



OPERATOR'S MANUAL

**9s Series
AIR CART**

N58344-00A

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Safety

SAFETY-ALERT SYMBOL



Watch for this symbol. It identifies potential hazards to health or personal safety. It means:

ATTENTION - BE ALERT.
Your Safety is involved.

Familiarize yourself with the location of all decals. Read them carefully to understand the safe operation of your machine.

Signal Words

The words **DANGER**, **WARNING** or **CAUTION** are used with the safety alert symbol. Learn to recognize the safety alerts, and follow the recommended precautions and safe practices.

Three words are used in conjunction with the safety-alert symbol:



DANGER

Indicates an imminently hazardous situation that, if not avoided, will result in **DEATH OR SERIOUS INJURY**.



WARNING

Indicates a potentially hazardous situation that, if not avoided, could result in **DEATH OR SERIOUS INJURY**.



CAUTION

Indicates a potentially hazardous situation that, if not avoided, may result in **MINOR OR MODERATE INJURY**.

Replace any **DANGER**, **WARNING**, **CAUTION** or instructional decal that is not readable or is missing. The location and part number of these decals is identified later in this section of the manual.

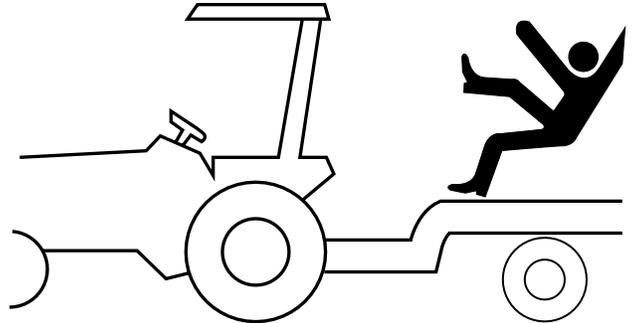
The words **Important** and **Note** are not related to personal safety but are used to give additional information and tips for operating or servicing this equipment.

IMPORTANT: Identifies special instructions or procedures which, if not strictly observed could result in damage to, or destruction of the machine, process or its surroundings.

NOTE: Indicates points of particular interest for more efficient and convenient repair or operation.

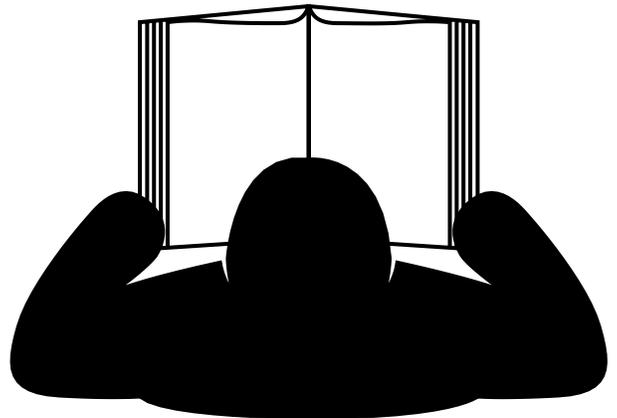
General Operation

- **DO NOT RIDE!!** Do not allow riders on the implement when in motion.
- Do not allow extra riders in the tractor unless an instructor seat and seat belt are available.
- **Check behind** when backing up.
- **Reduce speed** when working in hilly terrain.
- Never allow anyone within the immediate area when operating machinery.
- **Keep all shields in place**, replace them if removed for service work.
- Always lock auger attachment in raised position.
- Keep hands clear of tank opening when closing lid. Keep lid seal clean to ensure proper sealing.
- **Do Not enter tank unless another person is present and the tractor engine has been shut off.**



Tractor Operation

- Be aware of the correct tractor operating procedures, when working with implements.
- Review tractor operator's manual.
- Secure hitch pin with a retainer and lock drawbar in centre position.



Safety

Chemicals

- **Use extreme care** when cleaning, filling or making adjustments.
- **Always read** granular chemical or treated seed manufacturer's warning labels carefully and remember them.
- Wear close fitting clothing and appropriate personal protective equipment for the job as specified by the chemical and/or seed manufacturer.
- **Always wear** safety goggles, breathing apparatus and gloves when handling with granular chemical or treated seed.
- **Do not feed** any treated seed to livestock. Treated seed is poisonous and may cause harm to persons or livestock.
- **Wash exposed skin immediately** - do not leave chemicals on your skin.
- **Properly store** chemicals in original containers with labels intact per the manufacturer's instructions.
- Always follow the manufacturer's operating instructions and warning labels when operating an ammonia tank with the equipment.
- **Do Not enter tank unless another person is present and the tractor engine has been shut off.**



Danger

Failure to comply may result in death or serious injury.

Read Operator's Manual and decals on **Ammonia** tank before operating Air Drill. Become familiar with all warnings, instructions, and controls.

Always wear gloves and goggles when transferring or handling ammonia.

Always stay clear of hose and valve openings.

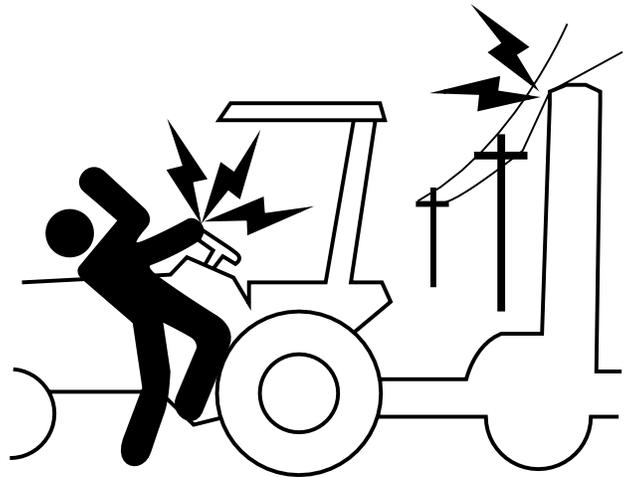
Always be sure pressure is relieved before disconnecting hoses or parts.

Always secure connecting parts and safety chains before towing ammonia trailer.

Always have ample water available in case of exposure to ammonia liquid or gases.

Transporting

- **Be aware** of the height, length and width of implement. Make turns carefully and be aware of obstacles and overhead electrical lines.
- Empty tanks before transporting. Do Not Exceed 20 M.P.H. (32 kph) with an empty air cart.
- Use an agricultural tractor that is large enough with sufficient braking capacity so that the weight of the loaded equipment towed does not exceed 1.5 times the weight of the tractor.
- Use flashing amber warning lights, turn signals and SMV emblems when on public roads.
- Do not transport in poor visibility.
- The slow moving vehicle (SMV) emblem and reflectors must be secured and be visible on the machine for transport.
- Avoid soft surfaces, the additional wing weight on the centre wheels could cause the machine to sink.
- Ensure safety chain is attached correctly to the towing vehicle and the hitch of the air cart.
- Check that wings are firmly seated in transport wing stops, and lock pins installed.
- Secure transport locks on depth control cylinders.
- Be familiar with and adhere to local laws.



Hydraulics

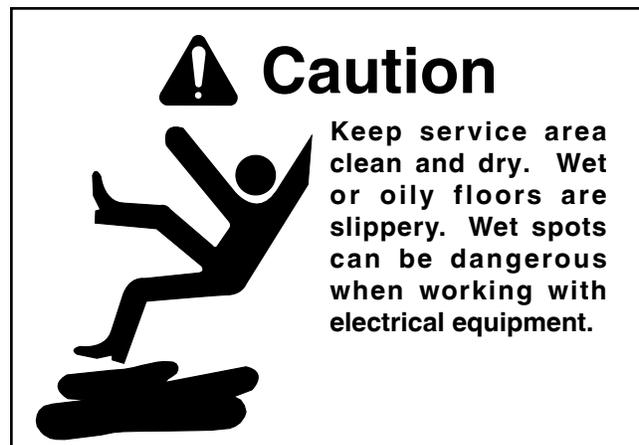
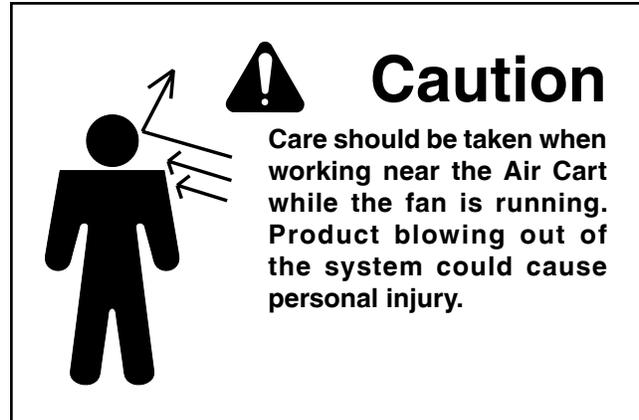
- **Do not** search for high pressure hydraulic leaks without hand and face protection. A tiny, almost invisible leak can penetrate skin, thereby requiring immediate medical attention.
- Use cardboard or wood to detect leaks - never your hands.
- Double check that all is clear before operating hydraulics.
- **Never** remove hydraulic hoses or ends with machine elevated. Relieve hydraulic pressure before disconnecting hydraulic hoses or ends.
- Maintain proper hydraulic fluid levels.
- Keep all connectors clean for positive connections.
- Ensure all fittings and hoses are in good condition.
- Do not stand under wings.



Safety

Maintenance

- **Shut tractor engine off** before making any adjustments or lubricating the machine.
- **Block** machine securely to prevent any movement during servicing.
- Wear close fitting clothing and appropriate personal protective equipment for the job.
- **Always wear** safety goggles, breathing apparatus and gloves when working on seeder filled with granular chemical or treated seed per the manufacture's instructions.
- Do not modify the machine.



Storage

- Store implement away from areas of main activity.
- Level implement and block up securely to relieve pressure on jack.
- Do not allow children to play on or around implement.

Safety Signs

Transmission Side

Tow Behind Shown



CAUTION

To avoid injury, do not open lids while fan is operating. Air gust may contain dust and particles.

N15094

WARNING

Keep off while machine is moving or mechanism is running.

D13705

WARNING

Personal injury or property damage may result from loss of control.

- Always use large enough tractor with sufficient braking capacity.
- > Weight of fully loaded implement should not be more than 1.5 times weight of tractor.
- Maximum recommended towing speed is 20 mph (32 km/h).
- Use flashing amber warning lights and SMV emblem when on public roads, except where prohibited by law.
- Refer to tractor and implement Operator's Manuals for weights and further information.

N24301

WARNING

This implement may exceed maximum road regulations. Before you transport this implement contact a local agency regarding road regulations concerning maximum allowable implement dimensions.

C31201

IMPORTANT

ENSURE THAT ALL WHEEL NUTS ARE TORQUED TO THE FOLLOWING:

- 5/8" Tapered Wheel Nuts - 150 ft-lbs
- 3/4" Flanged Wheel Nuts - 270 ft-lbs

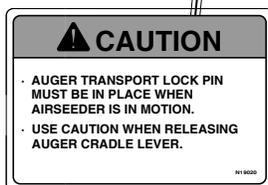
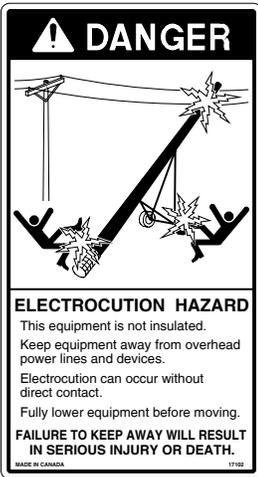
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Safety

Safety Signs - Continued

Auger Side

Tow Behind Shown



Safety Signs - Continued

Fan

Tow Behind Shown



Safety

Lighting and Marking

MORRIS recommends the use of the correct lighting and marking to meet the ASAE standard for roadway travel. Be familiar with, and adhere to, local laws.

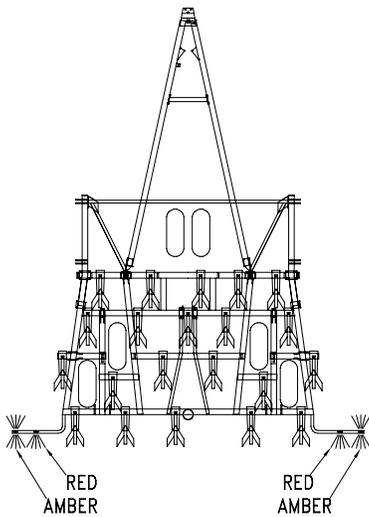
Amber warning and red tail lights secured on the machine promote correct transportation of this implement.

Note: Always replace missing or damaged lights and/or connectors.

Amber warning and red tail lights must be mounted to the rear of the implement and be visible from front and rear. The lights must be within 16 inches (41 cm) of the extremities of the machine and at least 39 inches (99 cm) but not over 10 feet (3 m) above ground level.

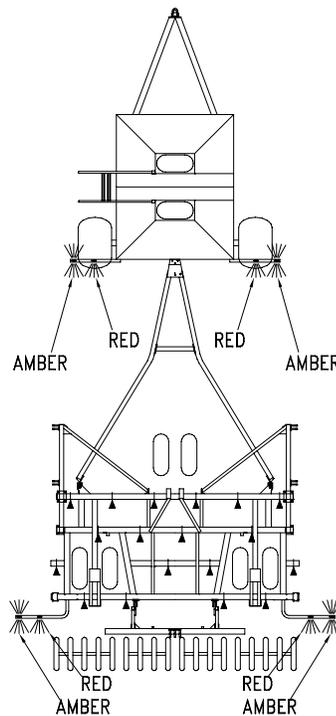
Note: Always replace missing or damage front, side, rear reflectors and SMV emblem.

Tillage Unit



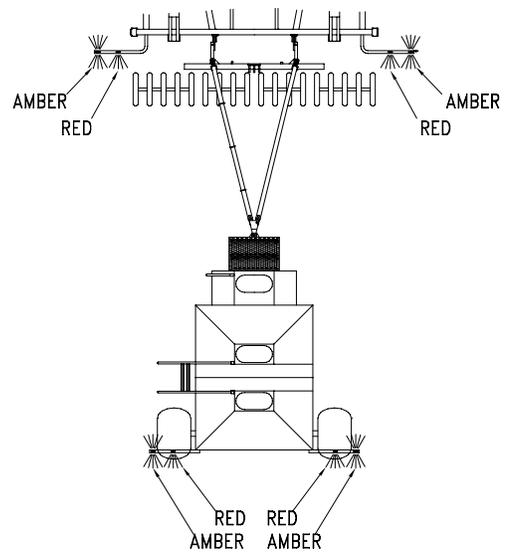
Seeding Unit

Tow Between



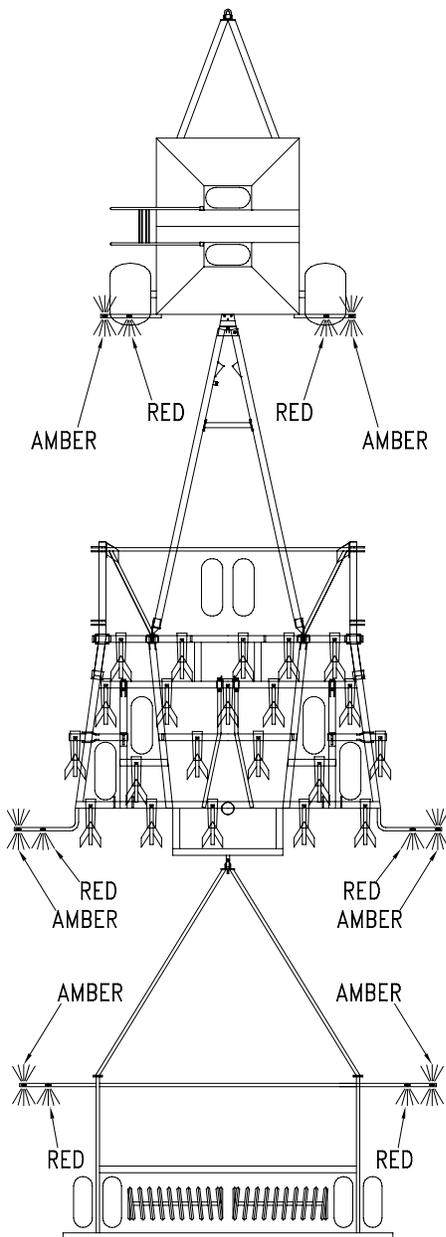
Seeding Unit

Tow Behind

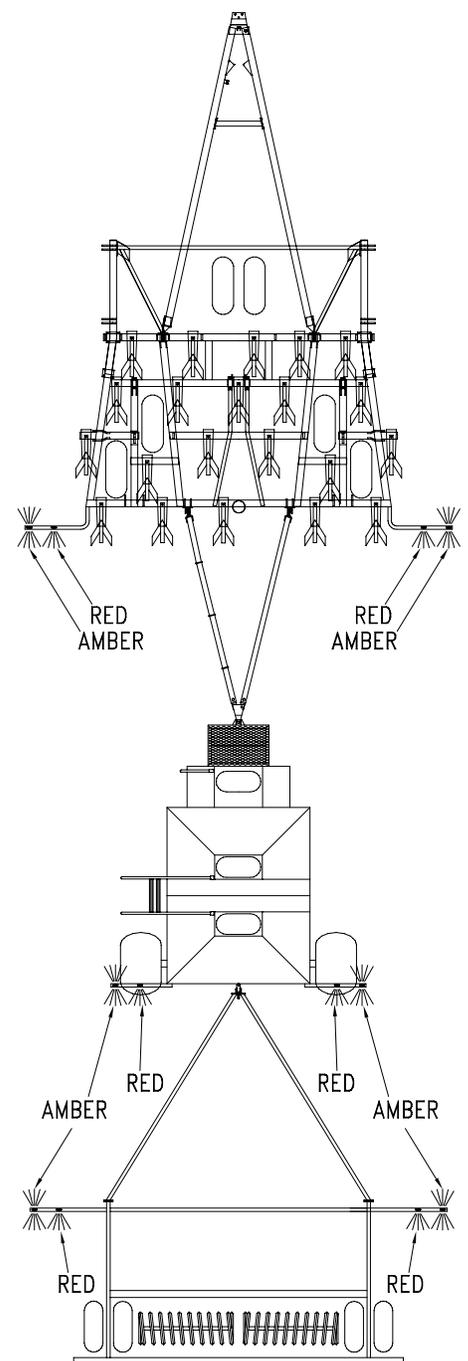


Lighting and Marking - Continued

**Seeding Unit - Tow Between
with Packer Bar**



**Seeding Unit - Tow Behind
with Packer Bar**



Safety

Notes

Section 2: Specifications

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Specifications

9240s Specifications and Options

Model	9240	9240
Configuration	Tow Behind	Tow Between
Length - with auger	25' 8" (7.82 m)	26' 10" (8.18m)
Height	11' 4" (3.45 m)	11' 4" (3.45 m)
Width	12' (3.66 m)	12' (3.66 m)
Weight (Hydraulic Drive)	7,315 lbs (3,325 kg)	6,825 lbs (3,071 kg)
Safety Lights	Standard	Standard
Safety Chain	Standard	Standard
Rear Tow Hitch	Optional	Standard
Tank Capacity - Tank 1	95 bu (3,460 l)	95 bu (3,460 l)
- Tank 2	145 bu (5,270 l)	145 bu (5,270 l)
- Tank 3	Optional 40 cu.ft. (1,129 l)	Optional 40 cu.ft. (1,129 l)
- Total	240 bu (8,730 l)	240 bu (8,730 l)
Tank Screens	Optional	
Tank Access Ladder - Right Hand Side	Standard	
Fan Impeller Diameter	13" (33 cm) - Up to 5,000 r.p.m.	
Hydraulic Drive (Closed Centre or Closed Centre Load Sensing systems required) Hydraulic requirements for Air Cart only at Rated Fan Speed.	12cc - piston type orbit motor 15.5 U.S. gal./min. (59 l/min) at 2,100 p.s.i. (14,469 kpa) VRT requires an additional 5.5 U.S. gal/min (21 l/min)	
Loading Auger	Standard (8" Dia x 20 ft) (20.32 cm Dia x 609.6 cm)	
Tires - Standard (Front)	(2) 21.5 x 16.1 AWT - 10 ply rating Distance Center-Center 38" (97 cm) Optional 3M Axles Center-Center 118" (3 m)	
- Standard (Rear)	(2) 23.1 x 26 AWT - 12 ply rating Distance Center-Center 121" (307cm) Optional 3M Axles Center-Center 118" (3 m)	
- Optional (Front)	(2) 21.5 x 16.1 Rice - 12 ply rating	
- Optional (Rear)	(2) 23.1 x 26 Rice- 10 ply rating	
3 Meter Axles	Optional	
Metering - Ground Driven	Standard	
- Variable Rate (VRT)	Optional	
- GPS Compatible VRT	Optional	
Meter Shut Off	Electric	
Number Secondary Runs - Single Shoot	21 to 80	
Number Secondary Runs - Double Shoot	42 to 160	
Primary Hose - Diameter	2 1/2" (6.4 cm)	
Secondary Hose - Diameter	Standard - 15/16" (2.4 cm) Optional - 1 1/8" (2.8 cm)	
Frame - Trussed	4" x 8" (10 cm x 20 cm) tubing	
Easy Clean Out System	Standard	
Meter Drive Options - Second Clutch (For spot fertilizing on the go)	Standard	
Monitor (Shaft Motion (3), Bin Level (3), Fan Speed, Acre Tally, Ground Speed)	Standard Optional Seed Flow	
Work Switch (Mounted to Seeding Machine)	Optional	

Specifications

9252s Specifications and Options

Model	9252	9252
Configuration	Tow Behind	Tow Between
Length - with auger	25' 8" (7.82 m)	26' 10" (8.18m)
Height	11' 4" (3.45 m)	11' 4" (3.45 m)
Width	12' (3.66 m)	12' (3.66 m)
Weight (Hydraulic Drive)	8,828 lbs. (4,013 kg)	8,348 lbs. (3,795 kg)
Safety Lights	Standard	Standard
Safety Chain	Standard	Standard
Rear Tow Hitch	Optional	Standard
Tank Capacity		
- Tank 1	71.3 bu (2580 l)	71.3 bu (2580 l)
- Tank 2	71.3 bu (2580 l)	71.3 bu (2580 l)
- Tank 3	109 bu (3,970 l)	109 bu (3,970 l)
- Total	252 bu (9,130 l)	252 bu (9,130 l)
Tank Screens	Optional	
Tank Access Ladder - Right Hand Side	Standard	
Fan Impeller Diameter	13" (33 cm) - Up to 5,000 r.p.m.	
Hydraulic Drive (Closed Centre or Closed Centre Load Sensing systems required) Hydraulic requirements for Air Cart only at Rated Fan Speed.	12cc - piston type orbit motor 15.5 U.S. gal./min. (59 l/min) at 2,100 p.s.i. (14,469 kpa) VRT requires an additional 5.5 U.S. gal/min (21 l/min)	
Loading Auger	Standard (7" Dia x 18.5 ft) (18 cm Dia x 564 cm)	
Tires		
- Standard (Front)	(2) 21.5 x 16.1 AWT - 10 ply rating Distance Center-Center 38" (97 cm) Optional 3M Axles Center-Center 118" (3 m)	
- Standard (Rear)	(2) 23.1 x 26 AWT - 12 ply rating Distance Center-Center 121" (307cm) Optional 3M Axles Center-Center 118" (3 m)	
- Optional (Front)	(2) 21.5 x 16.1 Rice - 12 ply rating	
- Optional (Rear)	(2) 23.1 x 26 Rice- 10 ply rating	
3 Meter Axles	Optional	
Metering		
- Ground Driven	Standard	
- Variable Rate (VRT)	Optional	
- GPS Compatible VRT	Optional	
Meter Shut Off	Electric	
Number Secondary Runs - Single Shoot	21 to 80	
Number Secondary Runs - Double Shoot	42 to 160	
Primary Hose - Diameter	2 1/2" (6.4 cm)	
Secondary Hose - Diameter	Standard - 15/16" (2.4 cm) Optional - 1 1/8" (2.8 cm)	
Frame - Trussed	4" x 8" (10 cm x 20 cm) tubing	
Easy Clean Out System	Standard	
Meter Drive Options - Second Clutch (For spot fertilizing on the go)	Standard	
Monitor (Shaft Motion (3), Bin Level (3), Fan Speed, Acre Tally, Ground Speed)	Standard Optional Seed Flow	
Work Switch (Mounted to Seeding Machine)	Optional	

Specifications

9300s Specifications and Options

Model	9300	9300
Configuration	Tow Behind	Tow Between
Length - with auger	25' 8" (7.82 m)	26' 10" (8.18m)
Height	12' (3.66 m)	12' (3.66 m)
Width	12' (3.66 m)	12' (3.66 m)
Weight (Hydraulic Drive)	7,770 lbs. (3,479 kg)	7,325 lbs. (3,296 kg)
Safety Lights	Standard	Standard
Safety Chain	Standard	Standard
Rear Tow Hitch	Optional	Standard
Tank Capacity - Tank 1	120 bu (4,360 l)	120 bu (4,360 l)
- Tank 2	180 bu (6,550 l)	180 bu (6,550 l)
- Tank 3	Optional 40 cu.ft. (1,129 l)	Optional 40 cu.ft. (1,129 l)
- Total	300 bu (10,910 l)	300 bu (10,910 l)
Tank Screens	Optional	
Tank Access Ladder - Right Hand Side	Standard	
Fan Impeller Diameter	13" (33 cm) - Up to 5,000 r.p.m.	
Hydraulic Drive (Closed Centre or Closed Centre Load Sensing systems required) Hydraulic requirements for Air Cart only at Rated Fan Speed.	12cc - piston type orbit motor 15.5 U.S. gal./min. (59 l/min) at 2,100 p.s.i. (14,469 kpa) VRT requires an additional 5.5 U.S. gal/min (21 l/min)	
Loading Auger	Standard (8" Dia x 20 ft) (20.32 cm Dia x 609.6 cm)	
Tires - Standard (Front)	(2) 21.5 x 16.1 AWT - 10 ply rating Distance Center-Center 38" (97 cm) Optional 3M Axles Center-Center 118" (3 m)	
- Standard (Rear)	(2) 23.1 x 26 AWT - 12 ply rating Distance Center-Center 121" (307cm) Optional 3M Axles Center-Center 118" (3 m)	
- Optional (Front)	(2) 21.5 x 16.1 Rice - 12 ply rating	
- Optional (Rear)	(2) 23.1 x 26 Rice- 10 ply rating	
3 Meter Axles	Optional	
Metering - Ground Driven	Standard	
- Variable Rate (VRT)	Optional	
- GPS Compatible VRT	Optional	
Meter Shut Off	Electric	
Number Secondary Runs - Single Shoot	21 to 80	
Number Secondary Runs - Double Shoot	42 to 160	
Primary Hose - Diameter	2 1/2" (6.4 cm)	
Secondary Hose - Diameter	Standard - 15/16" (2.4 cm) Optional - 1 1/8" (2.8 cm)	
Frame - Trussed	4" x 8" (10 cm x 20 cm) tubing	
Easy Clean Out System	Standard	
Meter Drive Options - Second Clutch (For spot fertilizing on the go)	Standard	
Monitor (Shaft Motion (3), Bin Level (3), Fan Speed, Acre Tally, Ground Speed)	Standard Optional Seed Flow	
Work Switch (Mounted to Seeding Machine)	Optional	

Section 3: Checklist

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Checklist

SAFETY-ALERT SYMBOL



Watch for this symbol. It identifies potential hazards to health or personal safety. It points out safety precautions. It means:

**ATTENTION - BE ALERT.
Your safety is involved.**

Manuals

Note: Pre-Delivery Inspection Form must be completed and submitted to Morris Industries within 30 days of delivery date.

Warranty Void if Not Registered

Parts Manual Order Part Number N58348

Assembly Manual Order Part Number N58345

Checklist

Please read the Operator's Manual carefully and become a "SAFE" operator.

Adopt a good lubrication and maintenance program.

General

- Check if assembled correctly.
- Proper chain tension.
- Check hose connections
 - Ensure cleanout door and tank lid are connected correctly.
- Both chains for the quick change transmissions are supplied: One 86 link and one 72 link.

Lubrication - Grease

- Metering Drive
- Axle Pivots
- Auger Pivots

Lubrication - Oil

- Drive chains

Tire Pressure

- See maintenance, section 7

Transport

- Tighten wheel bolts.
- Check hose connections.

OWNER REFERENCE

Model: _____
Serial No: _____
Dealer: _____
Town: _____ State: _____
Phone: _____
OWNER/OPERATOR _____
Date: _____



TAKE SAFETY SERIOUSLY.

**DO NOT TAKE
NEEDLESS CHANCES!!**

Checklist

Notes

Section 4: Introduction

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-------------------	-----

Introduction

Introduction

This Operator's Manual has been carefully prepared to provide the necessary information regarding the operation and adjustments, so that you may obtain maximum service and satisfaction from your new MORRIS 9s Series Air Cart.

To protect your investment, study your manual before starting or operating in the field. Learn how to operate and service your 9s Series Air Cart correctly, failure to do so could result in personal injury or equipment damage.

If you should find that you require information not covered in this manual, contact your local MORRIS Dealer. The Dealer will be glad to answer any questions that may arise regarding the operation of your MORRIS 9s Series Air Cart.

MORRIS Dealers are kept informed on the best methods of servicing and are equipped to provide prompt efficient service if needed.

Occasionally, your 9s Series Air Cart may require replacement parts. Your Dealer will be able to supply you with the necessary replacement parts required. If the Dealer does not have the necessary part, the MORRIS Factory will supply the Dealer with it promptly.

Your MORRIS 9s Series Air Cart is designed to give satisfaction even under difficult conditions. A small amount of time and effort spent in protecting it against rust, wear and replacing worn parts will increase the life and trade-in value.



Keep this book handy for ready reference at all times. It is the policy of Morris Industries Ltd. to improve its products whenever it is possible to do so. The Company reserves the right to make changes or add improvements at any time without incurring any obligation to make such changes on machines sold previously.

The MORRIS 9s Series Air Cart represents the latest in Air Cart design technology. There are three sizes available, a 240 bushel (8,730 liters) cart, a 252 bushel (9,130 liters) cart and a 300 bushel (10,910 liters) cart with hydraulic fan drive. The carts incorporate a four wheel, wide-stance high clearance frame. The high clearance frame gives easy access to the metering wheels and cleanout. The 9240 and 9300 carts have a 60:40 tank split. The 9252 cart has a 30:30:40 tank split. The tank lids are easily accessed by the convenient stairs and tank walk-through.

Each tank has its own metering system and metering drive. Included with the unit is a sample collector box that an operator can use to confirm seeding rates. The meter drives are positive, convenient, simple to set and are ground driven through an electric clutch. The metering system incorporates spiral fluted wheels. The size of the metering wheel is matched to the number of outlets on the secondary divider giving the best in accuracy. The spiral fluted metering wheels combined with the multi-range transmission allows a full range of products like Canola to peas to be seeded without having to change the metering wheels.

The Air Cart comes equipped with a monitor that senses both bin levels, motion of both metering shafts and fan speed. It also gives ground speed and provides an acremeter.

High quality 2 1/2" (64 mm) diameter hose is standard equipment for the distribution system. The patented flat fan divider, which is matched in size to the metering wheel, ensures final accurate distribution of the product.

Introduction

Notes

Section 5: Operation

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CAUTION



BE ALERT

SAFETY FIRST

REFER TO SECTION 1 AND REVIEW ALL SAFETY RECOMMENDATIONS.

Application

The Morris 9s Series Air Cart applies a wide range of seed and granular fertilizer products. It has the capacity to single shoot or double shoot. With the addition of the 9s Series Granular Applicator the Morris 9s Series Air Cart can apply granular herbicide or other fine seeds. With the addition of the Third Tank the Morris 9s Series Air Cart can apply seed and starter fertilizer, while deep banding additional fertilizer at the same time.

Tractor

Tires

- Proper ballast and tire pressure are required when pulling heavy implements.
- Consult your tractor operator's manual and follow all recommended procedures.

Hydraulics

- Wipe all hydraulic fittings and couplers with a clean cloth to avoid contaminating the system.
- Check that hydraulic reservoir is filled to the proper level.

Drawbar

- Centre and pin in a fixed position for easier hitching and greater stability.

Warning

Do not permit smoking, sparks or an open flame where combustible fuels are being used. Keep the work area well ventilated.

Warning

Do not search for high pressure hydraulic leaks without hand and face protection. A tiny, almost invisible leak can penetrate skin, that requires immediate medical attention.

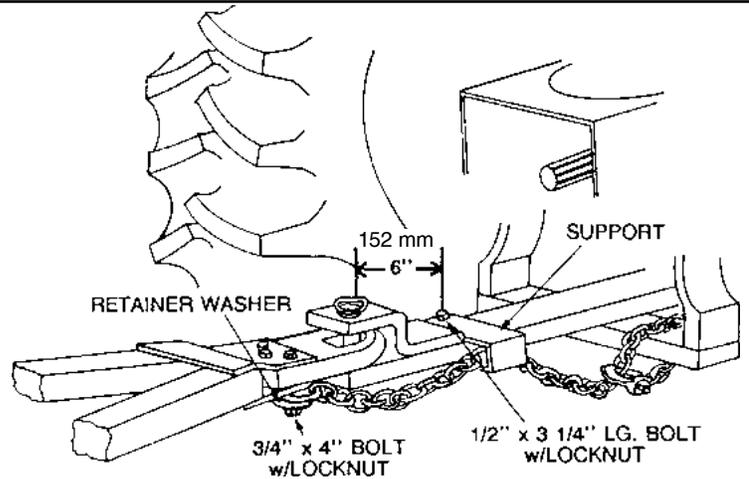
Operation

Hitching



Caution

A safety chain will help control towed machines should it accidentally separate from the drawbar while transporting. A runaway machine could cause severe injury or death. Use a safety chain with a strength rating equal to or greater than the gross weight of the towed machines.



Attach safety chain to the tractor drawbar support or other specified anchor location with the appropriate parts.

Hitching to Tractor (Seeding Tool or Tow Between Cart)

- Ensure swinging drawbar is locked in the centre position.
- Insure hitch pin is in good condition.
- Level clevis with tractor drawbar using hitch jack.
- Back tractor into position and attach hitch clevis to drawbar, using an adequate hitch pin.
- Lock hitch pin in place with a hairpin or other proper locking device.
- After tractor to implement connection is made, relieve pressure off the hitch jack.
- Place hitch jack in raised position.
- Route Safety Chain through chain support and drawbar support.
- Lock safety hook onto chain.

Note: Provide only enough slack in chain to permit turning.

- Ensure hydraulic hose quick couplers are dirt free.
- Inspect all fittings and hoses for leaks and kinks. Repair as necessary
- Connect the hydraulic hoses to the tractor quick couplers.



Caution

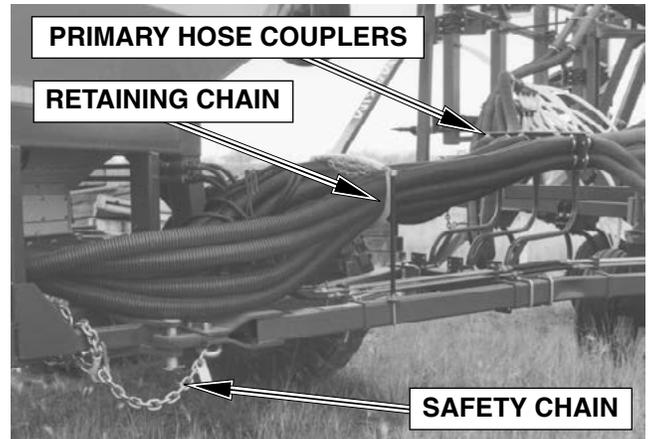
Dirt in the hydraulic system could damage O-rings, causing leakage, pressure loss and total system failure.

Hitching to Seeding Tool (Tow Between Cart)

- Connect seed cart to tractor.
- Back seed cart into position, aligning seeding tool hitch with seed cart.
- Attach hitch to seed cart with 1 1/2" x 6 1/2" pin and retain with a 1/4" hair pin.
- Attach Safety Chain to seed cart.

Note: Provide only enough slack in chain to permit turning.

- Connect hydraulic hose quick couplers.
- Connect the primary hose couplers.
- Loop retaining chain around the primary hoses with the secondary hose over the bottom half of the chain.



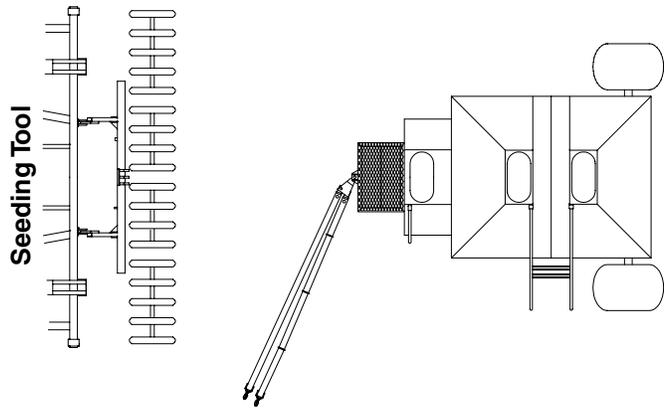
Primary Hose Coupler - Tow Between Shown

Operation

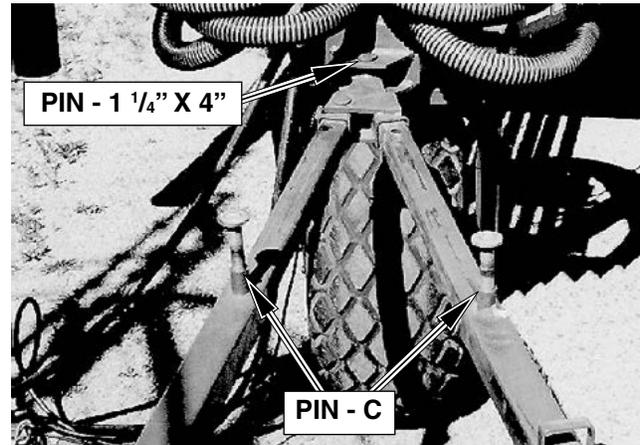
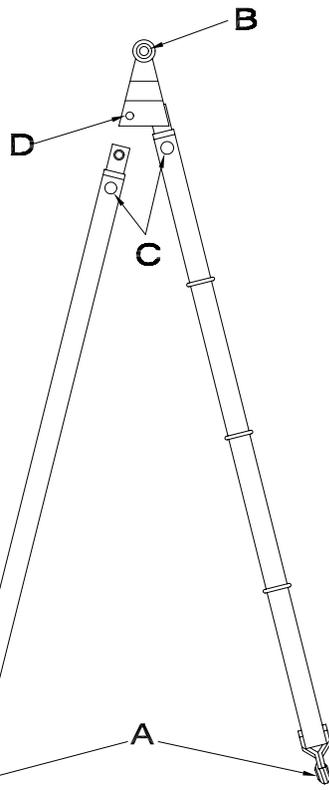
Hitching to Seeding Tool (Tow Behind Cart)

- Connect seeding tool to tractor.
- Attach hitch to air cart with 1 1/4" x 4" pin.
- Back seeding tool into position with seed cart.
- Extend the telescopic hitch arms and connect the seed cart to seeding tool using 1 1/8" x 3 11/16" pins.
- Block the tires of the seed cart and insert the 1" x 5 13/32" pins into their bushings.
- Slowly back seeding tool toward seed cart until the telescopic arms are fully retracted and the pins drop through the hitch tube locking the hitch poles.
- Retain the pins with Click Pins.
- Attach Safety Chain to seed cart.

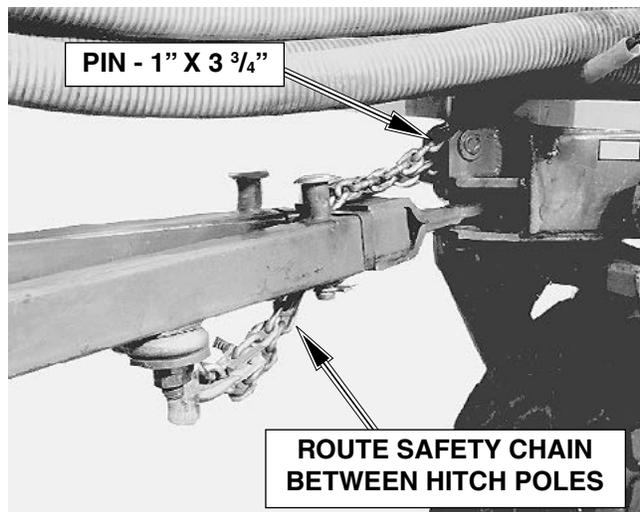
Note: Provide only enough slack in chain to permit turning.



