



**MORRIS**

Seeding, Tillage and Haying Solutions

**7000 Series  
VRT AIR CART**

**OPERATOR'S  
Manual**

N44295-00



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# Section 1: Safety

## Section Contents

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# Safety

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## 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.

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### 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.

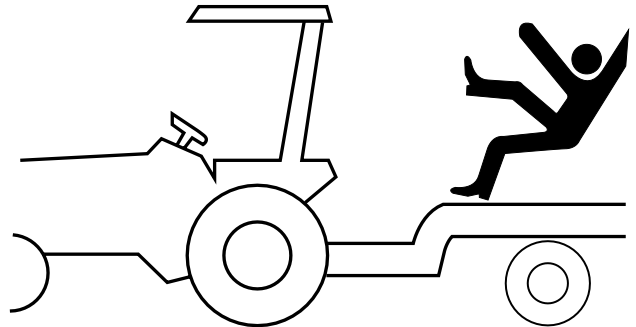
The words **Important** and **Note** are not related to personal safety but are used to give additional information and tips for operating or servicing this equipment.

**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.

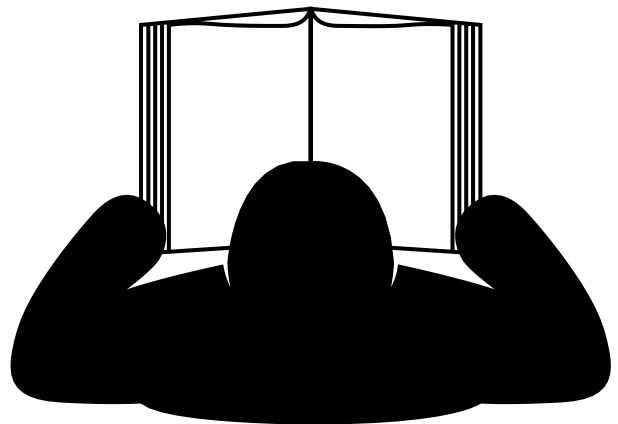
## General Operation

- **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

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## 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.

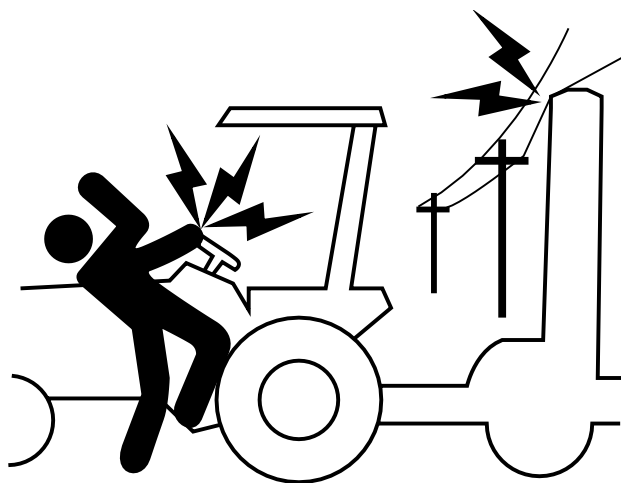
**Always** secure connecting parts and safety chains before towing ammonia trailer.

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



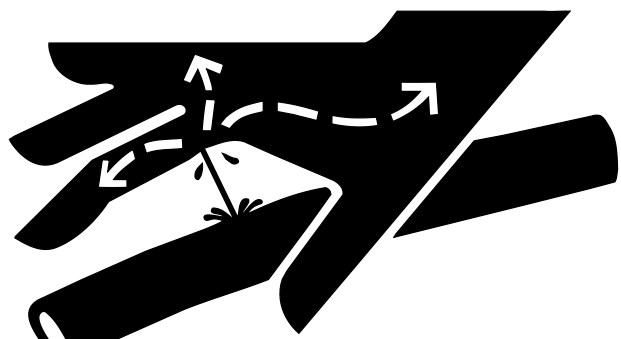
## Transporting

- **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.

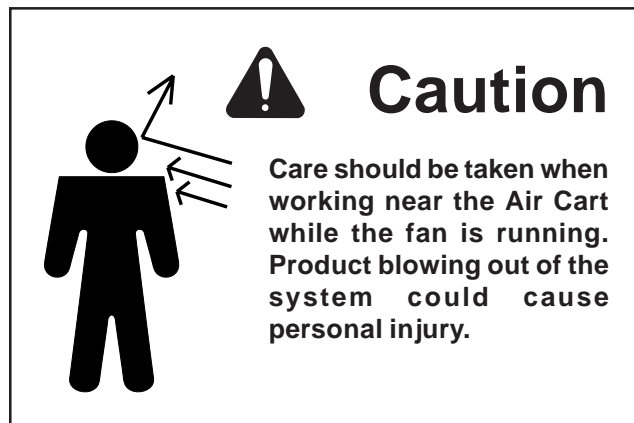


# Safety

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## 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.

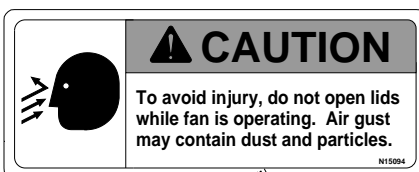


## Storage

- 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

### Tow Behind



**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

**IMPORTANT**

WHEN THE MACHINES ARE BEING TOWED BY A SEMI TRACTOR OR TRUCKS OF ANY DESCRIPTION THE UNITS MUST BE TOWED SEPARATELY FROM THE SEEDING TOOL WITH THE TOW HITCH PROVIDED!

N25674

**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.

C31261

**IMPORTANT**

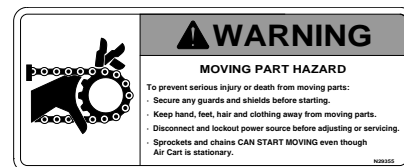
ENSURE THAT ALL WHEEL NUTS ARE TORQUED TO THE FOLLOWING:

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

N24412



Located on each  
Transmission



# Safety

## Safety Signs - Continued

### Auger

**CAUTION**

- AUGER TRANSPORT LOCK PIN MUST BE IN PLACE WHEN AIRSEEDER IS IN MOTION.
- USE CAUTION WHEN RELEASING AUGER CRADLE LEVER.



