is not recommended).
6. Improperly functioning switch, controller, or resistors

Another brake system electrical problem may be shorted or partially shorted circuits (indicated by abnormally high system amperage). These are occasionally the most difficult to find. Possible causes are:

1. Shorted magnet coils
2. Defective controller
3. Bare wires contacting a grounded object

Finding a short in the wiring system is a matter of isolation. If the high amperage reading drops to zero by unplugging the wiring harness, the short is in the Turf Tender. If the amperage reading remains high with all the brake magnets disconnected, the short is in the wiring leading to the Turf Tender.

All electrical troubleshooting procedures should start at the control box switch and then to the controller. Most problems regarding brake harshness or malfunctions are traceable to improperly adjusted or non-functioning controllers. See the controller information for proper adjustment and testing procedures previously discussed. If the voltage and amperage are not satisfactory, proceed to the connector and then to the individual magnets to isolate the problem source. 12 volts output at the controller should equate to 10.5 volts minimum at each magnet. **Nominal system amperage at 12 volts with magnets at normal operating temperatures (i.e. not cold and controller at maximum gain) should be about 6 amps with full braking force applied.**

HOPPER CONVEYOR BELT

Belt Adjustment

Due to stretching of the belting material with use, it will be necessary to periodically tighten the conveyor belt. Pressure on the belt and warm temperatures will increase the frequency of belt tightening. The belt should be loosened if the Turf Tender will not be used for an extended period of time or will be moving to a colder operating temperature due to seasonal or geographic changes.

NOTE: If the belt was loosened for storage or any other reason, the belt will need to be tightened before using the Turf Tender.

CAUTION

Always tighten the belt at the front roller. Adjusting the rear roller will affect the material placement on the twin spinners and may affect belt tracking.

To tighten the main conveyor belt, use the following procedure:

1. On drive motor side of the Turf Tender, loosen the two nuts securing the drive motor mount to the hopper frame.
2. Loosen the jam nut on each of the tensioning bolts.

3. Using a ¾ inch wrench, turn each tensioning bolt clockwise 1-2 complete turns. Be sure to make equal adjustments on both sides.

NOTE: Failure to adjust the belt equally on both sides could result in improper belt alignment and damage to the belt. If the belt doesn't stay on track, the belt may not be tightened equally on both sides.

4. Test the belt to see if it is properly tensioned.
5. When the belt is properly tensioned, secure the adjustment by tightening the two jam nuts against the frame and the two drive motor mount nuts.
6. Run the conveyor to make sure belt doesn't slip and remains running on track.

WARNING

Do not attempt to tighten the conveyor belt when the tractor is running or with the Turf Tender operating.

Belt Replacement

SPLICED BELT

If it becomes necessary to replace the spliced main conveyor belt, use the following procedure:

NOTE: DAKOTA sells replacement kits composed of a spliced belt and wire splice pin. The splice pin connects the two halves of the splice.

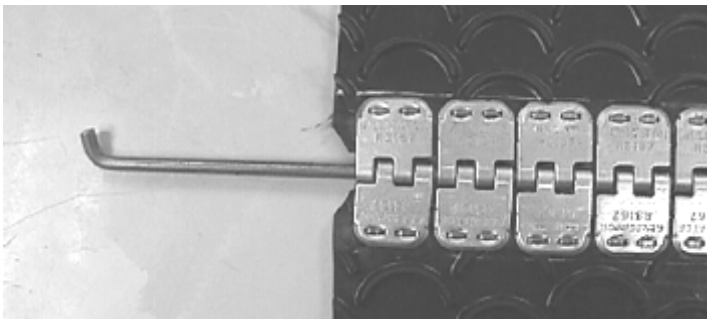
1. Run the conveyor until the belt splice is close to the front of the Turf Tender; then shut the vehicle's engine off.

WARNING

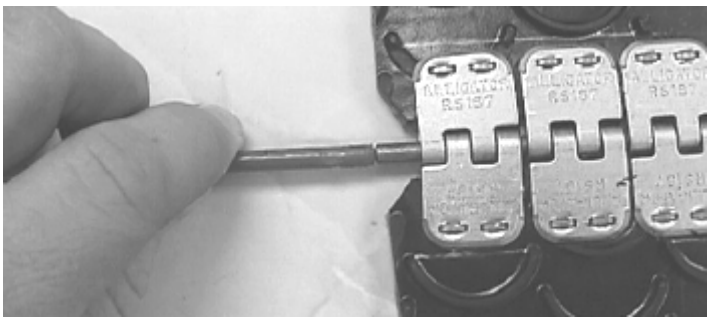
Make sure the vehicle's engine is not running before starting the belt replacement procedure.

2. Loosen the jam nut securing each of the four belt tensioning bolts (on both sides, front and rear).
3. On drive motor side (front and back) of the Turf Tender, loosen the two nuts securing the drive motor mount to the hopper frame.
4. Loosen the four belt tensioning bolts (one on each side of both the front and rear rollers). Make sure you loosen each tensioning bolt the same number of turns.
5. Rotate the loose belt until the splice is at the front of the Turf Tender.
6. Uncrimp or cut off the end of the belt splice securing the hinge pin.
7. Using a steel rod, drive or push the hinge pin out of the splice. The steel rod must be long enough to reach across the entire belt.

NOTE: Once the hinge pin has started to exit the splice, it may be easier to remove by pulling on it with a pair of locking pliers.



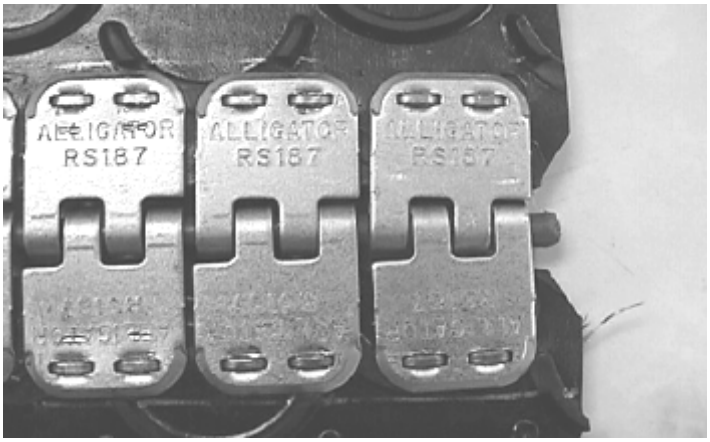
8. Remove the old belt; then place the new belt into position making sure the cups on the topside of the new belt have the open part of the "C" facing to the rear of the Turf Tender.
9. Align the splices of the new belt; then run the steel rod (used to remove the hinge pin) through the splice.



10. Fully insert the new hinge pin into the splice. Use the hinge pin to push the steel rod out of the splice.

NOTE: The steel rod provides splice alignment.

11. Making sure the hinge pin does not stick out beyond either edge of the belt, crimp both ends of the splice so the hinge pin cannot work its way out of the splice.



12. Starting at the rear roller, tighten the tensioning bolts for the rear roller until the horizontal distance from the **flat of the belt to the vertical wall of the chute** behind the rear roller **is 5 1/4 in. (13.3 cm)**. This is a critical distance that provides both alignment (tracking) of the belt and spread pattern control. Measure this distance at both the left and right sides of the belt.
13. Finish tensioning the belt at the front rollers by equally tightening the front tensioning bolts. Using a torque wrench, tighten each of the front tensioning bolts to approximately 35 ft-lb (4.8 kg-m). This is a "ballpark" value since the belt will expand and contract with temperature changes. Ultimately, the best method of tensioning is to have it just tight enough to not slip while unloading material.
14. Test the belt for proper alignment by running the conveyor. Make small adjustments to the rear roller tensioning bolts for this belt alignment fine tuning.
15. When the alignment and tensioning are complete, secure the adjustment by tightening the four jam nuts against the frame and the four drive motor mount nuts (two for each drive motor).

ENDLESS BELT

Before starting to replace the belt, make sure that there is adequate work space around the Turf Tender. Open and secure the front and rear gates. If equipped with a side conveyor, swing the side conveyor to the operating position for full access to both sides of the Turf Tender.