Pin Size	
A	1 1/8" x 3 11/16"
B	1 1/4" x 4"
C	1" x 5 13/32"
D	1" x 3 3/4"



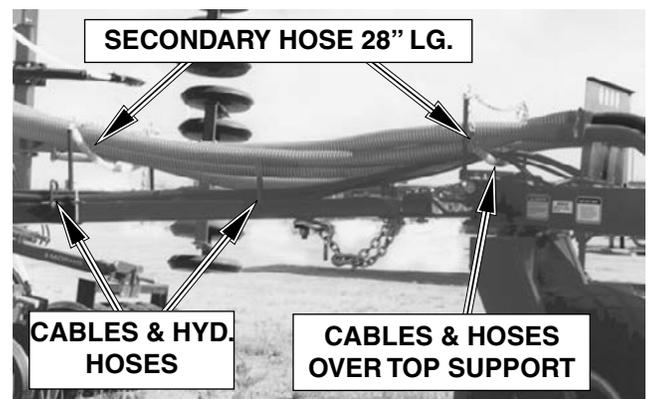
Hitch Extended



Safety Chain

Hitching to Seeding Tool (Tow Behind Cart) - Continued

- Route clutch and monitor wires and hydraulic lines through rear retaining chain with the secondary hose over the bottom half of the chain.
- Route clutch and monitor wires through the loops on the left hand hitch pole.
- Route the hydraulic lines (if any) through the loops on the left hand hitch pole.
- Connect the primary hose couplers.
- Loop retaining chain around the primary hoses with the secondary hose over the bottom half of the chain.
- Connect the monitor and clutch quick connectors at both the tractor/seeding tool and the seeding tool/air cart connections.



Hoses with correct amount of sag



Primary Hose Coupler - Tow Between Shown

Operation

Hitching to Seeding Tool (Tow Behind Cart) - Continued

Hydraulic Connections

- Connect the monitor and clutch quick connectors at both the tractor/seeding tool and the seeding tool/air cart connections.
- **If hydraulic fan drive**, then connect the fan hydraulic quick couplers at both the tractor/seeding tool and the seeding tool/air cart connections. Ensure couplers are clean and dirt free.



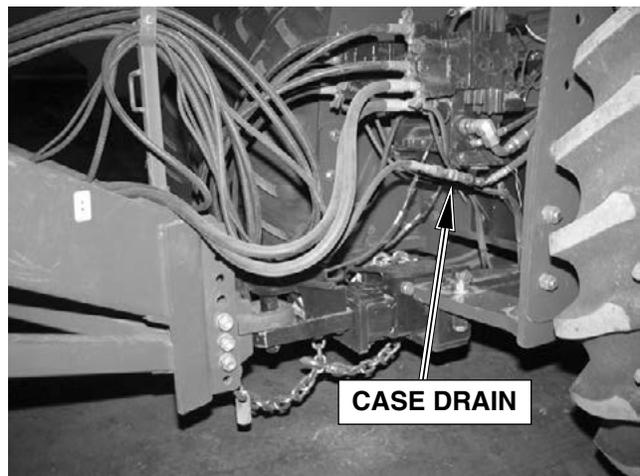
Seeding Tool Coupling



CAUTION

Hydraulic oil under pressure can penetrate the skin causing serious injury. Avoid personal injury by relieving all pressure, before disconnecting hydraulic hoses.

Note: The 3/8" (10 mm) diameter hose must be run directly into the hydraulic tank otherwise damage will occur to the seal in the motor. If the hose is run through the filler cap then ensure the cap is *VENTED*. A quick coupler can still be used between the tractor and the seeding tool.



Hydraulic Coupling on Tractor

Unhitching from Tractor (Seeding Tool or Tow Between Cart)

- Pin hitch jack in storage position.
- Lower hitch jack taking the weight off the air cart clevis.

Note: For added Safety it is recommended to unload any material that may be in the tanks.

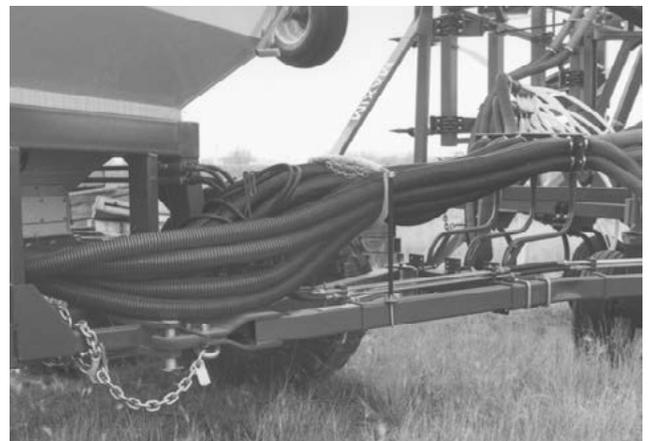
- Ensure all transport locks are properly secured. Refer to seeding tool manual for more details.
- Relieve pressure in the hydraulic hoses by positioning tractor hydraulic lever in “float” position or turn tractor engine off and cycle lever back and forth several times.
- Disconnect the hydraulic hoses.
- Disconnect the clutch and monitor cables.
- Remove the safety chain.
- Remove the drawbar pin.
- Slowly move tractor away from seeding tool or tow between cart.



Tow Between Cart

Unhitching from Seeding Tool (Tow Between Cart)

- Lower hitch jack taking the weight off the seeding tool hitch poles.
- Relieve pressure in the hydraulic hoses by positioning tractor hydraulic lever in “float” position or turn tractor engine off and cycle lever back and forth several times.
- Disconnect the primary hose couplers.
- Disconnect the hydraulic hoses.
- Remove the hitch pin.
- Slowly move seed cart away from seeding tool.



Tow Between Cart

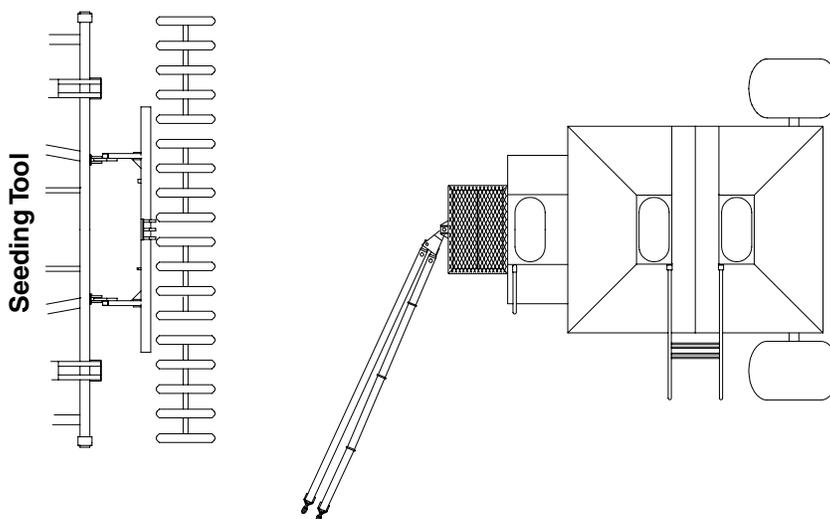
Operation

Unhitching from Seeding Tool (Tow Behind Cart)

- Lower hitch stands, if so equipped, taking the weight off the hitch poles.
- Relieve pressure in the hydraulic hoses by positioning tractor hydraulic lever in “float” position or turn tractor engine off and cycle lever back and forth several times.
- Disconnect the primary hose couplers.
- Disconnect the hydraulic hoses.
- Disconnect the clutch and monitor cables.
- Remove the hitch pins.
- Move hitch poles to the side of seed cart, if not equipped with hitch stands.
- Slowly move seeding tool away from seed cart.



Seeding Tool Coupling



Transport

Observe all applicable safety precautions under transport heading in Safety, Section 1.

- Refer to Specifications, Section 2 for weight, transport height and width.
- Transport with tractor only!
- Use Tow Hitch when transporting without seeding tool. (Tow Behind Units)
- Always connect safety chain provided to the towing vehicle and the hitch of the seed cart.
- Do not transport with the fan running.
- Disconnect main drive chain when towing air cart a long distance.
- Ensure all transport pins are secured.

Speed

- Always travel at a safe speed. Do Not Exceed 20 M.P.H. (32 kph) with an empty air cart.
- The combined weight of the implements being towed, including material in tank, **must not exceed 1.5 times** the weight of towing vehicle.
- **REDUCE SPEED** with material in tank. **Do Not** Exceed a speed of 10 M.P.H. (16 kph).
- Use additional caution when towing loads under adverse surface conditions, when turning, and on inclines.

Lights

- Ensure proper reflectors are in place, refer to Safety Section 1.
- Be familiar with and adhere to local laws.

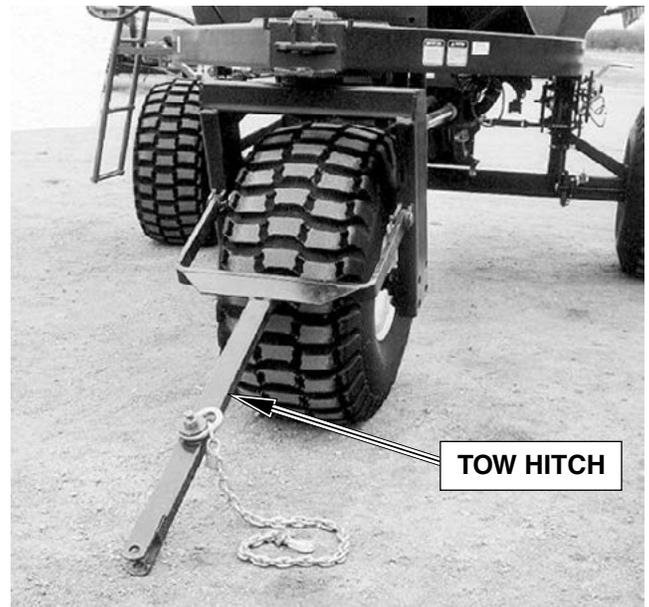
Tow Hitch (Tow Behind Units)

- Attach tow hitch to front axle with two 1" x 2 1/4" pins.
- Retain the pins with klik-pins.
- Use tow hitch when towing without seeding tool.
- **Do not** use tow hitch with material in tank.
- **Do not install transport lock pin in front castor fork when using tow hitch.**

MORRIS INDUSTRIES LTD. WILL NOT BE RESPONSIBLE FOR ANY DAMAGES OR OPERATOR INJURY RESULTING FROM NON-USE OR IMPROPER USE OF TRANSPORT LOCKS.

Important

When the machines are being towed by a semi tractor or trucks of any description, the units **HAVE to be towed separately from seeding tool with tow hitch provided.**



Tow Hitch

Important

DO NOT EXCEED 20 M.P.H. (32 kph)

The front castor tire will contact the mud scraper if towing speeds exceed 20 M.P.H. (32 kph) causing severe damage to the tire and mud scraper.

Operation

Transport - Continued

Disconnect Main Drive Chain:

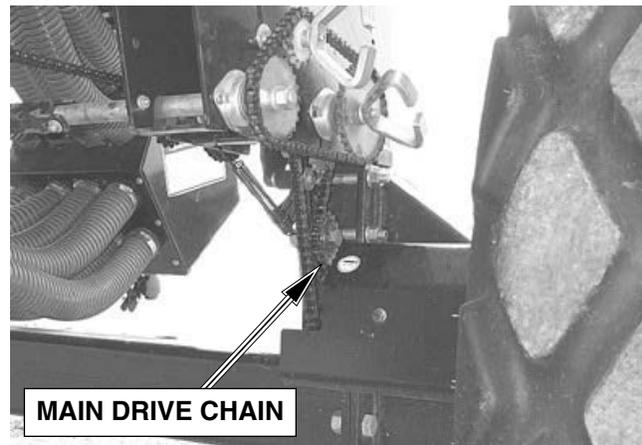
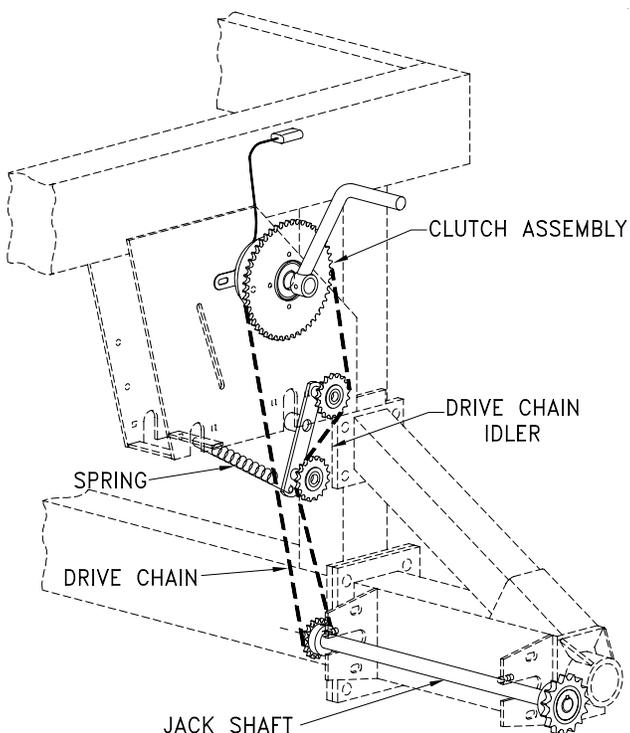
When travelling any distance the drive chain should be removed to prevent premature wear on the drive.

- Remove spring from the bottom idler.
- Remove chain from the jackshaft.
- Insert end of spring through the chain and hook other end of spring to the top idler as shown.



Installation of Main Drive Chain

- Unhook idler spring.
- Position chain on the jackshaft and idler sprockets as shown.
- Connect idler spring to transmission brace with idlers as shown.



Metering System

The 9s Series Air Cart uses a combination of metering wheels and spacers shown below. The metering wheel is individually sized to correspond to the number of outlets at the connected secondary head and the spacers make up the space between the wheel and the body. Some openings may be blanked off depending on the number of secondary divider heads used on the seeding tool.

The 9s Series Air Cart can meter all types of seeds and fertilizers by simply adjusting the slider plates. See "Slider Settings" for more details.

Different rates are easily obtained using the selection of quick change sprockets that attach to either of the two meter transmissions.

Note: Before putting product into the tanks check the following:

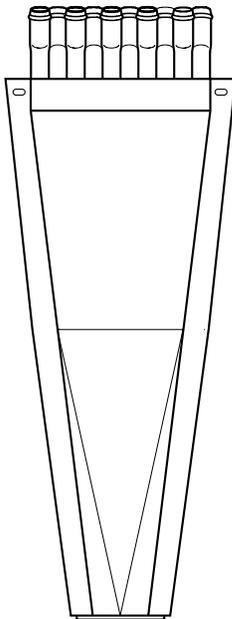
- (a) The slider plates are set correctly for product being applied.
- (b) The Clean-out doors are fully closed and sealed.
- (c) The plastic bag covering the fan is removed.

Important

Ensure distribution system is balanced. It is very important that head outlets only vary by one . (i.e. use only 7 and 8 together, 8 and 9 together, 9 and 10 together)

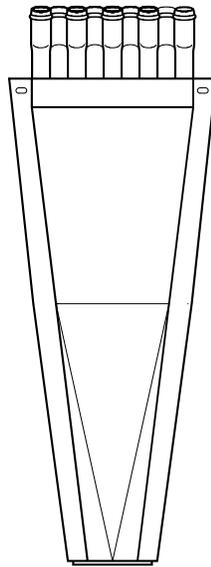
Note: The number of outlets on the divider head must match the metering wheel size.

10 Outlet Head



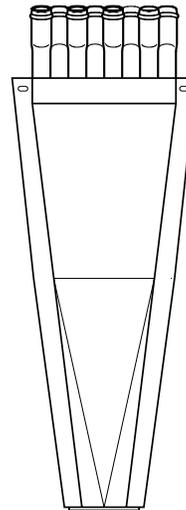
10 Outlet Metering Wheel with no spacer.

9 Outlet Head



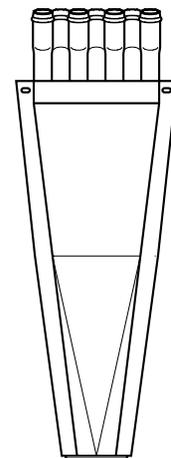
9 Outlet Metering Wheel with a single spacer.

8 Outlet Head



8 Outlet Metering Wheel with two single spacers.

7 Outlet Head



7 Outlet Metering Wheel with a single and one double spacer.

Operation

Metering System - Continued

Secondary Hose Installation

The lengths of the 15/16" (24 mm) diameter hoses are **very important**.

For Accurate distribution the secondary hoses have to be arranged by length symmetrically about the centre line.

The **longest** hoses **have to be** in the **centre** of the divider head. These hoses would normally feed the openers furthest away from the head.

- Ensure that the secondary hoses 15/16" (24 mm) diameter do not run higher than 3" (76 mm) above the height of the flat fan divider head.
- Allow an extra 3" (76 mm) of hose before cutting secondary hose for fitting in the seed boot.
- Always ensure that the secondary hoses are sufficiently long to accommodate tripping of trips.
- **Avoid sharp bends** in any of the hoses.
- Check for pinch points and clearances when folding in and out of transport.

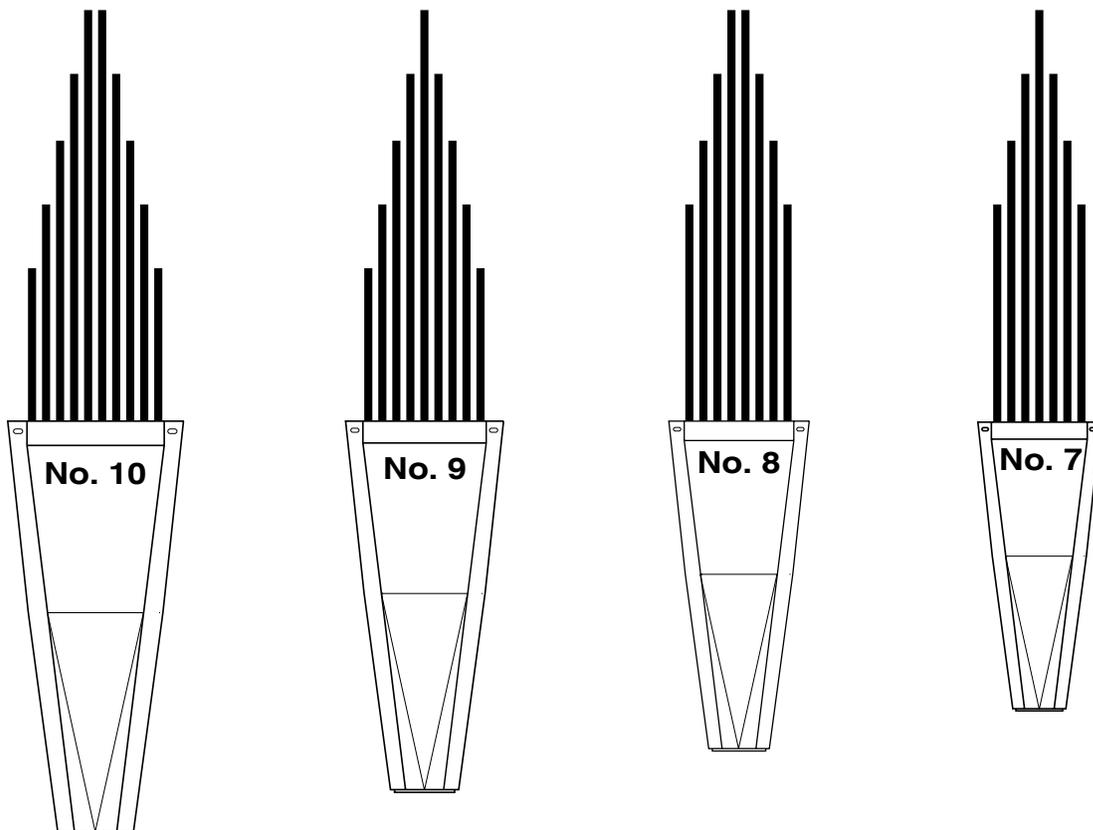
Important

Hot water is the only acceptable lubricant for the installation of the secondary hose.

The supplier advised MORRIS that WD-40 or any other lubricant (i.e. liquid detergent) will have a negative effect on the chemical stability of the hose, resulting in the degradation and failure of the hose due to Environmental Stress Cracking.

Important

Distribution uniformity will be adversely affected if hoses are incorrectly installed.



Slider Setting

The slider plates come in 4 different sizes. Each slider plate matches a specific metering wheel.

Note: The slider plates must match the metering wheel size.

The slider plates have three positions to allow all types of seeds and fertilizers to be metered.

The slider plate positions are **closed**, **open**, and **removed** as indicated on diagrams. (See next page)

- Position slider as indicated below and tighten nut to hold slider tightly in place.
- Position cover plate as indicated below and tighten wing nuts to hold cover plate in place.

Note: For Oats or Coarse Grains, if it appears bridging is occurring, remove sliders and recalibrate.

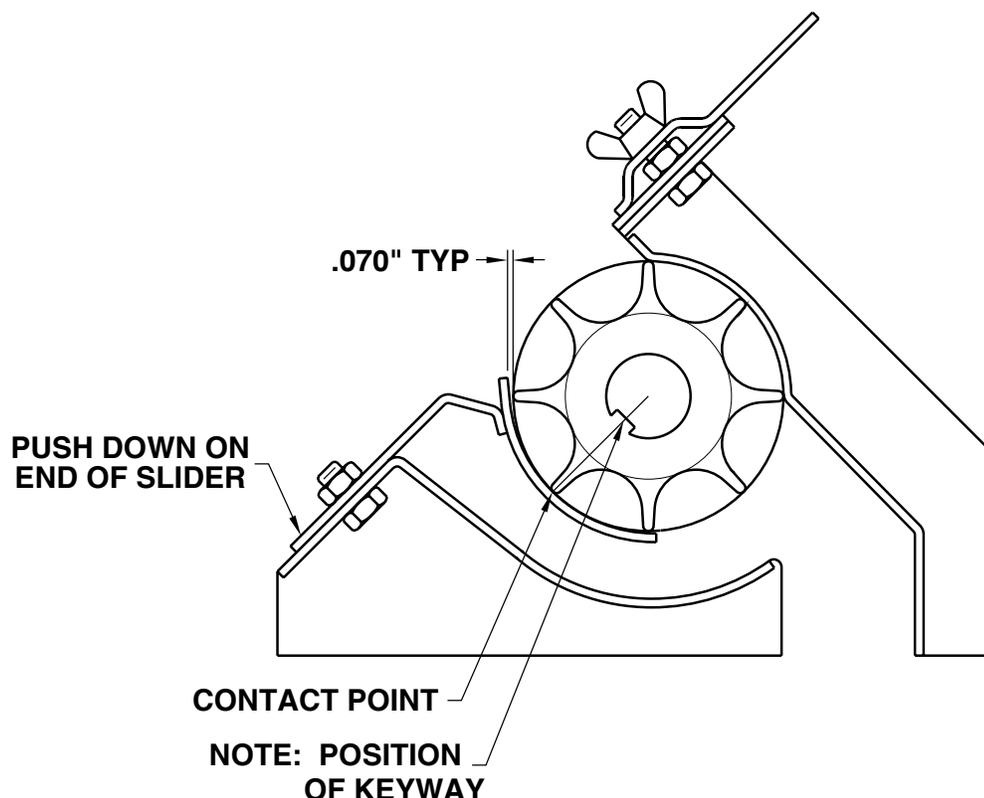
Important

When adjusting the sliders to the closed position follow the procedures below:

- 1) Locate the key-way in the metering wheel. Rotate shaft until high spot is located, this is the key-way location. Mark shaft for future reference.
- 2) Rotate metering shaft until key-way is in location shown below.
- 3) Keep the slider mounting plate flat on the metering body surface. See diagram A.

If the slider is tipped up when set to the closed position interference with the metering wheel will occur.

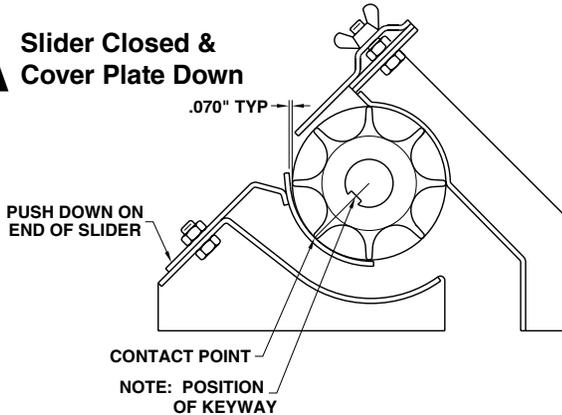
Note: In the closed position there is a gap of .070" (1.778 mm) between the metering wheel and the top edge of the slider plate.



Operation

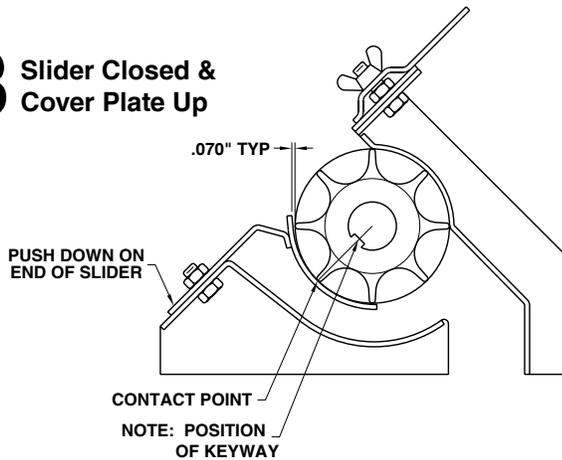
Slider Setting - Continued

A Slider Closed & Cover Plate Down

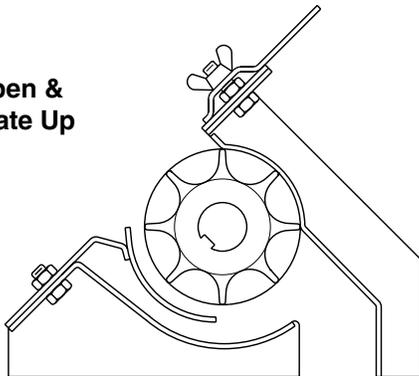


Note: For Oats or Coarse Grains, if it appears bridging is occurring, remove sliders and recalibrate.

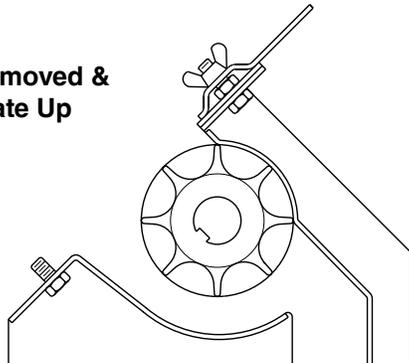
B Slider Closed & Cover Plate Up



C Slider Open & Cover Plate Up



D Slider Removed & Cover Plate Up



Slider Setting Chart

Diagram	Product	Slider Setting	Cover Plate
A	Canola Flax Mustard	Closed	Down
B	Nitragin Nodulator	Closed	Up
C	Barley Lentils Milo Oats Rice Wheat Fine Fertilizer	Open	Up
D	Beans Peas Soybeans Sunflowers 10-46-0-0 11-51-0 Fertilizers containing Sulphur and/or Potash	Removed	Up

Filling Tank

The Morris 9s Series Air Cart is equipped with 2 or 3 tanks. Typically the front tank is for seed and the middle and rear tank is for fertilizer. However, ALL tanks can be used for the same product.

The capacity of the air cart tanks are listed in the specification tables in Section 2.

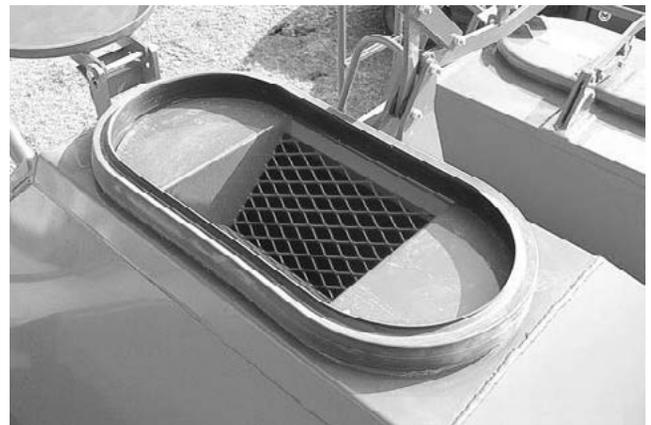
- Open lid fully on tank being filled.
- Check and remove any debris inside tank.
- Remove clean-out door.
- Check for debris inside metering body.
- Check for sheared metering wheels.
- Check the slider plates are set correctly.
- Fully close and seal the Clean-out door.
- Ensure the auger screen is in place.
- Always use screen to filter debris when filling.
- Adjust bin level sensor to desired alarm point.

Note: Even small fertilizer lumps can cause problems with plugging. All possible precautions should be taken to prevent lumpy fertilizer from entering the tank.

Important

Before putting product into the tanks check the following:

- (a) The slider plates are set correctly for product being applied.**
- (b) The clean-out doors are fully closed and sealed.**
- (c) The plastic bag covering the fan is removed.**
- (d) Inspect all augers used in handling the products for seeding. Run augers to clean out any debris inside auger so it does not get transferred to air cart tanks.**



Tank Lids

Warning

Do not enter tank unless another person is present.

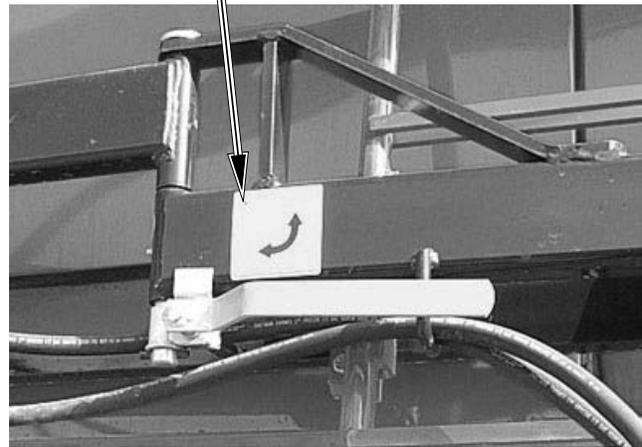
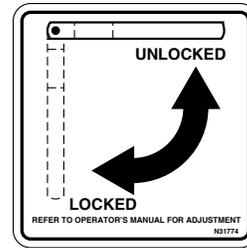


Inspect Metering Body

Operation

Filling Tank - Continued

- Position right hand access ladder in line with the tank walkway.
- Position auger as described below, if so equipped.
- Unlock auger arm lock. (Located 9240, 9252 & 9300 only)
- Unlatch the auger from its transport position.
- Swing out the auger making sure the motor end of the auger is still engaged at the arm pivot.
- Once the auger pivot is central to the Air Cart, tilt auger and swing into position with spout centrally located over the walkway.
- Lock auger arm lock. (Located 9240, 9252 & 9300 only)



Auger Arm Lock

Important

Check Metering Wheel keyways in the event the primary lines plug.

Keyways may shear if the collector becomes plugged.



Auger Cradle



Front Pivot

Filling Tank - Continued

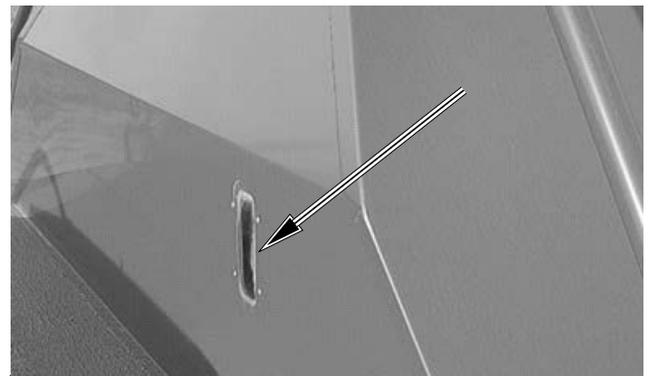
- Open lids on tank and insert spout.
- Back truck to the hopper and engage the hydraulic motor on the auger.
 1. If hydraulic fan drive then ensure selector valve is in correct position for auger operation and engage tractor hydraulics.
 2. If engine fan drive then engage tractor hydraulics to operate auger.
- Auger product into tank until product is visible in site glass.
- Stop the flow of product into the auger and allow auger to empty. The tank should be close to full.



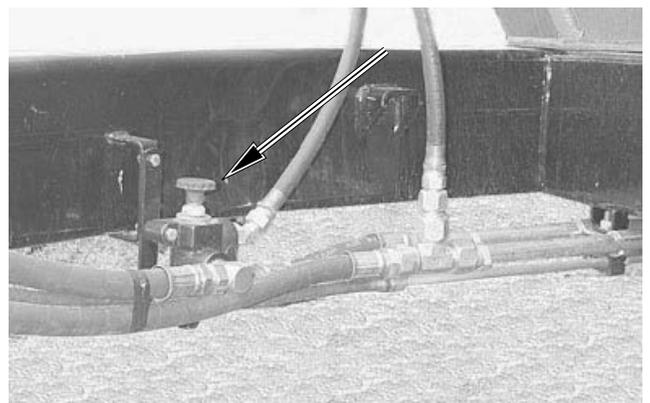
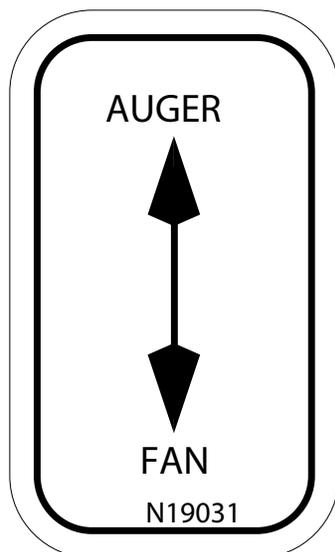
Auger Positioned

Important

Do not exceed 10 mph (16 kph) with tanks full.



Site Glass



Selector Valve

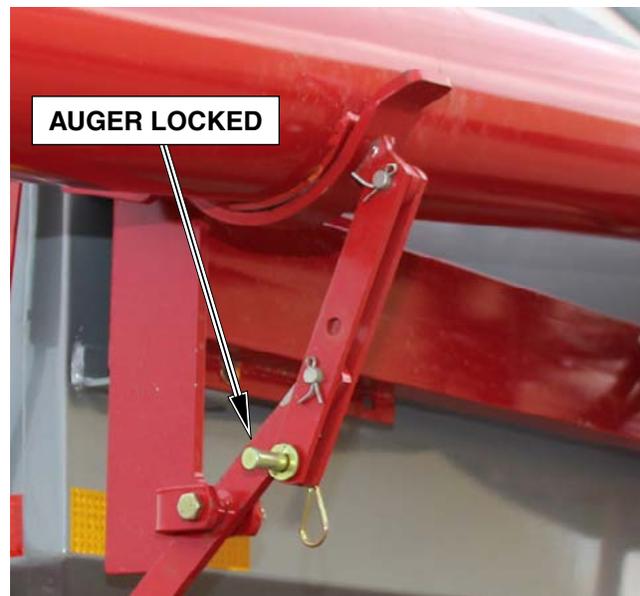
Operation

Filling Tank - Continued

- Clean lid seal and ensure lid seal is positioned correctly before closing tank lid.
- Reverse the auger to clean out the hopper.
- Unlock auger arm lock.
- Swing auger out making sure the motor end of the auger engages the arm pivot.
- Secure auger in transport position.
- Lock auger arm lock.
- Remove the plastic bag covering fan.
- Check lid for air leaks with your hands once Air Cart fan is operational. See Section 7
- Check metering body for air leaks.



Auger screen installed



Auger Cradle

Note: Before seeding it is recommended that after a rain or dew that fan be run for a few minutes to eliminate moisture in the system.

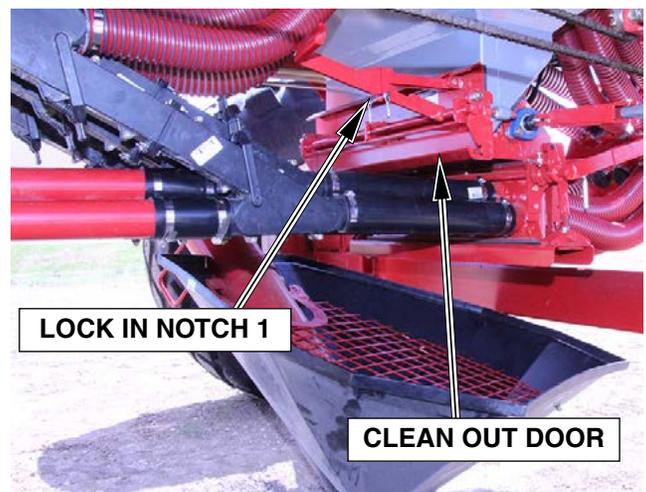
Unloading Tanks

Emptying tanks is quick and easy to do.

- Move access ladder forward.
- Position auger under the tank to be emptied.
- Start auger.
- Loosen Clean-out door on metering body by moving lock to notch 1.
- Regulate flow from the tank by loosening or tightening Clean-out door as required.
- Once all material stops flowing, remove Clean-out door completely and brush out remaining material in the corners.

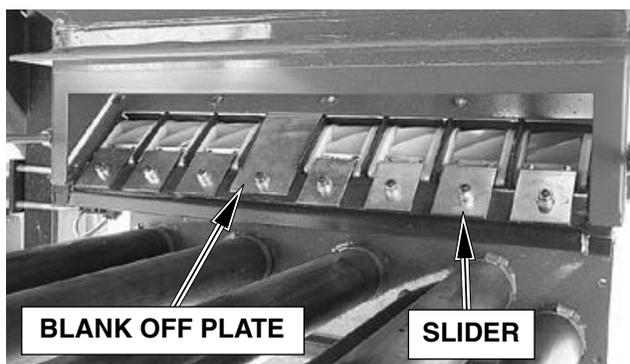
Complete Clean-out

- Remove all sliders and blank off plates.
- Remove the collector bottom.
- Run fan until all remaining material has been blown out of the system.
- Reinstall the sliders, blank off plates, collector bottom, and clean-out doors.



⚠ Danger

Keep all shields in place. Keep hands, feet and clothing away from auger intake, failure to do so will result in serious injury or death.



Collector Bottom

Operation

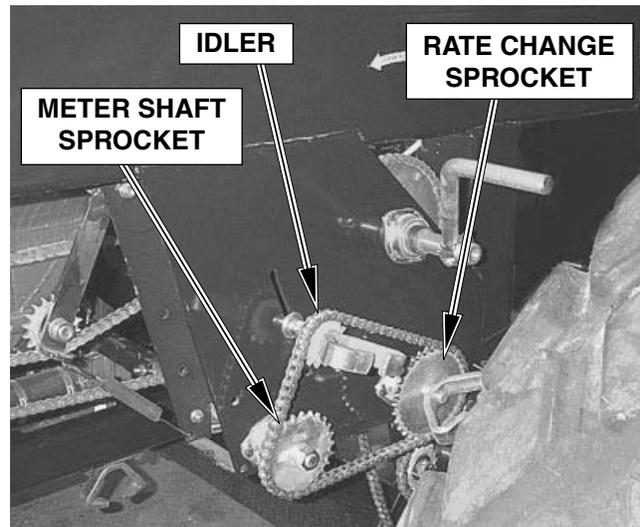
Metering Rate Adjustment

The metering rate adjustment for both tanks is done in the same manner. The rate varies with the speed of the metering wheels. A new rate is achieved by changing a sprocket on the Posi-Drive Transmission.

Refer to the rate charts for desired application rate and sprocket selection.

- Loosen metering chain on posi-drive transmission, by loosening the idler.
- Spin off wing nut and remove rate change sprocket.
- Install desired rate change sprocket and tighten wing nut.
- Tighten chain by adjusting idler.

Note: Do not over tighten chain, just take slack out of chain.



Acre Tally

To convert the acre tally reading (T) into the actual acres seeded turn to page 5-34 (page 11-2 for metric) to get the acre tally factor (F) for the Air Cart/Seeding Tool width being used. Take the acre tally reading (T) and multiply it by the acre tally factor (F) to get the actual acres seeded.

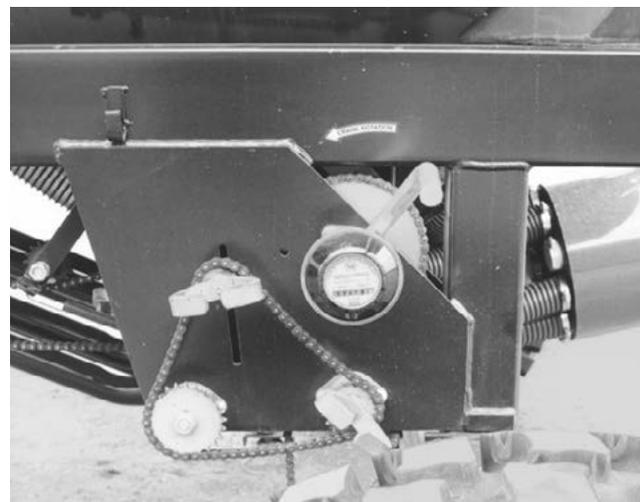
T x F = Actual Acres Seeded

Example: A 9240 with a 41 foot (12.5 m) seeding tool has an acre tally reading (T) of 100. The acre tally factor (F) on Page 5-34 is 6.59 for acres or Page 11-2 is 2.67 for hectares.