**DANGER**



**ROTATING FLIGHTING HAZARD**  
Keep away from auger intake.  
Keep intake shield in place and in good working order. Do not modify.  
**FAILURE TO HEED WILL RESULT IN SERIOUS INJURY OR DEATH.**

**DANGER**



**ELECTROCUTION HAZARD**  
This equipment is not insulated.  
Keep equipment away from overhead power lines and devices.  
Electrocution can occur without direct contact.  
Fully lower equipment before moving.  
**FAILURE TO KEEP AWAY WILL RESULT IN SERIOUS INJURY OR DEATH.**

**WARNING**



Keep off while machine is moving or mechanism is running.

### Tow Behind Rear


**DANGER**

- Hydraulic motor or engine and exhaust system becomes extremely hot from operation.
- Keep hands, feet and clothing away from moving parts.
- Keep all covers, shrouds and guards in place.

**DANGER**

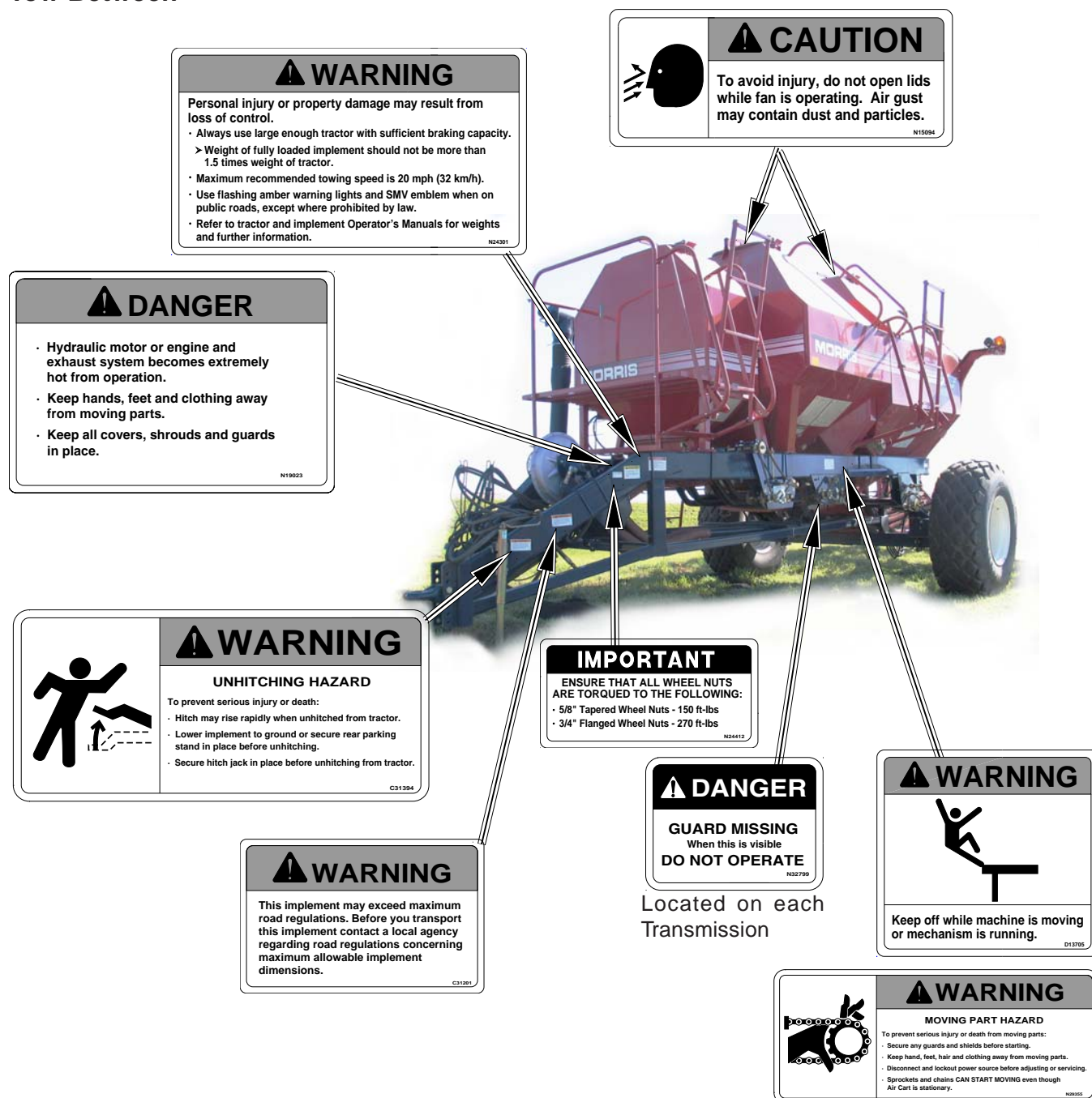
Failure to comply may result in death or serious injury.  
Read Operator's Manual and decals on Ammonia tank before operating Machine. Become familiar with all warnings, instructions, and controls.

**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.



## Safety Signs - Continued

### Tow Between



# 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.

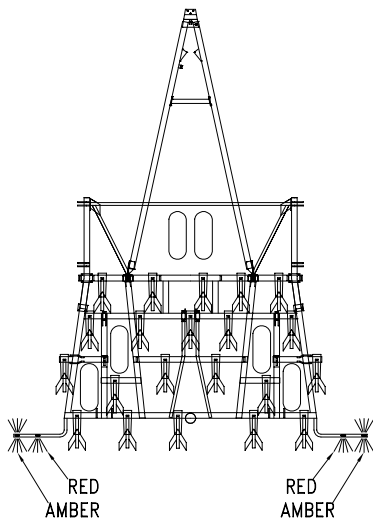
Amber warning and red tail lights secured on the machine promote correct transportation of this implement.