WARNING

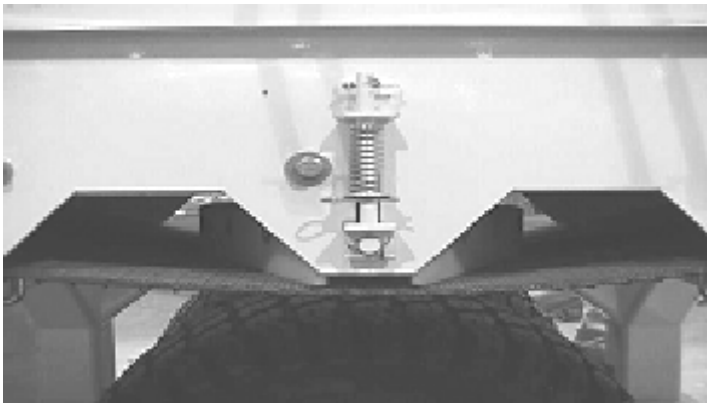
Always shut off the tractor engine when performing maintenance on the Turf Tender.

To replace the belt, use the following instructions:

1. Remove the spinner assembly; then remove both fenders.
2. Remove the front and rear hydraulic motors and mounting brackets.

Note: The hydraulic hoses do not have to be disconnected from the motors.

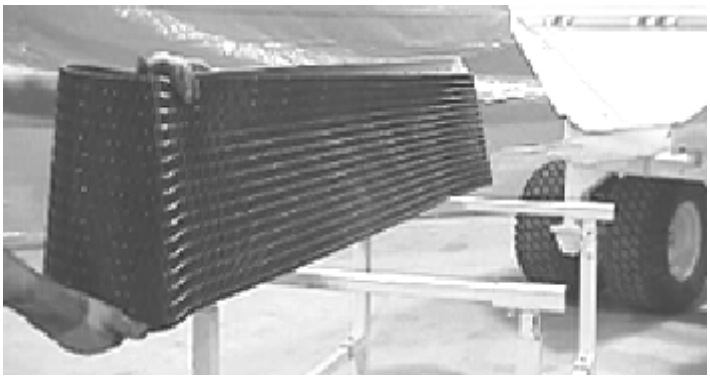
3. Loosen the jam nut securing each of the four belt tensioning bolts (on both sides, front and rear); then loosen the adjusting bolts.
4. Pull the belt to the rear and remove the rear roller; then pull the belt forward and remove the front roller.
5. Remove the diamond wiper located in the center of the hopper.



Note: The diamond wiper is located between the frame of the machine under the fender. It is mounted with the UHMW plastic facing downward.

6. Remove the bolts holding the belt run in place.
7. Set two sawhorses in front of the hopper and pull the belt and belt run out together. If it seems tight, the belt may be removed from the front as well.

8. Roll the belt run over on its side and remove the old belt from the belt run.



9. Slide the new belt over the belt run. Make sure the cups on the belt will face the rear when the belt run is laying down.
10. Together, tip the belt and belt run over making sure that the UHMW is facing up.
11. Gather all slack belting on both the top and bottom and pull to the rear.
12. On both sides of the belt run, rub a small amount of lithium grease along the edge to keep the belt run from sticking when sliding it back into position.
13. Together, slide the belt and belt run into the frame.
14. Line up the belt run with the guide pins (two in front and two in the rear).
15. Start, but do not tighten, all of the belt run bolts.
16. Inspect each roller to be sure that it is centered in the conveyor. Each roller is adjusted with spacers on the motor side. All slack must be pulled to the motor side when aligning the roller. After making sure the roller is centered, place the front roller assembly into position.
17. Pull the slack of the belt to the rear and under the belt run; then place the rear roller assembly into position.

NOTE: To install the roller, insert the roller through the belt at an angle.

18. Install and secure the diamond wiper making sure the UHMW plastic facing downward.
19. Tighten both the front and rear rollers until the belt is snug (not tight). Make sure to tighten each side of both rollers equally.
20. Check to ensure that the belt feels firm when you push down on the inside of the conveyor. The tightness of the belt can be adjusted when tightening the bolts securing the belt run.
21. Tighten all of the bolts securing the belt run. Monitor the tightness of the belt inside the conveyor and adjust as needed during tightening.
22. Install the spinner assembly. Final adjustment of the rollers cannot be made until the spinner assembly is installed. Tighten the tensioning bolts for the rear roller until the horizontal distance from the **flat of the belt to the vertical wall of the chute** behind the rear roller **is 5 1/4 in. (13.3 cm)**. If you are not using the spinner package, make sure that rollers are adjusted equally on both sides.
23. After completing the rear roller adjustment and the roller to spinner setting, finish tightening the belt at the front roller only. Secure each roller adjustment by tightening the jam nuts on the adjusting bolts.
24. Install the hydraulic drive motors with mounting brackets; then install the fenders. Tighten all hardware securely.

SIDE CONVEYOR

Belt Adjustment

On occasion, the tension on the conveyor belt will need to be adjusted. The belt should be loosened when the Turf Tender will not be used for an extended period of time. The belt will need to be tightened after extended periods of inactivity, or when it becomes loose. Heavy use, as well as hot weather, could loosen the belt due to normal stretching of the belting. The belt can only be adjusted at the discharge end of the conveyor.

WARNING

Always shut off the tractor engine when performing maintenance on the Turf Tender.

To adjust side conveyor belt tension, use the following procedure:

1. Loosen the four bolts (two above and two below) securing the motor mount to the frame.

2. Loosen the jam nut on right-hand adjusting bolt.
3. Adjust the adjusting bolts as needed to either loosen or tighten the belt. Make sure both sides are adjusted equally.
4. Test the conveyor for proper tension and to be sure the belt is properly aligned.
5. Tighten jam nut on the right hand adjusting bolt; then tighten the motor mount bolts.
6. Run the conveyor for short period to make sure that the belt stays on track.

It is important that the belt always runs in the proper track. If the belt is allowed to run off track to either side it could become jammed or could wear the belt out prematurely.

Belt Replacement

If it becomes necessary to replace the belt, use the following procedure:

1. Loosen the four bolts (two above and two below) securing the motor mount to the frame; then loosen the jam nut on right-hand adjusting bolt.
3. Adjust the adjusting bolts to loosen the belt. Make sure both sides are adjusted equally; then remove the splice pin.
4. Pull the old belt out of the conveyor.
5. Starting on high end of conveyor, thread the new belt into the conveyor. Make sure V-belt on the inside of the conveyor belt fits in V on roller and that the belting cups are positioned with their open end facing the discharge end of the conveyor.
6. Connect the two ends of the belt with the splice pin; then crimp the ends of the lacing to keep the pin from sliding out.
7. Tighten the belt using the belt tightening procedure. Make sure the belt is tracking correctly.

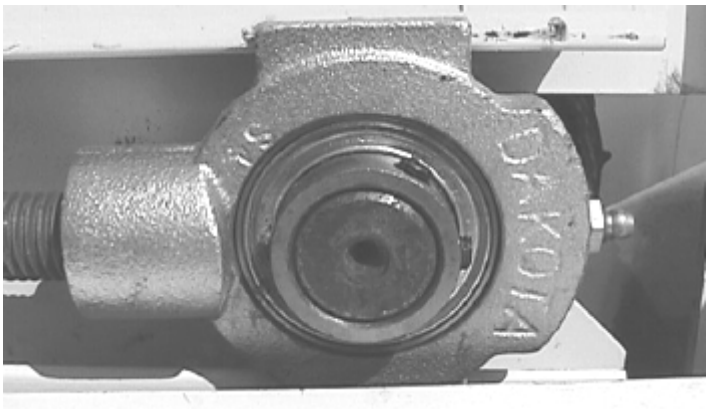
CAUTION

Before operating, always test the Turf Tender after either repair or adjustment.

Regular Maintenance

Regular maintenance of the conveyor system consists of:

1. Regular greasing of the roller's bearings (consult the lubrication chart for recommended lubrication schedule). There is one grease point on each side of both the front and rear rollers.