T x F = Actual Acres Seeded

100 x 6.59 = 659 Acres

100 x 2.67 = 267 hectares



Acre Tally

Rate Charts

Spacing Sprocket

The rate chart applies to all spacings listed below.

Check that the correct spacing sprocket is installed on your machine. This sprocket is located on the inner side of the rear transmission on the clutch output shaft.

The spacing sprocket must be matched to the seeding tool trip spacing.

Determining Spacing Sprocket

To determine spacing sprocket for other spacings not listed in the chart use the following equation:

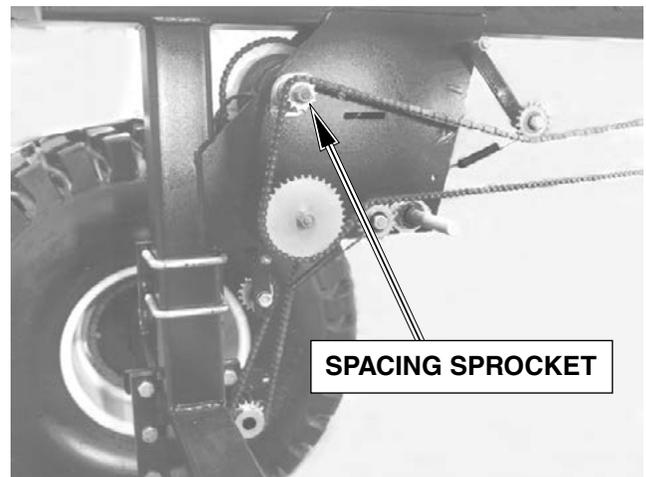
$$\text{New Spacing Sprocket} = \left(\frac{\text{New Spacing}}{12"} \right) \times 20$$

$$\text{New Spacing Sprocket} = \left(\frac{\text{New Spacing}}{304.8 \text{ mm}} \right) \times 20$$

The rate charts and drive rates are all based upon 12" (305 mm) spacing - 20 tooth sprocket.

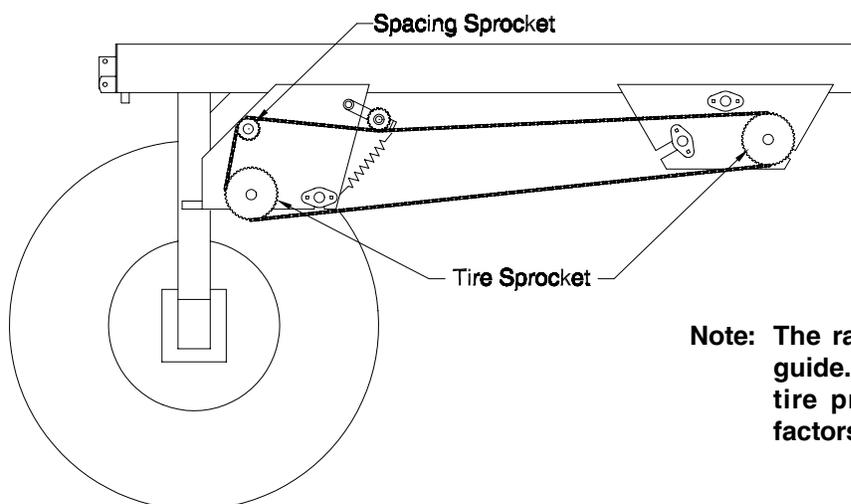
Note: Due to ratios of spacing the value may not be a whole number and should be rounded to nearest value.

Note: Incorrect spacing sprocket will cause inaccurate application rates.



Spacing Sprocket

Spacing Sprocket	
Opener Spacing	Spacing Sprocket
7.2" (183 mm)	12 teeth
7.5" (191 mm)	12 teeth
8" (203 mm)	13 teeth
9" (229 mm)	15 teeth
10" (254 mm)	17 teeth
12" (305 mm)	20 teeth
15" (381 mm)	25 teeth



Note: The rate charts should only be used as a guide. Variation in seed size, density, shape, tire pressure and wheel sinkage are all factors that can influence the seed rate.

Operation

Rate Charts - Continued

Tire Size Sprocket

In conjunction with the spacing sprocket is the tire size sprocket as illustrated in the previous diagram.

Check that the correct tire sprockets are installed on your machine. These sprockets are located on the inner side of each transmission input shaft and are driven by the spacing sprocket.

The tire sprocket must be matched to the tire size of the air cart.

Determining Tire Sprocket

Factors that may affect the tire circumference and in turn metering rates and monitor PPM values are as follows:

- Tire size tolerances can vary +/- 4%.
- Tire pressure.
- Field soil conditions (firm-unworked versus soft-worked)
- Tank capacity (empty tanks versus full tanks)
- Tire manufacturer (Good-Year versus Firestone)

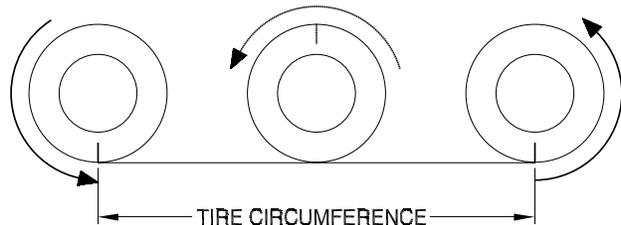
Note: The values used for monitor PPM values and tire size sprockets is based upon the tire circumference of Good-Year tires at proper pressure with half full tanks in normal working field conditions.

To determine tire sprocket for other tires not listed in the chart or to check the actual tire circumference use the following equation:

- The tire circumference should be checked under normal field conditions with tanks half full.
- Mark tire and starting point.
- Drive air cart one revolution of tire.
- Mark ending point.
- Measure distance from starting point to ending point to get the rolling circumference of the tire.

Note: Incorrect tire size sprocket will cause inaccurate application rates.

Tire Sprocket			
Tire Size	Tire Style	Rating	Tire Sprocket
23.1L x 26	AWT (Implement)	12 ply	26 teeth
23.1L x 26	Rice (TD8 Sure Grip)	10 ply	24 teeth



Imperial Measurement

Tire Sprocket Size: (Ts)

For 26" Rim = $4360/Tc$ $Ts =$ _____

Tc = Tire Circumference measured in inches.

Metric Measurement

Tire Sprocket Size: (Ts)

For 26" Rim = $110.744/Tc$ $Ts =$ _____

Tc = Tire Circumference measured in meters.

Rate Charts - Continued

Rate Chart Use

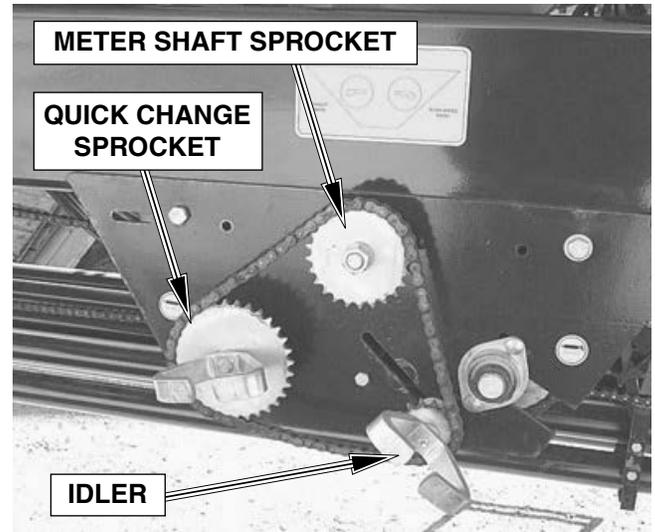
The rate chart applies to all spacings listed below.

The spacing sprocket must be matched to the seeding tool trip spacing see “*Spacing Sprocket*”.

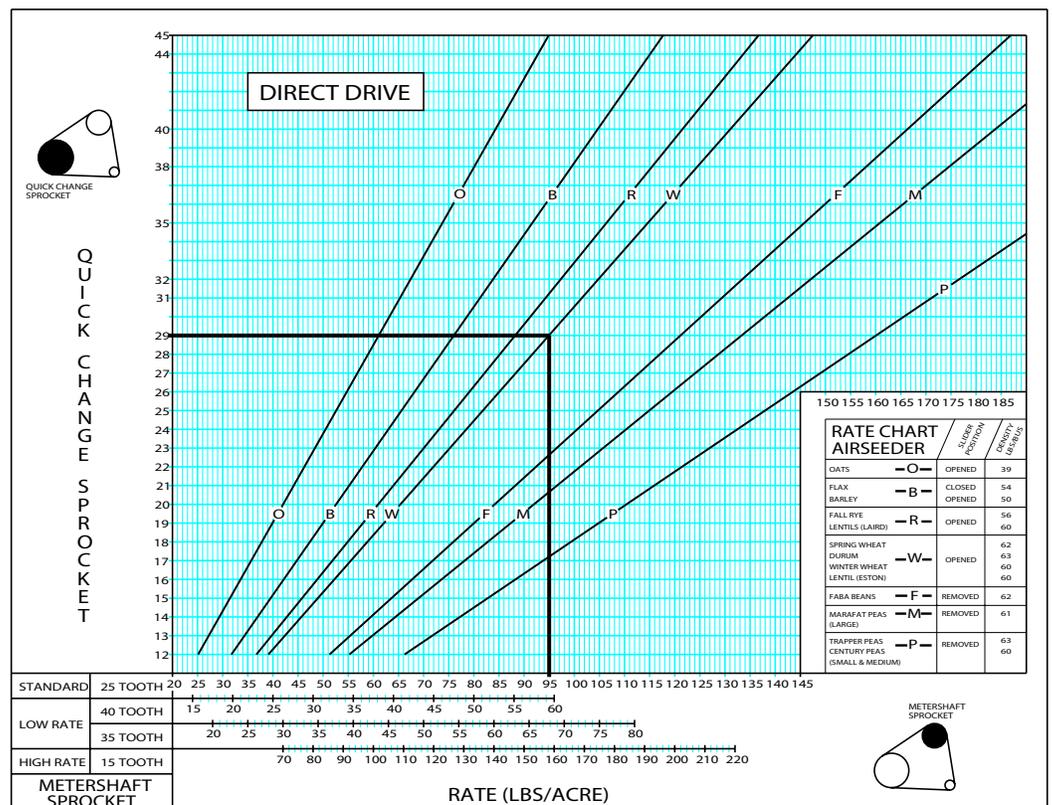
The charts should only be used as a guide. Specific rates can be achieved by using the rate check method as outlined under “*Rate Calibration*”.

To determine a seed/fertilizer rate from the chart:

- Go to the desired rate along the line marked “Standard” of a specific graph. (i.e. 95 lbs/acre of wheat)
- Go straight up from that point to where that line is intersected by the graph. This will give the sprocket size required to give the particular rate chosen.
- At this intersection go straight across to the vertical line of the graph. This will give the sprocket size required to give the particular rate chosen. (i.e. 95 lbs/acre of wheat requires a 29 tooth sprocket)
- Change the Quick Change Sprocket see “*Metering Rate Adjustment*”.
- Perform a rate check to confirm the seed rate see “*Rate Calibration*”.
- Repeat the above procedure for the other tank.
- For very low or very high rates, see next page *Extra Low Rates* and *Extra High Rates*.



Note: The rate charts should only be used as a guide. Variation in seed size, density, shape, tire pressure and wheel sinkage are all factors that can influence the seed rate.



Operation

Rate Charts - Continued

Extra Low Rates

Although the charts show a minimum rate of 35 lbs. per acre for fertilizer and 20 lbs. per acre for seed, sometimes this is not low enough, especially when product is being metered from both tanks.

Rates under the values mentioned can be achieved by replacing the standard 25 tooth sprocket on the front of the transmission with either a 35 or 40 tooth sprocket.

The rates obtained when using the 35 and 40 tooth sprocket are shown on the rate charts beside the respective size sprocket.

When both tanks are being used to meter the same product *without* the Banding Kit, then the 25 tooth sprocket on each transmission must be changed. Now both transmissions will have the same size *metershaft* sprocket.

If the ***Banding Kit is installed***, then only the 25 tooth sprocket on the ***front or rear*** transmission needs to be changed.

The same metering chain can be used with these larger sprockets up to a certain size of quick change sprocket.

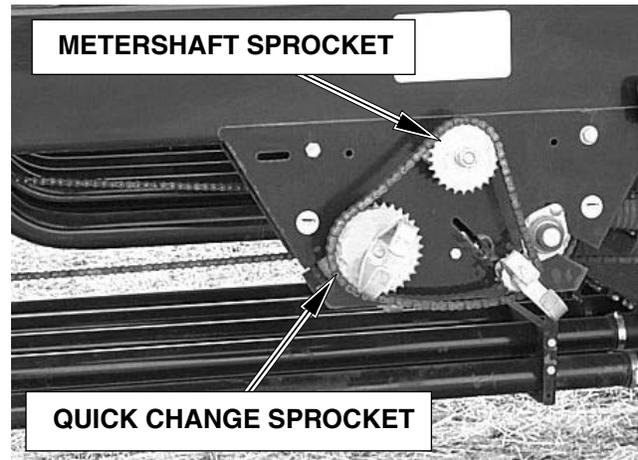
To determine a rate from the chart:

- Go to the desired rate along the line next to the size of metershaft sprocket used.
- Go straight up from that point to where that line is intersected by the graph line of the particular product being metered.
- At this intersection go straight across to the vertical line of the graph. This will give the sprocket size required to give the particular rate chosen.
- Change the quick change sprocket and repeat the rate check to confirm the seed rate.
- Repeat the above procedure for the other tank.

Extra High Rates

In areas where higher rates of product are required the metershaft sprocket is changed from the standard 25 tooth to a 15 tooth.

Use the method described under EXTRA LOW RATES to determine the required metering rate.

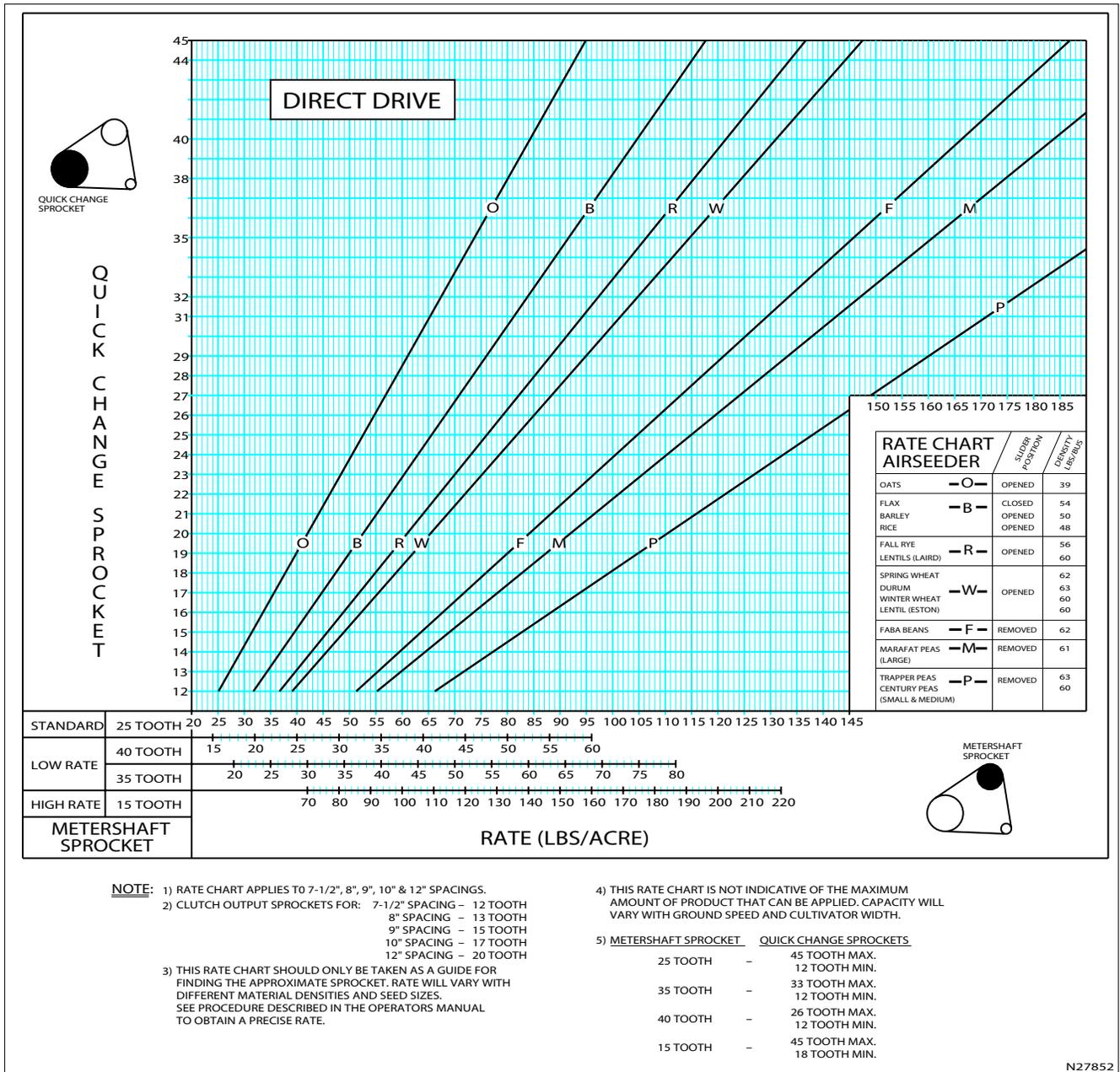


Rate	Metershaft Sprocket Size	Maximum Size of Quick Change Sprocket	Minimum Size of Quick Change Sprocket
Standard	25 Tooth	45 Tooth	12 Tooth
Low Rate (1)	35 Tooth	33 Tooth	12 Tooth
Low Rate (2)	40 Tooth	26 Tooth	12 Tooth
High Rate	15 Tooth	45 Tooth	18 Tooth

Rate Charts - Continued

Seed Rate Chart: (Front Transmission)

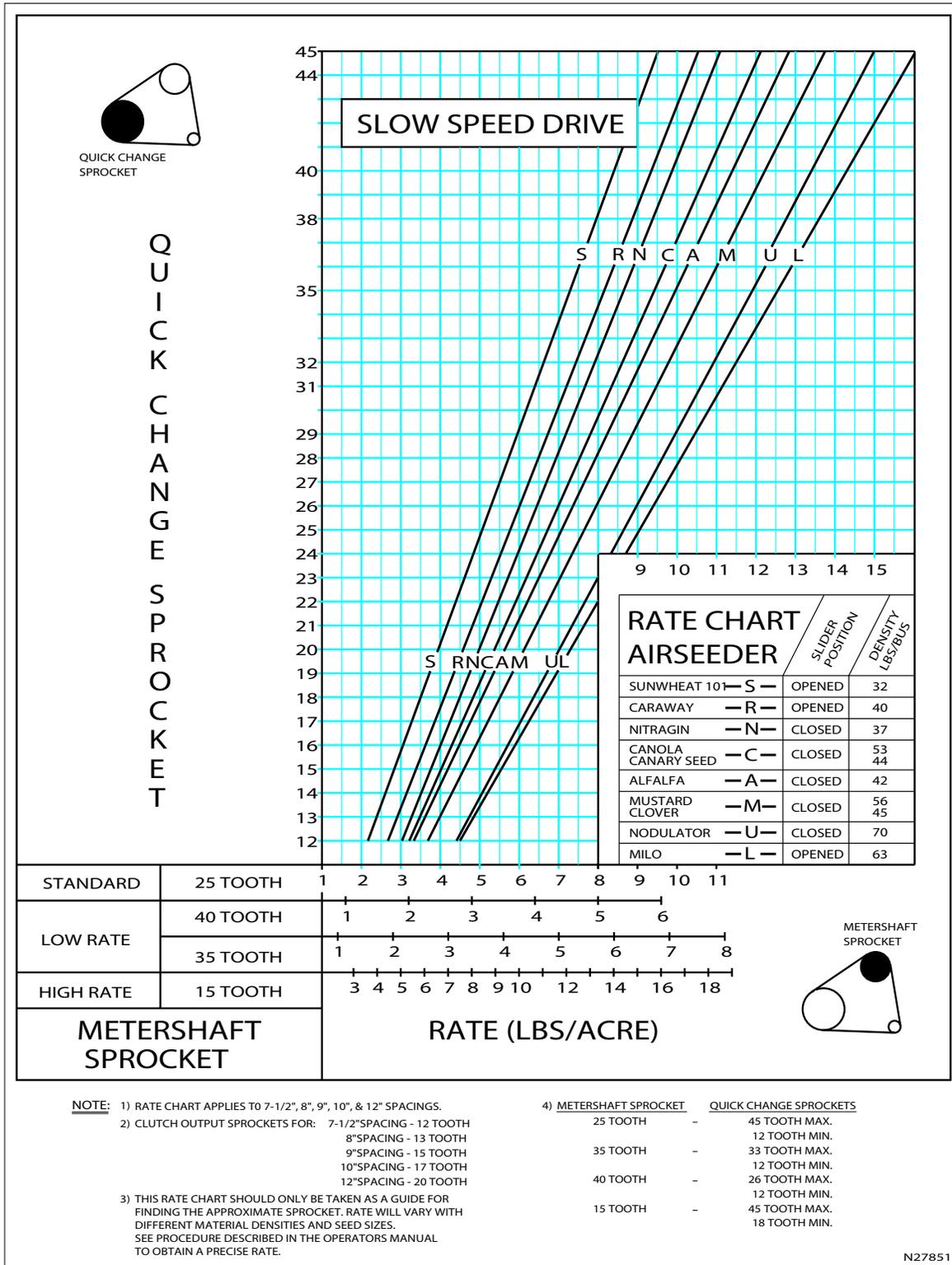
See Section 11 for Metric Rate Charts



Rate Charts - Continued

Slow Speed Seed Rate Chart: (Front Transmission)

See Section 11 for Metric Rate Charts



Operation

Rate Calibration

The practice of doing a rate calibration is strongly recommended as it will confirm the **actual** amounts of product being put into the ground.

Checking the rate on the 9s Series Air Cart is very simple.

The following procedure is one that should be followed for every rate calibration or change of product.

- Refer to calibration chart for the correct number of turns of the crank. (See page 5-35 for imperial and page 11-2 for metric charts.)
- Remove the bottom of the collector.
- Remove the metering chain from the transmission that is **not** being checked.
- Check that the desired rate change sprocket is installed in the transmission.
- Turn the crank until material begins to fall through the collector body.
- Slide rate check box on the collector body.
- Turn the crank in direction of the arrow (Counter Clockwise) the required number of turns.

Note: Incorrect rates will occur if crank is rotated clockwise.

For **Fine Seeds** it is recommended to take a large sample. Typically to take a sample for 1/2 acre (1/4 hectare) or 1 acre (1/2 hectare).

Example:

For 1/2 acre sample for a 41 ft. wide seeding unit with 23.1 x 26 AWT tires on Cart:

From the chart on page 5-34

Turns required for 1/10 acre = 8.50

Turns required for 1/2 acre = 8.50 x 5 = 42.5

Rate = lbs/acre

= 1/2 acre sample weight (lbs.) x 2

From the chart on page 11-2

Turns required for 1/10 hectare = 20.99

Turns required for 1/4 hectare = 20.99 x 2.5 = 52.48

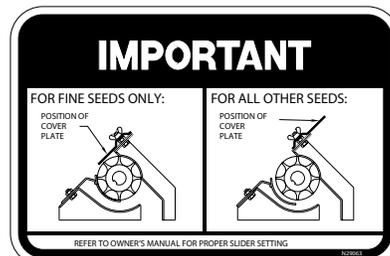
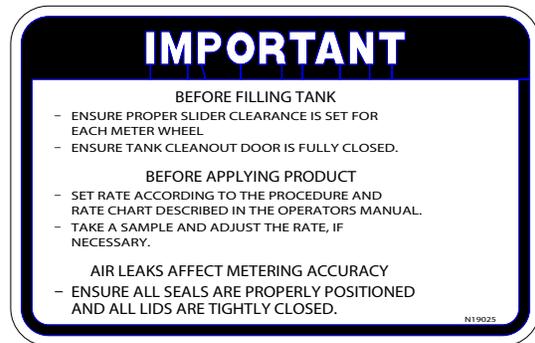
Turns required for 1/2 hectare = 20.99 x 5 = 104.95

Rate = kg/hectare

= 1/4 hectare sample weight (kg) x 4

= 1/2 hectare sample weight (kg) x 2

Note: The fan must not be running when a rate check is performed.



Collector Bottom



Rate Calibration - Continued

- Weigh the sample by using tarp straps to hook rate check box to spring scale.

Note: Remember to subtract the weight of the rate check box from the total sample weight.

- Check this rate against rate required.

For 1/10 acre sample:

$$\text{Rate} = \text{lbs/acre} = \text{Sample Weight (lbs)} \times 10$$

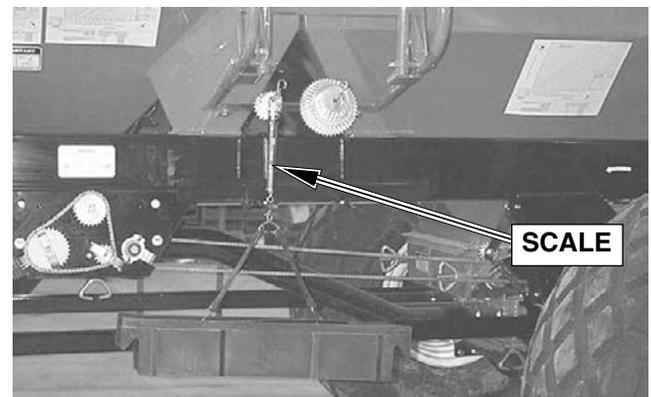
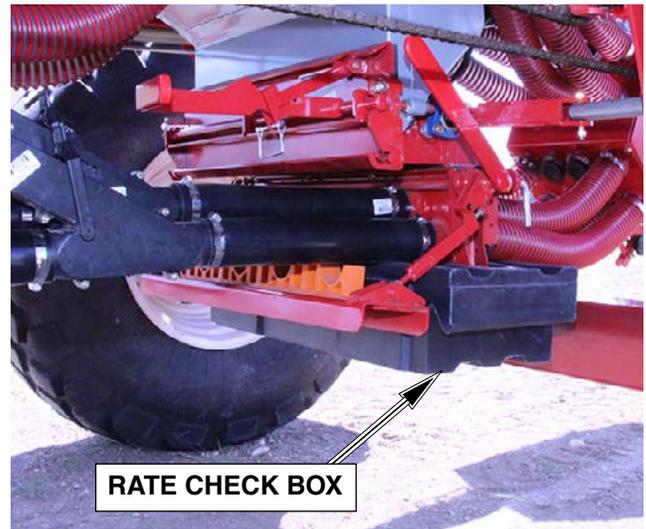
For 1/10 hectare sample:

$$\text{Rate} = \text{kg/ha} = \text{Sample Weight (kg)} \times 10$$

- If a different rate is required then increase or decrease the size of the rate change sprocket. Increasing the sprocket size will increase the rate and vice versa.
- Replace the bottom of the collector.

Note: Arrow directions on the collector bottom must point in the same direction as the ones on the collector body.

- Follow the above procedure to check the rate of the other tank.



Alternative Rate Calibration

An alternate rate calibration method takes into account wheel sinkage and variations in tire circumference.

See the Monitor Section 6 (Application Rate). Instead of turning the calibration crank, the metering drive clutch is engaged and the seeder is pulled through a distance that equals at least 1/10 of an acre (1/10 hectare).

Note: Fan should not be running for either rate check method.



Operation

Imperial Rate Calibration Chart

9240, 9252 and 9300

Calibration Chart based on 1/10 of an Acre.

W = Machine Width (Feet)

F = Optional Mechanical Acre Tally Factor = 56/R

R = Crank Rotation - turns

for 1/10 acre = 348.5/W for 9240/9252/9300 with 23.1 x 26 All Weather Tires.

for 1/10 acre = 316.8/W for 9240/9252/9300 with 23.1 x 26 Rice Tires.

D = Distance required for 1/10 Acre (Feet) = 4356/W

**See Section 11 for
Metric calibration chart.**

$$\text{New Crank Rotations} = \left(\frac{D \times 12}{\text{Tire Circumference}} \right) \times \frac{48}{15} \times \frac{18}{48}$$

9s Series Air Cart											
IMPERIAL RATE CALIBRATION CHART											
WIDTH [W] (ft)	Air Cart Model				DISTANCE [D] (ft)	WIDTH [W] (ft)	Air Cart Model				DISTANCE [D] (ft)
	9240/9252/9300						9240/9252/9300				
	Tire 23.1 x 26		Rice Tire 23.1 x 26				Tire 23.1 x 26		Rice Tire 23.1 x 26		
	[R]	[F]	[R]	[F]			[R]	[F]	[R]	[F]	
21	16.59	3.38	15.09	3.71	207.43	51	6.83	8.20	6.21	9.02	85.41
22	15.84	3.54	14.40	3.89	198.00	52	6.70	8.36	6.09	9.20	83.77
23	15.15	3.70	13.77	4.07	189.39	53	6.57	8.52	5.98	9.36	82.19
24	14.52	3.86	13.20	4.24	181.50	54	6.45	8.68	5.87	9.54	80.67
25	13.94	4.02	12.67	4.42	174.24	55	6.34	8.83	5.76	9.72	79.20
26	13.40	4.18	12.18	4.60	167.54	56	6.22	9.00	5.66	9.89	77.79
27	12.91	4.34	11.73	4.77	161.33	57	6.11	9.17	5.56	10.07	76.42
28	12.44	4.50	11.31	4.95	155.57	58	6.01	9.32	5.46	10.26	75.10
29	12.02	4.66	10.92	5.13	150.21	59	5.91	9.48	5.37	10.43	73.83
30	11.62	4.82	10.56	5.30	145.20	60	5.81	9.64	5.28	10.61	72.60
31	11.24	4.98	10.22	5.48	140.52	61	5.71	9.81	5.19	10.79	71.41
32	10.89	5.14	9.90	5.66	136.13	62	5.62	9.96	5.11	10.96	70.26
33	10.56	5.30	9.60	5.83	132.00	63	5.53	10.13	5.03	11.13	69.14
34	10.25	5.46	9.32	6.01	128.12	64	5.44	10.29	4.95	11.31	68.06
35	9.96	5.62	9.05	6.19	124.46	65	5.36	10.45	4.87	11.50	67.02
36	9.68	5.79	8.80	6.36	121.00	66	5.28	10.61	4.80	11.67	66.00
37	9.42	5.94	8.56	6.54	117.73	67	5.20	10.77	4.73	11.84	65.01
38	9.17	6.11	8.34	6.71	114.63	68	5.12	10.94	4.66	12.02	64.06
39	8.93	6.27	8.12	6.90	111.69	69	5.05	11.09	4.59	12.20	63.13
40	8.71	6.43	7.92	7.07	108.90	70	4.98	11.24	4.53	12.36	62.23
41	8.50	6.59	7.73	7.24	106.24	71	4.91	11.41	4.46	12.56	61.35
42	8.30	6.75	7.54	7.43	103.71	72	4.84	11.57	4.40	12.73	60.50
43	8.10	6.91	7.37	7.60	101.30	73	4.77	11.74	4.34	12.90	59.67
44	7.92	7.07	7.20	7.78	99.00	74	4.71	11.89	4.28	13.08	58.86
45	7.74	7.24	7.04	7.95	96.80	75	4.65	12.04	4.22	13.27	58.08
46	7.58	7.39	6.89	8.13	94.70	76	4.58	12.23	4.17	13.43	57.32
47	7.41	7.56	6.74	8.31	92.68	77	4.53	12.36	4.11	13.63	56.57
48	7.26	7.71	6.60	8.48	90.75	78	4.47	12.53	4.06	13.79	55.85
49	7.11	7.88	6.47	8.66	88.90	79	4.41	12.70	4.01	13.97	55.14
50	6.97	8.03	6.34	8.83	87.12	80	4.36	12.84	3.96	14.14	54.45

Seeding Fine Seeds (Canola, Mustard, etc.)

When seeding fine seeds such as canola or mustard, the slow speed transmission has to be engaged to ensure the low rates required for these products.

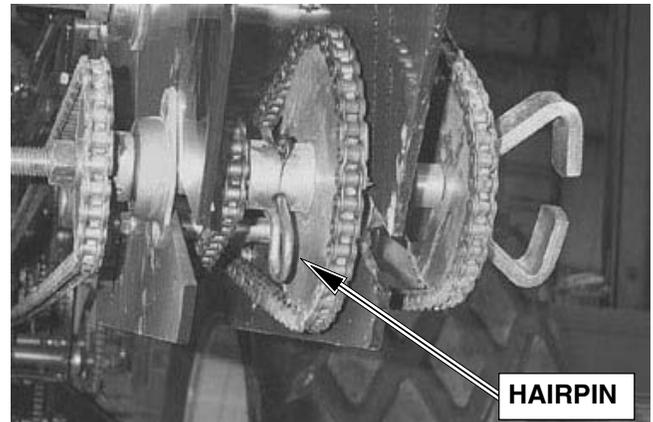
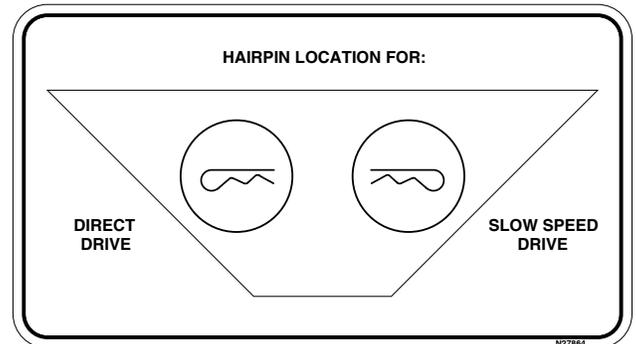
The slow speed transmission is incorporated in the **FRONT** Posi-Drive Transmission.

- To engage the slow speed, remove the large hairpin from the front shaft and install through the sleeve and shaft located at the rear of the transmission.

Note: Shaft will have to be rotated to align holes for pin insertion.

- To disengage the slow speed, reverse the above procedure.
- Rate checks can be performed the same way as for other seeds.
- Usually it is necessary to reduce the fan rpm when seeding fine seeds. See *Fan Speed* for specific fan speeds.

Note: Seed must be placed in the front tank.



Applying Inoculant

When inoculant is applied at the time of seeding, then once the Air Cart has been filled, the fill-lids should be left open and the fan run for 5-10 minutes at full rpm to dry the seed.

Calibration must be done after the seed is dried, otherwise the calibration will be incorrect.

Note: If the seed is not dried then the seed will have a tendency to bridge and not meter into the air stream.

Operation

Hydraulic Fan Drive

The piston type orbit motor on the fan requires tractor to have either a load sensing hydraulic system or a closed center hydraulic system with flow control.

The flow required is 18 U.S. gpm (68 liters) for the 12 cc motor at a pressure of 2,750 p.s.i. (18,960 kPa) However, smaller flows can be used depending on the product being metered.

Note: An additional 6 gpm (23 liters/min) is required for the VRT system.

For correct operation of the fan the hydraulic motor must be coupled to the priority valve (if tractor is so equipped) in the hydraulic valve bank.

Check with the tractor manual or manufacturer to determine if or which spool is a “priority valve”.

Speed fluctuations will result if the fan is not connected to the priority valve if hydraulic system is equipped with a priority valve.

Ensure couplers are free of dirt and are clean when connecting the fan hydraulics to the tractor.

Fan speed is adjusted by increasing the amount of oil being delivered to the motor by adjusting the respective flow control valve until the desired rpm is displayed on the monitor.

Note: There is a one-way check valve installed in the hydraulic circuit. If the fan does not rotate, then move hydraulic lever in the opposite direction; this will engage the fan. This valve prevents damage to the hydraulic systems when the fan is shut OFF, by allowing the fan to freewheel.

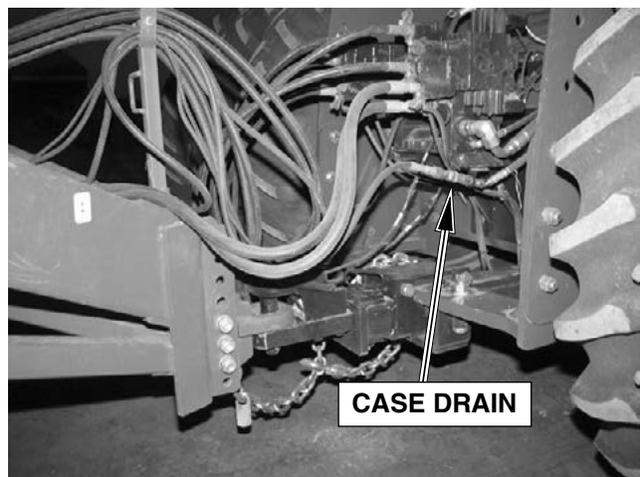
A piston motor creates leakage past the internal components for lubrication. This oil needs to go back to the oil reservoir at the lowest pressure possible. The motor has a 3/8” diameter case drain line. This line must be connected directly into the tractor hydraulic reservoir to ensure that there is zero back pressure in the drain line; otherwise damage will result to the motor.



Orbit Motor Drive

IMPORTANT

Run hydraulic fan drive at lowest rpm possible (1,000-2,000) for 5-10 minutes before operating at set rpm. This is required to warm up the hydraulic fluid. Cold hydraulic fluid will cause pressure spikes in the system that will damage the case drain seal in the orbit motor.



Hydraulic Coupling on Tractor

Fan Speed

Adequate air volume is necessary at all times to carry the product in the air stream. Air volume can be controlled by adjusting hydraulic oil flow on hydraulic fan drives or adjusting engine speed on engine fan drive models.

Air volume hence fan speed requirements will vary with:

- (a) Ground speed
- (b) Metering rate
- (c) Number of primary runs
- (d) Width of machine
- (e) Density and size of material

Excessive fan speed can cause seed damage, seed bouncing and premature wear of the system.

Generally fan speed is adequate if product flows through the hoses without surging and the hoses empty quickly and evenly when the system shuts down.

The table lists *suggested minimum fan speeds* for certain products. **The table should be used only as a guide.** If plugging or surging occurs increase the fan speed to eliminate the problem.

Note: It is recommended that after a rain or dew the fan be run two to three minutes to expel any moisture in the system.

Important

Keep fan impeller blades clean at all times.

Note: Once fan speed is properly set, be sure to adjust the monitor fan alarm setting accordingly. See Monitor Section “Monitor Programing”.

Suggested Fan RPM @ 5 mph (8 kph) on a 41 ft unit				
Product	Application Rate		Fan Speed Setting	
	Seed	Fertilizer	Single Shoot	Double Shoot
Fine Seeds	All Rates	50 lbs/acre 56 kg/ha	3400 RPM	3000 RPM
		100 lbs/acre 112 kg/ha	3800 RPM	3400 RPM
		> 150 lbs/acre 168 kg/ha	4300 RPM	3800 RPM
Lentils	All Rates	All Rates	3800 RPM	3800 RPM
Coarse Grains	90 lbs/acre 100 kg/ha	50 lbs/acre 56 kg/ha	4300 RPM	3800 RPM
	90 lbs/acre 100 kg/ha	100 lbs/acre 112 kg/ha	4500 RPM	3800 RPM
	90 lbs/acre 100 kg/ha	> 150 lbs/acre 168 kg/ha	4800 RPM	4000 RPM
Large Seeds	180 lbs/acre 200 kg/ha	40 lbs/acre 45 kg/ha	4400 RPM	4000 RPM
Fertilizer Light	*****	<100 lbs/acre 112 kg/ha	4000 RPM	*****
Fertilizer Heavy	*****	> 100 lbs/acre 112 kg/ha	4500 RPM	*****
<p>Note: Fan Speeds given are when applying product. It is normal for fan speed to drop when not applying product.</p>				

Operation

Double Shoot Settings

Double Shooting is done with a few simple adjustments as follows:

1. Plenum Setting
2. Diverter Setting
3. Quick Coupler Position (Tow Behind Only)

Plenum Damper Settings

Adequate air volume is necessary at all times to carry the product in the air stream. Air volume can be controlled by adjusting the plenum damper settings.

The table below lists initial plenum damper settings for certain products.

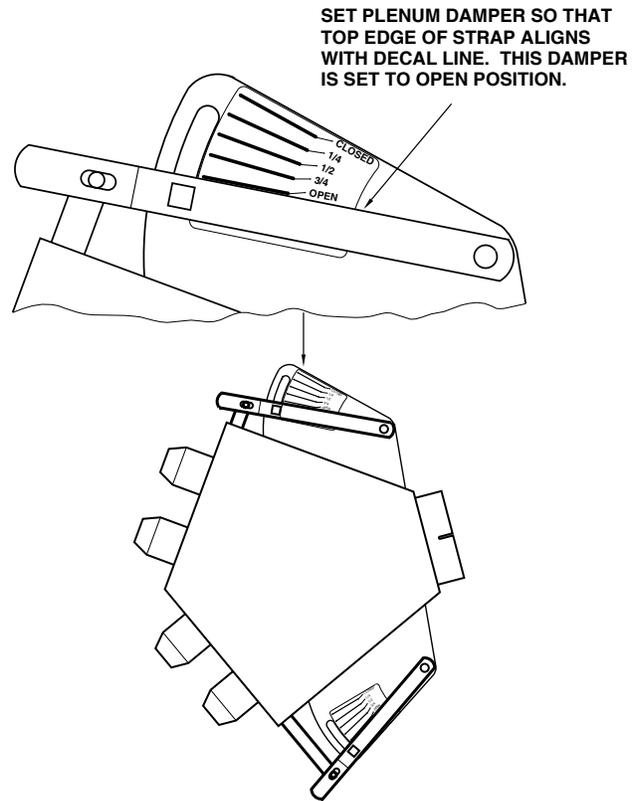
Note: The settings in table should be used only as a guide.