**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.

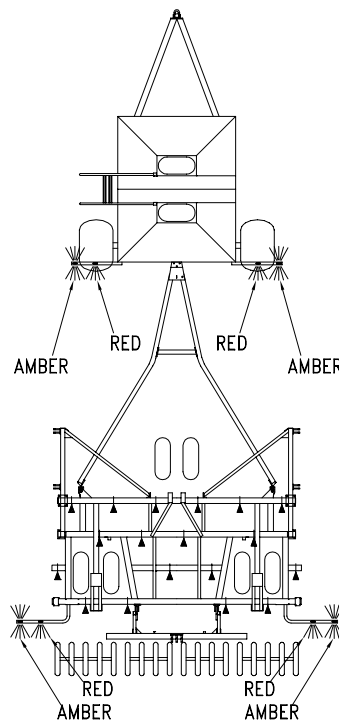
**Note: Always replace missing or damage front, side, rear reflectors and SMV emblem.**

**Tillage Unit**



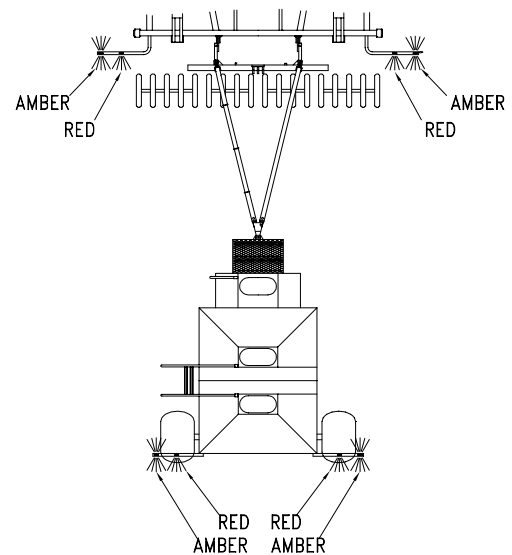
**Seeding Unit**

**Tow Between**



**Seeding Unit**

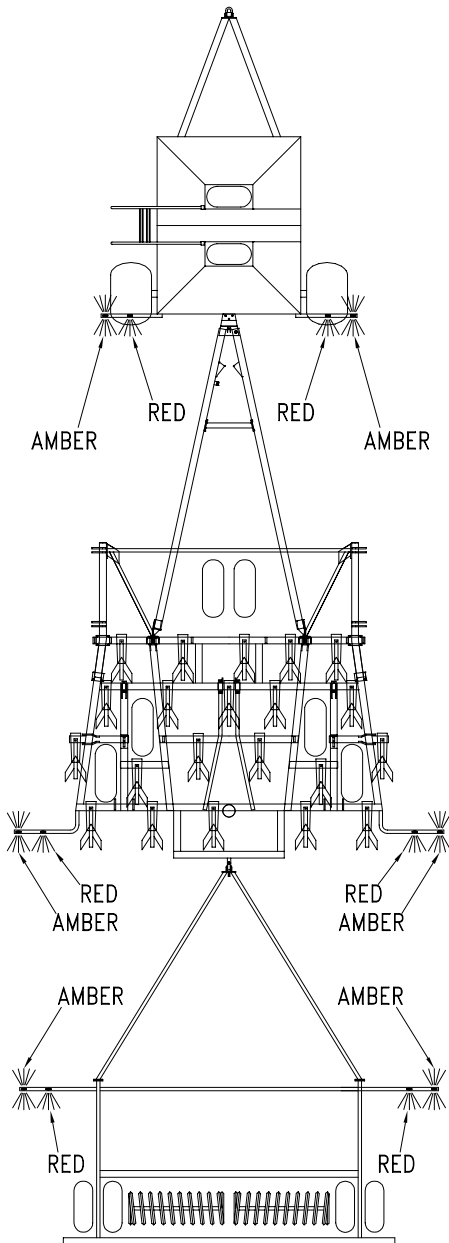
**Tow Behind**



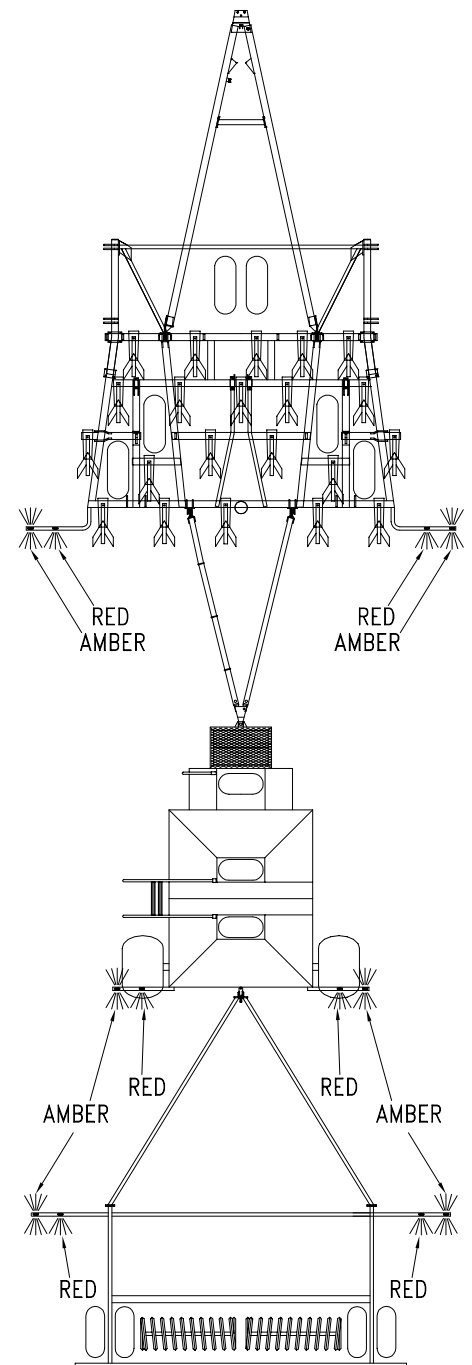


## Lighting and Marking - Continued

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



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



# Safety

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Notes

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## Section 2: Specifications

### Section Contents

|                   |     |
|-------------------|-----|
| 7180 Models ..... | 2-2 |
| 7240 Models ..... | 2-3 |
| 7300 Models ..... | 2-4 |