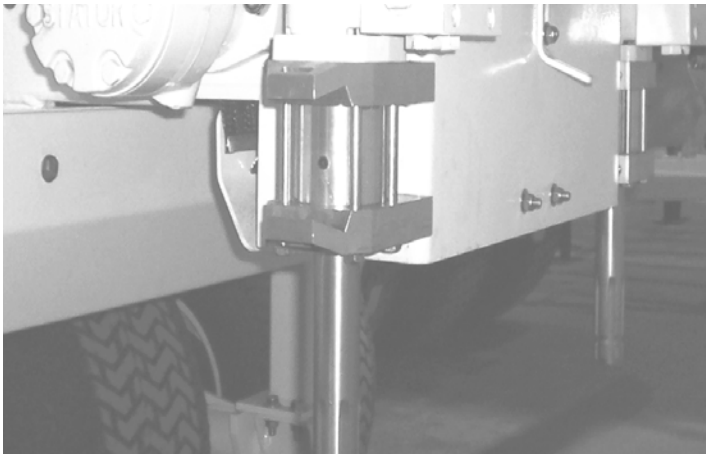


2. Regularly clean and wash the hopper and conveyor especially if hauling potentially corrosive materials such as fertilizer.
3. Keep belt tight when in use.
4. Loosen belt at the front rollers when Turf Tender is not going to be used for an extended period of time. The belt contracts a significant amount as its temperature drops so loosening the belt for winter storage is important.
5. Periodically check belt for tears and wear.
6. Never allow hydraulic fluid to come in contact with the belt. It is made of PVC which provides resistance to fertilizers and other agricultural chemicals but has little resistance to hydraulic fluid.

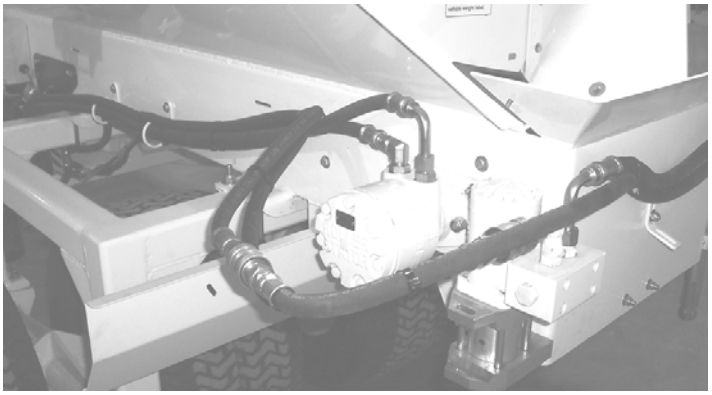
DUAL SPINNER SPREADING SYSTEM

Regular Maintenance

Maintenance of the dual spinner system consists of greasing the bearing on each spinner shaft. There is a total of two (2) grease points on the spinner package (consult the lubrication chart for recommended lubrication schedule).



Periodically check the hydraulic hoses for worn areas and other unsafe conditions (cracks or leaks). This should be part of the safety walk around each time before using the Turf Tender. Pinhole leaks under pressure can pierce skin and inject hydraulic oil under your skin. Never handle hoses while the hydraulic system is pressurized.



Whenever changing spinner blades, thoroughly clean the spinner shafts before installing a different set of spinners. This prevents a buildup of dirt, grease, and other materials. After cleaning, apply Anti-Seize to the shafts.

ELECTRICAL SYSTEM

NOTE: Electrical schematics are available upon request. If problems are experienced with a control box, contact either your dealer or Dakota Peat.

Overview

The Turf Tender electrical system (on all models except the self-contained models which obtains its power from the lighting coil of the engine) obtains its DC electrical power from the vehicle's battery and/or alternator. A power cord is supplied with the Turf Tender to carry the power from the vehicle to the control box; then back to the Turf Tender. The power cord should be installed as a permanent addition to the vehicle. The power cord is plugged into the control box.

Switches and Fuses

Electrical control of actuators (brakes, electric motors and hydraulics) is through the use of ON-OFF type switches located in the control box.

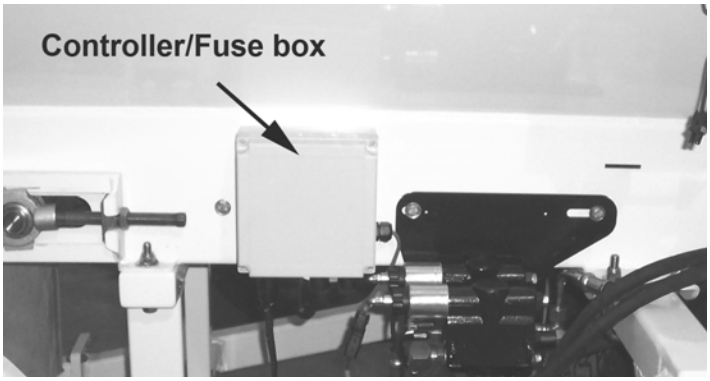
Electric-control models (as opposed to the Manual-control models) use electronic controls for the regulation of the hopper conveyor and spinners hydraulic motor speeds. These are normally set in a specific position during operation and the switches for each turn the electronic controls ON and OFF.

All branch circuits leading to controls and actuators are protected by either fuses or circuit breakers. On 440 and 420 models, the fuses are located in the bottom of the control box. All other models have a controller/fuse box located on the left side of the Turf Tender. Each function of the Turf Tender is fused separately. If a fuse blows, be sure to identify and correct the cause of the blown fuse prior to replacing the fuse. Simple replacement of a fuse normally results in another blown fuse.

Access to the controller/fuse box should be limited to replacement of a blown fuse after correcting the cause. Located within the controller/fuse box are adjustments that may be made to the valve bank controls. These controls have been preset at the factory and should not be changed unless instructed to do so by the factory.

CAUTION

Always replace fuses with fuses of the same amperage. Any adjustments within the controller/ fuse box must be pre-authorized by the factory.



Wiring

All wiring conforms to SAE J1128 standards low tension, PVC insulated, stranded copper wire. The PVC insulation has a 176ºF (80ºC) temperature rating. It is important that wires not be routed through areas having high temperatures.

Exposed wires are also encased in black, abrasion-resistant looming wherever possible. The working temperature range of the loom is -34º to 200ºF (-34º to 93ºC). Again, since this a low temperature plastic, it is important that the wires are not routed near areas with high temperatures.

The connectors used on the Turf Tender are either flat automotive-type connectors or round "cannon" connectors. The control box may contain extra wires for options not ordered. The connectors are designed to "break away" if the wires are pulled from the control box. Should damage result to either a connector or wiring harness, a genuine DAKOTA replacement part should be ordered and installed.

Electric Hydraulic Valves

Electric actuated hydraulic valves are used for the control of all hydraulic circuits. The valves are a replaceable but not repairable item. Depending upon the style, the amperage draw of each solenoid is rated at a maximum of either 1 or 3 amps.

Vibrator Motor

The vibrator uses a carbon brush-type electric motor. The brushes in the vibrator motor are a replaceable item, and after extended use, may need to be replaced.

NOTE: The position of the counterweights inside the vibrator have been preset from the factory and should not be changed.

Problem Diagnosis And Repair

Diagnosing electrical system problems involves identifying the features, components, or functions which are not working properly; then tracking and testing the system back from there. A multimeter and two jumper wires (preferably with alligator clips on the ends) will be needed for these tests. Most tests will be checking for the presence of voltage. Make sure the multimeter is set to **DC volts** (not amps or ohms) prior to conducting these tests.

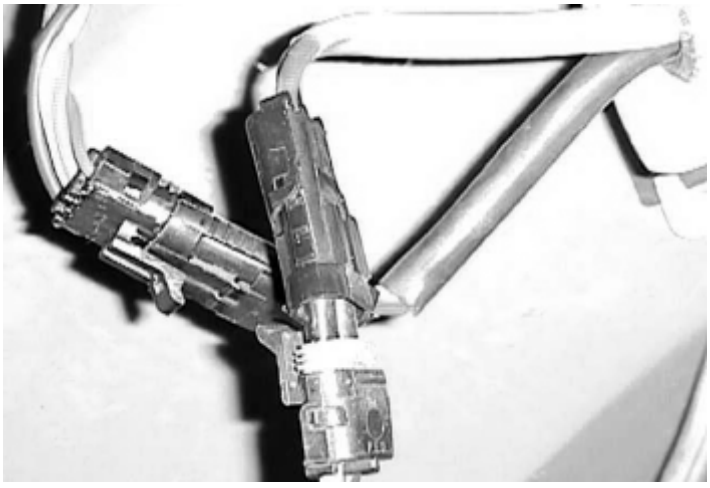
COMPLETE SYSTEM FAILURE

Should the whole system appear to be inactive, including the vibrator and electric front door, when the vehicle's engine is running and supplying electrical and hydraulic power, troubleshoot the electrical system using the following steps. The vehicle's transmission must be in the neutral position and the parking brake set. All tests are to be performed with the engine off so that there is no chance of accidental engagement during the tests.