- If **fertilizer** plugging or surging occurs **decrease** the seed damper setting to eliminate the problem.
- If **seed** plugging or surging occurs **increase** the seed damper setting to eliminate the problem.

Diverter Settings

Located between the metering bodies in each primary line are two diverter valves. The diverters must be correctly set in order for product to flow correctly as outlined on next two pages.

1. Double Shoot - Handles in Double Shoot Position.
2. Single Shoot - Handles in Single Shoot Position.

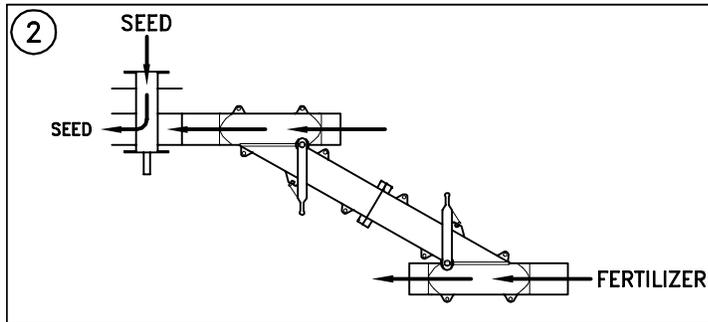


Suggested Plenum Settings				
Product	Seed		Fertilizer	
	Rate lb/acre	Damper Setting	Rate lb/acre	Damper Setting
Fine Seeds	All Rates	1/4	All Rates	Open
Coarse Grains	90 lb (100 kg/ha)	Open	50 lb (56 kg/ha)	1/2
	90 lb (100 kg/ha)	Open	100 lb (112 kg/ha)	Open
	90 lb (100 kg/ha)	1/4	150 + lb (168 kg/ha)	Open
Large Seeds	180 lb (200 kg/ha)	Open	40 lb (45 kg/ha)	1/4
Single Shoot	Tow - Top Damper Closed			
	Behind - Bottom Damper Open			
Single Shoot	Tow - Top Damper Open			
	Between - Bottom Damper Closed			

Note: See "Fan Speeds" for Fan RPM.

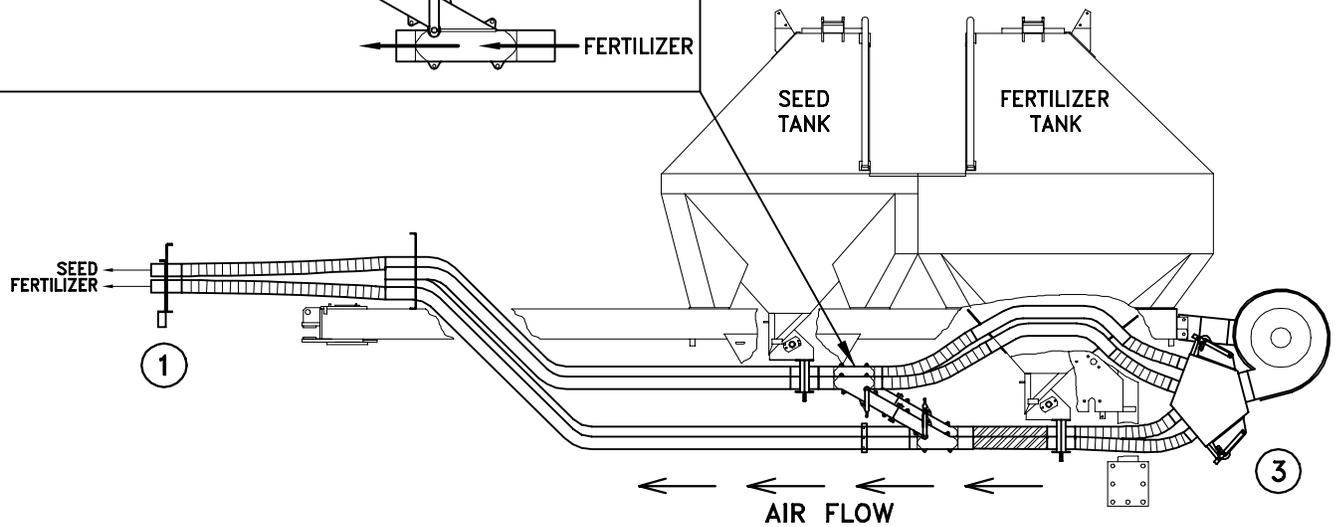
Double Shoot Settings - Continued

Double Shoot Tow Behind

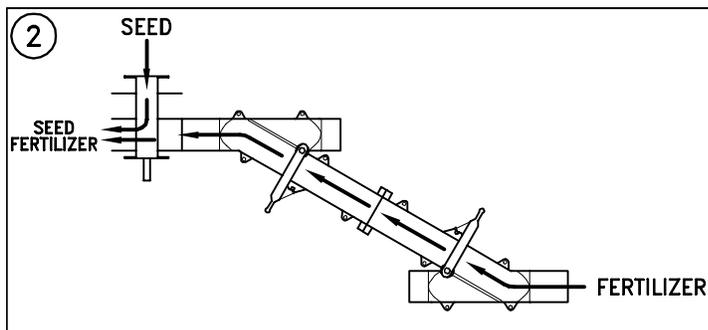


Double Shoot

1. Coupler: Top Position
2. Diverter Setting: Handles are in Double Shoot Position.
3. Plenum Setting: Refer to table.

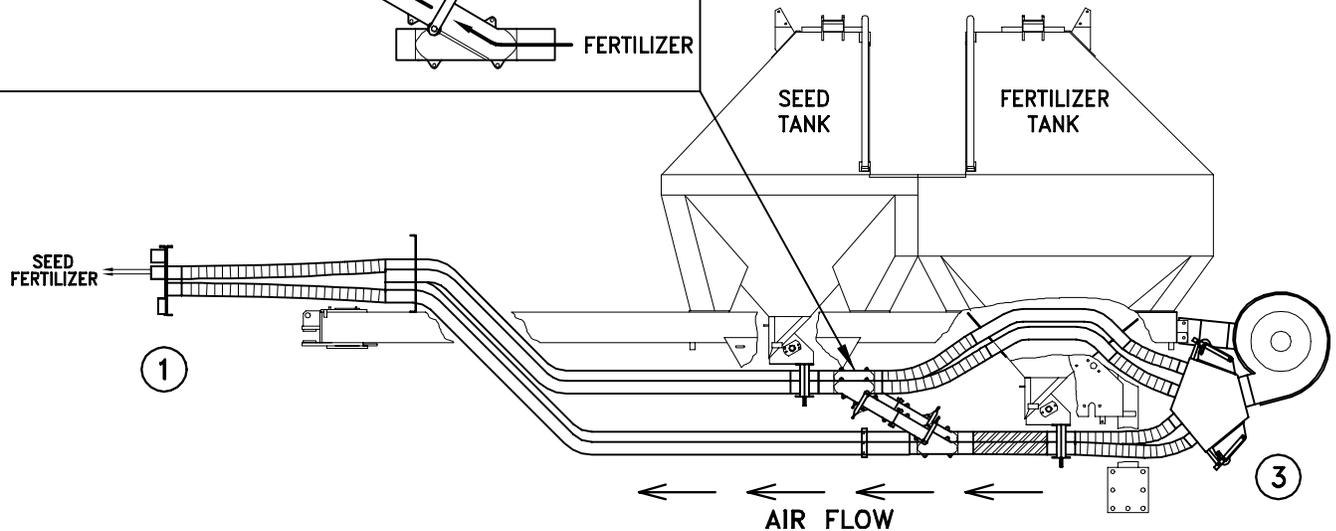


Single Shoot Tow Behind



Single Shoot

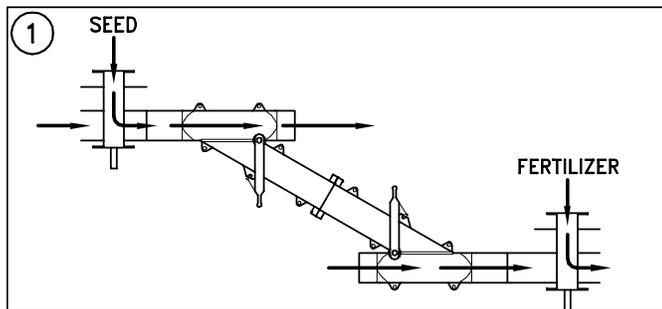
1. Coupler: Lower Position
2. Diverter Setting: Handles are in Single Shoot Position.
3. Plenum Setting: Refer to table.



Operation

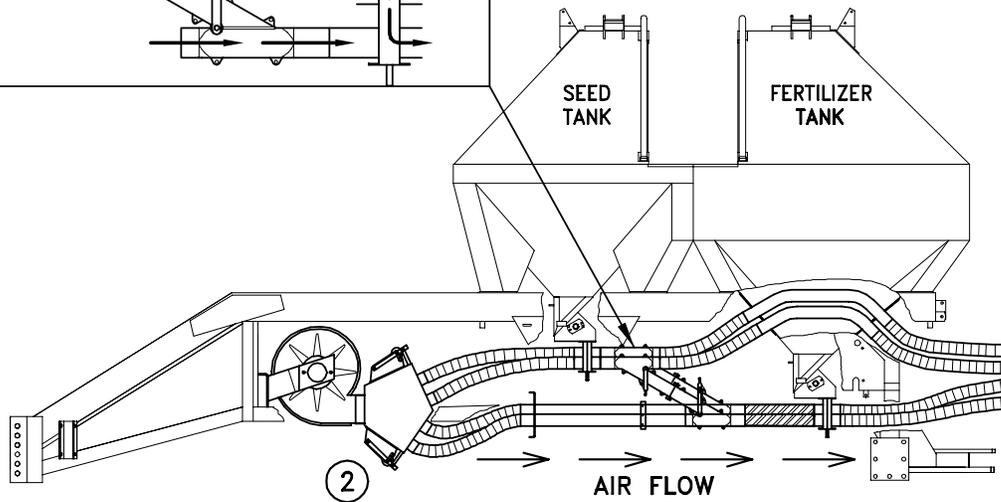
Double Shoot Settings - Continued

Double Shoot Tow Between

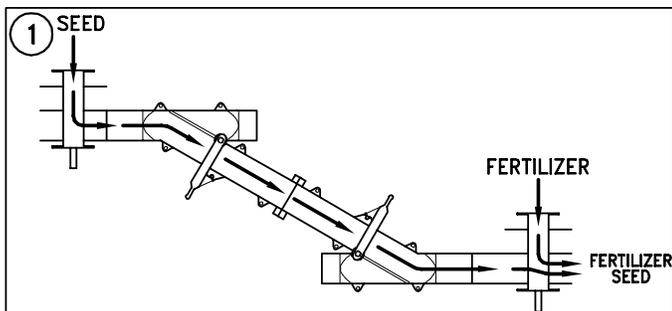


Double Shoot

1. Diverter Setting: Handles are in Double Shoot Position.
2. Plenum Setting: Refer to table.

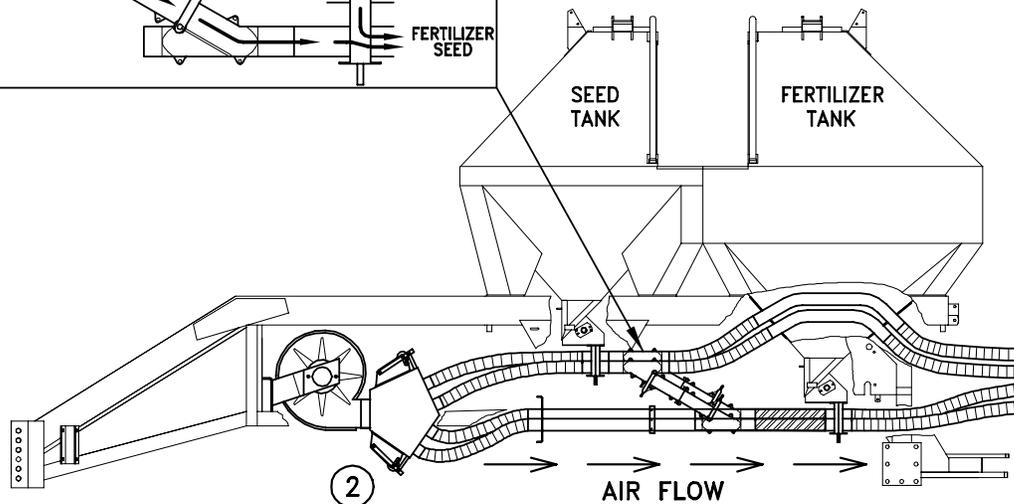


Single Shoot Tow Between



Single Shoot

1. Diverter Setting: Handles are in Single Shoot Position.
2. Plenum Setting: Refer to table.



Operating Guidelines

There are a number of areas that can cause problems when seeding. Listed below are specific points that should be addressed at all times. Following these guidelines will ensure better crop emergence and consequently the potential for better yields.

An improperly levelled seeding tool cause uneven depth which could result in poor emergence.

It is important that the seeding tool is levelled both side to side and front to back.

Check Tire Pressures

- Ensure all tires are inflated to their specified pressure. Incorrect tire pressure can cause depth variations.

Level Seeding Tool Side to Side

- Check the depth of each shovel on the back row.
- Adjust side to side level as necessary. See seeding tool manual for more details.

Level Seeding Tool Front to Rear

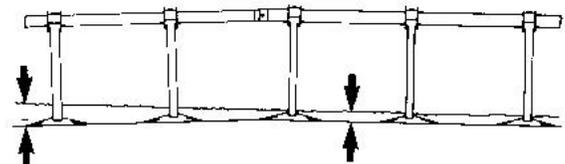
- Poor front to rear levelling causes ridging as shown.
- Check the depth of two adjacent shanks normally one on the front row and one on the rear row.
- Adjust level as necessary. See seeding tool manual for more details.

Worn Seeding Tool Parts

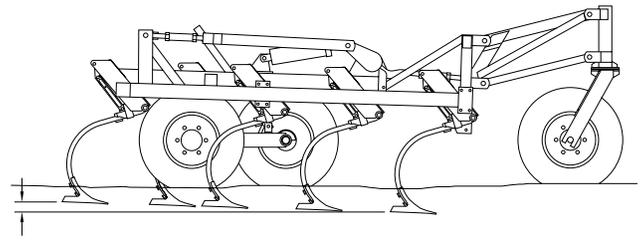
- Shanks that are bent cause uneven depth and they should be repaired or replaced.
- Trip mechanisms that are worn can also cause poor depth control and any worn parts should be repaired or replaced.

Packing

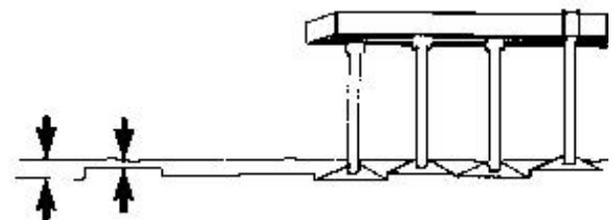
- Packing behind the seeding unit is strongly recommended. This improves germination and helps reduce moisture loss and erosion.
- In wet conditions the head land should be done last to prevent over packing.



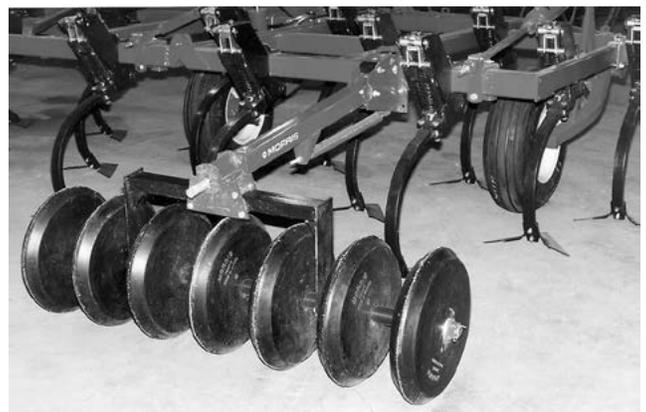
Side to Side Level



Front to Back Level



Ridging Front to Back



Mounted Packers

Operation

Operating Guidelines - Continued

Turning

- Avoid sharp turns. Backing up of the outer wings with the seeding tool in the ground has a tendency to plug the seed boot with soil.
- Raise seed boots fully before making sharp turns or backing machine.

Note: It is strongly recommended to consult local agricultural extension offices for allowable product rates, which are dependent on soil moisture and type.

Seed Rate Settings

- Remove any caked-on material from sliders and metering wheels.
- Ensure all sliders are properly set and wheels turn freely.
- Check product rates carefully by performing a calibration check.

Note: If equipped with a granular tank, the lines must be blocked off when not in use.

Fertilizer Application

- Avoid using fertilizers that absorb moisture readily, especially during periods of high humidity.
- Also avoid fertilizers that contain a high percentage of fine dust, as these materials can plug metering wheels and coat the inside of seed distribution system.

Fan Setting

- Run fan at recommended speed. If plugging or surging occurs increase the fan speed to eliminate the problem.
- Allow tractor hydraulic oil to warm-up thoroughly prior to seeding. Cold oil will cause slower fan speeds (Hydraulic driven fan).

Product Application

- Control product application with the clutch switch in tractor.
- Have machine moving forward before lowering seed boots to avoid plugging.
- To prevent skipping, allow 15 feet (5 m) of forward travel to ensure air system has delivered product to seed boots.

Note: Do not attempt to meter product when fan is not running. Damage to the metering wheels may occur.

Operating Guidelines - Continued

Adjustments and Operational Checks

- When changing fields and periodically throughout the day the seeding tool should be checked for level and depth and the seed boots for blockage.

Checking Seed Flow

The following procedure should be implemented throughout the day typically at each fill of the Air Cart:

- Raise the seeding tool out of the ground.
- With the fan running turn the crank on the rear transmission 4 or 5 turns.
- Seed and/or fertilizer should appear at each outlet on the ground.
- If no seed or fertilizer appears on the ground at any of the openers check for hose blockage in both the 15/16" (24 mm) diameter secondary and the 2 1/2" (64 mm) diameter primary hose, as well as in the flat fan divider.
- See Trouble Shooting Section for possible causes of the blockage.

Moisture Alert

- Whenever Air Cart has been standing for an hour or more during period of high humidity or damp, rainy days, or after sitting overnight, run fan at recommended rpm, with machine stationary for 5 minutes.

Air Leaks

It is imperative that no air leaks occur in the Air Cart tank as even the smallest air leak from the lid will lead to material bridging in the tank thereby causing misses in the field.

Check the following areas for air leaks:

- Tank clean-out door
- Metering body assembly seals
- Collector assembly seals
- Tank lid

Tank Low in Product

- Refill tank before metering wheels are exposed.
- The metering wheels must be completely covered to avoid unseeded strips.

Important

Check Metering Wheel keyways in the event the primary lines plug.

Keyways may shear if the collector becomes plugged.

Note : Check Seed Flow as described above, after running fan for 5 minutes.

Operation

Operating Guidelines - Continued

Monitor

- Familiarize yourself with all monitor functions.
- Ensure all monitor “*settings*” are correctly set for the air cart/seeding tool combination.
- Recognize and correct alarm conditions as indicated on the machine.
- Check all wire harness connections for corrosion and use a dielectric spray to clean. Inspect all sensors for proper gap.



MONITOR N44049 Shown

General Field Operation

- Follow guidelines outlined in “*Operating Guidelines*”.
- Switch monitor on.
- Start fan.

Note: Load sensing hydraulic systems require “*warming up*” before they function smoothly. See “*Hydraulic Fan Drive*” for more details.

- Move forward with seeding tool.
- Engage metering system clutch (MAIN).
- Lower seeding tool into ground.
- Turning at headland: Switch metering system clutch off (MAIN), immediately raise seeding tool fully rephasing hydraulics (see seeding tool manual).
- Once turned engage metering system clutch (MAIN) and lower seeding tool into ground.

Note: Do not attempt to meter product when fan is not running. Damage to the metering wheels may occur.

Note: It takes a minimum of 15 feet (5 m) of forward travel @ 6 mph (10 kph) before product reaches the seed openers. Forward travel should be equal to half the width of the seeding tool. [i.e. for a 40 ft (14 m) wide seeding tool the forward travel should be a minimum of 20 feet (7 m).]

Clutch Switches

Main

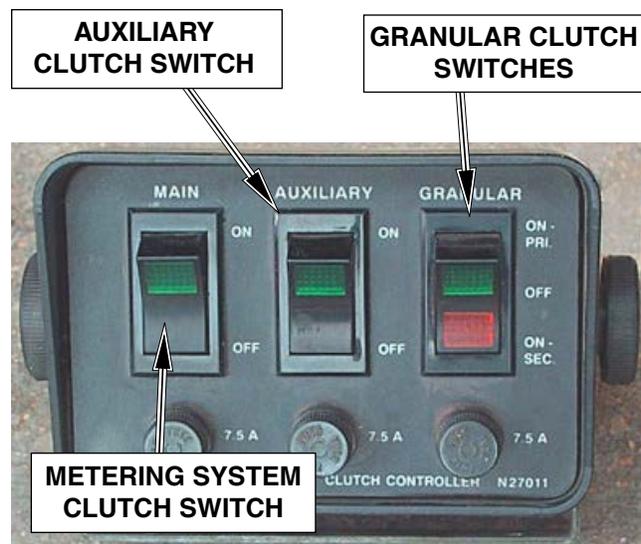
- Controls the main clutch which engages and disengages the ground drive.

Auxiliary

- Controls the optional second clutch.

Granular

- Controls a secondary auxiliary clutch



Clutch Switch Console

Section 6: Monitor

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Monitor

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Introduction

The monitor utilizes a multiplexed data communication system to monitor the functions of the Air Cart. In the multiplexed system, all sensors communicate with the monitor on the same three wires.

The system can monitor and display status of the following functions:

- Fan speed
- Ground speed
- Shaft speeds (up to 4)
- Bin levels (up to 4)
- Flow Blockage (up to 192 runs)

An audio alarm will sound upon detection of: low or high fan speed, low shaft speed, low bin level and failure of sensors. Also, loss of flow in any runs that are being monitored with Blockage Modules will generate alarms. Audio alarms persist until the alarm condition is removed or until the alarm is acknowledged by the operator by pressing the appropriate soft key.

In addition, the monitor can determine and display:

- Field Area
- Total Area
- Application Rate (weight per unit area) (VRT systems only)

The monitor allows the following settings to be changed:

- High and Low fan speed alarm point
- Low shaft speed alarm point for 4 meter shafts
- Ground speed pulses per 400 ft and pulses per revolution
- Pulses per revolution of fan and 4 meter shafts
- Low bin alarm for 4 bins
- The number of Blockage Modules that are connected to the monitor
- The width of the implement
- Imperial or metric units
- English or Russian language

The settings listed above, as well as field and accumulated areas are stored in nonvolatile memory. This means that the information is retained even when power is disconnected.

Two cables exit the rear of the monitor. There is a two wire power cable that connects to the tractor power supply. The other is a three wire cable that brings power and communications to the remote sensors through the main harness.



MONITOR - N44049



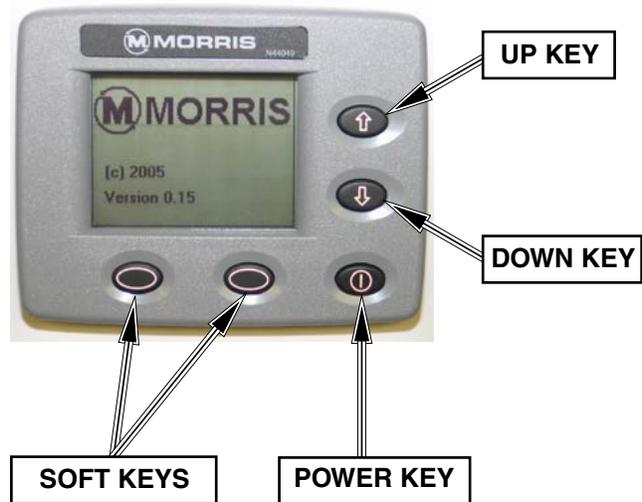
CLUTCH SWITCHES

Monitor

Identifying Monitor Switches

The five keys on the monitor face are used for controlling the monitor.

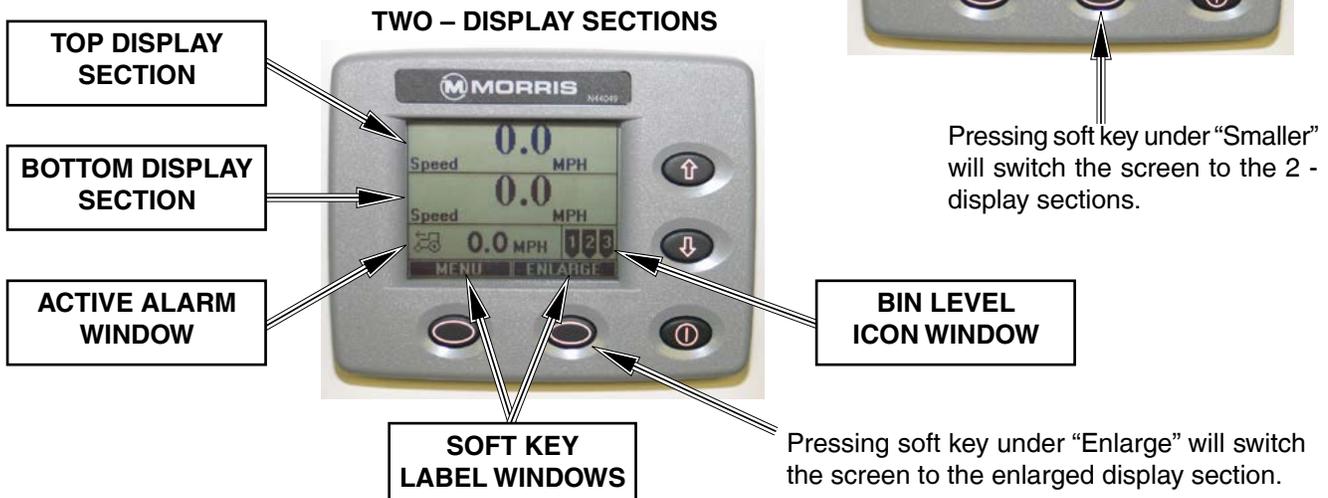
- Power Key** • Used to turn monitor on and off.
- Up Key** • Used for moving function selection icon. Also used to increment parameter when changing settings.
- Down Key** • Used for moving function selection. Also used for decrementing parameter when changing settings.
- Soft Keys** • Used to enter menus and selections. Also used for going to next parameter in program mode.



Identifying Monitor Displays

The Operating Screen is divided into the following areas:

- Two small display sections or one enlarged display section
- Active alarm window or, if there are no active alarms, the current ground speed is displayed
- Bin level icon window
- Soft key label windows



Operating Screen

Display Section

The display has two Display Sections on the operating screen. These windows have their data periodically refreshed at ½ to 1- second intervals. Each window has the following information in it:

- Display object name (e.g. Shaft)
- Display object instance (e.g. 1), if applicable
- Display object data (e.g. 7)
- Display object units (e.g. RPM), if applicable

Active Alarm Window

All acknowledged alarms are displayed on the operating screen's "active alarm window" until the alarm condition is removed. If there is only one acknowledged alarm, it will flash on the display in order to draw the user's attention to the continued error. If there is more than one acknowledged alarm they will cycle on the display, with each alarm being displayed on the screen for 2 seconds.

Note: If there are no active alarms, the current ground speed is displayed

See "Alarms" for more details on when an alarm is first observed.

Bin Level Icon Window

The display has one window dedicated to graphically showing the status of product in up to 3 bins. When a bin is empty an alarm will be generated and the corresponding bin icon will flash.

Soft Key Label Windows

The display has two windows displaying the current function of the two available soft keys. The function of the soft keys change depending on the screen being viewed. On Operating Screen, MENU can be accessed with left soft key or bottom display ENLARGED.

Note: Monitor will show "communication errors" if the system installation (Sensor Learn Mode) was not completed. See *Sensor Installation*.



Operating Screen



Operating Screen with Alarm

Monitor

Operating Screen - Continued

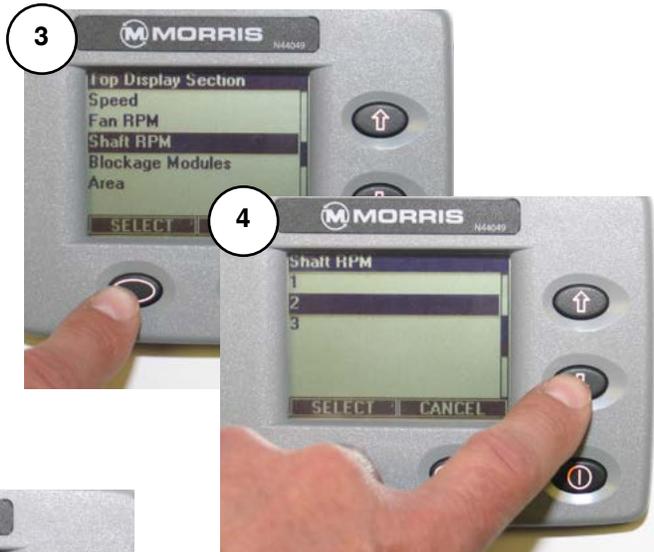
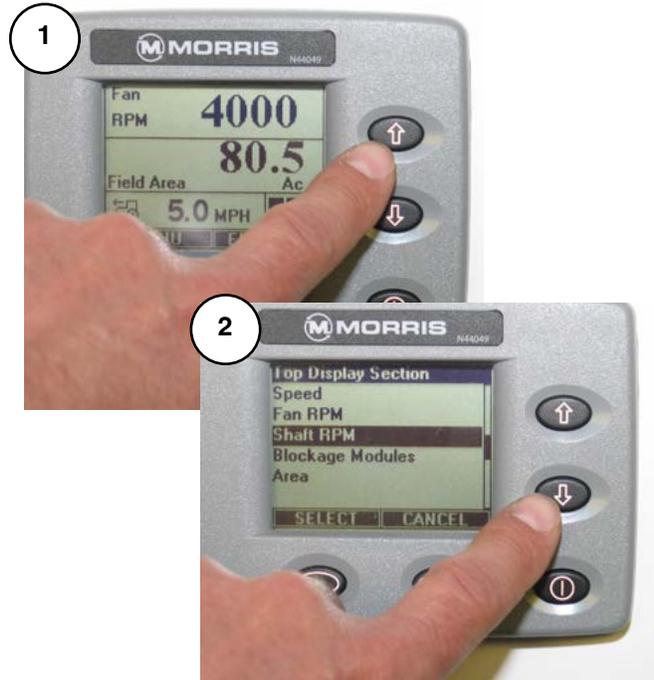
Navigating the Operating Screen

When the UP or DOWN key is pressed in the Operating Screen, this allows the user to select what is shown on the Top Display Section and the Bottom Display Section.

Example: Change the top display from Fan to Shaft 2

1. Press the UP key to enter the "Top Display Section".
2. Use the UP/DOWN keys to scroll to other display items. Press the DOWN key to highlight "Shaft RPM".
3. Press the SELECT key to enter "Shaft RPM", which will display the instances of Shaft RPM.
4. Use the UP/DOWN keys to change the selected shaft to 2.
5. Press the SELECT key to choose shaft 2. This will return the monitor to the main screen and the Top Display Section is no longer displaying Fan, but is now displaying Shaft 2 RPM.

Note: If the DOWN key were pressed in step 1 to enter into this mode, the title of the menu would be "Bottom Display Section" and the bottom display would be changed.



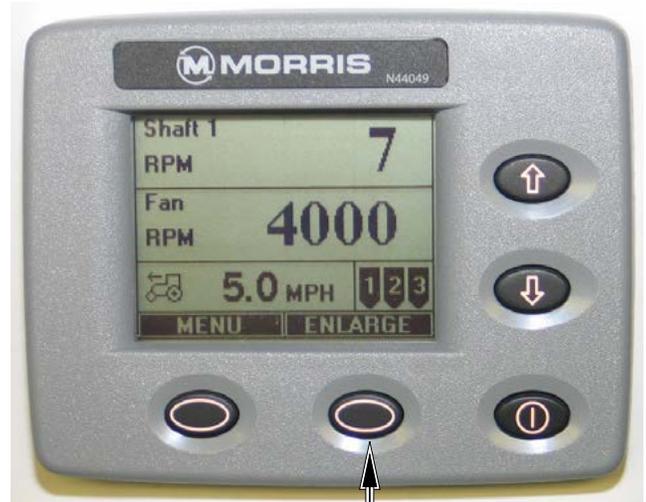
Operating Screen - Continued

Enlarged Operating Screen

If the ENLARGE key is pressed, the Bottom Display Section will expand up into the Top Display Section and the text will increase in size.

When in the enlarged mode, the right most soft key will be re-labeled SMALLER. Press the key, to return to display of top and bottom sections.

In Enlarged mode, the UP and DOWN keys allow changing function displayed on screen.



Press soft key under ENLARGE to enlarge bottom section.



Pressing soft key under SMALLER will switch the screen back to the two - display sections.

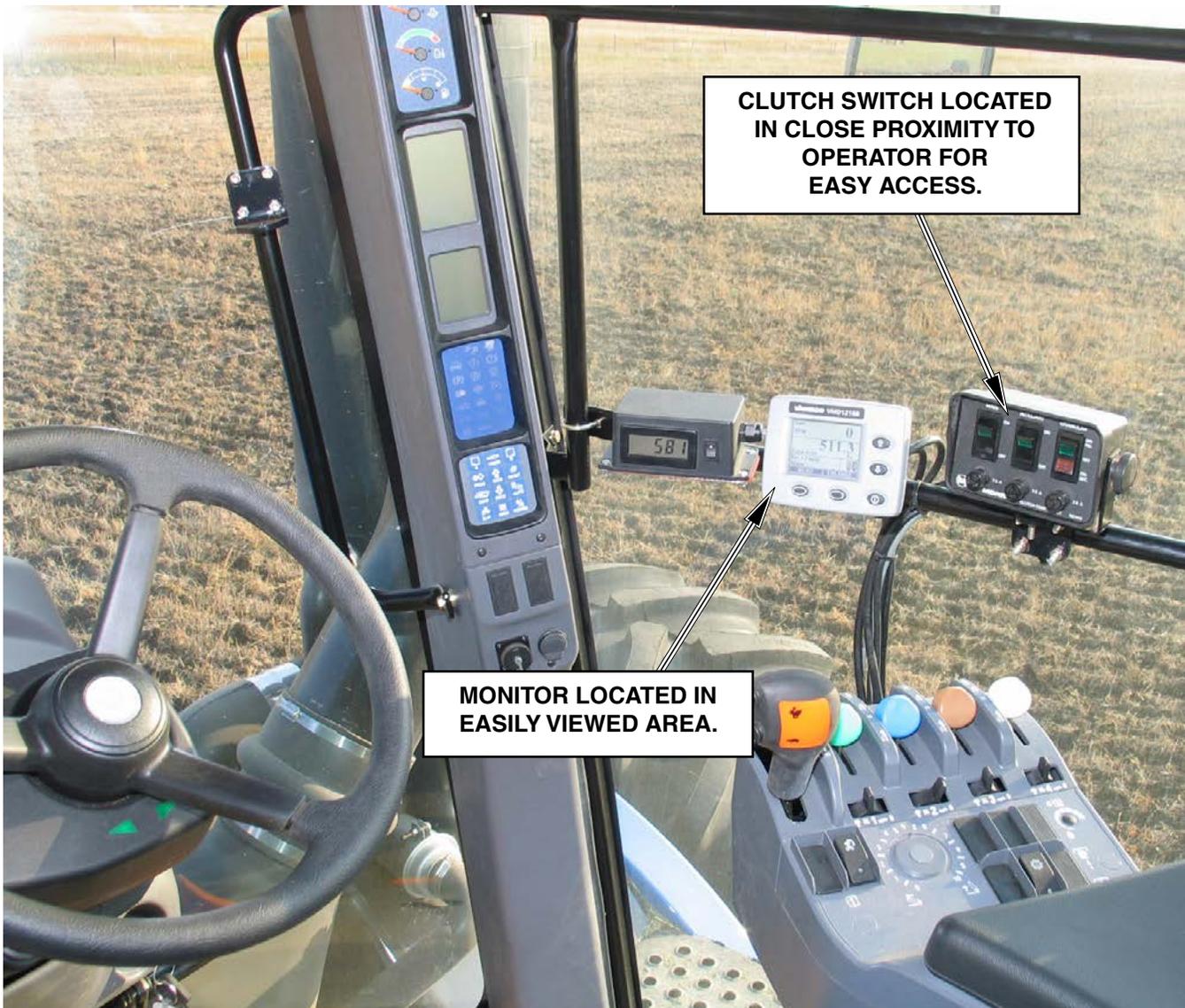
Monitor

Installing Monitor

- Locate monitor and clutch switch in a convenient location in cab.
- Connect power cables directly to a 12V battery.
 - White or Red wires **positive**.
 - Black wires **negative**.
- Route cable harness to seeding tool and Air Cart. Ensure cables clear any pinch points (i.e. tractor articulation point, hitch point, etc.)
- Program monitor as described in *System Installation* and *Monitor Programming* Sections.

Note: Locate monitor, power and ground wires away from radio and antenna if tractor is so equipped.

Note: Do not connect monitor directly to starter switch.



Startup

Power On

Press the Power Key to turn the monitor on.

When the unit is turned on, the following display sequence takes place:

- MORRIS is briefly displayed along with the Version number of the monitor software. **This number should be included with any reports of faulty or unexpected system operation.**

This Splash Screen is displayed for a short time – long enough to go through the system startup and wake up all of the sensors (approximately 3 seconds).

- If any sensors are found, the monitor proceeds to the “Operating” screen
- If no sensors are found, the monitor proceeds to the “Installation” Screen.

Power Off

Press and hold the Power Key for a couple of seconds until the monitor turns off.

Force Language

The user can press and hold the following keys when turning monitor on to force the display to a certain language:

Force English Language

- Press and hold the UP and DOWN keys. Push the power button. Release the UP and DOWN keys after the correct language is shown.

Force Russian Language

- Press and hold Soft key 1 and Soft key 2. Push the power button. Release the UP and DOWN keys after the correct language is shown.

Note: This language setting will not be retained when the monitor is turned off. To retain language setting, go to “Global Settings” and choose “Language” and select “Exit and Save” option.

Monitor ID
Version Number



Splash Screen



Operating Screen

Monitor

Startup - Continued

Startup Menu Screen

The startup menu screen provides the user with four different options:

- 1) **System Startup** – this will not install any sensors.
- 2) **Learn New System** – this is used to learn a new compliment of sensors, but not modify the menu parameters that have already been customized by the user.
- 3) **Default Settings** – this is used to restore all of the menu parameters to the factory configuration.
- 4) **Learn New System and Default Settings** – this performs the actions of number 2 and number 3 above.



System Startup Screen

Sensor Installation

The installation procedure is required to configure the monitor to the sensors attached to it.

The operator may have to redo the installation if:

- 1) An extra tank is added to the Air Cart.
- 2) Replacing or adding sensors.
- 3) Replacing monitor with a new monitor.

Installation Precautions

- 1) During installation the monitor has a predetermined order in which it wants the sensors attached. The installer must be sure that the proper sensor is plugged in the proper sequence.
 - i.e. If during installation the installer plugs in the Front Shaft and Ground Speed sensors in the wrong order, the monitor would not know this. The monitor would interpret Front Shaft rpm from the Ground Speed shaft and vice versa.
- 2) There may be occasions when the operator will not have use of all the sensors.
 - i) During sensor installation when the monitor prompts for an unused sensor to be plugged in, the operator can press the SELECT key to skip over the sensor. **The sensor will be assigned a disabled status.** A sensor disabled by this method can only be enabled by repeating the installation procedure.
 - ii) During operation the operator can disable shaft sensors by setting the pulses per revolution to zero. When pulses are set to zero alarms for that sensor and corresponding Bin Level sensor are ignored and no monitoring occurs.
- 3) Blockage modules attached to the harness are handled differently than the sensors attached to the harness. See Assembly Section "*Blockage Module*".

Optical Sensors - the blockage modules **have to be unplugged from the harness** before sensor installation can be performed and are connected like the other sensors requested by the monitor during sensor installation.

Note: Each monitor is unique to the sensors installed. If monitor is moved to another Air Cart it has to be reprogrammed to match the sensors.