# Specifications

## 7180 Models

### 7000 SERIES AIR CART - VRT

#### Specifications and Options

| Model                                | 7180 VRT  |  |
|--------------------------------------|---|--|
|                                      | Tow Behind  | Tow Between  |
| Configuration                        |   |  |
| Length without auger                 | 17' 5" (5.31 m)   | 20' 3" (6.17 m)  |
| Height - Hydraulic Drive             | 10' 9" (3.28 m)   | 10' 9" (3.28 m)  |
| Width                                | 11' 4" (3.45 m)   | 11' 4" (3.45 m)  |
| Weight (Hydraulic Drive with Auger)  | 5,720 lbs. (2,574 kg)   | 5,420 lbs. (2,439 kg)                                    |
| Safety Lights                        | Standard  | Standard   |
| Safety Chain                         | Standard  | Standard   |
| Tank Capacity - Front Tank           | 71 bushels/5,112 lbs. (2,580 $\ell$ )   | 71 bushels/5,112 lbs. (2,580 $\ell$ )                    |
| - Rear Tank                          | 109 bushels/7,848 lbs. (3,970 $\ell$ )  | 109 bushels/7,848 lbs. (3,970 $\ell$ )                   |
| - Total                              | 180 bushels/231 ft. cu. (8,730 $\ell$ )   | 180 bushels/231 ft. cu. (8,730 $\ell$ )                  |
| Tank Access Screens                  | Optional  | Optional   |
| Tank Access Ladder R.H.S.            | Standard  | Standard   |
| Loading Auger                        | Standard<br>(7" Diameter x 18.5' Long) (0.18 m x 5.64 m)  | Standard<br>(7" Diameter x 18.5' Long) (0.18 m x 5.64 m) |
| Brush Flighting Kit (Used with peas) | Optional  | Optional   |
| Tires - Floatation                   | (3) 21.5 x 16.1 - 6 ply rating  | (2) 21.5 x 16.1 - 6 ply rating                           |
| - Optional                           | (3) 21.5 x 16.1 Rice - 8 ply rating   | (2) 21.5 x 16.1 Rice - 8 ply rating                      |
| - Three Point Hitch                  | N/A   | (2) 18.4 x 26 - 10 ply rating                            |
| Number Secondary Runs - Single Shoot | 21 to 80  | 21 to 80   |
| Number Secondary Runs - Double Shoot | 42 to 160   | 42 to 160  |
| Primary Hose - Diameter              | 2 1/2" (6.4 cm)   | 2 1/2" (6.4 cm)  |
| Secondary Hose - Diameter            | 15/16" (2.4 cm)   | 15/16" (2.4 cm)  |
| Frame                                | Formed 4" x 6" tubing (10 cm x 15 cm)   | Formed 4" x 6" tubing (10 cm x 15 cm)                    |
| Walk Through Tank                    | Standard  | Standard   |
| Easy Clean Out System                | Standard  | Standard   |
| Three Point Hitch                    | N/A   | Optional (Categories II, III, III-N)                     |
| Trailing Hitch                       | Optional  | N/A  |
| Hitch Stand                          | Optional  | N/A  |
| Scraper (Front Wheel Only)           | Optional  | N/A  |
| Third Tank - Capacity                | Optional<br>40 cu. ft. (1,129 $\ell$ )  | Optional<br>40 cu. ft. (1,129 $\ell$ )                   |
| Granular Applicator - Capacity       | Optional<br>30 cu. ft. (847 $\ell$ )  | Optional<br>30 cu. ft. (847 $\ell$ )                     |
| - Working Width                      | 26 ft. to 64 ft. (7.93 m to 1,951 m)  | 26 ft. to 64 ft. (7.93 m to 1,951 m)                     |
| Fan - Speed                          | Up to 5,000 r.p.m.  |  |
| - Impeller Diameter                  | 13" (33 cm)   |  |
| - Drive                              | Hydraulic   |  |
| Hydraulics - System                  | Closed Centre or Closed Centre Load Sensing systems required                                    |  |
| - Flow                               | Maximum 21 U.S. gal./min. (80 $\ell$ /min.) including fan drive                                 |  |
| - Pressure                           | Minimum 2100 p.s.i. (14,469 kPa)  |  |
| Metering - Meter Drive               | Independent Hydraulic Motors of up to 3 meter shafts  |  |
| - Meter Shut Off                     | Electric Solenoid   |  |
| - Rate Adjustment                    | Independently controlled through Electric Solenoid Valves at a Frequency of 20 times per second |  |
| Monitor - Displays                   | Application Rate (3), Bin Level (3), Fan Speed, Ground Speed, Field Acres, Total Acres          |  |
| - Alarms                             | Meter Shaft Motors, Meter Shafts, Low Bin Level, Fan, Ground Speed                              |  |
| - Rate Change                        | Increments of 5% of nominal rate (Max/Min - 50%)  |  |

### 7000 Series Air Cart VRT Specifications and Options

| Model                                | 7240 VRT  |  |
|--------------------------------------|---|--|
|                                      | Tow Behind  | Tow Between  |
| Configuration                        |   |  |
| Length without auger (with auger)    | 20' 4" (6.2 m) (25' 8" (7.82 m))  | 19' 2" (5.84 m) (26' 10" (8.18 m))                   |
| Height - Hydraulic Drive             | 11' 4" (3.45 m)   | 11' 4" (3.45 m)                                      |
| Width                                | 12' (3.66 m)  | 12' (3.66 m)   |
| Weight (Hydraulic Drive with Auger)  | 7,315 lbs. (3,325 kg)   | 6,825 lbs. (3,071 kg)                                |
| Safety Lights                        | Standard  | Standard   |
| Safety Chain                         | Standard  | Standard   |
| Tank - Front Tank                    | 95 bushels/6,840 lbs. (3,460ℓ)  | 95 bushels/6,840 lbs. (3,460ℓ)                       |
| Capacity - Rear Tank                 | 145 bushels/10,440 lbs. (5,270 ℓ)   | 145 bushels/10,440 lbs. (5,270 ℓ)                    |
| - Total                              | 240 bushels/308 ft. cu. (8,730 ℓ)   | 240 bushels/308 ft. cu. (8,730 ℓ)                    |
| Tank Screens                         | Optional  | Optional   |
| Tank Access Ladder R.H.S.            | Standard  | Standard   |
| Loading Auger                        | Standard<br>(8" Diameter x 20' Long) (0.2 m x 6.1 m)  | Standard<br>(8" Diameter x 20' Long) (0.2 m x 6.1 m) |
| Brush Flighting Kit (Used with peas) | Optional  | Optional   |
| Tires - Floatation (Front)           | (2) 21.5 x 16.1 - 6 ply rating  | N/A  |
| - Floatation (Rear)                  | (2) 23.1 x 26 - 12 ply rating   | (2) 23.1 x 26 - 12 ply rating                        |
| - Optional (Rear)                    | (2) 23.1 x 26 Rice - 10 ply rating  | (2) 23.1 x 26 Rice - 10 ply rating                   |
| - Three Point Hitch (Rear)           | N/A   | (2) 23.1 x 26 - 12 ply rating                        |
| Number Secondary Runs - Single Shoot | 21 to 80  | 21 to 80   |
| Number Secondary Runs - Double Shoot | 42 to 160   | 42 to 160  |
| Primary Hose - Diameter              | 2 1/2" (6.4 cm)   | 2 1/2" (6.4 cm)                                      |
| Secondary Hose - Diameter            | 15/16" (2.4 cm)   | 15/16" (2.4 cm)                                      |
| Frame                                | Formed 4" x 8" tubing (10 cm x 20 cm)   | Formed 4" x 8" tubing (10 cm x 20 cm)                |
| Walk Through Tank                    | Standard  | Standard   |
| Easy Clean Out System                | Standard  | Standard   |
| Three Point Hitch                    | N/A   | N/A  |
| Trailing Hitch                       | Optional  | N/A  |
| Hitch Stand                          | Optional  | N/A  |
| Scraper (Front Wheel Only)           | N/A   | N/A  |
| Third Tank - Capacity                | Optional<br>40 cu. ft. (1,129 ℓ)  | Optional<br>40 cu. ft. (1,129 ℓ)                     |
| Granular Applicator - Capacity       | Optional<br>40 cu. ft. (1,129 ℓ)  | Optional<br>40 cu. ft. (1,129 ℓ)                     |
| - Working width                      | 26 ft. to 64 ft. (7.93 m to 1,951 m)  | 26 ft. to 64 ft. (7.93 m to 1,951 m)                 |
| Fan - Speed                          | Up to 5,000 r.p.m.  |  |
| - Impeller Diameter                  | 13" (33 cm)   |  |
| - Drive                              | Hydraulic   |  |
| Hydraulics - System                  | Closed Centre or Closed Centre Load Sensing systems required                                    |  |
| - Flow                               | Maximum 21 U.S. gal./min. (80 ℓ/min.) including fan drive                                       |  |
| - Pressure                           | Minimum 2100 p.s.i. (14,469 kPa)  |  |
| Metering - Meter Drive               | Independent Hydraulic Motors of up to 3 meter shafts  |  |
| - Meter Shut Off                     | Electric Solenoid   |  |
| - Rate Adjustment                    | Independently controlled through Electric Solenoid Valves at a Frequency of 20 times per second |  |
| Monitor - Displays                   | Application Rate (3), Bin Level (3), Fan Speed, Ground Speed, Field Acres, Total Acres          |  |
| - Alarms                             | Meter Shaft Motors, Meter Shafts, Low Bin Level, Fan, Ground Speed                              |  |
| - Rate Change                        | Increments of 5% of nominal rate (Max/Min - 50%)  |  |