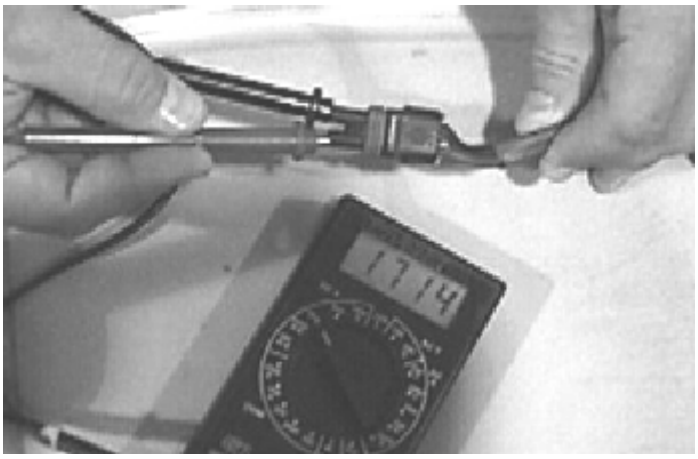
WARNING

Never perform any maintenance or troubleshooting unless the vehicle's engine is off and the parking brake set.

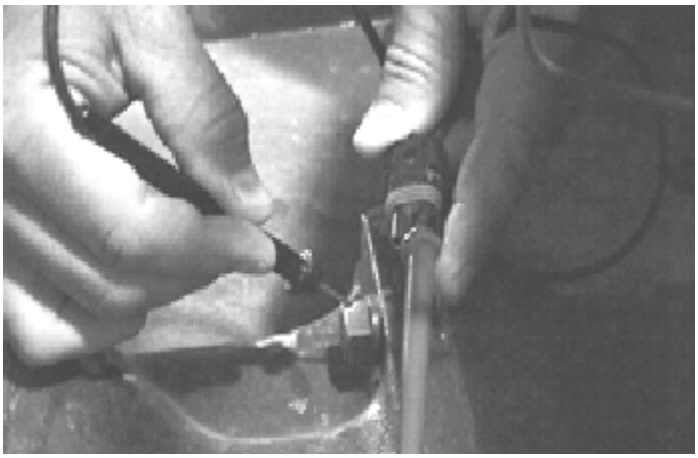
1. Turn the master switch on the control box (if equipped) to the ON position. The red light on the control box should illuminate. If the red light illuminates, the electrical problem is between the control box and the Turf Tender. If the light does not illuminate, the problem is either with the electrical system of the vehicle or in the wiring leading to the control box.
2. Check the main power harness connector at the control box making sure it is clean and making good contact. Clean or replace as necessary.



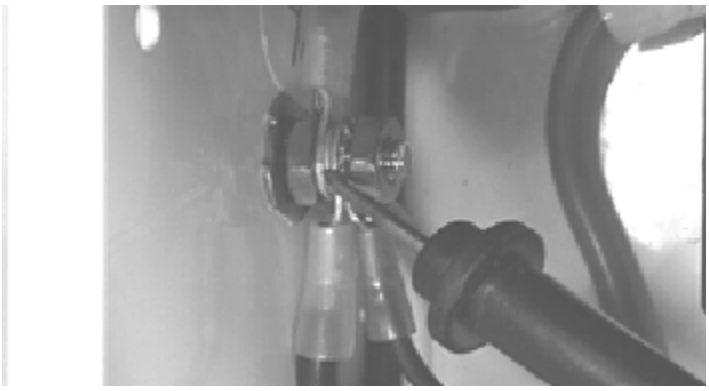
3. Using a multimeter set in the 12 volts DC range, check the voltage at the end of the main power wiring harness. Being sure to observe polarity connect the red test lead from the meter to the red (+) wire and the black test lead to black. **Voltage greater than 11 volts** should be present. Low voltage indicates a problem with either the vehicle's battery or the connections of the main power wiring harness. If there is no evidence of damage to the power wiring harness and the connections are good, connect the main power wire harness to the control box.



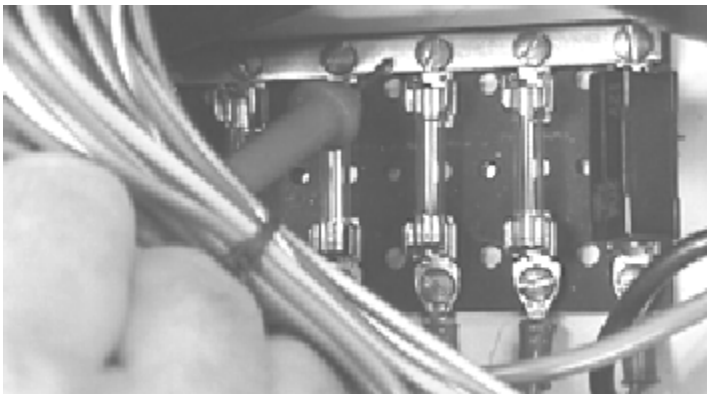
NOTE: If there is a reading of zero volts, move the negative lead from the power wire harness to a bare spot on the chassis of the tractor which will give a good chassis ground. Paint is a poor conductor of electricity. If a voltage is present, there is a problem with the ground (black) wire or it's connection to the battery. Check the connection. If the connection is not the problem, replace the power wire harness.



4. Open the control box, and check the voltage between the chassis ground screw (located on the inner left wall) and the power lead (located on the fuse block). If no voltage is detected, but voltage was present at the end of the main power harness, the problem is in the power pigtail of the control box. Repair or replace as necessary.



5. Check the voltage between the control box's chassis ground screw (on the left side wall) and the brass buss bar running across the top of the fuse block. If there is no voltage detected, check all connections.



WARNING

Prior to closing the control box lid, make sure the rubber sheet is laying over the top of the fuse block. This serves as an insulator to keep the control wires from rubbing on the fuse block and possibly shorting. Failure to do so could result in loss of control, injury, or even death.

FAILURE OF SPECIFIC FUNCTIONS

1. If all functions <u>except the vibrator</u> do not work, there is a problem in either part of the large circular "cannon" plug connector portion of the control box to the Turf Tender wiring harness. Check the connections to ensure that they are fully connected, clean, and not damaged.

If after uncoupling the Turf Tender on trailer-type models, it has happened that the operator drove off without disconnecting the power cable from the tractor and forgetting to return the control box to its storage location the connector may get damaged.

2. If all functions <u>except</u> the vibrator work, the problem is most likely with the small, circular cannon plug connector portion of the wiring harness. Check the connections to ensure they are fully connected, clean, and not damaged.

If the vibrator still does not work, check the voltage at the two pins exiting out of the smaller cannon plug connector on the control box. Make sure they are clean and not damaged.

If no voltage is detected while the vibrator switch is ON, open the control box (or controller/fuse box) and check the fuse. Replace as needed.

If the fuse is working properly, check the voltage at the switch terminal while it is in the ON position. If no voltage is detected, replace the switch. The switch is rated at 12 volts DC, 20 amps. Do not use an underrated switch as a replacement.

Check the voltage at the rear end of the wiring harness coming from the control box. If no voltage is detected, the problem is most likely with the wiring harness coming from the control box. Repair or replace as necessary.

If the wiring harness checks out, visually check all wires going back through the Turf Tender including the connectors behind the valve assembly. If all the wires and connections appear good, there may be a problem with the vibrator's motor. Prior to removal, check for voltage at the motor. The brushes in the motor are consumable parts and are replaceable. Use only original DAKOTA replacement parts.

3. If an individual function does not operate, perform the same tests listed above. The solenoid(s) on the hydraulic valve assembly are not serviceable parts and, although rare, may need to be replaced.

NOTE: The retaining nut on the top of each hydraulic valve section requires only firm hand tightening. Application of excessive force will result in damage to the valve.