Sensor Installation Order
Speed (Ground)
Fan 1
Fan 2
Shaft 1
Shaft 2
Shaft 3
Shaft 4
Tank 1
Tank 2
Tank 3
Tank 4
VarCon (Variable Rate) (Unit calls for installation only if var controller is installed)
Optical Blockage Modules



Monitor

Sensor Installation - Continued

Installation Procedure

1. **Disconnect** all the sensors (3 pin connector) from the harness before turning monitor on.

Turn monitor on. With no sensors found, the monitor proceeds to the "Startup menu" screen.

Use the Up/Down keys to select "Learn New System". Press the soft key below SELECT to enter the "Install New System" mode.

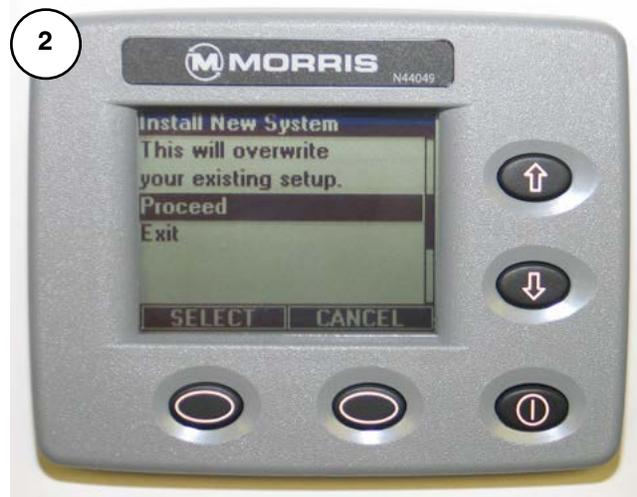
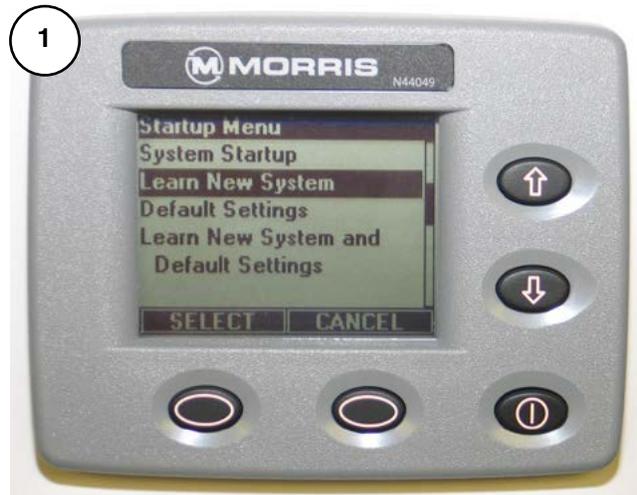
2. The monitor will ask if you want to proceed or exit.

With "Proceed" highlighted, press the SELECT key to enter the "Install New System" mode.

3. The display will indicate to install the speed sensor indicating that the ground speed sensor may now be connected. Connect the ground speed sensor.

The monitor will give a double beep when it acknowledges the sensor.

Continued on next page.



Sensor Installation - Continued

Installation Procedure - Continued

4. The display will indicate to install the fan sensor indicating that the fan sensor may now be connected. Connect the fan sensor.

The process is the same for rest of the sensors in the sequence.

5. When the monitor requests a sensor that **will not be used** in the configuration, use the Up/Down keys to select "Skip this Sensor" and press the soft key below SELECT and the monitor will skip the sensor and advance to the next one in the sequence.

Note: There are **12 Blockage Modules**. To skip past the blockage modules use the Up/Down keys to select "Skip this Type of Sensors" and press the SELECT key, the monitor will skip all of the blockage modules and advance to the next type of sensor in the sequence.

6. When all sensors in the list have either been learned or skipped, the monitor will display "Installation Complete". Use the Up/Down keys to select "Exit" press the SELECT key to return to the main "Startup Menu".

To verify the installation, turn the monitor off, then turn it on again. The monitor will now proceed to the "Operating" screen.



OR



Monitor

Monitor Settings

Navigating Settings Screens

The settings screens contain all the configuration information required to tailor the monitoring capabilities to the installed system and user preferences. Only setting parameters that are relevant are displayed (i.e. if no Shaft 3 is installed, there will not be any Shaft 3 setting parameters made available).

Pressing the MENU key when in the “Operating Screen” enters this mode.

The menu system is made up of screens that have the following content:

- 1) A menu title
- 2) The body of the menu
- 3) The soft key descriptions - changed to “Select” and “Cancel”.

The Menu Title

The menu title is at the very top of the screen.

This indicates to the user what the rest of the screen is referring to. For example, if the user is in the “Speed Settings” menu, the field “Pulses Per Rev” refers to the ground speed sensor and if the user were in the “Seed Shaft Settings” menu, the field “Pulses Per Rev” would refer to the seed shaft speed sensor.

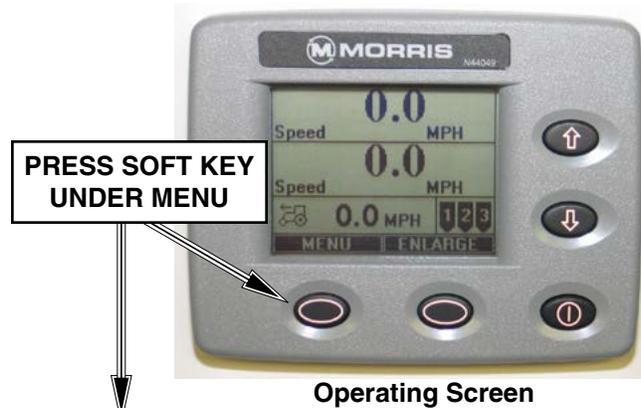
The menu title line is always highlighted so that it stands out from the rest of the screen.

The Body of the Menu

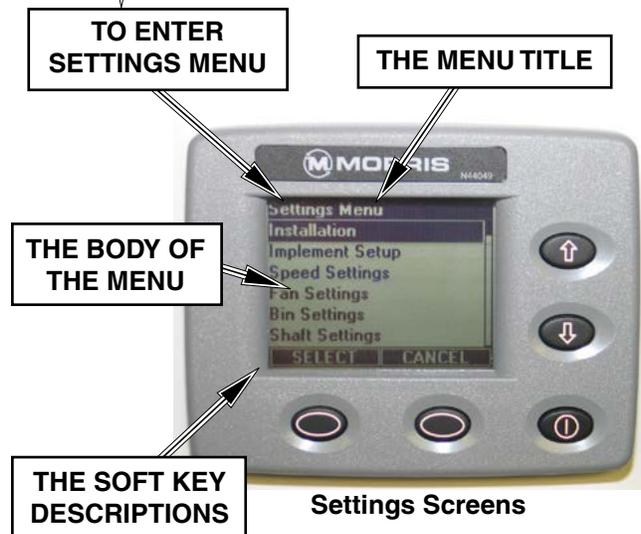
The main body of the menu is a list of objects. The objects in the menu system will take up 1 or more lines of space. The scroll bar on right hand side of screen indicates where the object is in the list and when the list has been wrapped.

When a menu is entered, the top object is always highlighted. The highlighting of the object indicates to the user the current object that they are on.

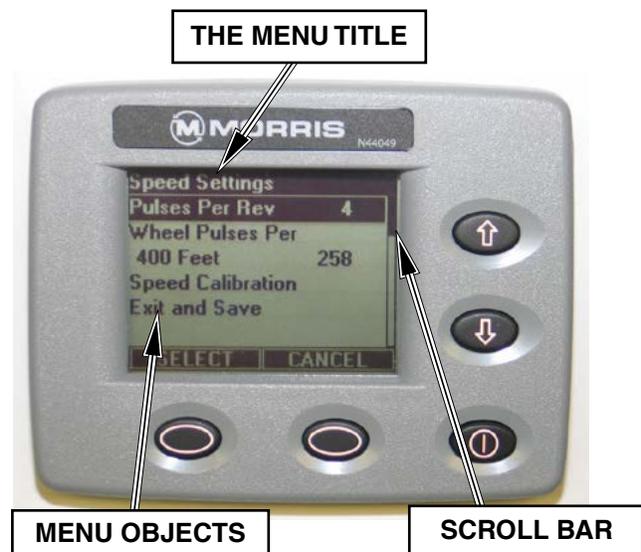
- If the Select key is pressed, the current object is selected.
- If the Up or Down arrow keys are pressed, the object above or below the current object is highlighted.
- If Cancel is pressed, the menu exits without saving anything and reverts back to the previous menu that was displayed.



Operating Screen



Settings Screens



MENU OBJECTS

SCROLL BAR

Monitor Settings - Continued

Navigating Settings Screens - Continued

The Body of the Menu - Continued

When an object is selected, the value becomes highlighted.

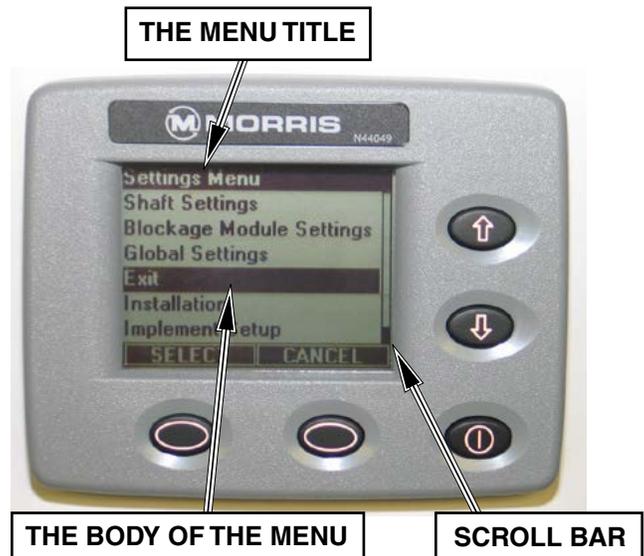
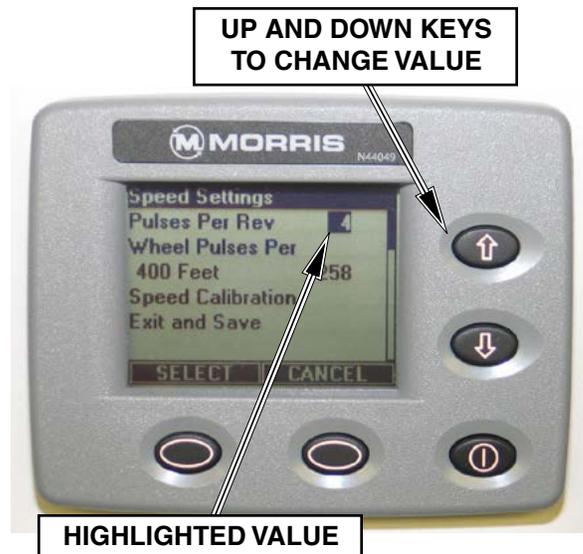
- Highlighted value can be changed with the Up and Down keys.
- Press “Select” key after changing value to enter value and return to object list.
- Select “Exit and Save” to keep any changes.

There are multiple ways to exit from the menu screens:

- 1) If the changes that were made on the menu screen need to be saved, the “Exit and Save” menu link must be selected.
- 2) If the changes are to be discarded or if the current operation is to be terminated (such as a calibration), the “Cancel” key can be pressed, or if it exits, the “Exit” link can be chosen.

The Menu Soft Key Descriptions

Like in the “Operating Screen”, the Menu also has two soft keys. These keys allow the user to select an item or object (the Select key) or to Cancel out of the current operation without saving anything (the Cancel key).



Note: The list shown has been wrapped. The scroll bar indicates that the highlighted item “Exit” is actually the last item in the list.

Important

The use of “Restore Default Settings” restores ALL of the menu parameters to the factory configuration.

(i.e. Implement width, Pulses Per Rev, Wheel Pulses Per 400 Feet, etc.)

Monitor

Monitor Settings - Continued

See charts on following pages for monitor settings.

Changing Monitor Settings

The following example explains the procedure for changing settings.

Entering the “Settings Menu”

Example: Change the implement width to 41.5 ft.

1. From the “Operating Screen” press the MENU key to enter the “Settings Menu”.

Use the Up/Down keys to select the desired function. Press the soft key below SELECT to enter the function “Implement Setup”.

2. Under each function there is a list of parameters that can be changed, see “Settings Menu” chart.

3. Use the Up/Down keys to select the parameter. “Implement Width”.

4. Press the SELECT key to highlight the value. Use the Up/Down keys to change the value to “41.5 Ft”.

5. Press the soft key below SELECT to enter the value and move to the next parameter in the list.

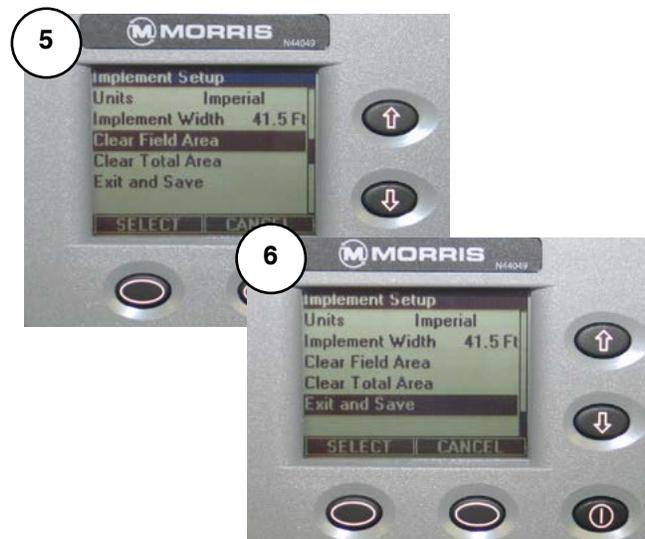
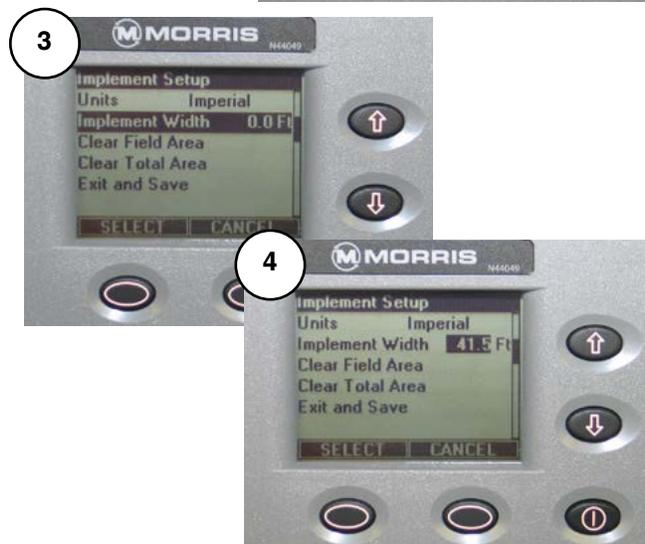
Set all parameters in the list as indicated in the above steps.

6. When all parameters in the list have been set, use the Up/Down keys to highlight “Exit and Save” press the SELECT key to save the changes and return to “Settings Menu”.

Proceed to set all function parameters as indicated in “Settings Menu” chart.

Saved settings are retained even after power has been removed from the monitor.

Note: When the operator is in any of the “Settings Menu” modes, the monitor will not generate normal monitor alarms (i.e. low fan speed, shaft speed and so on).



Settings Menu Chart - Standard Drive

Installation

- Install New System _____ See "Sensor Installation"
- Replace a Sensor _____ See "Sensor Replacement"
- Add a Sensor _____ See "Sensor Replacement"
- Remove a Sensor _____ See "Sensor Replacement"

Implement Setup

- Units _____ Select Imperial or Metric
- Implement Width _____ Set to width of seeding tool
- Clear Field Area _____ See "Resetting Area"
- Clear Total Area _____ See "Resetting Area"

Speed Settings

- Pulses Per Rev _____ Set to 4
- Wheel Pulses Per 400 Feet ____ See PP400 Chart
- Speed Calibration _____ See "Pulse Counting Mode for PP 400"

Fan Settings

- Pulses Per Rev _____ Set to 2
- Low Alarm Point _____ Set to 3000 rpm
- High Alarm Point _____ Set to 5000 rpm

Bin Settings

- Tank 1, Tank 2 and Tank 3
- Alarm Setting _____ Enabled (default) Set to Disabled if tank is not in use.

Shaft Settings

- Shaft 1, Shaft 2 and Shaft 3
- Settings _____ Pulses Per Rev Set to 4
- Low Alarm Point 2.0 rpm - Can be adjusted to 0.5 rpm for low rates.

Blockage Module Settings

- Runs per Module Setup _____ Set individual Module number of Runs
- Individual Runs Setup _____ Allows Runs to be Enabled/Disabled
- Blockage Module Test _____ See "Blockage Module Test"
- Blockage Calibration _____ See "Blockage Calibration"

Global Settings

- Language _____ Select English or Russian
- Volume/Pitch _____ 50% (default) Set as desired.
- Backlight _____ 50% (default) Set as desired.
- Contrast _____ 100% (default) Set as desired.
- Restore Default Settings _____ Resets ALL Monitor Settings to defaults

Note: Only setting parameters that are relevant are displayed (i.e. if no Shaft 3 is installed, there will not be any Shaft 3 setting parameters made available).

Important

Select "Exit and Save" in each Menu Setting to save changes.

Monitor

Monitor Settings - Continued

Wheel Pulses Per 400 Feet (PP400) Standard Drive

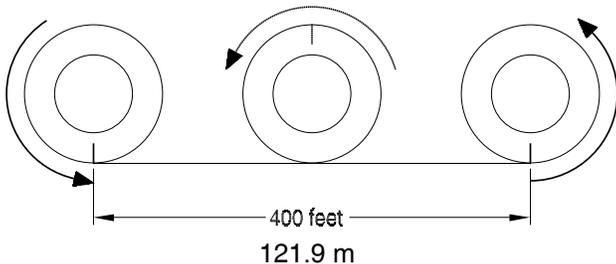
The chart contains average PP400 values, for the tire options offered by Morris.

PP400 - Standard Drive			
Tire Size	Tire Style	Rating	PP400
23.1L x 26	AWT (Implement)	12 ply	341
	TD8 Sure Grip	10 ply	310

PP400 Math Calculation

To determine PP400 value, first determine the tire circumference as outlined in "Determining Tire Sprocket" under Operation Section.

Note: The PP400 can also be determined using the speed calibration feature.



Imperial Measurement

Monitor PP400 Formula for Standard Drive

For 26 Rim = $56244/T_c$ **PP400** = _____

T_c = Tire Circumference measured in inches

Metric Measurement

Monitor PP400 Formula for Standard Drive

For 26 Rim = $1428.6/T_c$ **PP400** = _____

T_c = Tire Circumference measured in meters

Monitor Settings - Continued

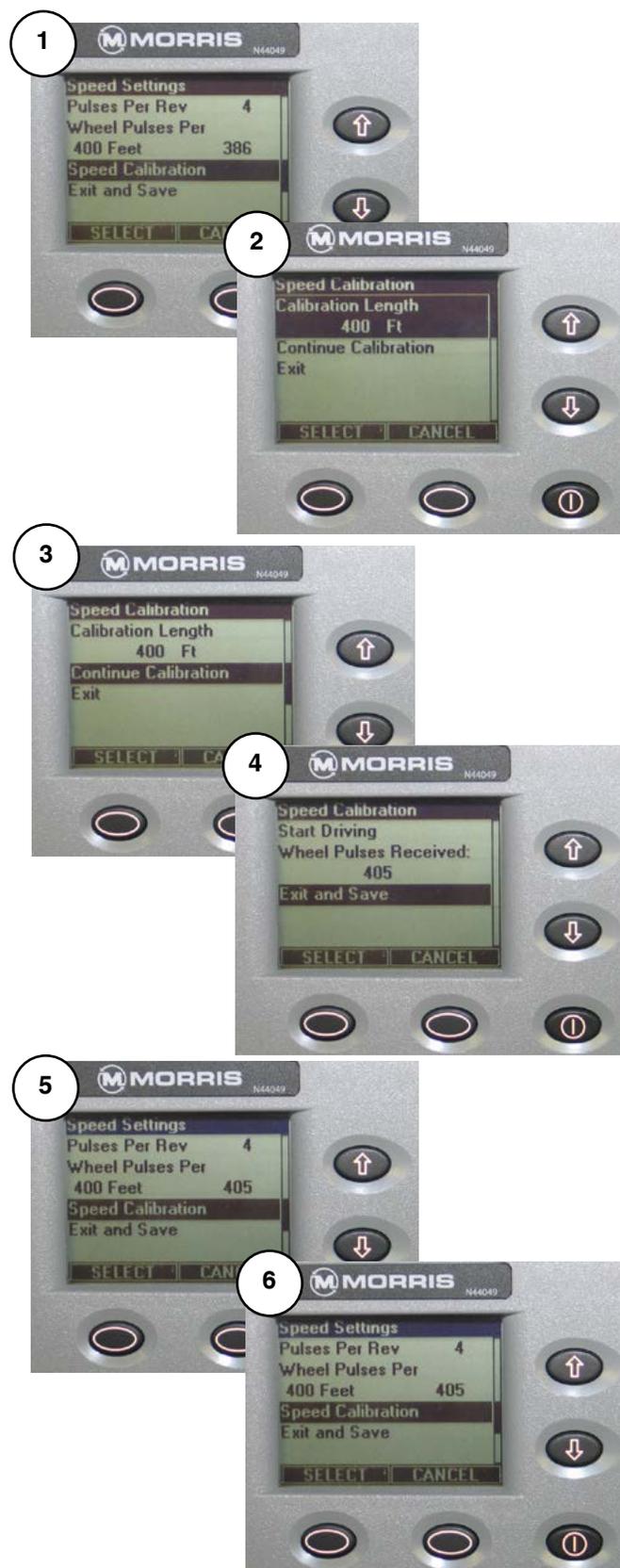
Speed Calibration

If the operator does not know what the pulses per 400 feet should be, or, if more accuracy is desired for present levels of tire inflation or soil conditions, the monitor can be put into “Speed Calibration” mode, pulses will be counted while driving a specified distance.

To start the Pulse Counting Mode:

1. Measure and mark out 400 feet (121.92 m).
Select “Speed Settings” under the “Settings Menu”.
2. Then select “Speed Calibration”.
Use the Up/Down keys to select “Continue Calibration” at which point the monitor will request “Start Driving”.
3. Drive the marked distance and the monitor will count the number of pulses.
4. When the distance has been travelled, stop, press the SELECT key to stop the pulse counting. This will “Exit and Save” the new pulse count under the “Speed Settings” menu.
5. The new value will now be displayed under “Wheel Pulses Per 400 Feet” (PP400).
6. Select “Exit and Save” to exit “Speed Settings” and return to the main menu.

Note: The monitor can accept PP400 values from 50 to 9999. Therefore, if the new count is less than 50, the existing count is not replaced. The monitor will state “Pulses Too Low” and display options to “Continue Driving” or “Cancel Calibration”.



Monitor

Alarms

Introduction

All configured sensors and various other operating conditions are continuously monitored. Alarms fall into one of the following three categories:

- **Sensor alarms** are alarms which are generated when information returned by a sensor exceeds the appropriate threshold.
- **Communication alarms** occur when a sensor repeatedly does not respond to attempts at communication.
- **System alarms** are for various other conditions that are found to be in fault.

When an alarm condition occurs the monitor will beep repeatedly and an alarm screen will pop up indicating the fault condition.

The audio alarm and alarm screen persist until the alarm condition is fixed or until it is acknowledged by the operator. Follow the steps on the screen to fix or acknowledge the alarm.

After acknowledgement, the “Operating Screen” will be displayed with any unfixed alarms shown in the “active alarm window”. If there are more than one acknowledged alarms, they will cycle on the display.

When the alarm condition is corrected, the alarm notification is removed and ground speed will again be displayed in bottom window.

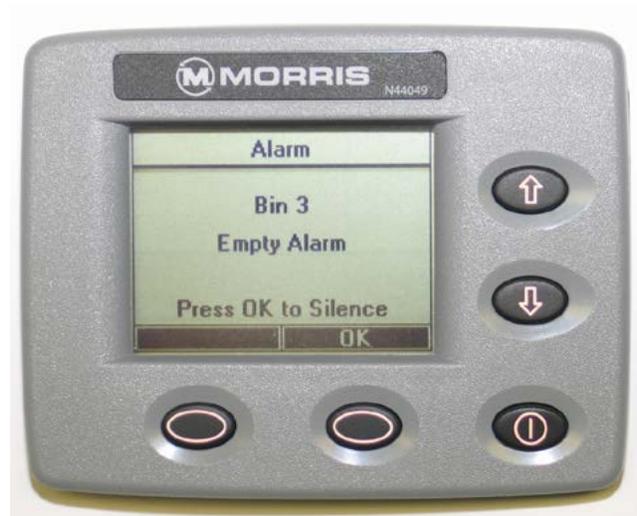
Nuisance Shaft Alarm

Low application rates of Canola may cause the seed shaft to rotate less than 2 rpm.

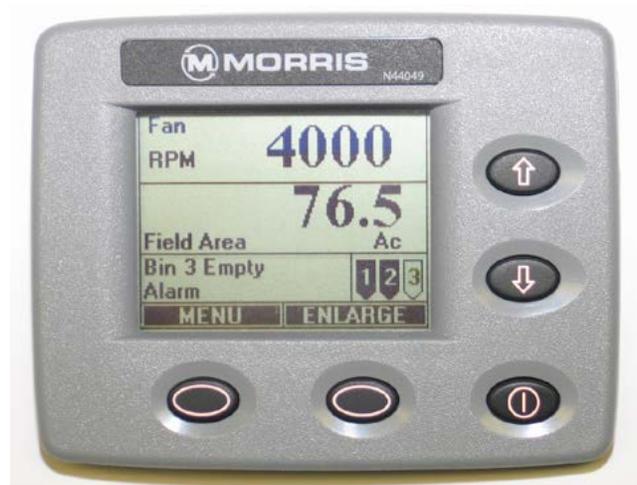
The low shaft rpm will cause the monitor to give a shaft alarm, since the shaft is rotating below the default alarm threshold of 2 rpm.

To avoid this nuisance alarm change the seed shaft low rpm alarm setting to 0.5 rpm.

Note: Change the setting back to 2 rpm when returning to higher application rates.



Alarm Screen



Alarm - Operating Screen

Note: To “TURN OFF” any shaft not in use set pulses to 0. This will eliminate any nuisance alarms caused by an inactive shaft. Also the corresponding bin should be “Disabled” to eliminate any nuisance alarms caused by an empty bin.

Alarms - Continued

“In Motion” Notification

The “In Motion” condition means that the monitor, based on ground speed and clutch state, considers that the system is supposed to be actively seeding.

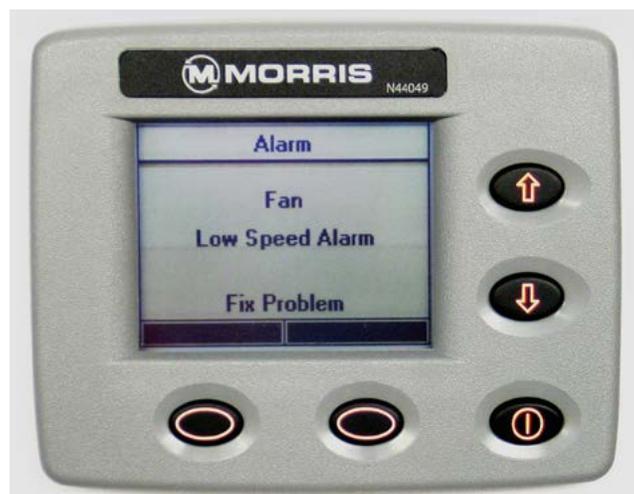
The monitor emits a double beep whenever the “In Motion” condition becomes true or false. This condition is defined as *speed greater than 2 mph (3.2 Kph) and drive clutch engaged*.

1. If ground speed is less than 2 mph (3.2 Kph) for more than 30 seconds the monitor will alarm and display “Should be Seeding”.
2. If ground speed is greater than 2 mph (3.2 Kph) for more than 30 seconds and clutch is not engaged the monitor will alarm and display “Clutch Switch is Off”.
3. Certain alarms are inhibited when the “In Motion” condition is false. These are described elsewhere in this manual, but an example is whether to generate an alarm for a stopped shaft.

If a speed sensor is unavailable the speed is considered to be greater than 2MPH for the purpose of this variable. This allows metering shaft monitoring to work normally, as if there were motion.

Low Fan Alarms

Low fan alarms are handled differently because a stopped fan can result in damage to the metering mechanics as unblown material accumulates. **Low fan alarms can not be acknowledged while the system is “in motion”**. Thus, if a low fan alarm occurs during active seeding, the user will **not be able** to silence the alarm with the soft key, but will need to stop the vehicle or disengage the clutch. When this happens, the monitor accepts it as an acknowledgement of the alarm, and an effective “automatic acknowledge” takes place, resulting in the beeper being silenced and the resumption of normal display with “Fan Low RPM” flashing in the alarm window.



Monitor

Blockage Sensing

Module Installation

When blockage sensing systems are used, modules must be installed in the system, runs per module set, and calibration done while seeding.

Note: When optical modules are added, they must be learned by the monitor. See the “Sensor Installation”.

Runs per Module Setup

The number of runs connected per blockage module must be set in order for the system to operate correctly. This should only need to be done when the blockage modules are first installed, and afterwards only if the number of sensors is changed.

Optical Sensors the number of runs connected is set in the monitor. Refer to “Monitor Settings”.



Individual Runs Setup

Optical Sensors Only

Runs can be enabled/disabled individually. This feature is useful for turning off runs that are not in use. Refer to “Monitor Settings”.



Blockage Sensing - Continued

Blockage Module Test

This test will check the blockage module for proper functioning. Number of runs reported should match the number of sensors connected to each module.

To perform the blockage module test follow the steps below.

1. Stop driving the machine.

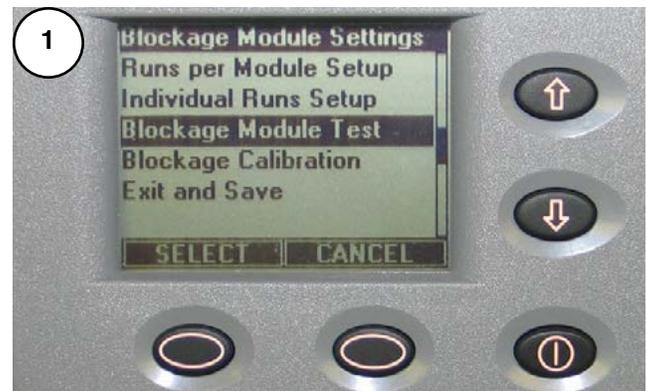
From the "Operating Screen" press the MENU key to enter the "Settings Menu".

Use the Up/Down keys to highlight "Blockage Module Settings" press the SELECT key to enter the function.

Use the Up/Down keys to highlight "Blockage Module Test" press the SELECT key to enter the function.

2. The monitor will indicate when a module test is complete. Testing may take a few minutes depending on configuration and application.
3. Once all modules have completed their test the monitor will display how many optical sensors each module could communicate with. If this number does not match the actual number connected check the wiring and installation of the sensors.
4. Once all of the modules have been tested use the Up/Down keys to highlight "Exit" press the SELECT key to return to the "Blockage Module Settings" menu.
Use the Up/Down keys to highlight "Exit and Save" press the SELECT key to save the changes and return to the "Settings Menu".

At any time during this test, CANCEL may be pressed to exit the "Blockage Module Test".



Monitor

Blockage Sensing - Continued

Blockage Calibration

In calibration mode, the module determines the normal seed flow rate for each run. This calibrated flow rate is used to determine the threshold for indicating that a run is blocked.

To calibrate the blockage modules follow the steps below.

1. Start seeding in the field.

From the "Operating Screen" press the MENU key to enter the "Settings Menu".

Use the Up/Down keys to highlight "Blockage Module Settings" press the SELECT key to enter the function.

Under "Blockage Module Settings" use the Up/Down keys to highlight "Blockage Calibration" press the SELECT key to enter the function.

2. The monitor will indicate what number of sensors are "Calibrating", "Calibrated" and "Total" installed sensors. Calibration may take a few minutes depending on the number of sensors and application rate.
3. Once all of the sensors have been calibrated (calibrated = total) press the SELECT key to exit and return to the "Blockage Module Settings".
4. Use the Up/Down keys to highlight "Exit and Save" press the SELECT key to save the changes and return to the "Settings Menu".

At any time during this test, CANCEL may be pressed to exit the "Blockage Calibration" leaving the sensors uncalibrated.



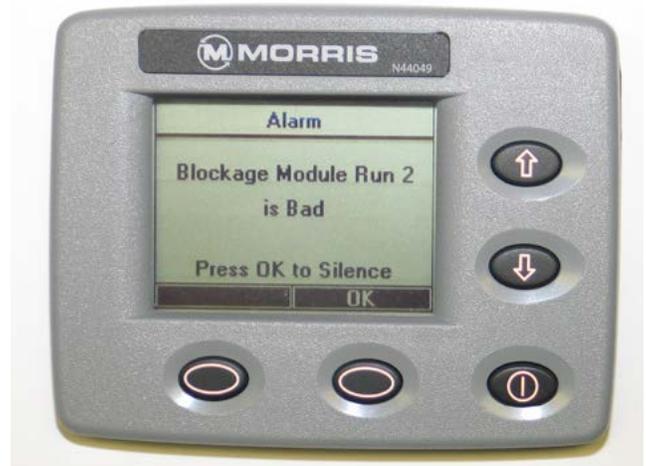
Important

CALIBRATION must be done each time the seeding rate or the seed type is changed.

Blockage Sensing - Continued

Optical Blockage Run Bad Alarms

If any monitored run does not pass the self-test mode on monitor power-up, the blockage module will report that run is bad. The optical sensor or wiring may be faulty or too much light may be getting into the tube.

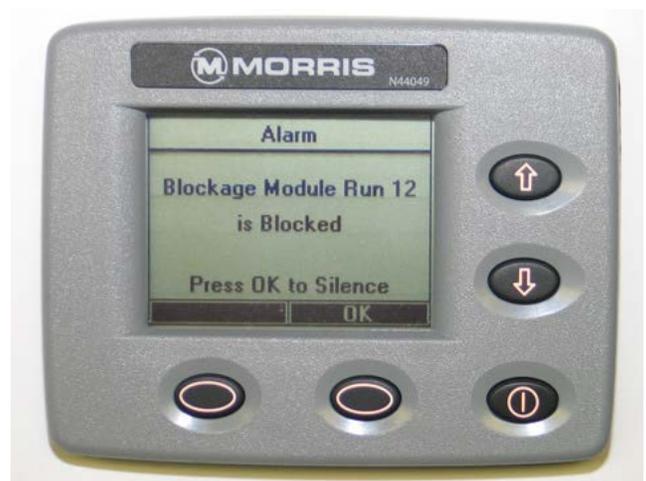


Blockage Alarms

During seeding, if the blockage monitor senses a low seed count or does not see any seeds from a run sensor, an alarm will be displayed to show which runs are blocked.

The alarms can be silenced with the OK soft key.

Note: If this alarm is active when the “In Motion” condition becomes FALSE, this alarm is suspended until the “In Motion” condition becomes TRUE.



Monitor

Area Display

There are two area counters, field area and total area. They are both accumulated whenever the system “In Motion” condition is true. Area counts are stored in memory when the unit is turned off.

The area counts can be displayed on the “Operating Screen” as outlined in “Navigating the Operating Screen”. The FIELD AREA and the TOTAL AREA are displayed to the nearest tenth of an acre (or hectare).



Resetting Area

To clear FIELD AREA and/or TOTAL AREA follow the steps below.

- From the “Operating Screen” press the MENU key to enter the “Settings Menu”.
- Use the Up/Down keys to highlight “Implement Setup” press the SELECT key to enter the function.
- Use the Up/Down keys to highlight the desired function of “Clear Field Area” or “Clear Total Area” press the SELECT key to enter the function.
- The monitor will ask “Are you sure?” leave as “Yes”.
- Use the Up/Down keys to highlight “Enter Selection” press the SELECT key to clear area and return to the “Implement Setup” menu.
- Use the Up/Down keys to highlight “Exit and Save” press the SELECT key to save the changes and return to the “Settings Menu”.

Note: Field area will not be reset to zero when total area is reset.



Sensor Replacement

The monitor will alarm the operator if there is a faulty sensor in the system by displaying a communication error for the sensor.

To replace a faulty sensor follow the steps below.

Example: Replace Shaft 1 sensor.

1. From the “Operating Screen” press the MENU key to enter the “Settings Menu”.

Use the Up/Down keys to highlight “Installation” press the SELECT key to enter the function.

2. Use the Up/Down keys to highlight “Replace a Sensor” press the SELECT key to enter the function.

3. The monitor will highlight “Select Sensor” press the SELECT key to enter the function.

Use the Up/Down keys to display desired sensor to be replaced (i.e. Shaft 1), press the SELECT key to accept selection.

4. “Proceed” will now be highlighted, press the SELECT key to enter mode.

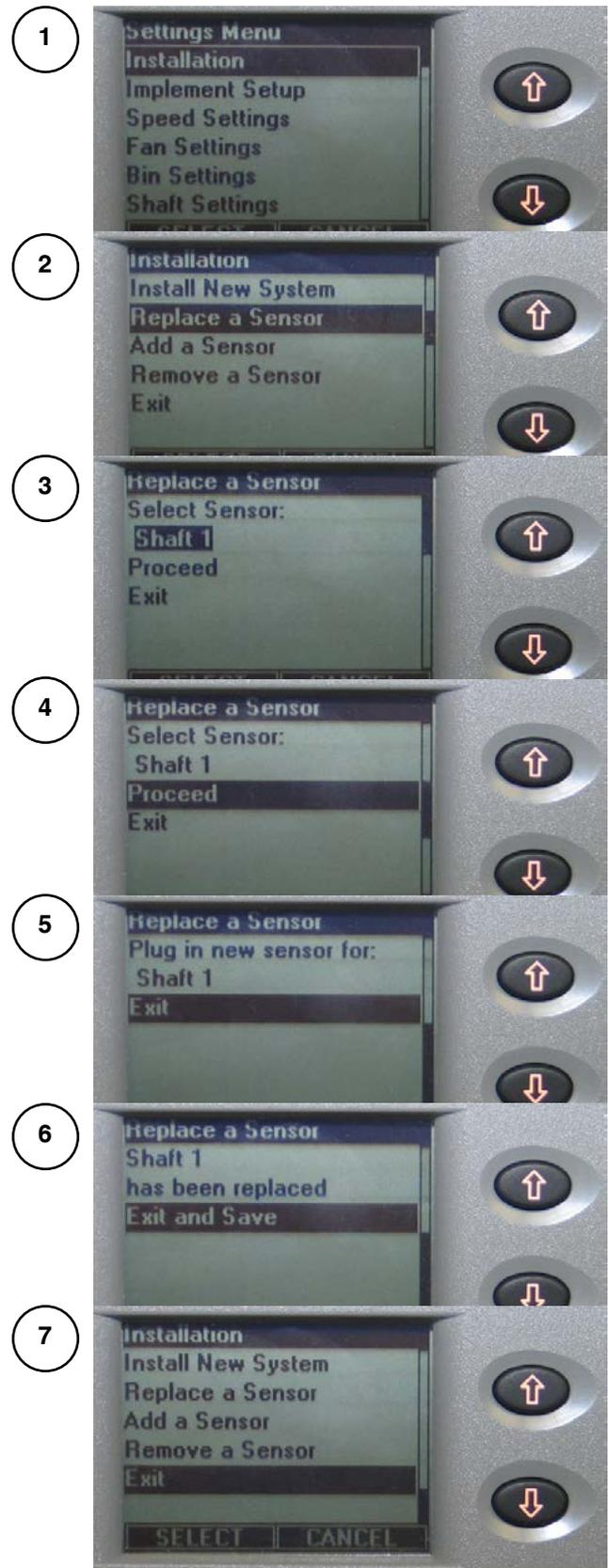
5. The monitor will then display “Plug in new sensor for: Shaft 1”. Unplug the old sensor and plug in the new sensor.

6. Once the monitor acknowledges the new sensor, it will emit a double beep and acknowledge that the sensor has been replaced.

“Exit and Save” will be highlighted, press the SELECT key to save the changes and return to the “Installation” menu.

7. Use the Up/Down keys to highlight “Exit” press the SELECT key to return to the “Settings Menu”.

Note: Sensors can also be added or removed from the system in the same manner by selecting the choice from step 2.