# Specifications

## 7300 Models

### 7000 Series Air Cart VRT Specifications and Options

| Model   | 7300 VRT   |  |
|---|--|--|
| Configuration   | Tow Behind   | Tow Between  |
| Length without auger (with auger)   | 20' 4" (6.2 m) (25' 8" (7.82 m))   | 19' 2" (5.84 m) (26' 10" (8.18 m))                   |
| Height - Hydraulic Drive  | 12' (3.66 m)   | 12' (3.66 m)   |
| Width   | 12' (3.66 m)   | 12' (3.66 m)   |
| Weight (Hydraulic Drive with Auger)                                       | 7,770 lbs. (3,479 kg)  | 7,325 lbs. (3,296 kg)                                |
| Safety Lights   | Standard   | Standard   |
| Safety Chain  | Standard   | Standard   |
| Tank Capacity - Front Tank  | 120 bushels/8,640 lbs. (4,360 ℓ)   | 120 bushels/8,640 lbs. (4,360 ℓ)                     |
| - Rear Tank   | 180 bushels/12,960 lbs. (6,550 ℓ)  | 180 bushels/12,960 lbs. (6,550 ℓ)                    |
| - Total   | 300 bushels/385 ft. cu. (10,910 ℓ)   | 300 bushels/385 ft. cu. (10,910 ℓ)                   |
| Tank Screens  | Optional   | Optional   |
| Tank Access Ladder R.H.S.   | Standard   | Standard   |
| Loading Auger   | Standard<br>(8" Diameter x 20' Long) (0.2 m x 6.1 m)   | Standard<br>(8" Diameter x 20' Long) (0.2 m x 6.1 m) |
| Brush Flighting Kit (Used with peas)                                      | Optional   | Optional   |
| Tires - Floatation (Front)  | (2) 21.5 x 16.1 - 10 ply rating  | N/A  |
| - Floatation (Rear)   | (2) 23.1 x 26 - 12 ply rating  | (2) 23.1 x 26 - 12 ply rating                        |
| - Optional (Rear)   | (2) 23.1 x 26 Rice - 10 ply rating   | (2) 23.1 x 26 Rice - 10 ply rating                   |
| - Three Point Hitch (Rear)  | N/A  | N/A  |
| Number Secondary Runs - Single Shoot                                      | 21 to 80   | 21 to 80   |
| Number Secondary Runs - Double Shoot                                      | 42 to 160  | 42 to 160  |
| Primary Hose - Diameter   | 2 1/2" (6.4 cm)  | 2 1/2" (6.4 cm)                                      |
| Secondary Hose - Diameter   | 15/16" (2.4 cm)  | 15/16" (2.4 cm)                                      |
| Frame   | Formed 4" x 8" tubing (10 cm x 20 cm)  | Formed 4" x 8" tubing (10 cm x 20 cm)                |
| Walk Through Tank   | Standard   | Standard   |
| Easy Clean Out System   | Standard   | Standard   |
| Three Point Hitch   | N/A  | N/A  |
| Trailing Hitch  | Optional   | N/A  |
| Hitch Stand   | Optional   | N/A  |
| Scraper (Front Wheel Only)  | N/A  | N/A  |
| <b>Third Tank</b><br>- Capacity   | Optional<br>40 cu. ft. (1,129 ℓ)   | N/A  |
| <b>Granular Applicator</b><br>- Capacity<br>- Working width               | Optional<br>40 cu. ft. (1,129 ℓ)<br>26 ft. to 64 ft. (7.93 m to 1,951 m)   | N/A  |
| <b>Fan</b><br>- Speed<br>- Impeller Diameter<br>- Drive                   | Up to 5,000 r.p.m.<br>13" (33 cm)<br>Hydraulic   |  |
| <b>Hydraulics</b><br>- System<br>- Flow<br>- Pressure                     | Closed Centre or Closed Centre Load Sensing systems required<br>Maximum 21 U.S. gal./min. (80 ℓ/min.) including fan drive<br>Minimum 2100 p.s.i. (14,469 kPa)  |  |
| <b>Metering</b><br>- Meter Drive<br>- Meter Shut Off<br>- Rate Adjustment | Independent Hydraulic Motors of up to 3 meter shafts<br>Electric Solenoid<br>Independently controlled through Electric Solenoid Valves at a Frequency of 20 times per second                                     |  |
| <b>Monitor</b><br>- Displays<br>- Alarms<br>- Rate Change                 | Application Rate (3), Bin Level (3), Fan Speed, Ground Speed, Field Acres, Total Acres<br>Meter Shaft Motors, Meter Shafts, Low Bin Level, Fan, Ground Speed<br>Increments of 5% of nominal rate (Max/Min - 50%) |  |

## Section 3: Checklist

### Section Contents

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| Parts Manual .....    | 3-2 |
| Assembly Manual ..... | 3-2 |
| Checklist .....       | 3-3 |

## 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.**

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### 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 N27799

**Assembly Manual**

Order Part Number N29391

## 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.

### 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

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Notes

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## Section 4: Introduction

### Section Contents

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| Collector Plug .....                    | 4-7 |

# Introduction

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## 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 7000 Series VRT Air Cart.