HYDRAULIC SYSTEM

Interchange Chart for HDZ-46 Oil	
AMOCO	RYKON MV
CHEVRON	AW HYDOIL MV 46
EXXON	UNIVIS N46
MOBIL	DTE 15 M
SHELL	TELLUS OIL T46
TEXACO	RANDO HDZ46

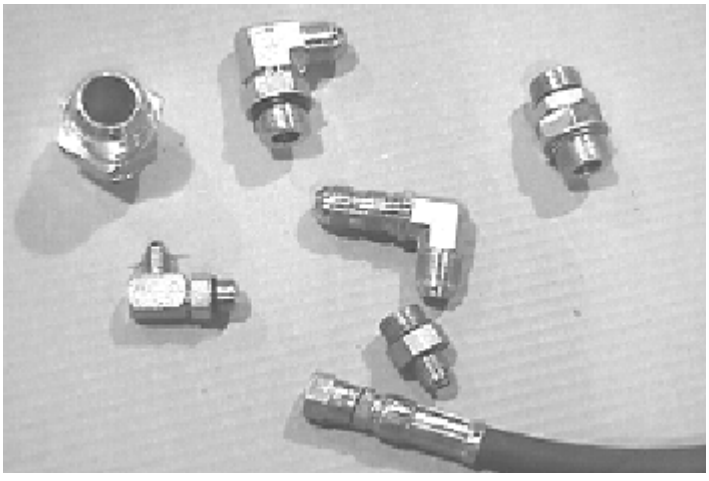
The hydraulic system providing hydraulic fluid to the Turf Tender should be filled with premium grade hydraulic fluid per the recommendations of the vehicle's owner's manual. The oil should be good for at least two years unless one of the following problems occur:

1. If the reservoir is **contaminated with excessive water or dirt**. Hydraulic fluid can hold more than 20% water in solution. Usually at these high levels, the fluid will appear milky. A quick test for water at lower concentrations may be performed outside with a hot (>300°F) sheet of steel. With the sheet heated, drop a small amount of hydraulic fluid in the center of the sheet. If it sputters there is a significant amount of water in the fluid and the fluid should be replaced.
2. If the oil has been **overheated** [above 190° F (87°C)]. The oil will have a foul odor. Do not use oil that has been overheated. The lubricating properties have been destroyed and acids and varnish have been created by oxidation.
3. If a **pump or motor has had a catastrophic failure** resulting in metal fragments and particles entering the fluid. These particles may cause the replacement components to fail before the filter cleans up the system. The filter in a hydraulic system does not filter out 100% of all particles as the fluid passes through it.

After any of the above have occurred, the entire system should be drained, cleaned, and filled with new fluid. A new filter should always be installed after any maintenance to the hydraulic system.

FITTINGS AND HOSES

All hoses and fittings are rated for 3000 psi or greater. All replacement fittings and hoses must meet or exceed this specification.



All components use either an O-ring boss or 37° flare hydraulic fittings. Do not use pipe-threaded hoses or fittings for replacements. Do not use Teflon tape or pipe thread compound. These are not helpful and may cause damage to the system.

Operation

Hydraulic flow is required to operate the Turf Tender functions. With all Turf Tender control switches off, the oil circulates from the hydraulic source through the electric control valves and back to the source with little system flow restriction.

When the conveyor switch is activated, a portion of the oil is directed to the conveyor motor and the remainder is sent to the exhaust port of the valve. The motor return flow is combined with the exhaust flow and the full flow is sent to the spinner valve.

When the spinner switch is activated, a portion of the oil is directed to the spinner motors in series and the return flow is again combined with the exhaust flow and returned to the tractor.

In all switch positions, the tractor relief valve can limit the maximum pressure by dumping oil to the tractor reservoir. This should happen only during a malfunction wherein the desired flow path is blocked. The engine must be shut down immediately as all the engine power is being turned to heat and being absorbed by the hydraulic fluid. The cause of the blockage must be identified and eliminated before the engine is restarted.

A few newer model tractors are capable of producing very high working pressures. In case an operator reverses the flow of the hydraulic fluid by hooking up hoses backwards or by reversing the tractor controls, a check valve has been added to the return (exhaust) line to prevent reverse pressurization and potential failure of seals on the control valve assembly. This check valve hangs down off the left end of the control valve assembly.

Hydraulic Valves

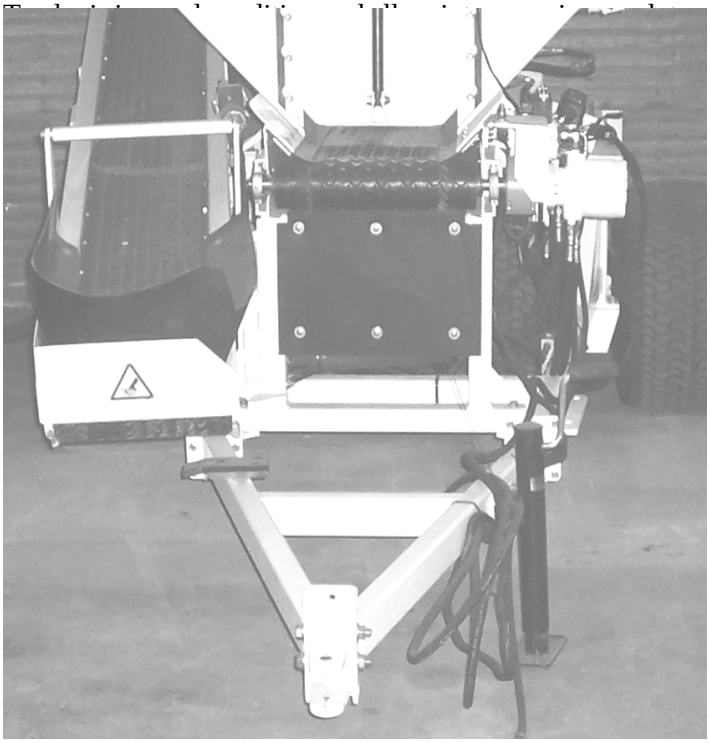
The hydraulic valve package is operated by 12 VDC solenoids which are controlled by toggle switches in the control box. The speed of the spinners and the conveyor belt are adjusted by the rotating knobs.

Hydraulic Schematics

NOTE: Hydraulic schematics are available upon request.

STORAGE

Before storing the Turf Tender for an extended period of time, such as over the winter, it is important to make sure the Turf Tender is in good condition and all maintenance is completed.



Wash the Turf Tender thoroughly to make sure you have removed all corrosive or potentially corrosive materials. Let the Turf Tender dry completely, especially if you will be covering the Turf Tender.

Grease all points that need to be greased. This is a good time to do the annual repacking of the wheel bearings. Otherwise it will need to be done when you remove the Turf Tender from storage.

Relax the tension on the conveyor belt.

Check the air pressure on all tires and fill if needed to maintain recommended pressure. It is usually a good idea to make any needed repairs before storing the Turf Tender. If all repairs and maintenance is completed before storing the Turf Tender, it will be ready for use immediately when you need it.

If you have taken the time to complete these season storage operations, removing the Turf Tender from storage will be easy. Do a safety inspection as you would any time you hook up to the Turf Tender.

If you did not have time to store your Turf Tender properly you may have to do repair work on the Turf Tender before you can use it. Grease any points that need to be greased. Repack the axle bearings if this was not done. Check the tire pressure and fill the tires. Do a complete safety inspection of the Turf Tender to spot any potential problem areas. Fix any problems that you find. Tighten the conveyor(s) to the proper tension. Hose off the layer of dust that has collected on the Turf Tender. The Turf Tender should be ready to use.

LUBRICATION SCHEDULE

ITEM	GREASE INTERVAL
AXLE PIVOTS	150 HOURS
SPINNER SHAFT BEARINGS	25 HOURS
CONVEYOR ROLLER BEARINGS	50 HOURS
SIDE CONVEYOR BEARINGS	50 HOURS
REAR DOOR HINGES	50 HOURS
WHEEL BEARINGS	ANNUALLY

NOTE: Not all items are applicable to all models.