Monitor

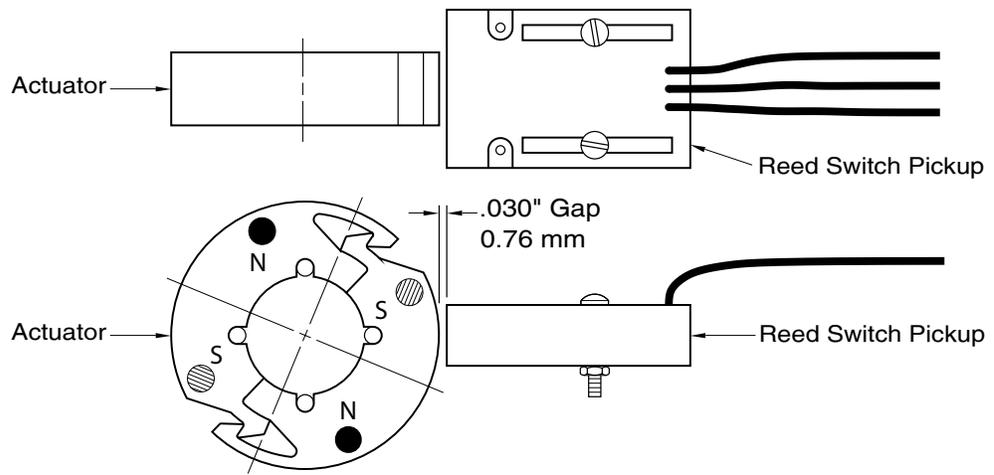
Sensor Gap Settings

Reed Switch Sensors

These sensors are used on slowly revolving shafts, in this case the meters and ground speed.

Check the gap between the sensor and actuator.

A gap of .030 inch (0.76 mm) is recommended.

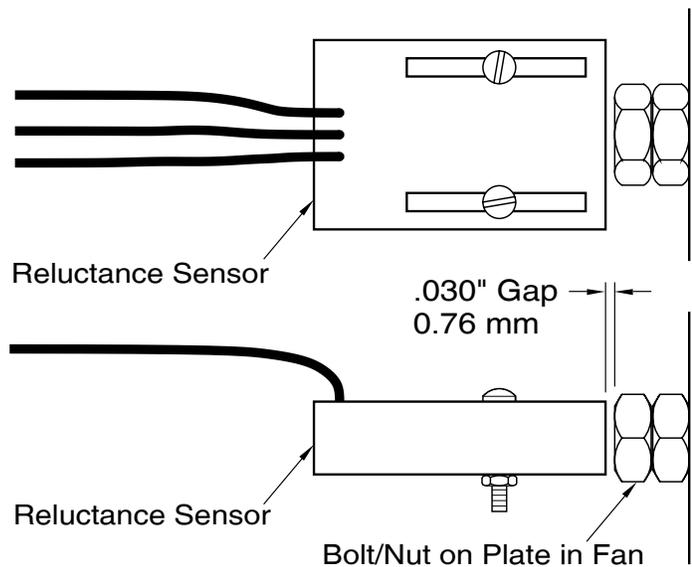


Variable Reluctance Sensors

These sensors are used on high speed shafts, in this case the fan.

Target to sensor gap is critical with these sensors.

A gap of .030 inch (0.76 mm) is recommended.



Trouble Shooting Guide

Most electronic problems are usually one of the following:

- Harness connections.
- Damaged harness wires.
- Loose terminal in harness plug.
- Sensor to Actuator clearance.
- Defective sensor.

The monitor will alert the operator of these problems as a communication error.

Checking Harness

First, check for the obvious things like broken connections, loose terminals, insulation rubbed off and so forth.

- Check continuity of wires with ohm meter.

Checking Sensors

The best approach to testing a sensor is to substitute a suspected sensor with a known good one. If the problem goes away, the sensor is faulty. If it does not go away, it is faulty wiring.

Bin Level Sensors ensure there is no foreign material covering the optical sensor. Remove material with a cloth as not to damage lens.

Make sure sensor wires are not damaged.

Checking Blockage System

Check modules by performing a blockage module test on the monitor.

Optical sensors make sure the “optical eyes” are not coated with material or worn down. Remove material with a cloth as not to damage lens.

Pin sensors make sure there is no buildup of material on the pins. Remove material buildup with a knife and gently scraping away the material buildup.

Make sure sensor wires are not damaged.

Monitor

Notes

Section 7: Maintenance

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SAFETY-ALERT SYMBOL



Watch for this symbol. It identifies potential hazards to health or personal safety. It points out safety precautions. It means:

ATTENTION - BE ALERT.
Your safety is involved.

General

This section deals with two goals, maximum life and dependable operation. Adopt a regular maintenance and lubrication program. Care and sufficient lubrication is the best insurance against delays.

Safety

- Always shut off the tractor and remove key before dismounting.
- Guard against hydraulic high pressure leaks with hand and face protection.
- Never work under the Implement unless it is in the down position or transport lock pins are in place and secured with hair pins. Do not depend on the hydraulic system to support the frame.
- Always wear safety goggles, breathing apparatus and gloves when working on seeder filled with chemical. Follow manufactures recommended safety procedures when working with chemicals or treated seeds.
- Do not feed left over treated seed to livestock, treated seed is poisonous and may cause harm to persons or livestock.



Warning

Securely support any machine elements that must be raised for service work.



Caution



Keep service area clean and dry. Wet or oily floors are slippery.

Maintenance

Tighten Bolts

- Before operating the Air Cart.
- After the first two hours of operation.
- Check tightness periodically thereafter.
- Use Bolt Torque Chart for correct values on various bolts.
- Note dashes on hex heads to determine correct grade.

Note: DO NOT use the values in the Bolt Torque Chart if a different torque value or tightening procedure is given for a specific application.

- Fasteners should be replaced with the same or higher grade. If higher grade is used, only tighten to the strength of the original.

Bolt Torque Chart				
Grade 5 Bolt Marking		Bolt Size	Grade 8 Bolt Marking	
Nm	lb. ft.		lb. ft.	Nm
11	8	1/4	12	16
23	17	5/16	24	33
41	30	3/8	45	61
68	50	7/16	70	95
102	75	1/2	105	142
149	110	9/16	155	210
203	150	5/8	210	285
366	270	3/4	375	508
536	395	7/8	610	827
800	590	1	910	1234
1150	850	1-1/8	1350	1850
1650	1200	1-1/4	1950	2600
2150	1550	1-3/8	2550	3400
2850	2100	1-1/2	3350	4550

Tires

- Inspect tires and wheels daily for tread wear, side wall abrasions, damaged rims or missing lug bolts and nuts. Replace if necessary.
- Tighten wheel bolts - refer to Bolt Torque Chart.
- Check tire pressure daily, when tires are cold.
- Correct tire pressure is important.
- Do not inflate tire above the recommended pressure.

Tire Specifications			
Tire Size	Tire Style	Rating	Pressure
21.5L x 16.1	Softrac II	10 ply	28 psi 193 kPa
	Sure Grip Traction	12 ply	32 psi 220 kPa
23.1L x 26	AWT (Implement)	12 ply	24 psi 165 kPa
	Rice (TD8 Sure Grip)	10 ply	28 psi 193 kPa



Caution

Tire replacement should be done by trained personnel using the proper equipment.

Daily Maintenance

- Check for and remove any water in primary collectors after rainy weather. Remove both front and rear clean-out doors and collector bottom to drain water from the tanks and collectors.
- Reinstall collector bottoms and clean-out doors.

Important: Care must be taken when reinstalling collector bottoms to prevent damage to the inside of the collector.

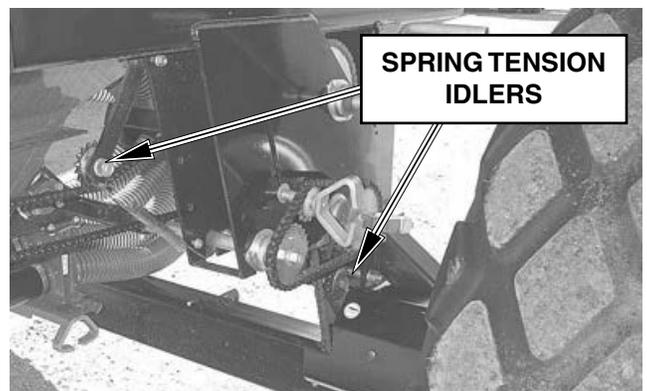
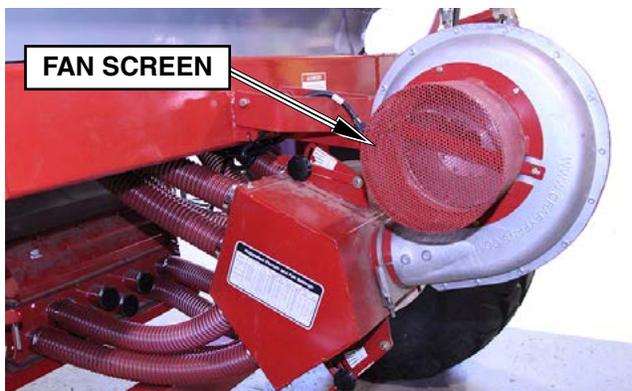
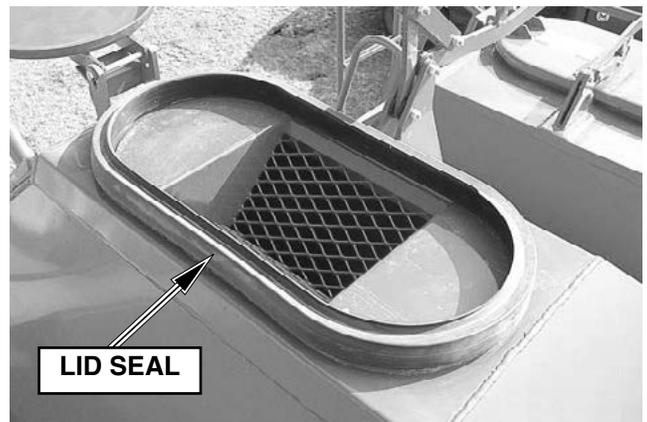
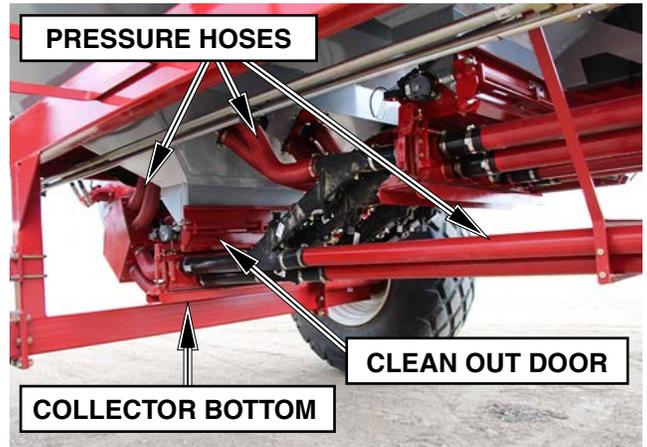
- Assure fan screen is clear of debris.

Note: Start fan and run for 3 - 5 minutes prior to loading machine to get rid of accumulated moisture.

- Check lid seals for damage, and that they are sitting properly on steel ring.
- Check tank pressure hoses for leaks, cracks or plugging.
- Check the following areas for air leaks:
 - Tank clean-out door
 - Metering body assembly seals
 - Collector assembly seals
 - Tank lid

Refer to “Air Leak Check” under Air System Maintenance.

- Check monitor wiring that all sensor wires are properly routed and retained.
- Check for plugged hoses.
- Check for free movement of spring loaded chain tension idlers.
- Assure drive chains are cleared of debris.
- Inspect wheel bolts for looseness.



Maintenance

Lubrication

Greasing pivot points prevents wear and helps restrict dirt from entering. However, once dirt does enter a bearing, it combines with the lubricant and becomes an abrasive grinding paste, more destructive than grit alone.

- Apply new lubricant frequently during operation to flush out old contaminated lubricant.
- Use a good grade of lithium based grease.
- Use a good grade of machine oil.
- Clean grease fittings and lubricator gun before applying lubricant.

Refer to the photos on page 7-6 and 7-7 for grease fitting locations.

1. Drive shaft bearings

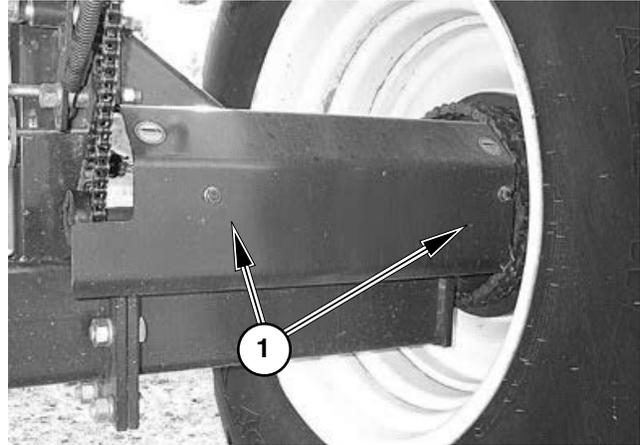
- Grease every 50 hours.

2. Drive Chains

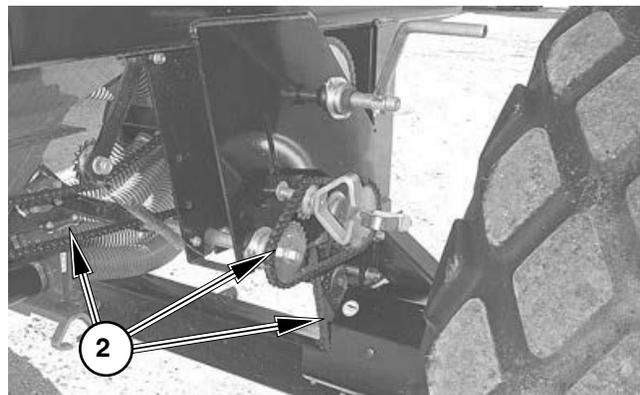
- Oil every 50 hours.

3. Slow Speed Drive

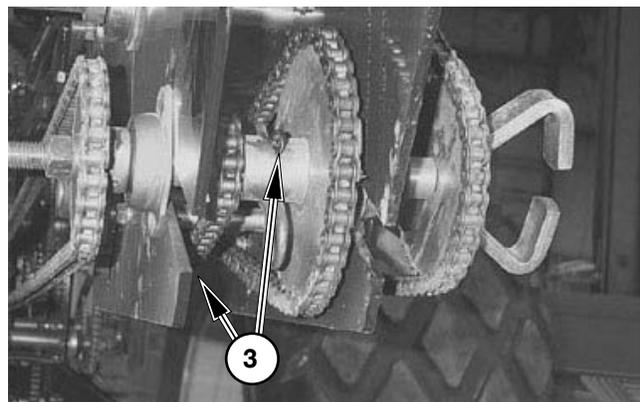
- Grease every 50 hours.



1. Drive Shaft Bearings



2. Drive Chains



3. Slow Speed Drive

Lubrication - Continued

4. Front Castor Wheel bearings

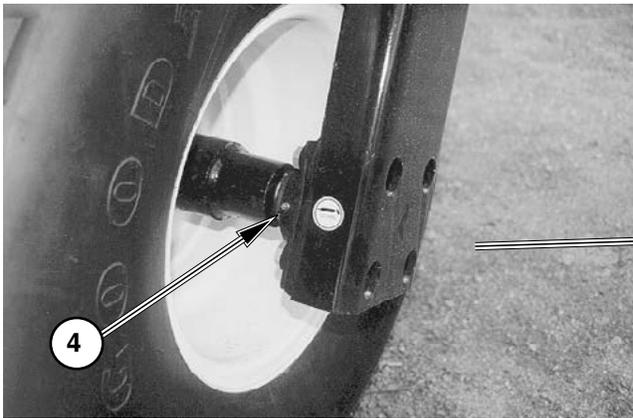
- Grease every 50 hours.

5. Castor Fork Pivot

- Grease every 50 hours.

6. Auger pivots

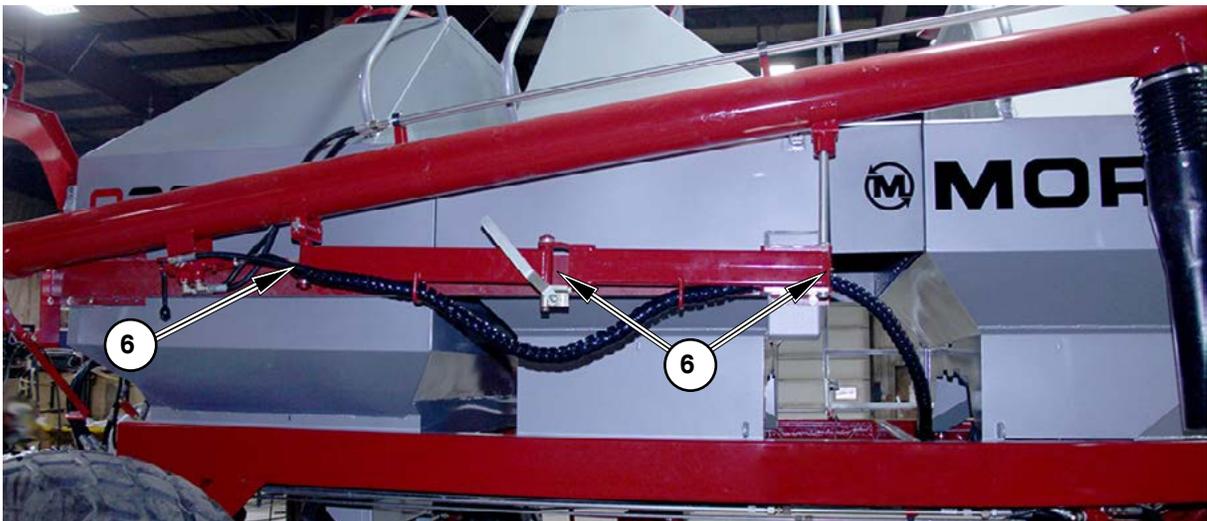
- Grease every 100 hours.



4. Front Castor Wheel bearings



5. Castor Fork Pivot (3 Meter Cart)



6. Auger Pivots

Maintenance

Air Delivery System

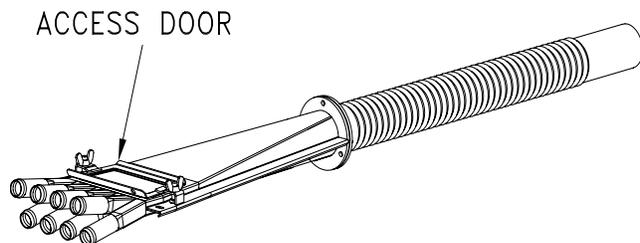
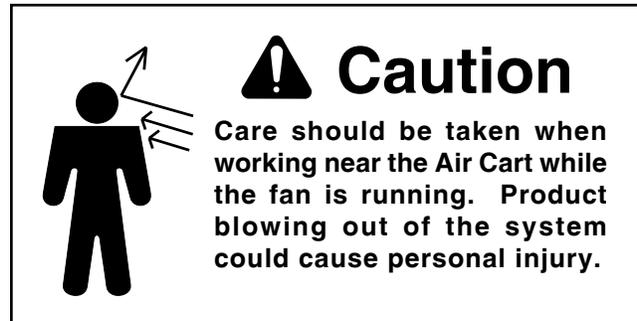
General

The air delivery system of all Air Carts is extremely important for the proper metering of product to the openers. The metering system on all pressurized Air Carts is sensitive to air leaks. **Loss of tank air pressure could affect feed rates, which could become erratic or even stop.**

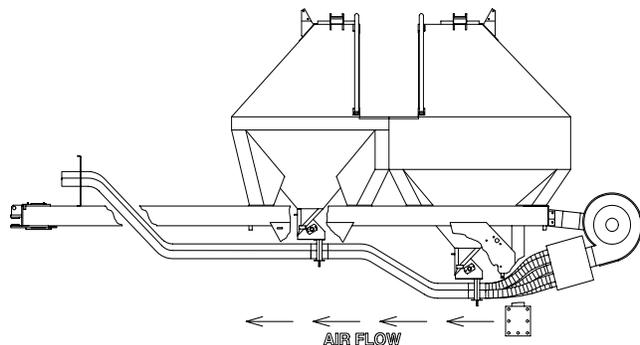
- Regularly check that all hoses are free from kinks or blockages throughout the day. To check for blockages raise seeding tool out of the ground and with the fan running turn crank a couple of turns. Equal amounts of material should be deposited under each boot if not check the following for blockage:
 1. Seed openers and secondary hoses.
 2. Divider heads by removing access doors.
 3. Primary hoses and collectors.
 4. Metering wheels for damage to key-way and the flutes of the wheel.
- Keep fan inlet screen clear and free from debris.
- Place a plastic bag over the fan when the unit is not in use. This helps prevent moisture from entering the system.
- Check periodically and at the end of each season for air leaks at hose connections.
- Check periodically and at the end of each season for air leaks at the following:
 1. Tank Lid Seals.
 2. Metering body shaft seals.
 3. Metering body to tank seals.
 4. Collector to metering body seals.
 5. Fan to plenum.
 6. Plenum to collector.
 7. Clean-out doors, for leaks and loss of seal memory.
 8. Collector door seals.
 9. Diverter Valves.
- Couplers between seeder and cultivator.
- Access Doors on Divider Heads.

Note: There must not be any air leaks from the tank. This air leakage causes air turbulence in the tank which can result in inaccurate metering rates.

- Once a year check for wear of primary and secondary hoses.



Note: Extended life can be obtained if the hoses are rotated 1/4 turn once a year.



Air Delivery System - Continued

Tank Lids

The lid seal is probably the area that sees the most abuse due to the activity associated with filling the tanks.

With each fill the lid seals should be inspected for cuts, abrasions, debris in the seal and ensure the seal is positioned properly on the steel rim around the tank opening.

Tank Lid Adjustment

Check Tank Lid tension on *all tanks* at beginning of each season and periodically during season for air leaks. The following checks and adjustments must be made to prevent air leaks from occurring:

- Check for any foreign material embedded into seal. Clean out foreign material from seal surface.
- Check seal for cuts and abrasions. If seal is cut or severely worn, then replace seal.
- Ensure seal is positioned properly on steel rim around tank opening.
- Use a 0 - 100 lb. (45 kg) spring scale to check the tank lid opening force. With the lid closed place one end of the scale one inch from the end of the tank lid lever. Pull straight up on the scale and note the maximum force it takes to open the lid. The force needed to open the lid **must be greater than 65 lbs (29 kg)**. Adjust the lid latch adjusting bolt as necessary. The lid latch should close with a **snap**. This will ensure that the lid is sufficiently tight and prevent any leaks.
- Re-check for leaks. If lids still leak turn down bolt one or two more turns. Re-check for leaks.



Important

It is imperative that no air leaks occur in the Air Cart tank as even the smallest air leak from the lid will lead to material bridging in the tank thereby causing misses in the field.

Note: When Air Cart is not in use, leave lid latches loose to help maintain resilience of the seals.

These bolts and lock nuts must be tightened to maintain a friction fit so the lid latch stays stationary when in open position.

Adjust the lid latch adjusting bolt to obtain a force *greater than 65 lbs (29 kg)* to open the lid.

Maintenance

Air Delivery System - Continued

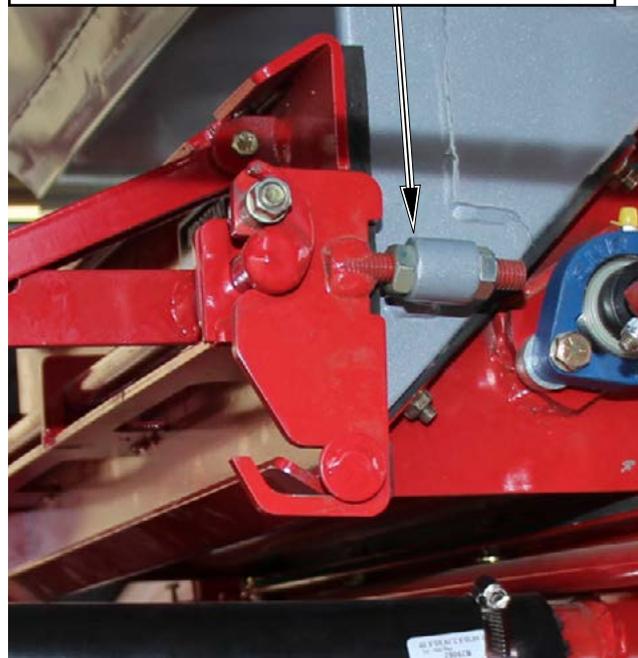
Inspection Door Adjustment

Check Inspection Door on *all metering bodies* at beginning of each season and periodically during season for air leaks. The following checks and adjustments must be made to prevent air leaks from occurring:

- Check for any foreign material embedded into seal. Clean out foreign material from seal surface.
- Check seal for cuts and abrasions. If seal is cut or severely worn, then replace seal.
- Ensure seal is positioned properly on steel rim around tank opening.
- Use a 0-100 lb. (0-45 kg) spring scale to check the tank lid closing force. With the Door near the closed position, place one end of the scale *on* the Door handle. Pull down on the scale and note the maximum force it takes to latch handle lock. The force needed to latch handle lock **must be 25 lbs to 30 lbs (12-14 kg)**.
- Adjust the door latch adjusting bolts as necessary. This will ensure that the lid is sufficiently tight and prevent any leaks.
- Re-check for leaks. If Doors still leak adjust latch bolts one or two more turns. Re-check for leaks.



Adjust the latch bolts to obtain a force of 25 lbs to 30 lbs (12-14 kg) to close the Door.

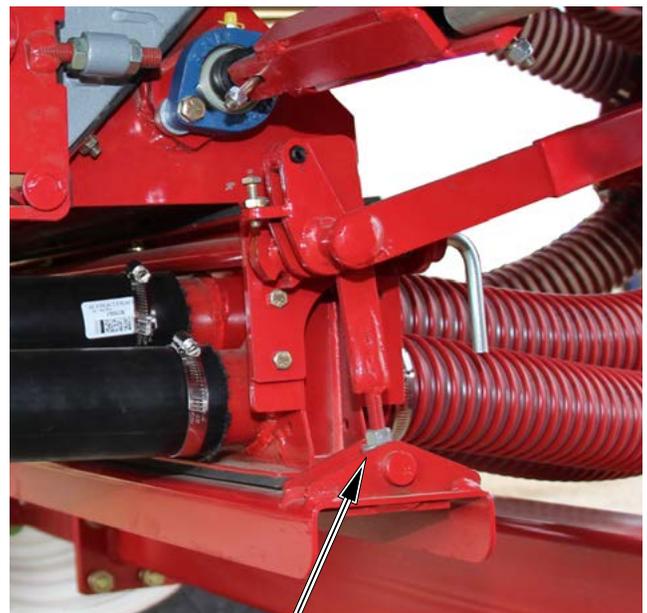
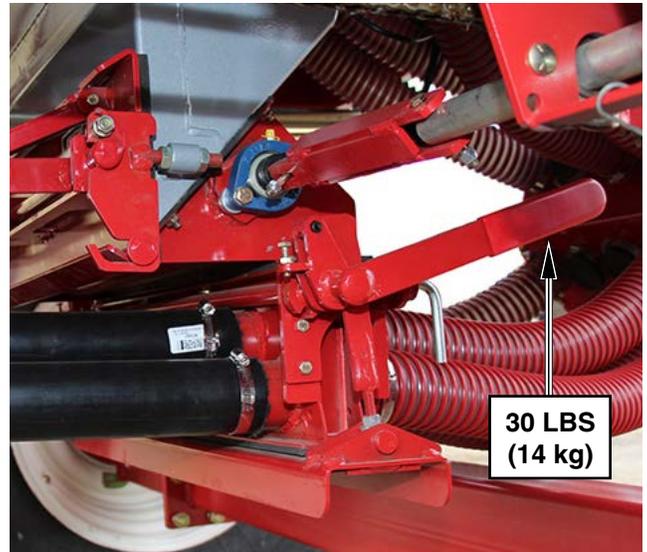


Air Delivery System - Continued

Clean Out Door Adjustment

Check Clean Out Door on *all metering bodies* at beginning of each season and periodically during season for air leaks. The following checks and adjustments must be made to prevent air leaks from occurring:

- Check for any foreign material embedded into seal. Clean out foreign material from seal surface.
- Check seal for cuts and abrasions. If seal is cut or severely worn, then replace seal.
- Ensure seal is positioned properly on steel rim around tank opening.
- Use a 0-100 lb. (0-45 kg) spring scale to check the tank lid closing force. With the Door near the closed position, place one end of the scale *on* the Door handle. Pull down on the scale and note the maximum force it takes to latch handle lock. The force needed to latch handle lock **must be 25 lbs to 30 lbs (12-14 kg)**.
- Adjust the door latch adjusting bolts as necessary. This will ensure that the lid is sufficiently tight and prevent any leaks.
- Re-check for leaks. If Doors still leak adjust latch bolts one or two more turns. Re-check for leaks.



Adjust the latch bolts to obtain a force of 25 lbs to 30 lbs (12-14 kg) to close the Door.

Maintenance

Air Delivery System - Continued

Air Leak Check

It is **imperative that no air leaks occur** in the Air Cart tank. Any air leaks could cause loss of tank air pressure affecting feed rates, which could become erratic or stop.

To prevent this from occurring, it is strongly recommended that a pressure test be conducted prior to seeding time. This can be performed very easily and simply by completing the following steps:

- Clean fan impeller and adjust tank lids.
- Disconnect the 2 1/2" (64 mm) diameter primary hoses from the rear of the cultivator at the primary hose coupler(s) by loosening the four 3/8" bolts.
- Install the blank off plate that is supplied with the Air Cart at each coupler and retighten the 3/8" bolts. If the blank off plates are not readily at hand a piece of cardboard can be used in its place.
- Once the blank off plates have been installed, start the fan and run at 4,500 rpm.

Check the following areas for air leaks:

1. Tank lid seals.
2. Metering body shaft seals.
3. Metering body to tank seals.
4. Collector to metering body seals.
5. Fan to plenum and plenum to collector.
6. Clean-out doors, for leaks and loss of seal memory.
7. Collector door seals.
8. Diverter valves and double shoot mounting plates.
9. Tanks union plate.
10. Tank site glasses.

Air leaks can be detected by spraying a soapy water solution onto the seal area. If bubbling of soap occurs, the seal has a leak. Another method is to use your hand to feel for any air movement around the seal. This method requires a calm day, as the wind can make it difficult to detect a small leak.

- If any of the above areas leak, remove the parts and replace the seal. Ensure upon reassembly that the parts are tightened sufficiently to prevent air leakage.
- Remove the blank off plates before using the Air Cart.

Once the pressure test is complete, check the following areas for air leaks:

11. Couplers between seeder and cultivator.
12. Access doors on divider heads.

Important

It is imperative that no air leaks occur in the Air Cart tank, as even the smallest air leak will lead to material bridging in the tank, thereby causing misses in the field.

Note: When Air Cart is not in use leave lid latches and clean-out doors loose to help maintain resilience of the seals.

Air Delivery System - Continued

Fan

Debris can build up on the fan screen and blades causing reduced output of the fan. The lack of air flow even at higher fan speeds will cause material plugging of the air system.

The build up of material during operation can cause the following:

1. Fan rpm will increase without increasing oil flow to orbit motor.
2. Air Cart distribution system plugging from a lack of air flow (Increasing fan rpm has little or no effect).

Fan Screen

- Ensure fan screen is clear of debris. Check periodically through the day.

Fan Impeller

The fan blades may become plugged under high humidity/dusty conditions/high insect counts.

Under severe conditions the fan blades should be inspected daily and cleaned as required.

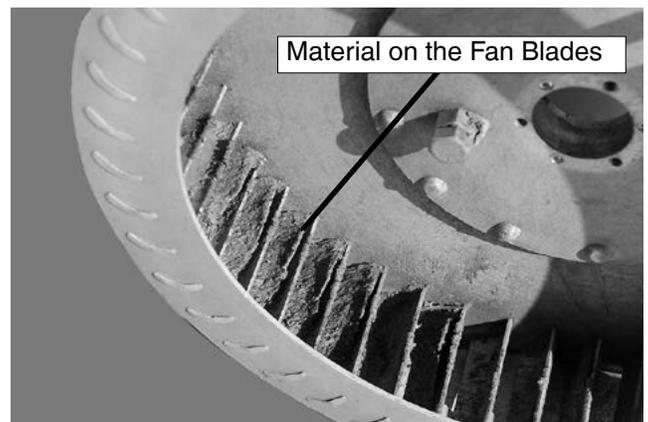
Under normal conditions the fan should be inspected and cleaned at least once a season.

- Care should be taken in cleaning all fan blades thoroughly to restore the fans peak performance.
- Ensure that the balance clips located on the fan blades are not removed, as this will put the fan out of balance.

Storage

To prevent water entering the air system, cover the fan intake with a plastic bag, whenever the seeder is not in use.

Note: Be sure to remove fan cover prior to starting fan. Serious damage could result to the fan.



Note: Material build up on the fan blades could cause the fan to be out of balance. The added vibration of the out of balance impeller will reduce the life of the fan components.

Maintenance

Air Delivery System - Continued

Impeller Clearance

The impeller should be centred inside the housing to avoid contact between the impeller and housing.

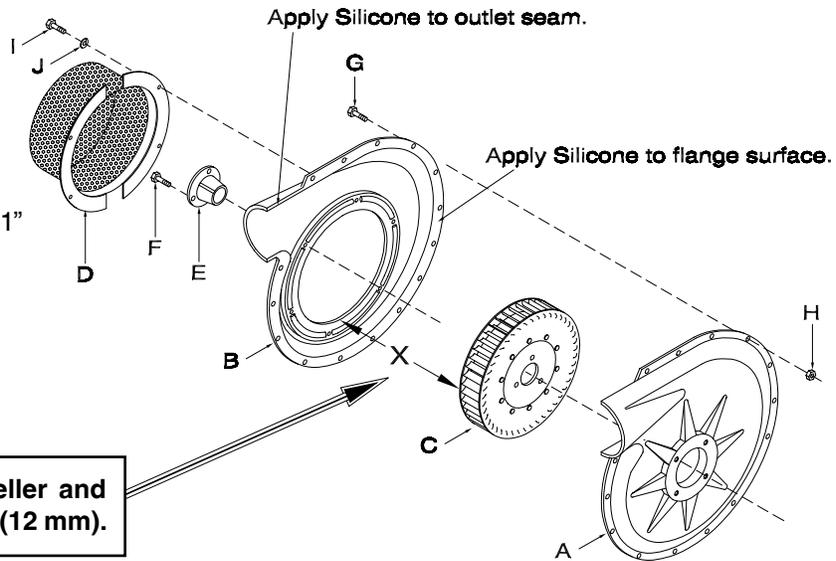
The distance "X" between the impeller and housing inlet, when centred, will be approximately 3/8" (9 mm) to 1/2" (12 mm).

When assembling fan ensure flange surfaces of housing are clean.

Apply a 1/4" (6 mm) silicone bead to one flange surface of housing including outlet seam.

Mate surfaces and secure in place with 1/4" x 1" hex bolts (G) and 1/4" serrated lock nuts (H).

Note: Torque 1/4" bolts to 49 in. lb.



Hoses

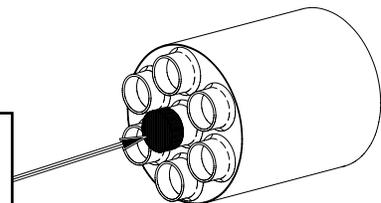
Inspect air delivery hoses for wear and replace as required. Check areas where hoses maybe exposed to moving parts such as hitch hinge area. At the Air Cart hitch area, place a piece of 2 1/2" (64 mm) hose 12" (305 mm) long over top of the two hitch extension pins to protect air hoses from contacting pins.

Also, inspect hoses for blockage as rodents/birds may nest in hoses that have not been properly capped during storage.

To optimize the 9s Series Air Cart air system on single shoot units the difference in length between the longest primary hose and the shortest primary hose **should not exceed six feet**.

In conjunction with this, it is important to eliminate the use of the centre port of the plenum. Check plenum hose routing, if centre port of the plenum is used change hose location.

**DO NOT USE
CENTRE PORT ON
ALL PLENUMS**



Hydraulic Orbit Motor

The motor requires no maintenance itself.

It does, however, require clean oil so the tractor hydraulic filters must be replaced regularly.

Repair/Replacement

- Remove orbit motor from the fan.

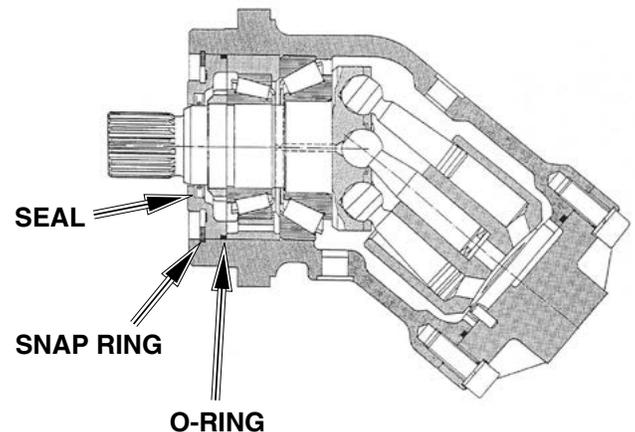
Note: The shaft should never be hammered on or forced in as this will result in motor damage upon startup.

- Remove the snap ring and front cover.
- Push out the old shaft seal and press in the new one.

Note: The bearings should never be removed from the shaft as they are pretensioned to the shaft with the motor spinning.

- Replace the O ring.
- Both the O ring and shaft seal should be greased with a “*very clean*” grease.
- Care must be taken when the front cover is installed so the shaft seal is not damaged.
- Reinstall the snap ring.
- Fill the motor case with “*clean*” oil before running.

Note: Any time a motor is replaced the case must be filled with oil before it is started, if not, a bearing failure could occur.



Clutch

A torque of 80 ft-lbs (108 N-m) - 100 ft-lbs (135 N-m) is required to slip the clutch.

To check clutch for slippage check the following:

- Check friction plates for corrosion and buff with a wire wheel if necessary.
- Check clutch coil resistance. If the meter reads below 2.40 ohms or above 2.90 ohms, then the clutch has failed and needs to be replaced.
- Check clutch current draw. If the meter reads below 4 amps, there is a problem in the electrical system leading to the clutch.
- Check clutch side play. If there is movement on the shaft between the two clutch halves, adjust using N31040 shim washers.

Note: All values taken at room temperature. Voltage at 12VDC. As temperature increases, resistance increases, and current decreases.

Maintenance

Hydraulics

Refer to Section 1 regarding hydraulic safety. In addition:

- Inspect hydraulic system for leaks, damaged hoses and loose fittings.
- Damaged Hoses and hydraulic tubing can only be repaired by replacement. **DO NOT ATTEMPT REPAIRS WITH TAPE OR CEMENTS.** High pressure will burst such repairs and cause system failure and possible injury.
- Leaking cylinders - install a new seal kit.
- Fittings - use liquid Teflon on all NPT hydraulic joints. **Do not use liquid Teflon or Teflon tape on JIC or ORB ends.**
- Hydraulic Hose Connections - when connecting the hoses to the cylinders, tubing, etc. always use one wrench to keep the hose from twisting and another wrench to tighten the union. Excessive twisting will shorten hose life.
- Keep fittings and couplers clean.
- Check the Tractor Manual for proper filter replacement schedule.

Refer to the Trouble Shooting Section.

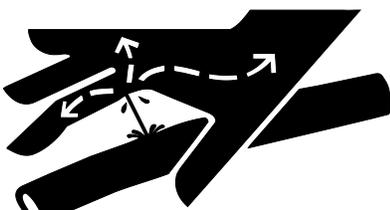
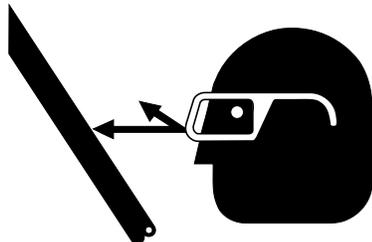


Contact your nearest Dealer for genuine repair parts. Dealers carry ample stocks and are backed by the manufacturer and regional associations.

Caution

Dirt in the hydraulic system could damage O-rings, causing leakage, pressure loss and total system failure.

Note: Extreme care must be taken to maintain a clean hydraulic system. Use only new hydraulic fluid when filling reservoir.



Warning

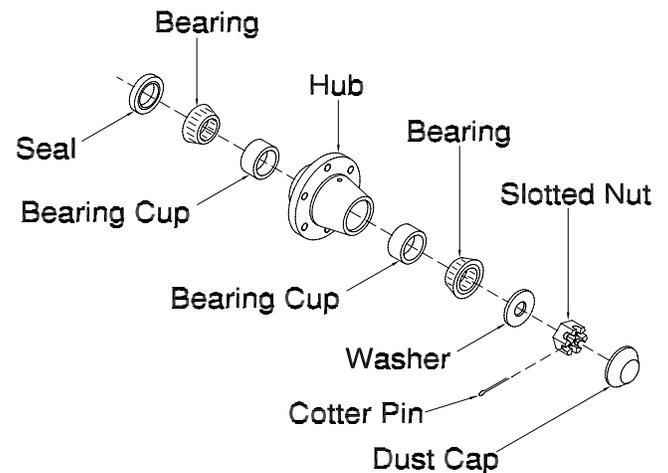
HIGH-PRESSURE FLUID HAZARD

To prevent serious injury or death:

- **Relieve pressure on hydraulic system before servicing or disconnecting hoses.**
- **Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands.**
- **Keep all components in good repair.**

Wheel Bearings

- Shut tractor off and remove key.
- Block wheel on tractor.
- Raise the Air Tank wheels enough to clear the surface.
- Securely block Air Tank frame.
- Remove wheel from hub.
- Remove the dust cap, cotter pin, and the slotted nut and washer.
- Be careful when pulling the hub off as not to drop the outer bearing.
- Clean spindle and bearing components with solvent.
- Inspect for wear on bearings, spindle and cups, replace parts as required.
- Do not reuse old seals. Use only new seals when assembling.
- Pack inner hub with bearing grease.
- Be sure bearing and cup are dry and clean.
- Work grease into the bearing rollers, until each part of the bearing is completely full of grease.
- Install inner bearing and cup first, then press new seals in place.
- Place hub on spindle.
- Install outer bearing, washer and slotted nut.
- Tighten nut while turning the wheel until a slight drag is felt.
- Back nut off one slot and install a cotter pin. Bend cotter pin up around nut.
- Pack grease inside the dust cap and tap into position.