To protect your investment, study your manual before starting or operating in the field. Learn how to operate and service your 7000 Series VRT 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 7000 Series VRT 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 7000 Series VRT 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 7000 Series VRT 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.

## Introduction - Continued

The MORRIS 7000 Series VRT Air Cart represents the latest in Air Cart design technology. There are three sizes available, a 180 bushel cart, a 240 bushel cart and a 300 bushel cart with hydraulic fan drive or an engine fan drive. The 180 bushel cart incorporate a three wheel, wide-stance high clearance frame. The 240 bushel and 300 bushel carts incorporate a four wheel, wide-stance high clearance frame. The high clearance frame gives easy access to the metering wheels and the easiest cleanout in the industry. The 7180, 7240 and 7300 carts have a 60:40 tank split. The tank lids are easily accessed by the convenient stairs and tank walk-through.

Each tank has it's 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 metering system incorporates spiral fluted wheels. The size of the metering wheel is matched to the number of outlets on the patented flat fan 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 VRT system enables the operator the ability to increase or decrease application rates from the tractor seat by pressing a button. Application rates can be changed on the go in increments of 5% from the operator set application rate (Max/Min - 50%). This enables the producer the ability to match application rates to varying soil requirements.

The VRT monitor with its easy to read display and Smart Sensors make basic operation effortless with unmatched reliability. Advanced functions are simple to program and the monitor can be quickly plugged into the harness at the Air Cart for ease of calibration. The monitor constantly monitors shaft rotation and bin levels, and with just a push of a button displays; fan speed, ground speed, field acres seeded, total acres seeded and actual application rates per acre. Real time actual application rate of two tanks can be displayed simultaneously on the monitor display.

Each metering shaft (up to three) is independently driven by a hydraulic motor. The hydraulic motors are independently controlled through electric solenoid valves. The VRT system senses ground speed and adjusts the hydraulic valves to maintain precise meter shaft rotation vs ground speed at a frequency of 20 times per second. The VRT system has the flexibility to allow the use of either tank for fertilizer or seed as well as the third tank or granular tank.

## Options

### Hydraulic Auger

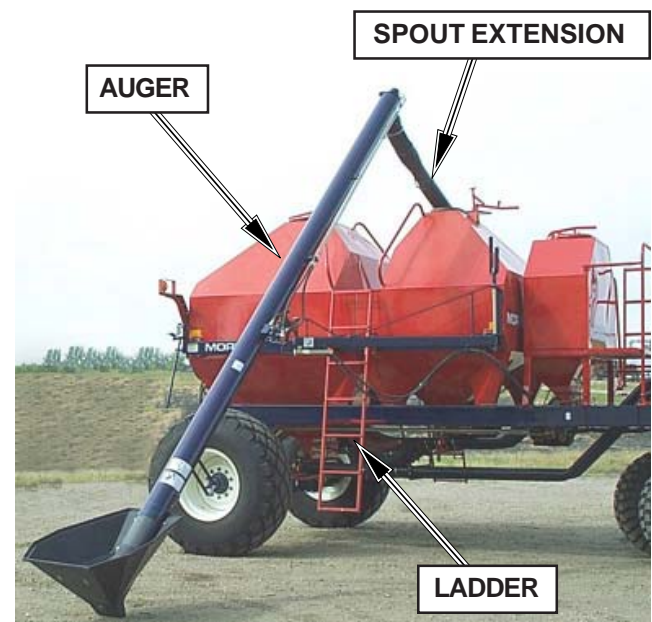
The optional hydraulic auger is designed to make loading and unloading product from the Air Cart tank very simple and easy.

An optional Brush Flighting Kit is available to gently handle seed.

For faster loading of the 7240 and 7300 Air Cart tanks an optional 8 inch auger is available.

### Auger Spout Extension Kit #N23188

The spout extension allows the operator easy access between the tanks without repositioning the auger, making filling the tanks more convenient.





# Introduction

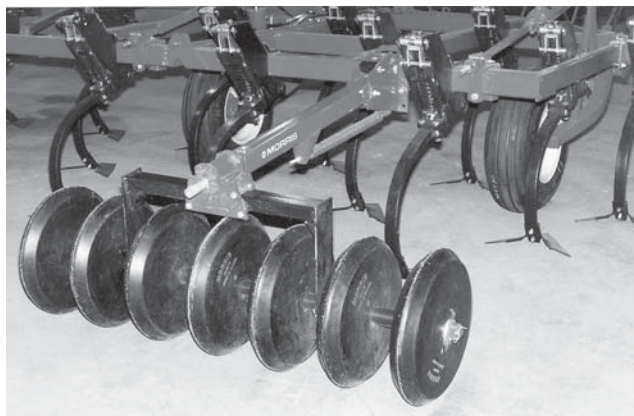
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## Options - Continued

### Mounted Packers

Morris offers mounted packers for in row packing of seed.

The packers feature a quick change device making it easy to change over to harrows when packing is not desired.



### Mounted Harrow Kit

The mounted harrow kit allows two six foot harrows to be attached on the tow behind Air Cart models.

The harrows will eradicate the Air Cart tracks.



### Granular Applicator

Available in two sizes:

- 30 cu. ft. unit for the 7180
- 40 cu. ft. unit for the 7240/7300.

The Granular Applicator is required to apply clay and limestone based granular chemicals.

### Third Tank

Available in two sizes:

- 40 cu. ft. unit for the 7180/7240/7300.