TROUBLESHOOTING

CONVEYOR BELT	
CONDITION - Belt does not start or move	
POSSIBLE SITUATION	**SOLUTION**
Slipping on drive roller (verify by watching end of shaft)	Tighten FRONT take-up bearings evenly
Fuse blown or loose	Find/correct cause; then replace fuse
Damaged/defective switch	Replace switch
Wiring harness disconnected	Connect wiring harness
Relief/dump valve open to tank	Check/repair/replace valve electrical wires
CONDITION - Belt tensioning bolt(s) loosen during use	
POSSIBLE SITUATION	**SOLUTION**
Jam nut loose or missing	Install nut. Adjust belt tension; then tighten
SPINNER SYSTEM	
CONDITION - Erratic spread pattern	
POSSIBLE SITUATION	**SOLUTION**
Spinners installed incorrectly	Install spinners with cups facing rear at center
Blades worn/installed incorrectly	Install correctly/replace blades
CONDITION - Clumps or piles of material spread	
POSSIBLE SITUATION	**SOLUTION**
Material on spinner before starting	Activate spinners before conveyor - leave spinners on if cycling conveyor off and on
CONDITION - Spinner will not turn	
POSSIBLE SITUATION	**SOLUTION**
Fuse blown	Find/correct cause; then replace fuse
Damaged/defective switch	Replace switch
Wiring harness disconnected	Connect wiring harness
Quick-coupler defective	Replace coupler
HYDRAULIC SYSTEM	
CONDITION - Slow or jerky operation	
POSSIBLE SITUATION	**SOLUTION**
Cold hydraulic oil	Run engine and cycle hydraulics
Low hydraulic oil	Check for leaks; add oil
Tractor flow control set too low	Increase flow control
Engine speed too slow	Increase engine speed
Flow checking/faulty quick-coupler	Replace coupler
Drive motor damaged/defective	Service/replace drive motor
CONDITION - Conveyor/spinners operate backwards	
POSSIBLE SITUATION	**SOLUTION**
Hoses connected backwards	Reverse connections
CONDITION - Oil leaks	
POSSIBLE SITUATION	**SOLUTION**
Loose connections	Tighten fittings (do not use Teflon tape)
Damaged hose/fittings	Replace hose/fittings
Damaged fittings/drive motor O-rings	Replace with correct O-rings
CONDITION - Oil overheats or entire system fails to function	
POSSIBLE SITUATION	**SOLUTION**
Low oil supply	Add oil
Plugged filter	Replace filter
Internal leak	Call Dealer
Plugged suction screen	Clean screen
ELECTRICAL SYSTEM	
CONDITION - Battery loses charge while machine not in use	
POSSIBLE SITUATION	**SOLUTION**
Master switch left ON	Turn all switches OFF after use
Wiring harness worn through	Repair/replace wiring harness
CONDITION - Conveyor or spinner speed doesn't change	
POSSIBLE SITUATION	**SOLUTION**
Knob turning on shaft	Align knob and shaft; then tighten set screw
CONDITION - Conveyor or spinners do not operate	
POSSIBLE SITUATION	**SOLUTION**
Master switch in OFF position	Turn switch to ON position
Wiring harness disconnected	Connect wiring harness
Master fuse blown or loose	Find/correct cause; then replace fuse

ELECTRONIC CONTROL OVERVIEW

The following section explains how the electronic control works on the 410, 412 and 414 Turf Tender models. Included in this section are screen shots of the controller, description of control functions and adjustments, and a list of fault codes.

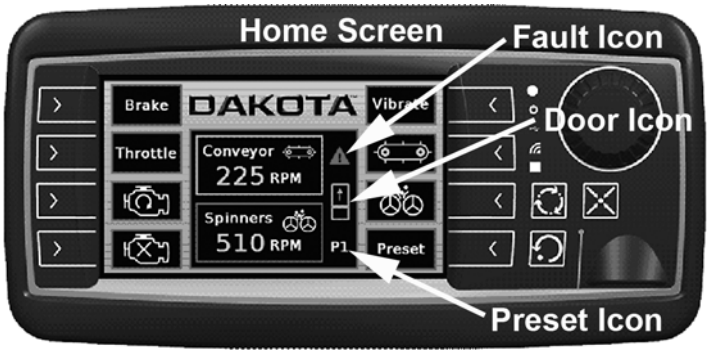
NOTE: Not all functions will apply to your Turf Tender. The controller is programmed for the options on the Turf Tender.

When the switch is turned ON and power is applied to the controller (for approximately 10 seconds) the controller will display the start up screen. After approximately another 10 seconds, a loading bar will appear at the bottom of the screen.

Upon completion of the loading screen, the home screen will be displayed and the controller is now functional. The following hard and soft keys are operational on the home screen. Also, the following will be displayed on the home screen.

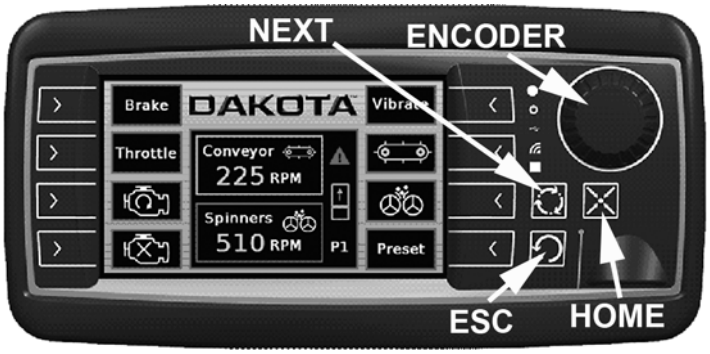
1. Conveyor RPM
2. Conveyor status
3. Spinners RPM
4. Spinners status
5. Fault Icon
6. Preset Icon
7. Door Up Icon

The status of the conveyor and spinners is displayed by icons on the buttons and in their RPM setpoint boxes. The icon will be green in color when the function is ON and white in color when the function is OFF.



Hard Keys

There are four hard keys on the right-hand side of the controller. The **NEXT** button, **HOME** button, **ESC** button, and **ENCODER** dial.



Pressing the following buttons will perform the following functions:

NEXT Changes the display to the next screen

HOME Controller will display the home screen

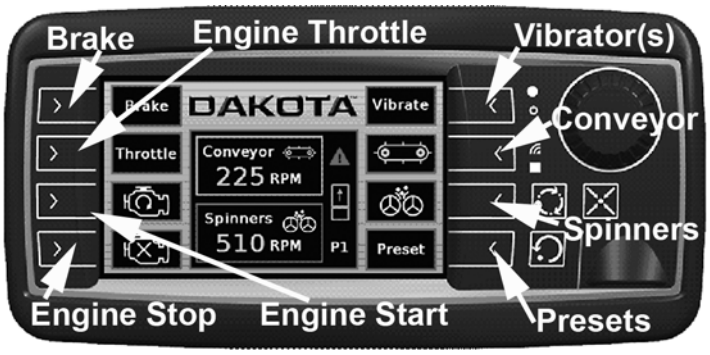
ESC Display will go back to the previous screen

The **ENCODER** dial adjusts the speed of the spinners or conveyor (depending upon which is highlighted by touching the screen on the desired function). Turning the dial clockwise increases the speed; turning the dial counterclockwise decreases the speed.

NOTE: In the Menu screen, the ENCODER dial can adjust the GAIN (pressure) of the brake control.

Soft Keys

The soft keys functions are identified on the display screen and their functions are described following the illustration. Depending upon the options of your Turf Tender, not all functions will apply.



BRAKE Applies the brakes for a period of 2 seconds.. The GAIN of the brakes may be adjusted in the menu screen and the brake adjust button is pressed; then use the ENCODER dial to adjust the GAIN. The GAIN adjustment range is from 10% - 100%.

ENGINE START Pressing the button activates the engine starting circuit.

ENGINE STOP Pressing the button will stop the engine.

THROTTLE When the **Throttle** button is pressed and the Throttle output is OFF, the Throttle output will be latched ON. When the Throttle button is pressed and the Throttle output is ON, the Throttle output will be latched OFF. Pressing the Engine Stop button will also turn the Throttle output OFF.

CONVEYOR Pressing the button will turn the conveyor ON and OFF. When the conveyor is activated, the ENCODER dial can adjust the conveyor speed. If equipped with an electric rear door, the door will open prior to the conveyor starting. When turning the conveyor OFF, the door will close after the conveyor stops.

SPINNERS Pressing the button will turn the spinners ON and OFF. When the spinners are activated, the ENCODER dial can adjust the spinners speed.

The status of the conveyor and spinners is displayed by icons on the buttons and in their RPM setpoint boxes. The icon will be green in color when the function is ON and white in color when the function is OFF.

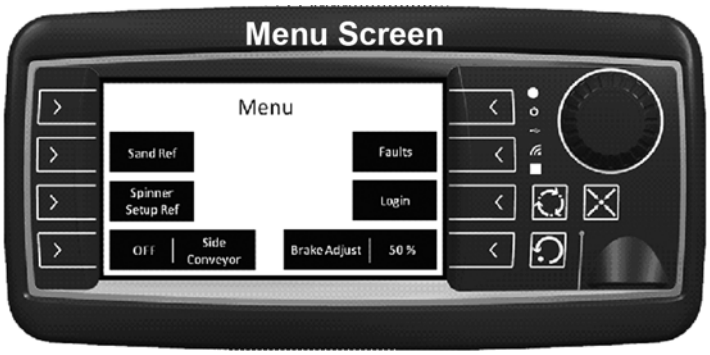
The conveyor and spinners RPM setpoints are adjustable while the function is either OFF or ON. The current setting will then be saved.

VIBRATE Pressing the button will activate the vibrator. When two vibrators are present, one press will activate one vibrator and a second pressing of the button will switch activation (alternate) to the opposite (non-active) vibrator.