Maintenance

Front Castor Brake Adjustment

The Dual Axle Front Castor is equipped with a brake which prevents the tires from shimmy under normal operation. It is important the front castor brake be properly adjusted. If the brake is not adjusted correctly the tires will shimmy excessively and may cause the axle assembly to fail.

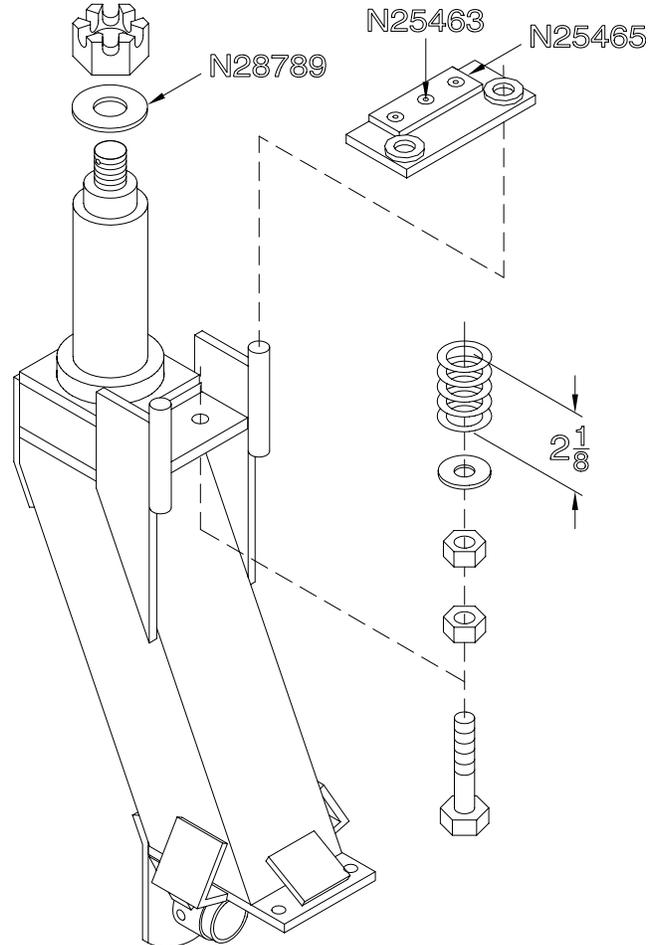
Adjust the castor brake as follows:

- Check and ensure there is no paint/grease where the brake pad rides, as the paint/grease will reduce the effectiveness of the brake.
- Inspect brake pad (N25465) ensuring it is not damaged or worn, replace if required.

Note: Maximum allowable wear is 1/8" (6 mm). (New pad is 3/8" (9 mm) thick)

- Check and ensure the hex socket brake pad mounting screws (N25463) are securely tightened.
- Check preload on castor fork top pivot bearings (with brake pad assembled loosely). Tighten as required using wheel bearing tightening procedure (springs will compress to a length of approximately 2 3/8" [60 mm]).
- Adjust the jam nuts until the spring length is 2-1/8" (54 mm). See Below.
- Increase the spring pressure on the brake to stop the castor wheels from shimmying in the field or on the road.

Note: Do not overtighten the springs. Excessive spring pressure will prevent wheels from castoring.



Note: Tighten jam nuts until the spring length is 2 1/8" (54 mm)

Important

Dual wheel brake will provide sufficient pressure to stabilize castor at all travel speeds up to 18 m.p.h. (28 kph). Avoid setting more pressure on brake pad than required to maintain stability. Tow only with all tanks empty. If a unit must be towed loaded over a short distance, the *transport speed must be reduced* to 10 m.p.h. (16kph) or slower.

Metering

The metering wheels come in 4 different sizes. Each wheel matches to a specific distribution head mounted on the Seeding Tool.

If the metering wheel and distribution head are not matched correctly, the distribution accuracy will be adversely affected.

Spacer plates are used to take up the extra space in each metering cup. These spacer plates vary in size according to the size of the metering wheel.

Metering Wheel Replacement

- Remove the monitor donut from the Right Hand Side of the metering body.
- Disconnect meter shaft coupler from the meter shaft and transmission drive shaft.
- Loosen the locking collars on the meter shaft bearings.
- Remove the bolts holding the meter shaft bearings and remove both bearings.
- Remove the meter shaft from the Right Hand Side.
- Remove the slider plates from all cups with metering wheels.
- Remove the metering wheels. Inspect wheels and replace if required.
- Clean cups in metering body thoroughly prior to re-assembly.
- Smear a very-very thin layer of silicone on the pin side of the spacer plates for the 7, 8 and 9 metering cups.

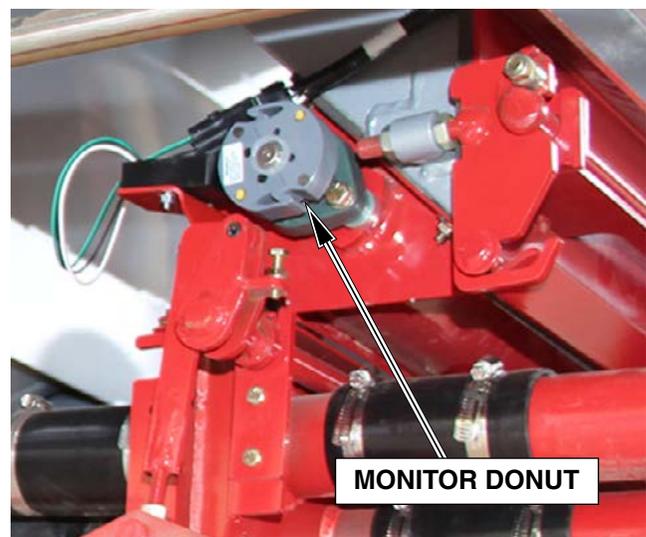
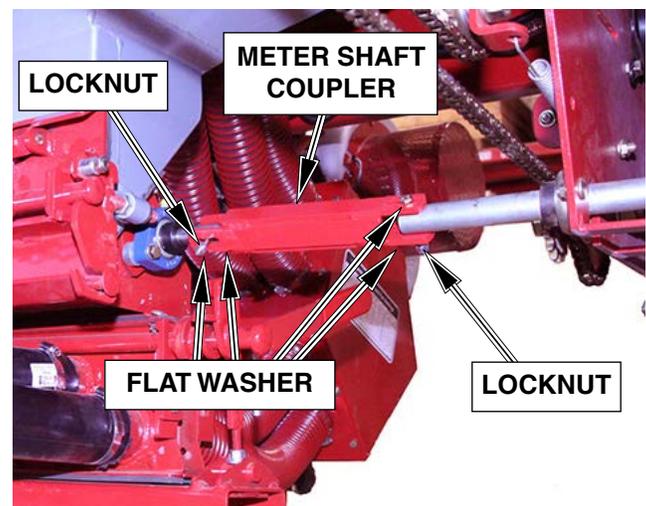
The side with the silicone must be installed against the metering body.

- Place all metering wheels and spacers back into the metering body in the same order they came out of.

The location of each primary run and wheel size must be the same for both metering bodies.

Assembly Hint: Mark the metering wheels on the outside of the rib that is next to the key.

Divider Head	Metering Wheel		Spacer	
Outlets	Number	Width	Qty	Width
7	7	1 3/4" (45 mm)	2	1/2" (13 mm) 1/4" (6.4 mm)
8	8	2" (51 mm)	2	1/4" (6.4 mm) 1/4" (6.4 mm)
9	9	2 1/4" (57 mm)	1	1/4" (6.4 mm)
10	10	2 1/2" (64 mm)	-	-

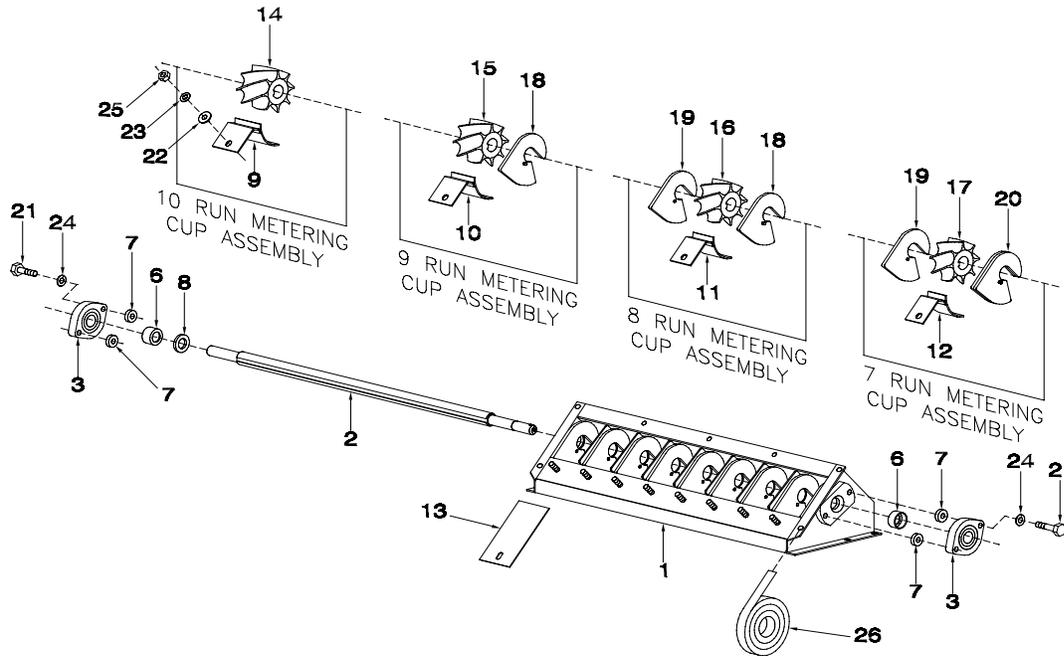


Maintenance

Metering - Continued

Standard Metering Body

Note: The metering wheels can be installed with the metering body mounted to the Air Cart.

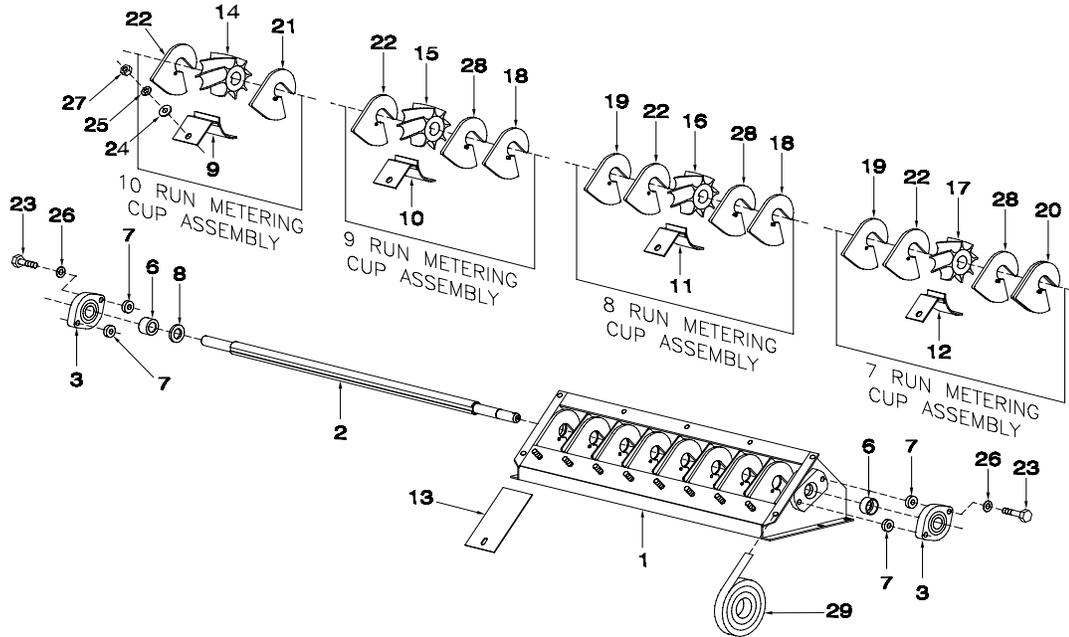


Item	Part No.	Description	Qty
1	N27100	Metering Body	1
2	N19687	Metering Shaft - 8 Outlet	1
3	N19269	Bearing Assembly - NTN - 2 Bolt Flange.....	2
6	N21659	Seal	2
7	N21602	Spacer	4
8	N21612	Backing Washer.....	1
9	N27090	Slider - #10 Wheel	Asreq
10	N27089	Slider - #9 Wheel	Asreq
11	N27088	Slider - #8 Wheel	Asreq
12	N27087	Slider - #7 Wheel	Asreq
13	N27605	Cover - Blank Off	Asreq
14	N42130	Wheel - #10 Metering (Cream Colored) (2.50 width)	Asreq
15	N42129	Wheel - #9 Metering (Cream Colored) (2.25 width)	Asreq
16	N42128	Wheel - #8 Metering (Cream Colored) (2.00 width)	Asreq
17	N42127	Wheel - #7 Metering (Cream Colored) (1.75 width)	Asreq
18	N27099	Spacer Plate - #9 Wheel (Single - Left)	Asreq
19	N27098	Spacer Plate - #8 Wheel (Single - Right).....	Asreq
20	N27097	Spacer Plate - #7 Wheel (Double - Left).....	Asreq
	N28492	Roll Pin - used in Spacer Plates (Not Shown)	Asreq
21	W-477	Hex Bolt - 3/8 x 1 1/2 Lg.....	4
22	D-5488	Flatwasher - 5/16.....	8
23	W-522	Lockwasher - 5/16	8
24	W-523	Lockwasher - 3/8	4
25	N15114	Hex Nut - 5/16 Stainless Steel.....	8
26	N15716	Seal Strip - 1/4 x 1 x 152 Lg (Bulk/Ft).....	8 ft
	N28831	Cover Plate - Shown on Hopper Assemblies.....	

Metering - Continued

Coated Metering Body

Note: The metering wheels can be installed with the metering body mounted to the Air Cart.



Item	Part No.	Description	Qty
1	N28928	Metering Body	1
2	N19687	Metering Shaft - 8 Outlet	1
3	N19269	Bearing Assembly - NTN - 2 Bolt Flange.....	2
6	N21659	Seal	2
7	N21602	Spacer	4
8	N21612	Backing Washer.....	1
9	N27090	Slider - #10 Wheel	Asreq
10	N27089	Slider - #9 Wheel	Asreq
11	N27088	Slider - #8 Wheel	Asreq
12	N27087	Slider - #7 Wheel	Asreq
13	N27605	Cover - Blank Off	Asreq
14	N42130	Wheel - #10 Metering (Cream Colored) (2.50 width)	Asreq
15	N42129	Wheel - #9 Metering (Cream Colored) (2.25 width)	Asreq
16	N42128	Wheel - #8 Metering (Cream Colored) (2.00 width)	Asreq
17	N42127	Wheel - #7 Metering (Cream Colored) (1.75 width)	Asreq
18	N27099	Spacer Plate - #9 Wheel (Single - Left)	Asreq
19	N27098	Spacer Plate - #8 Wheel (Single - Right).....	Asreq
20	N27097	Spacer Plate - #7 Wheel (Double - Left).....	Asreq
21	N28927	Plastic Spacer - Wheel (Left)	8
22	N28929	Plastic Spacer - Wheel (Right).....	1
	N28492	Roll Pin - Used in Spacer Plates (Not Shown).....	Asreq
23	W-477	Hex Bolt - 3/8 x 1 1/2 Lg.....	4
24	D-5488	Flatwasher - 5/16.....	8
25	W-522	Lockwasher - 5/16	8
26	W-523	Lockwasher - 3/8	4
27	N15114	Hex Nut - 5/16 Stainless Steel.....	8
28	N28924	Plastic Spacer - Wheel (Without Pin).....	7
29	N15716	Seal Strip - 1/4 x 1 x 152 Lg (Bulk/Ft).....	8 ft
	N29457	Kit Coated Metering Body Assy (Includes 1, 2, 3, 6, 21, 22, 28 & 29)	

Maintenance

Metering - Continued

Assembly Hint: Mark metering wheel size on the metering body. This will help in connecting the main distribution hose and secondary divider heads.

- Align the shaft keyway with the marks on the metering wheels. Slide the metering shaft through the metering wheels.

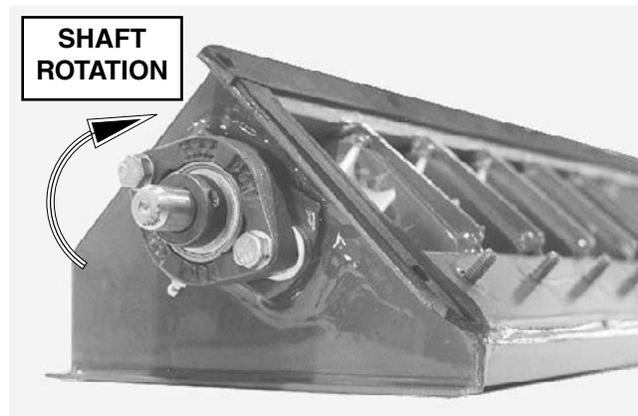
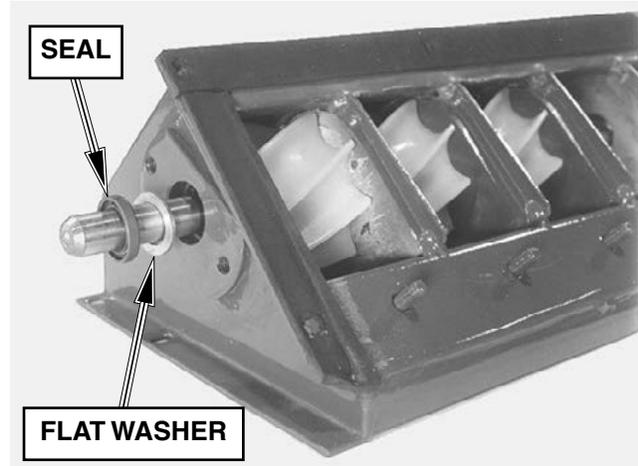
Note: Care must be taken that the key ways are aligned, otherwise damage to the key in the wheels may occur.

- The metering shaft must be pushed through until the shoulder on the shaft hits the side of the metering body.
- Install the washer on the shaft and into the housing on the Right Hand Side of the metering body.

Important: The seal must be installed as shown, with open side of the seal to the outside. Care must be taken when installing the seal. It is recommended that a brass drift be used to minimize any damage to the seal.

Note: The Left Hand Side seal is installed at the factory.

- Reinstall both meter shaft bearings and spacers with the grease fitting towards the rear of the machine.



IMPORTANT

PREVENT CORROSION

Clean the Metering Body (Including Air Passages) and the Collector Body. A light coating of Silicone Lubricant or WD-40 or Penetrating Oil should be applied before storage.

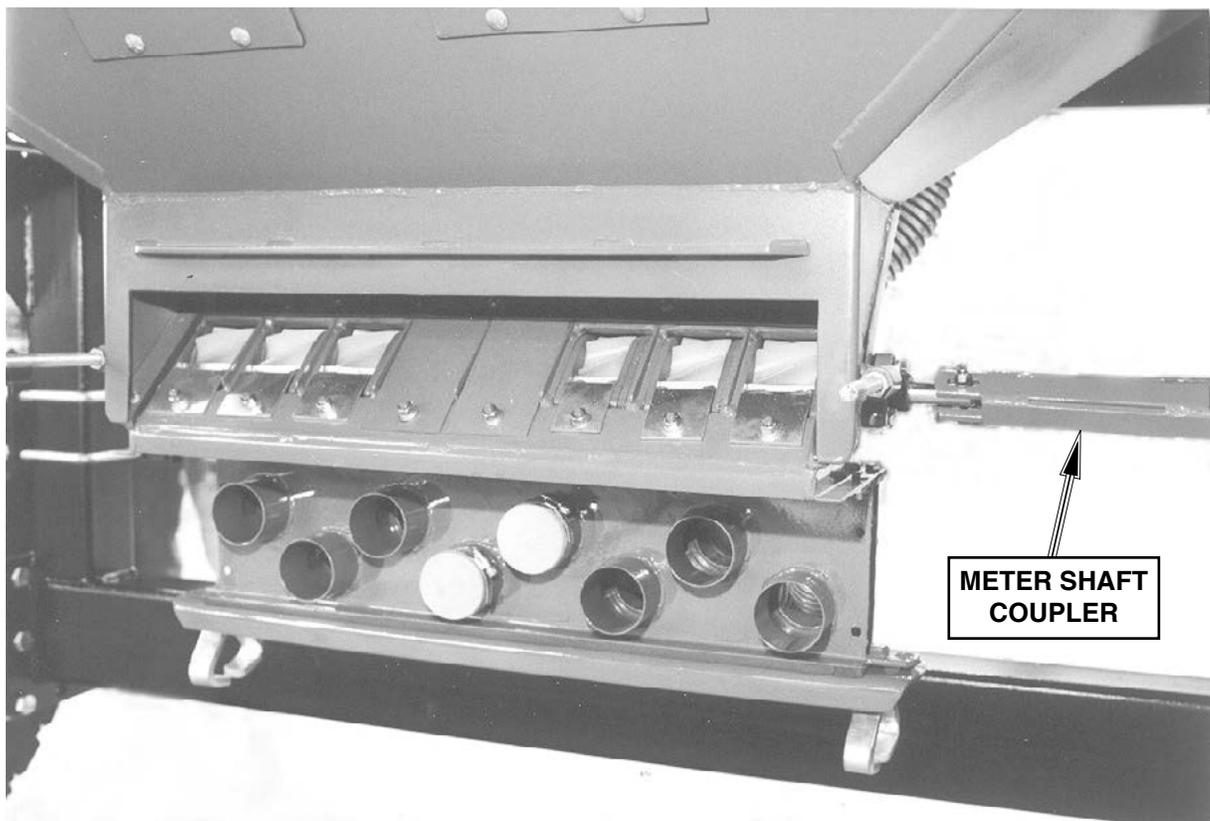
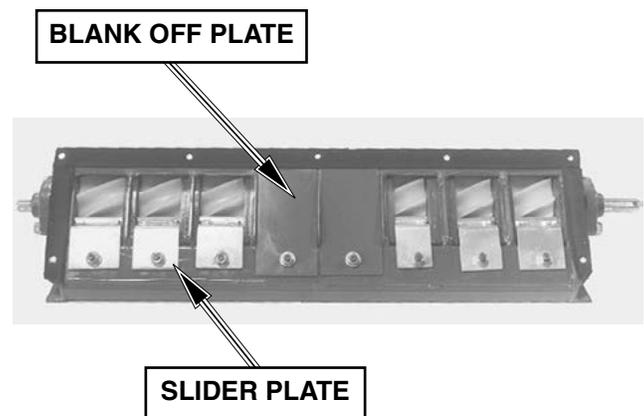
N21604

Metering - Continued

- Tighten locking collars by turning the collars in the direction of the shaft rotation. Lock the collar by tapping the collar with a punch in the direction of rotation of the shaft.
- Reinstall monitor donut on shaft. Ensure donut is centred to the pick-up. The gap between the pick-up and the donut must not exceed 1/8" (3 mm).
- Install the slider plates to all cups with metering wheels.

Note: Install blank-off covers on cups without wheels. Insert the top of the blank-off plate under the tank lip.

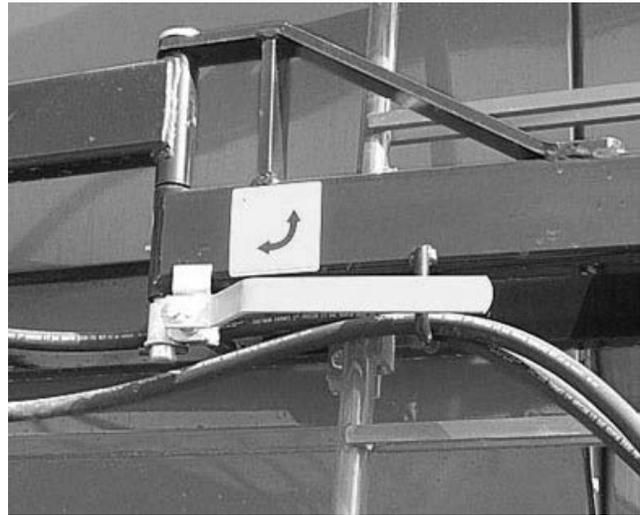
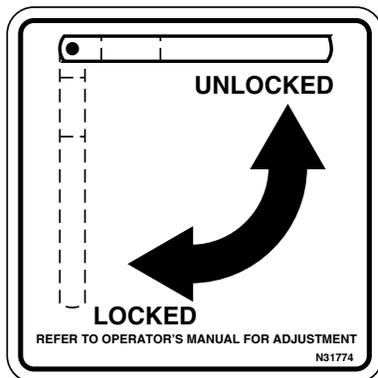
- Set sliders to top of slot. Tighten sliders with 5/16" stainless steel nut, lockwasher and flatwasher. (See "Slider Setting" under Operation Section for correct procedure)
- Attach meter shaft coupler over the meter shaft and transmission drive shaft.
- Install the 1/4" x 2 1/4" Special bolt with two -flatwashers and locknut. Tighten locknuts to bottom of threads.



Maintenance

Auger Arm Lock

Adjust 5/8 nuts such that the auger arm is unlocked when the handle is horizontal and locked when the handle is pulled down 90 degrees.



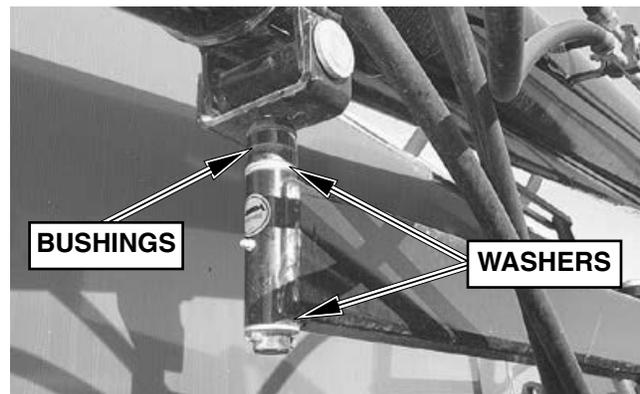
Auger Arm Lock

Auger Pre-Load Adjustment

The pre-load must be adjusted to firmly seat the auger on the front pivot pin when locked into storage position.

To adjust the pre-load on the auger the Middle Pivot Saddle washers/bushings must be moved as follows:

- To **decrease** the pre-load move washers/bushings from bottom to the top of arm.
- To **increase** the pre-load move washers/bushings from top to the bottom of arm.



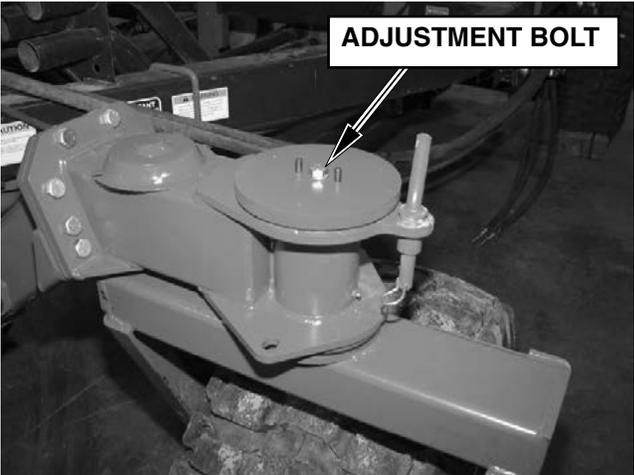
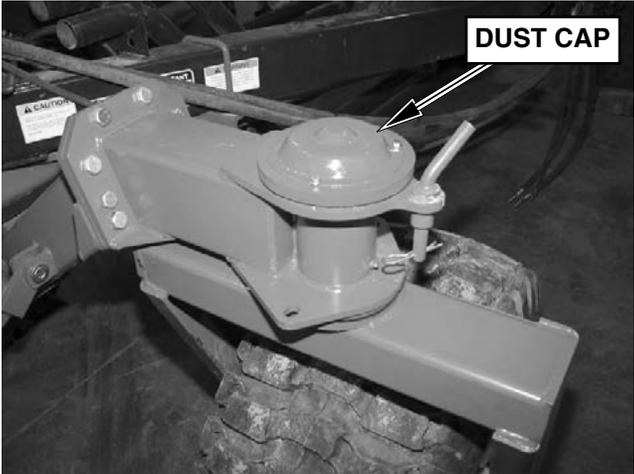
Middle Pivot Saddle

2-3 Meter Cart

Castor Fork Adjustment

Adjust castor wheel action to prevent excessive movement.

- Remove dust cap from castor axle.
- Tighten bolt to adjust pressure on castor drag plate to restrict excess castor movement.
- Loosen bolt to adjust pressure on castor drag plate to increase castor movement.
- Check tire pressures. Tires must be inflated evenly to ensure correct tracking.



Maintenance

Notes

Section 8: Storage

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Storage

Preparing for Storage

General

- To insure longer life and satisfactory operation, store the 9s Series Air Cart in a shed.
- If building storage is impossible, store away from areas of main activity on firm, dry ground.
- Clean machine thoroughly.
- Inspect all parts for wear or damage.
- Avoid delays - if parts are required, order at the end of the season.
- Lubricate grease fittings. (Refer to Lubricating Section).
- Tighten all bolts to proper specifications (Refer to Bolt Torque Chart).
- To prevent corrosion and damage by rodents, clean the hopper boxes and metering systems thoroughly and wash with mild soapy water solution. Rinse with water and dry thoroughly. **Refer to Metering Body Storage.**
- A light coating of silicone lubricant or WD-40 should be applied to all metal metering system components before storage.
- Avoid lubricant contact with grain and fertilizer tubes.
- Loosen fan tension adjusting bolt. (Engine Drive Only)
- Relieve tension on tank lids.
- Loosen clean-out doors.
- Remove all chains and store in clean oil.
- Relieve pressure from hydraulic system.
- Raise frame, block up and relieve weight from the tires.
- Cover tires with canvass to protect them from the elements when stored outside.
- Paint any surfaces that have become worn.



Warning

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

MORRIS PAINT

Part Number	Description
N53713	Red MORRIS Touch-Up Pen
N53714	Silver MORRIS Touch Up Pen
N53715	Red MORRIS Aerosol Can
N53716	Silver MORRIS Aerosol Can
N31087	Sky White MORRIS Aerosol Can

Preparing for Storage - Continued

Metering Body Storage

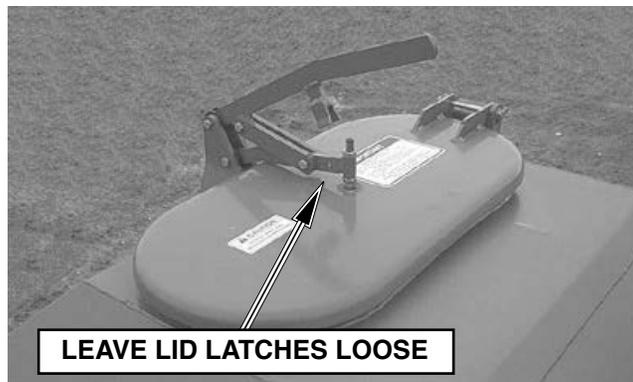
It is extremely important that the metering system is thoroughly cleaned before storing for any length of time.

The following procedure should be followed for both tanks:

- Empty tanks. (Refer to Unloading Tanks)
- Remove all sliders and blank off plates.
- Remove cover plate.
- Remove the collector bottom.
- Run fan.
- Wash the interior of both tanks and metering system with soapy water. Wash the collector.
- Rinse with cold water and let the unit air dry.
- Coat metal parts with silicone lubricant or WD-40.

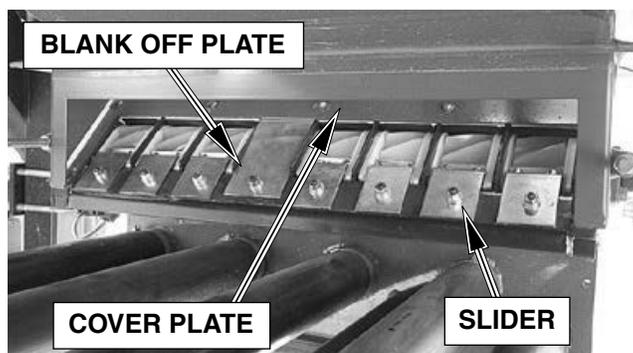
Note: Diesel fuel will harm seals.

- Reinstall all sliders and blank off plates in the same order they were removed.
- Reinstall cover plate.
- Replace the clean-out door and the bottom of the collector.
- Start the fan and operate for 5 minutes to dry out any remaining moisture in the system.
- Leave clean-out doors loose to help prevent condensation building up inside the tank.
- Leave lid latches loose to help maintain resilience of the seals.



Important

At no time should corrosive fertilizer or similar materials be allowed to remain in the tank or metering body cavity.



IMPORTANT

PREVENT CORROSION

Clean the Metering Body (Including Air Passages) and the Collector Body. A light coating of Silicone Lubricant or WD-40 or Penetrating Oil should be applied before storage.

N21604



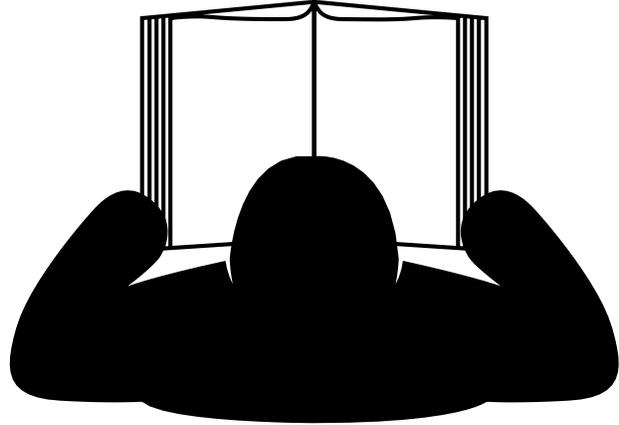
Collector Bottom

Storage

Removing From Storage

General

- Review Operator's Manual.
- Check tire pressure (Refer to Tire Pressure List)
- Clean machine thoroughly.
- Tighten lid latches.
- Tighten fan tension adjusting bolt. (Engine Drive Only)
- Lubricate and install chains.
- Spray internal parts or the metering body with WD-40 to loosen any corrosion buildup.
- Check for leaks. (Refer to Maintenance Section)
- Lubricate grease fittings. (Refer to Lubricating Section).
- Tighten all bolts to proper specifications (Refer to Bolt Torque Chart).



Monitor

Familiarize yourself with all monitor functions. Ensure all monitor “*settings*” are correctly set for the Air Cart/ Seeding Tool combination. Recognize and correct alarm conditions as indicated on the machine. See Monitor Section for more details.

Check all wire harness connections for corrosion and use a dielectric spray to clean. Inspect all sensors for proper gap. See Monitor Section for more details.

Clutch

Check friction plates for corrosion and buff with a wire wheel if necessary. Check the resistance of the clutch. See Maintenance Section for more details.

Auger

Inspect all augers used in handling the products for seeding. Run augers to clean out any debris inside auger so it does not get transferred to the tank.

Section 9: Troubleshooting

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Troubleshooting

Problem	Cause	Correction
General		
Delivery hoses plugged.	Insufficient air flow.	Clean fan impeller blades. Clean fan intake screen. Increase fan rpm.
	Hose sag.	Shorten hoses or add additional supports.
	Seed boots plugged with dirt.	Clean seed boots. See “Seed Boot Plugging” below.
	Hose obstruction.	Remove obstruction from hose.
	Air delivery hose partly off manifold.	Reinstall hose properly on manifold.
	Kinked hoses.	Straighten hoses and properly secure them to framework.
	Obstruction in divider head.	Remove access door and clear obstruction from appropriate outlets - be sure to use appropriate screens when filling.
	Exceeding machine’s delivery capabilities.	Reduce ground speed and speed up fan.
Hydraulic fan will not turn	Poorly mounted hoses.	Reroute hoses.
	Selector valve in wrong position.	Switch the selector to fan position.
	Hydraulic hoses not connected properly to tractor.	Reverse hydraulic hoses.
Fan turning too slow	Insufficient oil flow.	Perform flow test.
	Flow to hydraulic motor.	Increase flow control setting.
	Low hydraulic pressure.	Check hydraulic pressure 2100 psi.(14469 kPa) min.
Front Castor moving too freely.	Brake Not adjusted properly.	Adjust brake as necessary. See “Brake Adjustment” in Maintenance Section.
	Worn brake pad.	Replace brake pad. See “Brake Adjustment” in Maintenance Section.

Troubleshooting

Problem	Cause	Correction
Material flowing thru system when unit is stationary and the fan running.	Damaged metering wheel.	Replace metering wheel.
	Sliders not adjusted correctly.	Adjust as required. See <i>“Slider Settings”</i> .
	Small seed plate not installed.	Adjust as required. See <i>“Slider Settings”</i> .
Material not being divided in distribution head.	Head partially blocked.	Remove blockage and reinstall hose.
	Kinked hose running to shank	Straighten or replace hose.
	Damaged distribution section on head.	Replace head with new one.
	Bent or damaged diffuser pipe.	Straighten or replace diffuser pipe.
	Secondary hose length.	See <i>“Secondary Hose”</i> in Operation Section.
Clutch slipping.	Low power supply.	Ensure good connections at the power supply. Battery voltage must be 12V.
	Metering drive torque load too high.	See Maintenance Section.
	Corroded, rusty, dirty clutch.	Clean and inspect clutch.
	Faulty clutch.	Replace clutch.
Material not being metered out.	Metering clutch not engaged.	Engage switch in tractor cab.
	Metering Clutch slipping.	See <i>“Clutch Slipping”</i> below.
	Main drive chain not installed.	Install drive chain properly on Drive Sprocket.
	Drive chain or chains broken.	Install new chain. Ensure connecting link is installed correctly. Curved part of spring clip should face the direction of chain travel.
	Massive air leak in tank, resulting in material being blown up out of the metering cup.	Repair the air leak. See <i>“Air Leaks”</i> in Maintenance Section. See <i>“Tank Lid Adjustment”</i> in Maintenance Section.
	Key sheared on metering wheel.	Change metering wheel and check for cause of metering wheel shearing.

Troubleshooting

Problem	Cause	Correction
Material not being metered out.	Material caked up in tank.	Remove material and completely clean out the tank.
	Excessively wet material in tank.	Remove wet material and use reasonably dry material.
	Coupler bolt sheared	Replace with Grade 8 bolt.
Plugged seed boots	Backing up with openers near or in the ground.	Lift machine all the way up before backing up.
	Turning very sharp with openers near or in the ground.	Lift machine all the way up when making sharp turns.
	Lowering machine without any forward motion.	Always have forward motion when lowering machine.
	Worn openers or sweeps.	Replace openers.
	Severely bent or damaged boots.	Straighten or replace as required.
	Excessively wet conditions.	Change openers, operate when drier.
	Opener Adjustment.	See <i>“Opener Adjustment”</i> in Operation Section.
Material not being accurately metered out of the metering body.	Air delivery hoses loose, cracked or pulled off.	Tighten the hoses, replace cracked hoses or install hoses pulled off their respective locations.
	Metering Clutch slipping.	See <i>“Clutch Slipping”</i> below.
	Inlet screen to fan blocked off.	Clean off material that is blocking the fan screen.
	Metering wheel slider plate adjusted incorrectly.	Adjust sliders so they are all the same for the product being metered. See Operation Section for correct clearances.
	Material caked up above one or more of the metering cups.	Clean out caked up material.
	Excessively damp material in tank.	Use reasonably dry, fresh material only.
	Foreign obstruction in tank above metering wheels.	Remove obstruction, and always fill tanks through the screen.

Troubleshooting

Problem	Cause	Correction
Material not being accurately metered out of the metering body.	Caked up metering wheels on some or all of the metering cups.	Clean out the metering cups and wheels.
	Damaged metering wheels.	Replace broken metering wheels.
	Metering wheels mismatched to secondary outlet.	Install correct wheels to head. 1 3/4" wide wheel for 7 outlet head. 2" wide wheel for 8 outlet head. 2 1/4" wide wheel for 9 outlet head. 2 1/2" wide wheel for 10 outlet head. Be sure appropriate spacers are also used.
	Incorrect spacing sprocket.	Install correct sprocket on back of transmission. See Maintenance Section.
	Crank rotated wrong way when taking sample.	Crank must be rotated counter clockwise.
	Double Shooting hoses not routed correctly.	See Set-Up Section.
Air Leak in System.	Adjust lids and doors as necessary. Replace damaged seals. See Maintenance Section.	