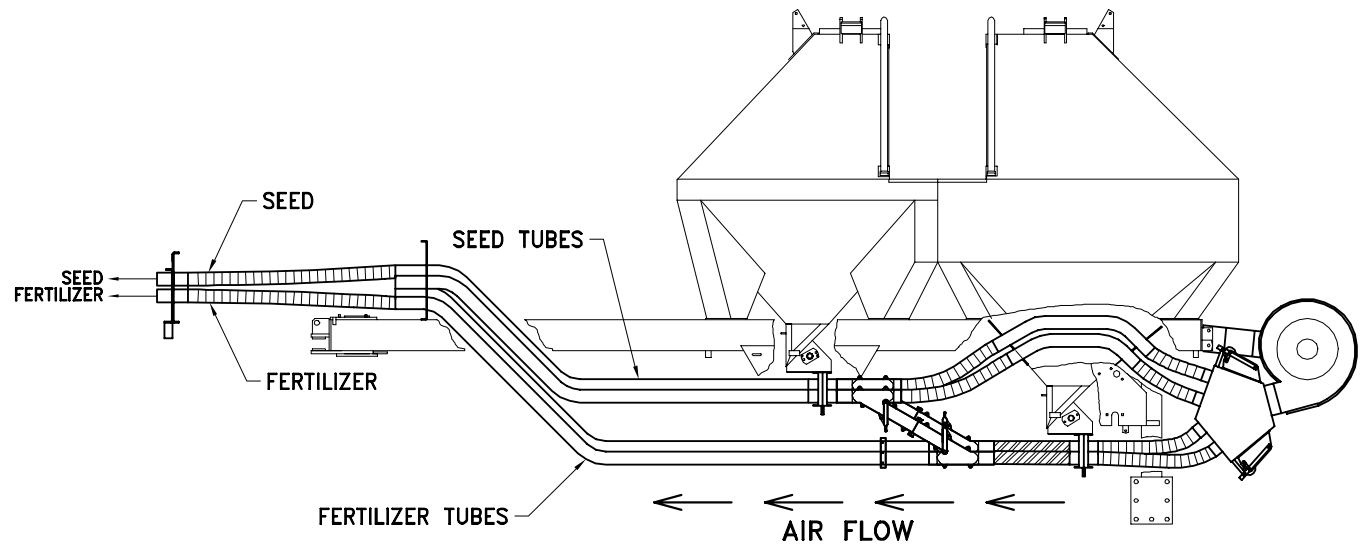
The Thrid Tank is required to apply seed and starter fertilizer, while deep banding additional fertilizer at the same time.



## Options - Continued

### Double Shoot Distribution

This is used when fertilizer is placed at a separate depth from the seed.



### Hitch Stand Kit (Tow Behind)

The hitch stands make hitching and unhitching easier.



# Introduction

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## Options - Continued

### Flow Sensors

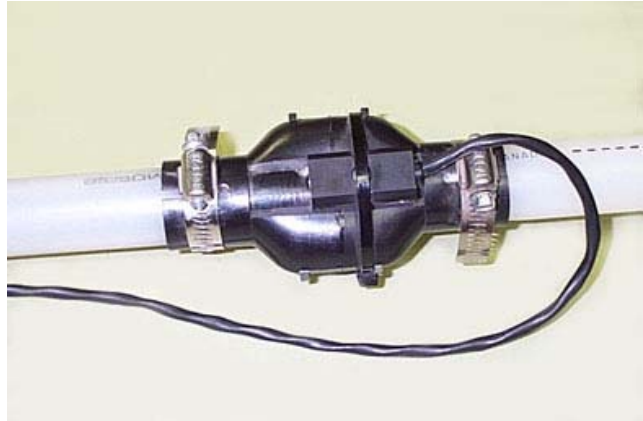
This option requires the use of Blockage Modules. The Blockage Modules signal the monitor on the loss of flow at any sensor.

### Pin Sensor System

Up to 16 blockage modules may be connected, each of which can have up to 12 pin sensors connected, providing a 192 run capability. More information is given in the Monitor Section under “Flow”.

### Optical Sensor System

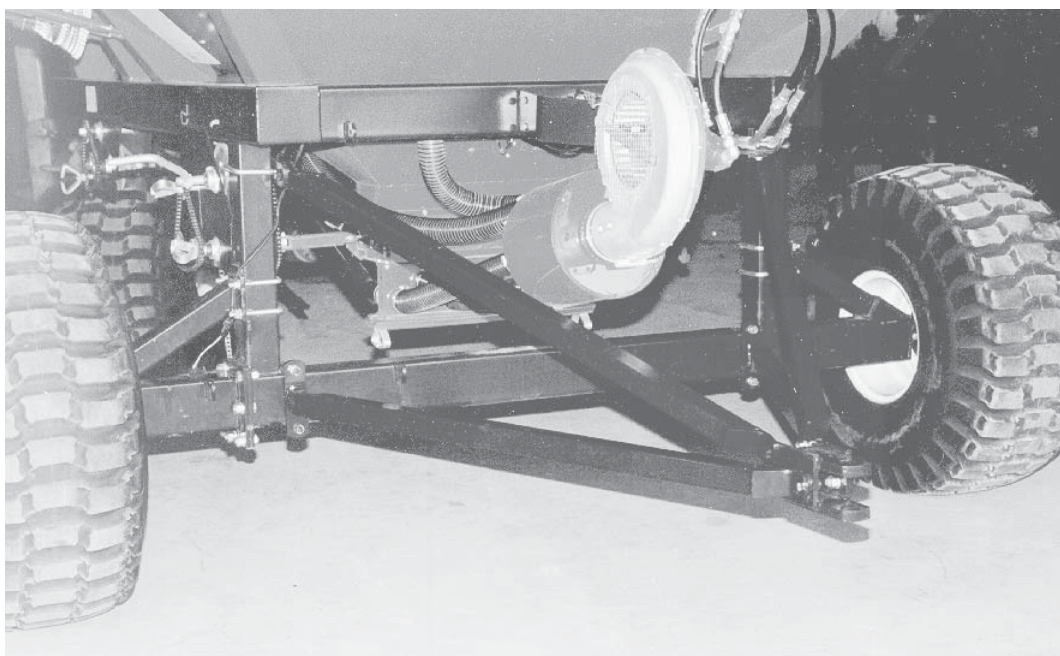
Up to 12 blockage modules may be connected, each of which can have up to 16 optical sensors connected, providing a 192 run capability. More information is given in the Monitor Section under “Flow”.



### Rear Tow Hitch

The Tow Hitch is available only on tow behind models.

The Tow Hitch enables the operator the ability to attach a packer bar or an anhydrous tank behind the Air Cart.