PRESETS When the PRESET button is pressed, the 4 buttons on the right-hand side of the screen will change to PRESET buttons 1-4. If one of the buttons is not pressed for 15 seconds, the screen will change back to the home screen. To set a preset, manually set the conveyor and spinner RPM; then press (and hold for 2 seconds) any one of the PRESET (P1-P4) buttons to save the setting. To use a preset, simply press the desired PRESET button (for less than 2 seconds) and the conveyor and spinner RPM will change to the saved values.

If a preset is selected, the icon will show on the Home Screen. If either the Conveyor or Spinner RPM is adjusted while the Preset icon is showing, the icon will disappear.

Menu Screen



The Menu screen will show when the **NEXT** button is pressed from the Home screen.

The Menu screen accesses the following displays:

1. Sand Reference
2. Spinner Setup Reference
3. Side conveyor ON and OFF.
4. Faults
5. Login
6. Brake Adjustment

Side Conveyor

Pressing the **SIDE CONVEYOR** button, will turn the side conveyor ON and OFF. The normal setting of the conveyor is OFF. When the Side Conveyor is ON, the Spinner function will be in the manual mode.

Brake Adjust

When the **Brake Adjust** button is pressed, the **Encoder** knob is active and the GAIN of the brake may be adjusted. Turning the dial clockwise increases the GAIN; turning the dial counterclockwise decreases the GAIN. The GAIN adjustment range is from 10% - 100%. The percentage of gain is displayed on the screen.

Sand Ref

Pressing the **Sand Ref** button will display the Sand Reference chart. The Sand Reference chart shows predetermined settings for spreading sand.

Spinner Setup Ref

Pressing the **SPINNER SETUP REF** button will display the Spinner Setup screen. The Spinner Setup screen shows how to set up the spinners for different spreading widths, patterns, and problems.

Faults

If the proper input is not detected, the fault icon on the Home Screen will be shown. If either a conveyor or spinner fault is detected, the output will then be controlled based on a percentage with no feedback.

Pressing the **Faults** button will display the Active Fault screen. The Active Fault screen will display a table indicating the message fault codes. The fault codes will be displayed as numerical values. Refer to the Fault Code Table for the details. It will also display a **Fault Reset** button. Pressing the **Fault Reset** button will reset all active faults.

- The ECU column indicates which controller the fault is coming from.
- The SPN column indicates what function has a fault.
- The OC column indicates how many times the fault has occurred.
- The FMI column indicates the reason for the fault.

Fault Code Table	
SPNFMI	**Description**
520192-22	Conveyor Output: Open circuit
520192-23	Conveyor Output: Short to ground
520193-31	Conveyor Sensor: No Signal
520194-22	Spinner Output: Open circuit
520194-23	Spinner Output: Short to ground
520195-31	Spinner Sensor: No Signal
520196-22	Brake 1 Output: Open circuit
520196-23	Brake 1 Output: Short to ground
520197-22	Brake 2 Output: Open circuit
520197-23	Brake 2 Output: Short to ground
520198-22	Brake 3 Output: Open circuit
520198-23	Brake 3 Output: Short to ground
520199-22	Brake 4 Output: Open circuit
520199-23	Brake 4 Output: Short to ground
520200-22	Rear Door Up Output: Open circuit
520200-23	Rear Door Up Output: Short to ground
520201-22	Rear Door Down Output: Open circuit
520201-23	Rear Door Down Output: Short to ground

Login Screen

The Login screen will show when the Login button is pressed from the Menu screen. The Login screen is to be used to access either the OEM Setup or the Calibration screens. Entering the appropriate password will access the desired screen. If the password is entered incorrectly, the Login page will reset.

The OEM Setup Password is 438765.
The Calibration Password is 833.

The following will Logout the operator from the Login screen:

- Pressing either the Home or ESC button.
- Power cycle.
- 5 minute timer.

OEM SETUP SCREEN

The OEM Setup screen is used to change the machine settings.

Brakes/Engine - By pressing the Brakes/Engine button, the setting will cycle between OFF*, Engine, 2-Brakes, and 4-Brakes. Default: OFF

Vibrator - By pressing the Vibrator button, the setting will cycle between OFF*, 1 Vibrator, and 2 Vibrators. Default: OFF

Rear Door - By pressing the Rear Door button, the setting will cycle between OFF* and ON. Default: OFF

Max Conveyor RPM - By pressing the Max Conveyor RPM button, the setting will be selected. Turning the encoder dial will adjust the value from 60-120. Default is model dependent. 60 for 410 and 412 models; 100 for the 414.

*If functions are OFF they will be disabled from the program and removed from any screens they would otherwise be shown on. Where they are removed from the screen, bar graphs will be shown instead.

CALIBRATION SCREEN

The Calibration screen is used to change the machine calibration settings. When a button is pressed, the Encoder knob will be linked to the corresponding setting and the icon will change in color. The following variables can be adjusted:

1. Conveyor Min mA
2. Conveyor Max mA
3. Conveyor Ramp Up
4. Conveyor Ramp Dn
5. Spinner Min mA
6. Spinner Max mA
7. Spinner Ramp Up
8. Spinner Ramp Dn

Note: Max spinner mA on 412 and 414 models is 1000.

Timed Power OFF

Timed Power OFF will be ON when the Main Power Switch is turned ON. If the Main Power Switch is turned OFF while the Conveyor is running, all of the outputs will be turned OFF except: Timed Power OFF, Spinner, and Engine Run/Stop (if applicable). A 5 second timer will start and the Rear Door Lower output will be turned ON. After the timer expires all outputs will be turned OFF, causing the controller to turn OFF as well.

Throttle

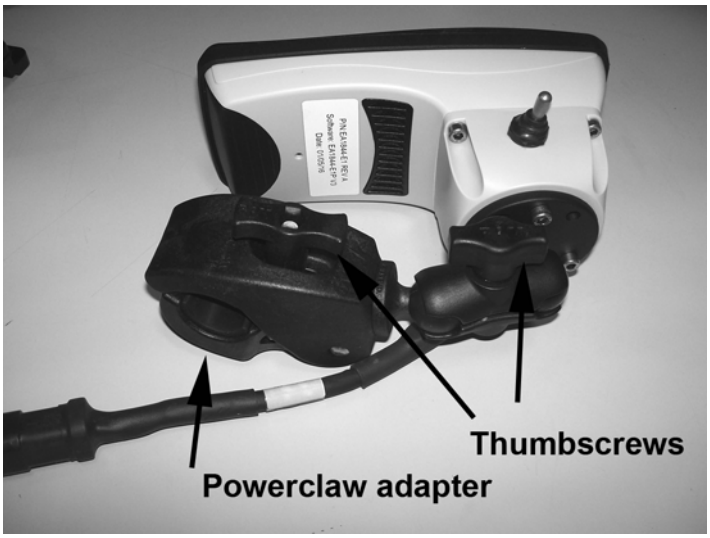
When the **Throttle** button is pressed and the Throttle output is OFF, the Throttle output will be latched ON. When the Throttle button is pressed and the Throttle output is ON, the Throttle output will be latched OFF. Pressing the Engine Stop button will also turn the Throttle output OFF.

CONTROLLER INSTALLATION

Mounting the controller

The controller comes with a 1 in. ball powerclaw adapter. The adapter allows the controller to be mounted in a wide variety of situations and can be rotated for the most visibility by the operator. Once the controller is mounted in the desired position, tighten the thumb screws to secure the controller.

To maximize the operator's view slightly loosen the thumbscrews, adjust the position of the controller, and tight the thumbscrews securely.



Main Power Cable and Harness

The main power cable and harness should be routed according to the appropriate instructions in the beginning of this Turf Tender Operator's Manual.

Be sure observe proper polarity when hooking up the main power cable as the controller will not operate if the polarity is reversed.

Once the power cable and harness have been properly routed, use cable ties to secure all wiring.

Test to be sure the controller powers up after completing the mounting. Troubleshoot and correct wiring installation as needed.

CONTROLLER OPERATION

Turn the ON/OFF switch to the ON position and allow the controller to power up. Once the HOME screen is visible, the controller is fully operational.

The NEXT, ESC, and HOME buttons as well as the ENCODER dial are operational from all screens.

Prior to operation of the Turf Tender, it is highly recommended that the operator go through each of the functions on all screens to become thoroughly familiar with each function and the screen from which it is activated. Practice accessing each function until totally familiar with its function and screen location.