3 Meter Cart

Castor Axles have excessive movement.	Drag plate adjustment.	Adjust pressure on drag plate.
Not tracking straight.	Tire Pressure uneven.	Inflate tires to correct pressure.

Troubleshooting

Problem	Cause	Correction
Monitor		
Monitor lights up but does not seem to work.	Faulty monitor	Replace monitor.
	Completely disconnected harness.	Connect harness.
No fan display.	Incorrect gap between sensor and target.	Gap should be 0.030" (0.76 mm).
	Faulty sensor.	Replace sensor.
	Broken or shorted wire.	Replace or repair harness.
No ground speed display	Sensor to magnet gap too large.	Gap should be 0.030" (0.76 mm).
	Faulty sensor.	Replace sensor.
	Broken or shorted wire.	Replace or repair harness.
No meter speed display.	Sensor to magnet gap too large.	Gap should be 0.030" (0.76 mm).
	Faulty sensor.	Replace sensor.
	Broken or shorted wire.	Replace or repair harness.
	Switched off	Replace or repair harness.
No display, no back light.	Poor power connections at the battery.	Switch unit on. Ensure good connections.
	Battery below 8 volts.	
No display, no back light.	Temperature below -10C or above +40C.	Check battery voltage. Operate between -10C and +40C.
	Broken wire.	
Bin indicates always empty.	Faulty sensor.	Repair wire.
	Wires not hooked to sensor.	Replace sensor.
		Hook up correctly.

Troubleshooting

Problem	Cause	Correction
Bin indicates always full.	Blocked light beam on photoelectric sensor.	Remove object blocking the beam.
	Wire shorted to ground	Repair or replace wire.
	Faulty sensor	Replace sensor.
Blown fuse.	Power hooked up backwards.	Hook up correctly. RED to positive terminal.

Troubleshooting

Notes

Section 10: Options Assembly

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Options Assembly

Hitch Stand Kit (Tow Behind)

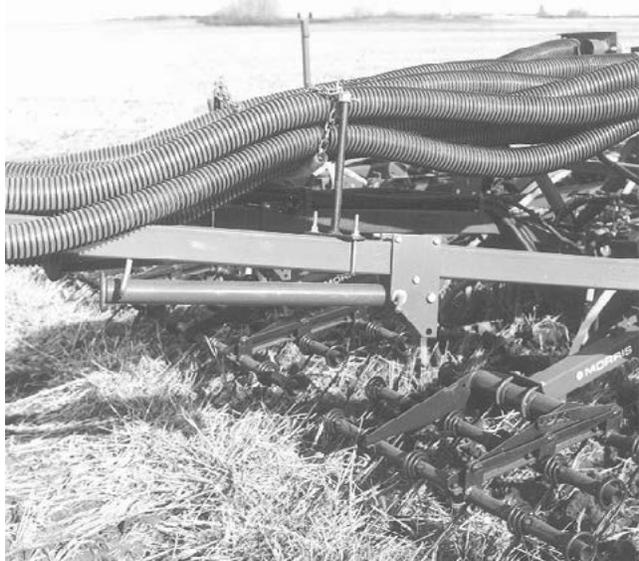
- Attach the mounting plates to the hitch pole using three - 3/8" x 4" bolts, lockwashers and nuts.

Note: Locate hitch stands in a position which will clear any attachments on the Seeding Tool. (i.e. Mounted Harrows, Packers, etc.)

- Mount the outer tube between mounting plates with a 1/2" x 4 1/2" bolt, lockwasher and nut.
- Slide inner tube into outer tube retaining with the tightener.
- Retain stand with a 5/8" pin and hair pin.



Attached/Detached Position



Transport Position

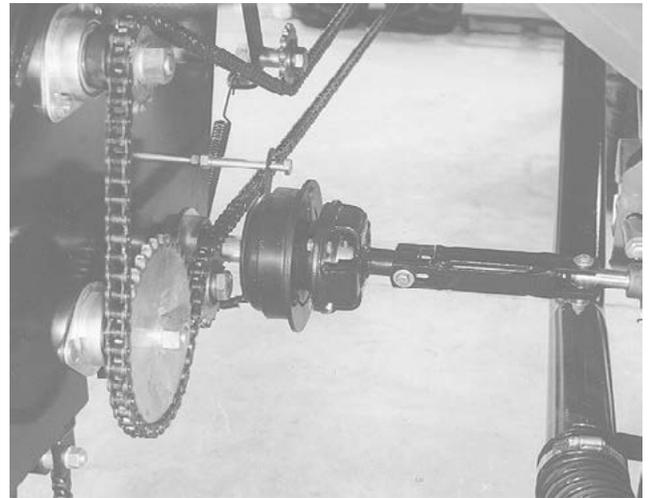
Options Assembly

Second Clutch

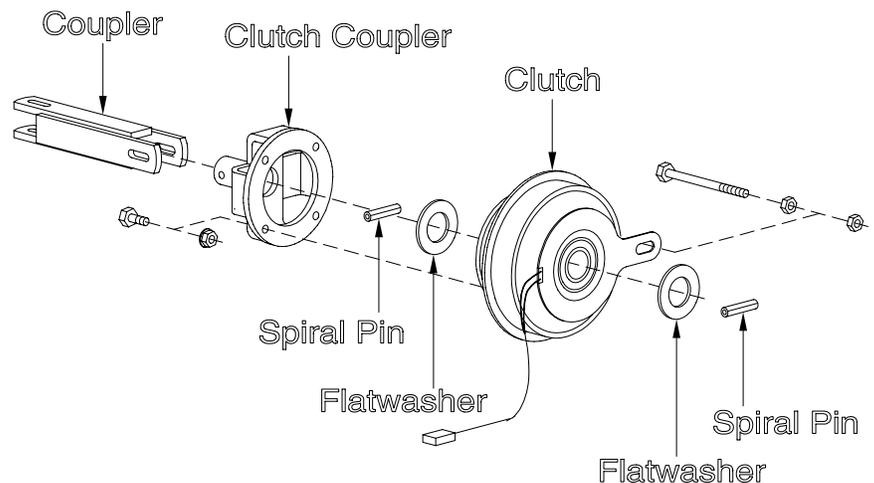
- Remove the metering shaft coupler from the rear metering shaft.
- Mount coupler to the clutch using 1/4" x 3/4" bolts.
- Install the clutch and coupler to the transmission output shaft with a 1/4" x 1 1/2" spiral pin on either side of the clutch.

Note: Install extra flatwashers as required to eliminate excess clearance between clutch components.

- Install the short metering shaft coupler.
- Install the 3/8" x 4" bolt into the hole in the rear transmission plate.
- Run the cable down the left hand Air Seeder hitch pole.
- Run the extension cable along the left hand hitch pole of the Seeding Tool.
- Connect cable to the auxiliary clutch switch quick coupler.

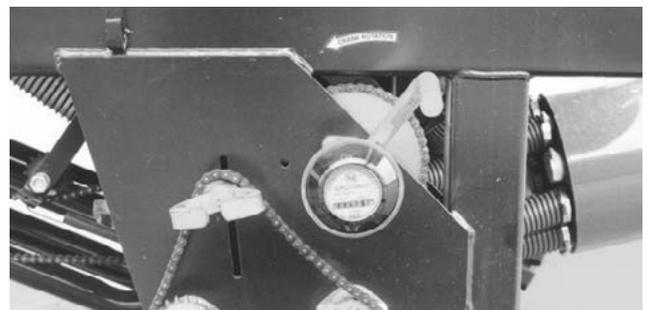


Second Clutch



Acre Tally

- Install the tamper proof acre tally to the crank handle shaft as shown.



Acre Tally

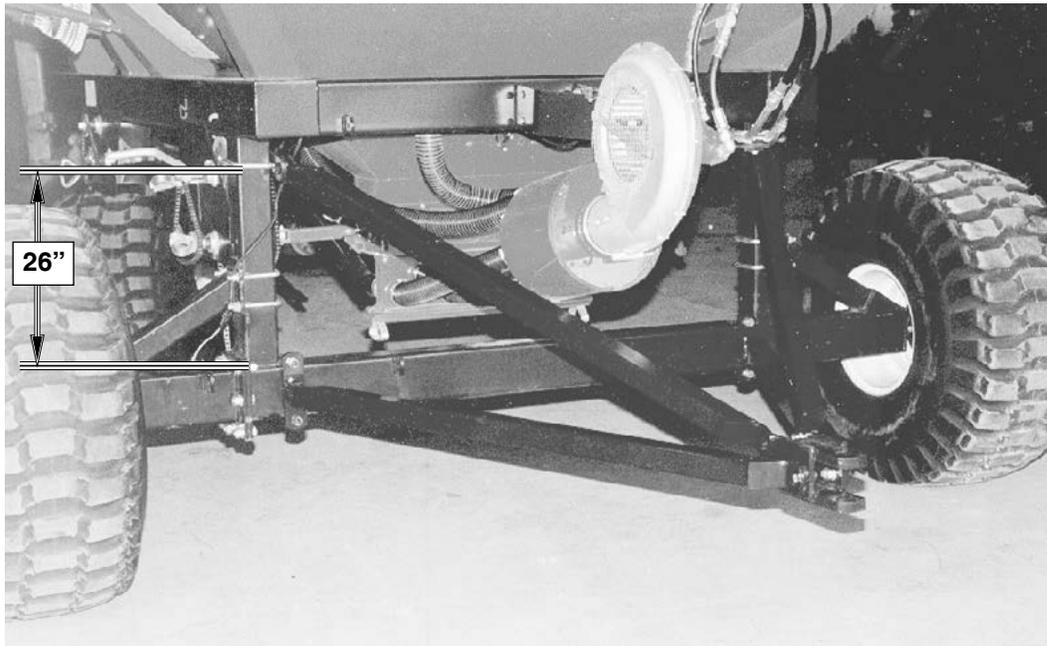
Options Assembly

Rear Tow Hitch (Tow Behind)

Standard Hitch

- Attach the upper brackets to the Air Cart frame with a 5/8" x 4" x 5 9/16" U-bolt, lockwashers and nuts. (Approximately 26" above lower frame member)
- Attach the lower brackets to the Air Cart frame with a 5/8" x 6" x 5 1/2" U-bolt, lockwashers and nuts.
- Attach the hitch tubes to the brackets using 3/4" x 2 1/4" bolts, lockwashers and nuts.
- Install the hitch clevis between the tubes using 3/4" x 2 1/4" bolts, lockwashers and nuts.
- Level hitch clevis and hitch tubes.
- Tighten all bolts securely.

Note: Leave all bolts loose for initial assembly.



Rear Tow Hitch (Tow Behind)

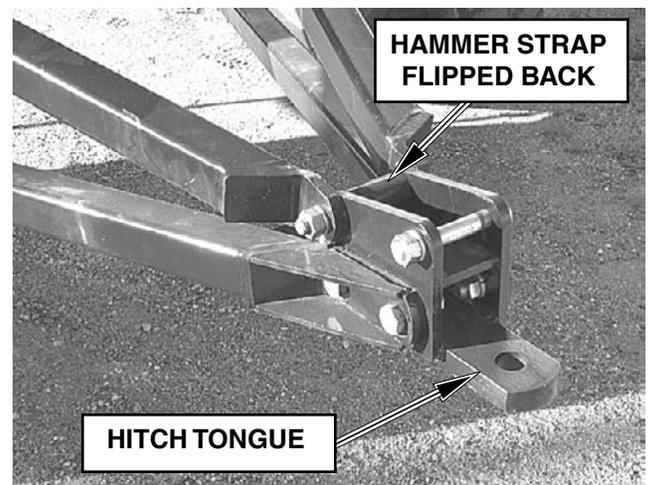
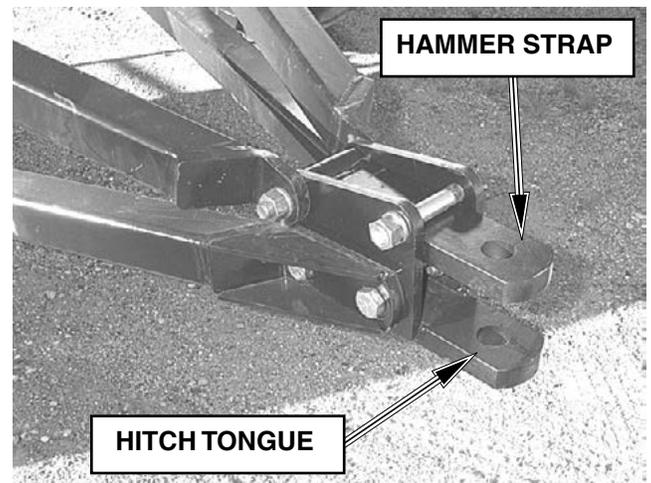
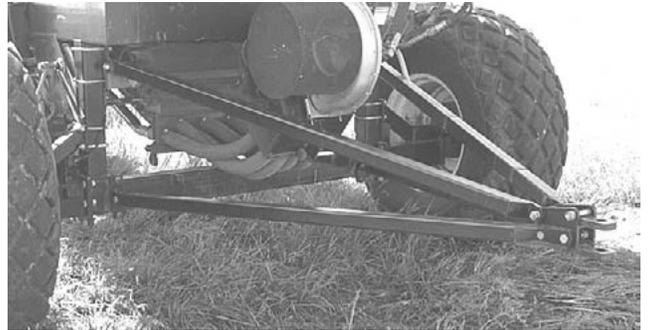
Extended Hitch

- Attach the upper brackets to the Air Cart frame with a 5/8" x 4" x 5 9/16" U-bolt, lockwashers and nuts. (Approximately 26" above lower frame member)
- Attach the lower brackets to the Air Cart frame with a 5/8" x 6" x 5 1/2" U-bolt, lockwashers and nuts.
- Attach the hitch tubes to the brackets using 3/4" x 2 1/4" bolts, lockwashers and nuts.
- Install the hitch tongue between the lower hitch tubes using 3/4" x 2 1/4" bolts, lockwashers and nuts.
- Install the hammer strap to hitch tongue between the upper hitch tubes using a 3/4" x 6 1/2" bolt, bushing - 1 1/4" OD x 3 1/16" lg, lockwasher and nut.
- Secure hammer strap above hitch tongue with a 3/4" x 5 bolt, lockwasher and nut.

Note: Hammer strap can be flipped back to accommodate different hitches.

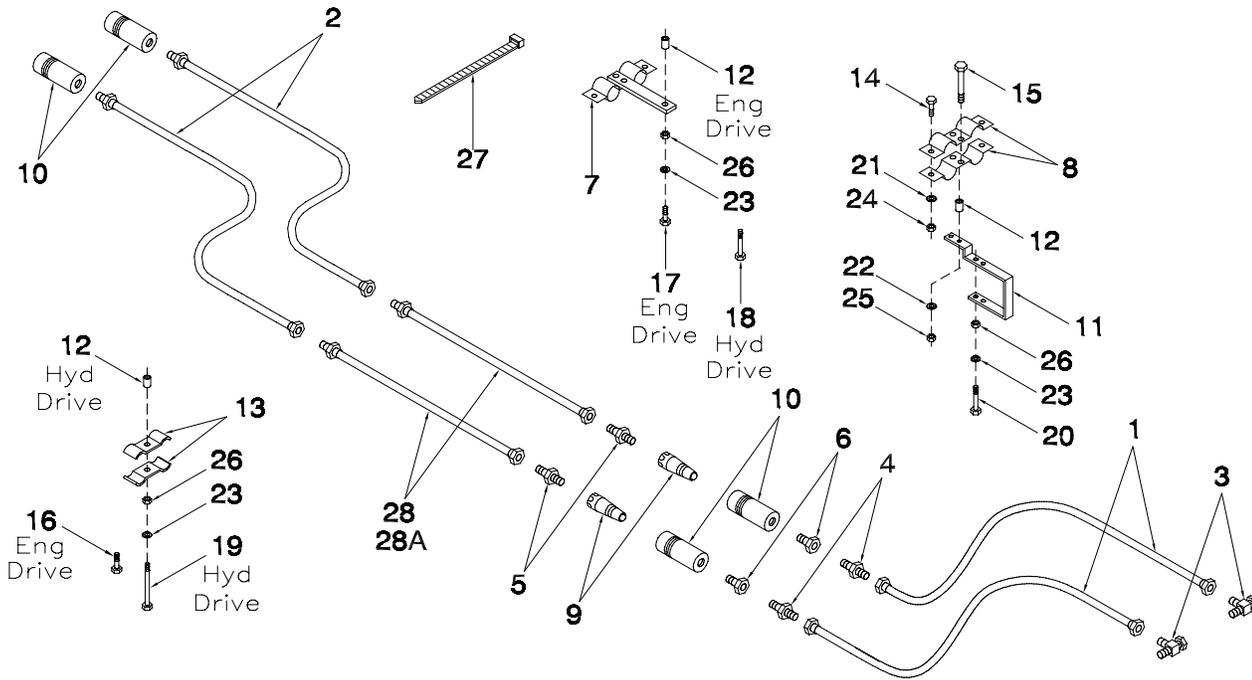
- Tighten all bolts securely.

Note: Leave all bolts loose for initial assembly.



Options Assembly

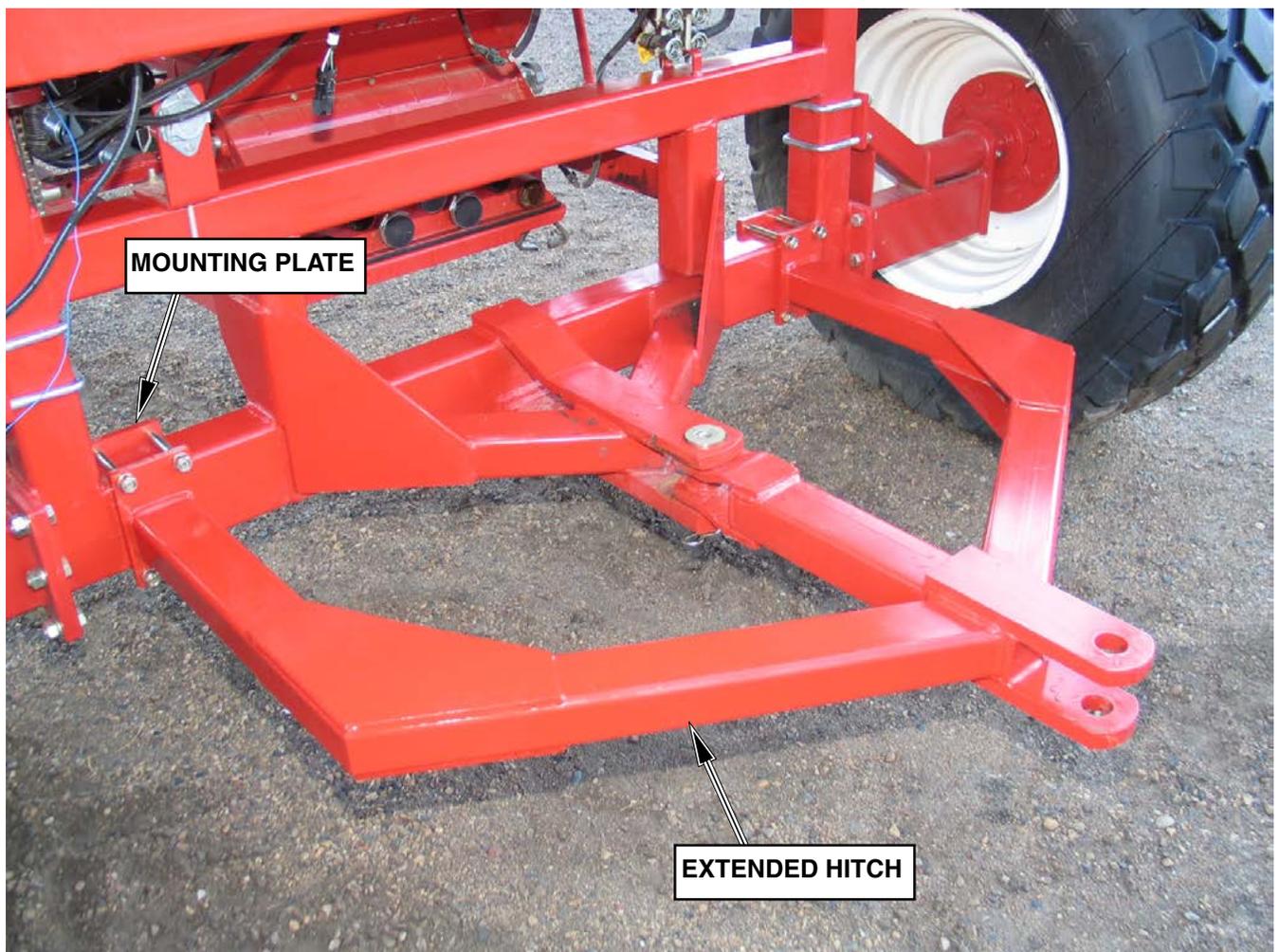
Rear Tow Hitch (Tow Behind)



Item	Part No.	Description	Qty
1	H18267	Hyd Hose - 1/4 x 96 Lg w/9/16-18 FJIC	2
2	N15041	Hyd Hose - 1/2 x 293 Lg w/7/8-14 FJIC x 1/2 MNPT	2
3	C-4403	Tee - (2) 9/16-18 MJIC x (1) 9/16-18 FJIC	2
4	C-4405	Connector - 9/16-18 MJIC x 3/8 MNPT	2
5	C-4399	Connector - 7/8-14 MJIC x 1/2 MNPT	2
6	C-719	Reducer - 1/2 MNPT x 3/8 FNPT	2
7	S-1379	Pioneer Coupler Assembly	1
8	N16608	Pioneer Clamp	2
9	C-817	Male Pioneer Tip - 1/2 FNPT	2
10	C-818	Pioneer Coupler - 1/2 FNPT	4
11	N21691	Mounting Bracket	1
12	N16257	Spacer	3
13	D-4808	Oil Line Clamp	2
14	W-469	Hex Bolt - 1/4 x 3/4	2
15	W-473	Hex Bolt - 5/16 x 1 1/2	2
16	W-187	Hex Bolt - 3/8 x 1 1/4	1
17	W-619	Hex Bolt - 3/8 x 1 3/4	1
18	D-5249	Hex Bolt - 3/8 x 3 1/4	1
19	S-1299	Hex Bolt - 3/8 x 4 1/2	1
20	C-3918	Hex Bolt - 3/8 x 5	1
21	W-521	Lockwasher - 1/4	2
22	W-522	Lockwasher - 5/16	2
23	W-523	Lockwasher - 3/8	3
24	W-512	Hex Nut - 1/4	2
25	W-513	Hex Nut - 5/16	2
26	W-514	Hex Nut - 3/8	3
27	D-4838	Tie Strap	6
28	C15310	Hyd Hose - 1/2 x 72 Lg w/7/8-14 MJIC x 7/8-14 FJIC 9240 / 9252 / 9300	2
	H25645	Kit - Hydraulic Extension - 9240 / 9252 / 9300 (Includes All Items) (ORDER THROUGH WHOLEGOODS)	

Hitch Extension (Tow Between)

- Attach extended hitch to Air Cart hitch with a 1 1/2" x 6 1/2" UL pin and #19 Hair Pin.
- Secure extended hitch to Air Cart frame with 5/8" x 6" bolts, lockwashers, nuts and mounting plates.



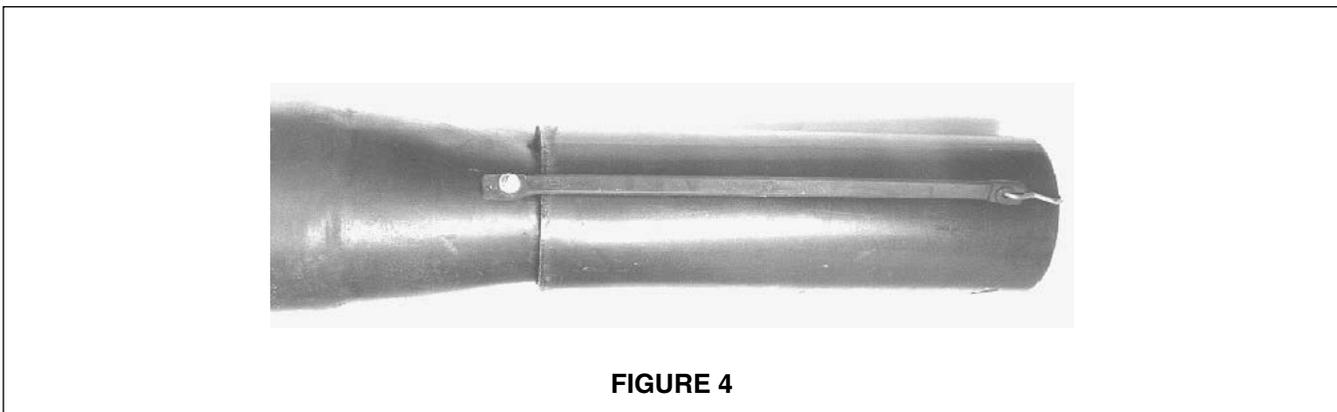
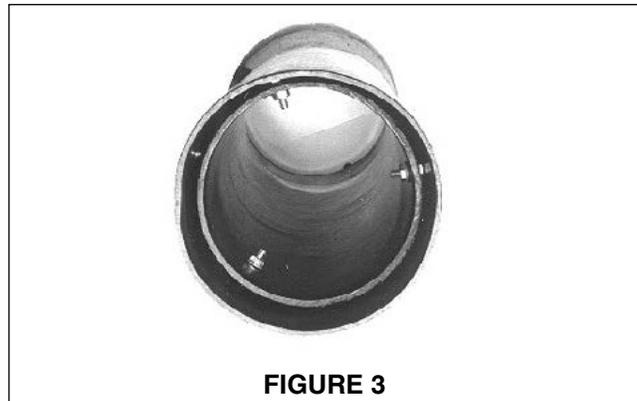
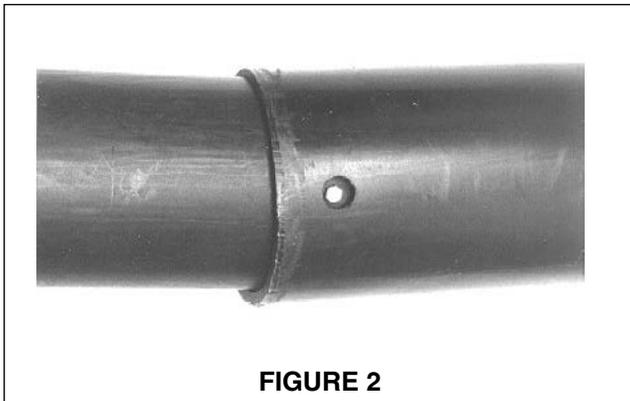
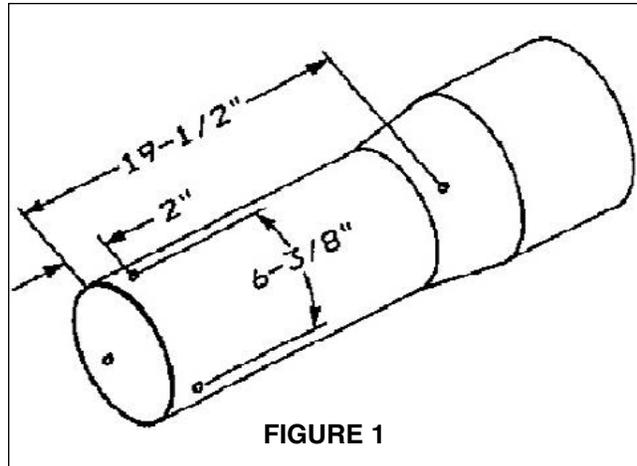
Options Assembly

Auger Spout Extension Kit

- Remove existing spout from the auger.
- Drill three 1/4" diameter holes 2" from edge of spout and approximately 6 3/8" apart. See fig. 1
- Slide extension onto the spout and install three 1/4" x 3/4" bolts with 1/4" locknuts through the hole in the extension. See fig. 2 & 3

Note: Flatwashers may be required to shim the bolt heads for desired fit.

- Attach the tarp strap to the spout with a 1/4" x 1 1/4" bolt, flatwasher and locknut. See fig. 4
- Install spout assembly onto the auger.



Section 11: Metric

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Metric

Metric Rate Calibration Chart

Model 9240, 9252 & 9300

Calibration Chart based on 1/10 of a Hectare.

W = Machine Spread Width (metres)

F = Optional Mechanical Hectare Tally Factor = 56/R

R = Crank Rotation (turns)

for 1/10 Hectare = 262.4/W for 23.1 x 26 All Weather Tires.

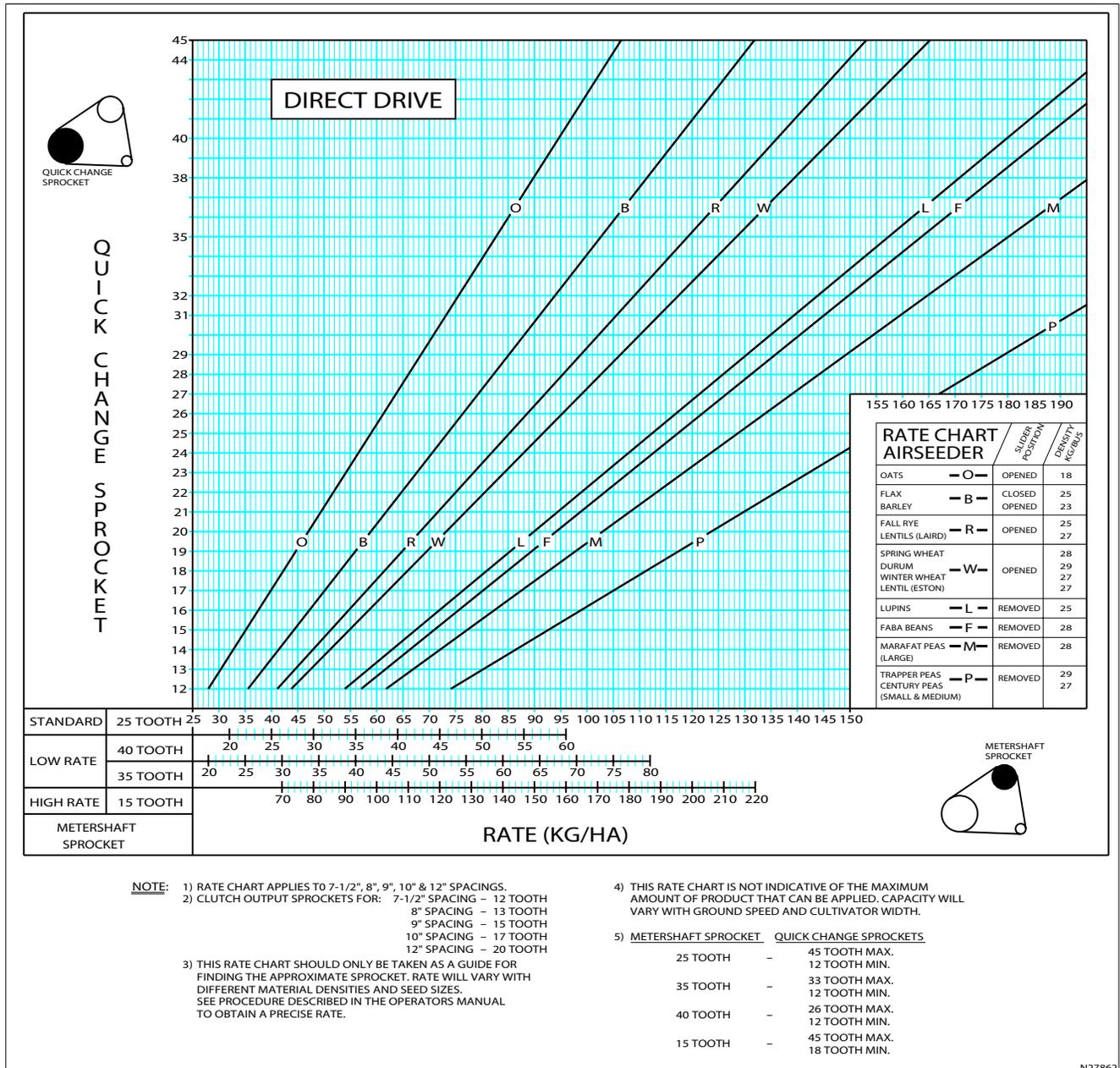
for 1/10 Hectare = 238.6/W for 23.1 x 26 Rice Tires.

D = Distance required for 1/10 Hectare (metres) = 1000/W

9s Series Air Cart													
METRIC RATE CALIBRATION CHART													
WIDTH [W]		Air Cart Model				DISTANCE [D]	WIDTH [W]		Air Cart Model				DISTANCE [D]
		9240/9252/9300							9240/9252/9300				
(ft)	(m)	Tire 23.1 x 26		Rice Tire 23.1 x 26		(ft)	(ft)	(m)	Tire 23.1 x 26		Rice Tire 23.1 x 26		(ft)
		[R]	[F]	[R]	[F]				[R]	[F]	[R]	[F]	
21	6.40	41.00	1.37	37.28	1.50	156.25	51	15.54	16.89	3.32	15.35	3.65	64.35
22	6.71	39.11	1.43	35.56	1.57	149.03	52	15.85	16.56	3.38	15.05	3.72	63.09
23	7.01	37.44	1.50	34.03	1.65	142.65	53	16.15	16.25	3.45	14.77	3.79	61.92
24	7.32	35.85	1.56	32.59	1.72	136.61	54	16.46	15.94	3.51	14.49	3.86	60.75
25	7.62	34.44	1.63	31.31	1.79	131.23	55	16.76	15.66	3.58	14.23	3.94	59.67
26	7.92	33.13	1.69	30.12	1.86	126.26	56	17.07	15.37	3.64	13.98	4.01	58.58
27	8.23	31.89	1.76	28.99	1.93	121.51	57	17.37	15.11	3.71	13.73	4.08	57.57
28	8.53	30.76	1.82	27.97	2.00	117.23	58	17.68	14.84	3.77	13.49	4.15	56.56
29	8.84	29.69	1.89	26.99	2.07	113.12	59	17.98	14.60	3.84	13.27	4.22	55.62
30	9.14	28.71	1.95	26.10	2.15	109.41	60	18.29	14.35	3.90	13.04	4.29	54.67
31	9.45	27.77	2.02	25.25	2.22	105.82	61	18.59	14.12	3.97	12.83	4.36	53.79
32	9.75	26.92	2.08	24.47	2.29	102.56	62	18.90	13.88	4.03	12.62	4.44	52.91
33	10.06	26.09	2.15	23.72	2.36	99.40	63	19.20	13.67	4.10	12.43	4.51	52.08
34	10.36	25.33	2.21	23.03	2.43	96.53	64	19.51	13.45	4.16	12.23	4.58	51.26
35	10.67	24.59	2.28	22.36	2.50	93.72	65	19.81	13.25	4.23	12.04	4.65	50.48
36	10.97	23.92	2.34	21.75	2.57	91.16	66	20.12	13.04	4.29	11.86	4.72	49.70
37	11.28	23.26	2.41	21.15	2.65	88.65	67	20.42	12.85	4.36	11.68	4.79	48.97
38	11.58	22.66	2.47	20.60	2.72	86.36	68	20.73	12.66	4.42	11.51	4.87	48.24
39	11.89	22.07	2.54	20.07	2.79	84.10	69	21.03	12.48	4.49	11.34	4.94	47.55
40	12.19	21.53	2.60	19.57	2.86	82.03	70	21.34	12.30	4.55	11.18	5.01	46.86
41	12.50	20.99	2.67	19.09	2.93	80.00	71	21.64	12.13	4.62	11.02	5.08	46.21
42	12.80	20.50	2.73	18.64	3.00	78.13	72	21.95	11.96	4.68	10.87	5.15	45.56
43	13.11	20.02	2.80	18.20	3.08	76.28	73	22.25	11.79	4.75	10.72	5.22	44.94
44	13.41	19.57	2.86	17.79	3.15	74.57	74	22.56	11.63	4.82	10.58	5.29	44.33
45	13.72	19.13	2.93	17.39	3.22	72.89	75	22.86	11.48	4.88	10.44	5.36	43.74
46	14.02	18.72	2.99	17.02	3.29	71.33	76	23.16	11.33	4.94	10.30	5.44	43.18
47	14.33	18.31	3.06	16.65	3.36	69.78	77	23.47	11.18	5.01	10.17	5.51	42.61
48	14.63	17.94	3.12	16.31	3.43	68.35	78	23.77	11.04	5.07	10.04	5.58	42.07
49	14.94	17.57	3.19	15.97	3.51	66.93	79	24.08	10.90	5.14	9.91	5.65	41.53
50	15.24	17.22	3.25	15.65	3.58	65.62	80	24.38	10.76	5.20	9.79	5.72	41.02

Rate Charts

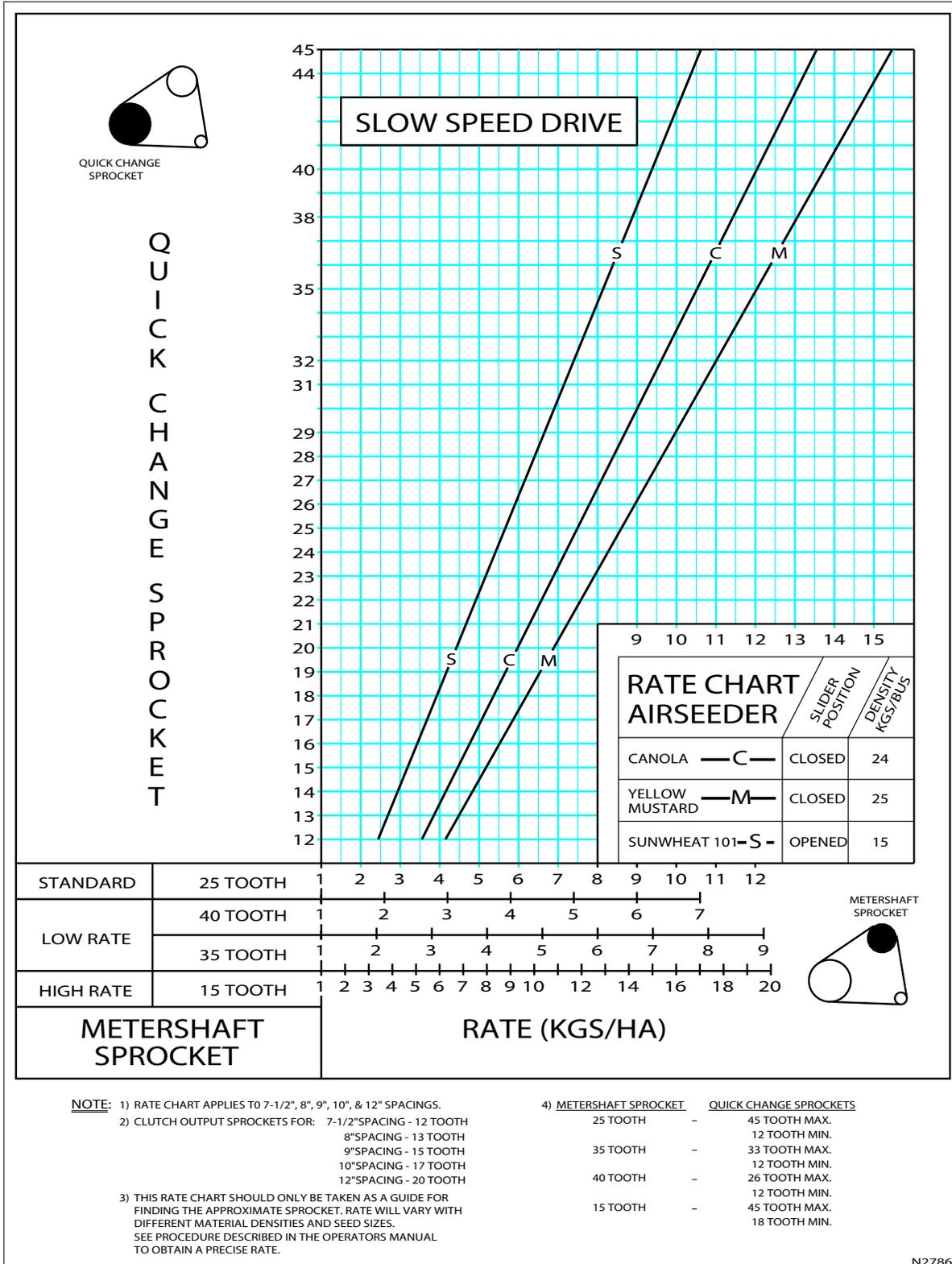
Seed Rate Chart: (Front Transmission)



Metric

Rate Charts - Continued

Slow Speed Seed Rate Chart: (Front Transmission)



Metric

Notes



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