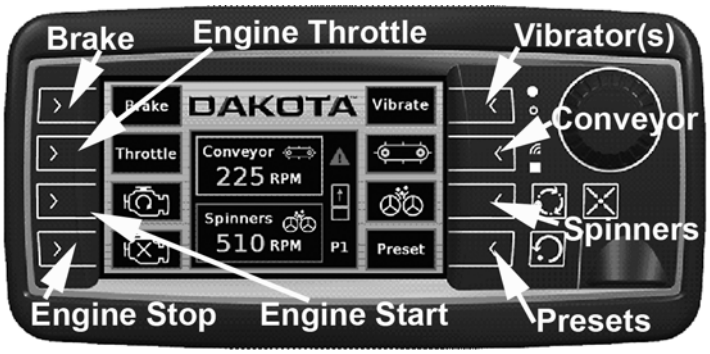
WARNING

Do not attempt to operate the Turf Tender until totally familiar with all controller functions.

Home Screen

Depending upon the features of your Turf Tender, the following buttons are active. Also, upon the initial startup, the ENCODER is tied to the conveyor set point. Pressing the ENCODER button allows the operator to select between the conveyor auto mode or the manual mode. Selecting the spinners; then pressing the ENCODER button allows the operator to select between the spinners auto mode or the manual mode.

NOTE: Remember that conveyor and spinner speeds are also dependent upon the provided hydraulic flow. Initial settings of the conveyor are 70 RPM for 410 and 412 models and 100 RPM for the 414 model. The 412 model may be set at 100 RPM.



When the Brake button is pressed, the Brake output will ramp ON to the Brake Adjustment setting over a 2 second period. When the Brake button is released the Brake output will be turned OFF.

Pressing the appropriate button once allows each of the functions to cycle ON. Pressing the button a second time will cycle the function OFF.

Conveyor
Spinners
Throttle
Vibrate

The status of the conveyor and spinners is displayed by icons on the buttons and in their RPM setpoint boxes. The icon will be green in color when the function is ON and white in color when the function is OFF.

The conveyor and spinners RPM setpoints are adjustable while the function is either OFF or ON. The current setting will then be saved.

NOTE: If equipped with the automatic rear door, cycling of the conveyor will also open and close the rear door.

NOTE: When two vibrators are present, one press will activate one vibrator and a second pressing of the button will switch activation (alternate) to the opposite (non-active) vibrator.

Pressing either the Engine Start or Engine Stop button will perform the function it is identified with.

Pressing the Preset button changes the right-hand side of the view to the 4 presets set previously by the operator. Selecting one of the presets will adjust the functions of Turf Tender to the preset.

Pressing the NEXT button changes the controller screen to the menu screen.

Menu Screen

In the Menu screen, the operator has access to the sand and spinner reference information. The operator can also adjust the GAIN of the brake and turn the side conveyor ON and OFF. Access to the fault screen is made by pressing the fault button.

Pressing the Side Conveyor button will cycle the side conveyor between ON and OFF.

Pressing Brake Adjust button allows the ENCODER dial to change the Gain of the Brake. The amount of GAIN will be indicated in a percentage.

Fault Screen

In the menu screen, press the fault button to bring up the fault screen.

When a fault has been indicated by the fault icon, press the fault button to bring up the fault code table to identify which function is experiencing a fault. Troubleshoot the wiring to the function according to the fault code table. When the fault has been corrected (usually a broken wire, loose connection, or wire grounding on the frame), then press the Fault Reset button to reset the fault.

NOTE: The Turf Tender will continue to operate even with a fault indicated.

Team DAKOTA™

With your purchase of the Dakota Turf Tender™, you have become an important member of Team DAKOTA. Yet we have found that many of the team members do not know all of the components of Team DAKOTA. Team DAKOTA includes many facets including quality tending and blending equipment, laboratory testing services, agronomy services, top dressing material, and material recommendations. Since you are already aware of the quality and function of the Turf Tender, we will inform you of the other Team DAKOTA components.

Blending Equipment

The Dakota Blender™, manufactured by Dakota Blenders, Inc. (another valuable member of Team DAKOTA) is the most thorough blender available in the industry today. For a complete description of the blender, see us on the web at dakotapeat.com or contact us directly at 1 800 477-8415 for the dealer nearest you. If the size of your operation does not justify the purchase of a blender, blending services are available from Team DAKOTA by Dakota Blenders, Inc. or through numerous sand companies that Team DAKOTA has blending relationships with. Check with us for the participating sand company nearest you.

Testing Laboratory

The testing of sand for USGA spec's can be obtained through another member of Team DAKOTA. Dakota Analytical, Inc. is one of eight laboratories world wide accredited by A2LA to be listed on the USGA's web site as one of the labs to be used in the testing of construction materials for greens and other sports fields. Our lab has analyzed hundreds of sand and mix samples since its establishment and is ready to serve any of your needs.

Agronomy Services

Dakota Agronomics provides root zone and greens construction advice, sand sourcing, and maintenance consultation. Our staff has nearly 20 years of experience. All advice is based upon individual customer needs and desires. If you would like to speak to us on any agronomy issues, contact us either on the web or at 1 800 477-3443.

Top Dressing Material

In cooperation with several universities and soil testing laboratories nationwide, Team DAKOTA has developed a highly concentrated organic material called Dakota Peat.

Dakota Peat is formed principally from partially decomposed reeds, sedges, marsh grasses, and other associated plants. These plants have a unique cellular structure that resists further decomposition. Cells with exceptionally high plant feeding ability are essential for successful development of a plant's root system and the right balance of air and water. This makes it an ideal soil conditioner and growing medium.

Dakota Peat is the finest quality peat from selected deposits, carefully processed to maintain its excellent, agronomic horticultural attributes. It is naturally dried by summer sun and winds; then gently packaged by vibrating machines to preserve its unique cellular structure. Dakota Peat is high in organic content, odorless, and free of harmful substances.

Material Recommendations for Use in Greens, Tees Boxes, and Sports Field Maintenance

The Agronomists at Dakota Peat and Equipment have performed thousands of hours of research into top dressing materials and have many recommendations for maintaining a quality green and healthy turf. One such recommendation is using a mix of USGA spec. sand and Dakota Peat in varying ratios for all situations of green and tee box maintenance. Dakota Peat blends can be utilized in sand-to-peat ratios from 80/20 to 90/10 (depending upon the needs of various turf problems or objectives). Simply stated, the facts are that this combination of components will enhance the quality, resiliency and playability of all surfaces and subsurfaces for future use. This applies to normal top dressing, top dressing prior to over-seeding, and top dressing after coring or other soil tillage practices. Using Dakota Peat/sand blends also helps mend the problem spots that may show up on all courses and/or fields from time to time.

Dakota Peat is the "one" amendment which virtually fulfills all dressing needs for healthy growth and maintenance of golf and sports turf. What makes Dakota Peat different from other peat materials and necessary for sand blends? We believe the following points will explain the benefits of Dakota Peat.

- When used with a tested, spec. sand, the resulting Dakota Peat/sand blend increases the water holding capacity of the sand while allowing excellent water infiltration and air exchange for optimum root growth and turf health.
- The Dakota Peat/sand blend retains fertilizer and pesticides in the upper soil horizon thereby maximizing usage and absorption by the turf and target pests. This limits chemical runoff and leaching potential creating a fertilizer and pesticide cost savings while reducing environmental responsibilities. This increase in retention is due to the unique CEC (cation exchange capacity) of Dakota Peat which greatly increases the blend's capacity for stabilization of leachable inputs and its water holding capacity.
- The "near neutral" pH of Dakota Peat continues to provide the best environment for microbial activity that decomposes thatch. This reduction in thatch keeps the turf as healthy as possible since (as we all know), thatch ties up fertilizer, prevents water infiltration, and is a huge disease "reservoir." Thatch also reduces root mass due to poor gas exchange. Even if using an aggressive aeration program, Dakota Peat/sand blends increase positive results by increasing the ability of the "sterile" sand to hold more fertility and water without inhibiting air exchange and water infiltration.
- The humic acid content of Dakota Peat aids in the gas exchange through the soil surface plus water infiltration by promoting soil particle aggregation. Its fulvic acid content helps stimulate root growth into core areas and also into any new root zones.
- Ideal particle size and density allows the Dakota Peat to become "part" of the sand since most of the particles fit the profile of the sand and stay there.

The goal of Team Dakota is to be your one-stop center for all of your golf course and sports field questions, needs, and equipment. For additional information, contact us either on the web at dakotapeat.com or by phone at either 1 800 477-8415 or 1 800 424-3443.