## Seed Boots

**MORRIS** offers a variety of Seed Boots for the **7000 Series Air Cart**. Check with your MORRIS Dealer for new additions to the MORRIS seed boot line-up and the application of the seed boots.

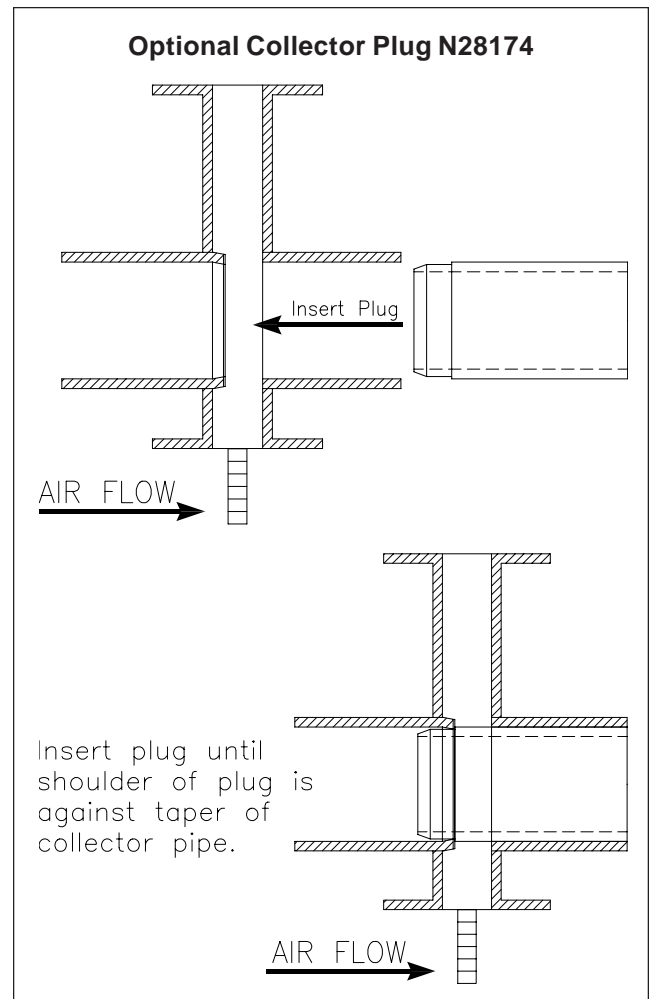
Reference Morris Marketing Bulletin #101.

**Note:** *For guidelines see Operation Section under “Opener Adjustments”.*

## Collector Plug

The Collector Plug helps reduce the requirement of having to clean the unused ports in the metering body.

- All unused ports must be blanked off using a plastic cap and hose clamp with or without the optional collector plug N28174 shown.



# Introduction

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Notes

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# Section 5: 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 3)
- Bin levels (up to 3)
- 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:

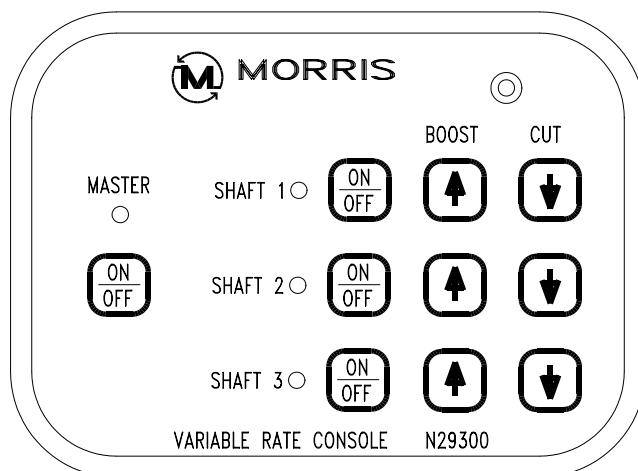
- High and Low fan speed alarm point
- Low shaft speed alarm point for 3 meter shafts
- Ground speed pulses per 400 ft and pulses per revolution
- Pulses per revolution of fan and 3 meter shafts
- Low bin alarm for 3 bins
- The number of Blockage Modules that are connected to the monitor
- The width 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.

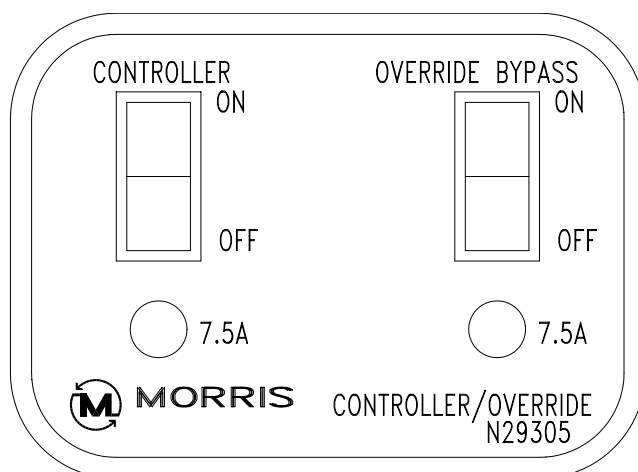
Two cables exit the rear of the monitor. There is a two wire power cable that connects to the tractor power supply. The other is a three wire cable that brings power and communications to the remote sensors through the main harness.



**MONITOR - N44049**



**VRT Console**



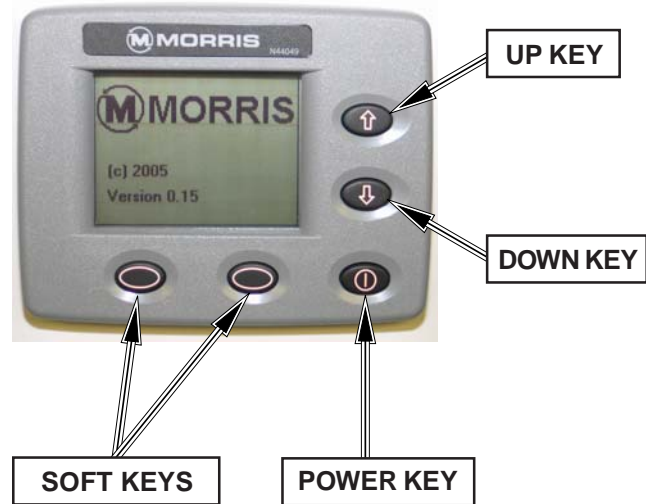
**Controller Switch**

# Monitor

## Identifying Monitor Switches

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

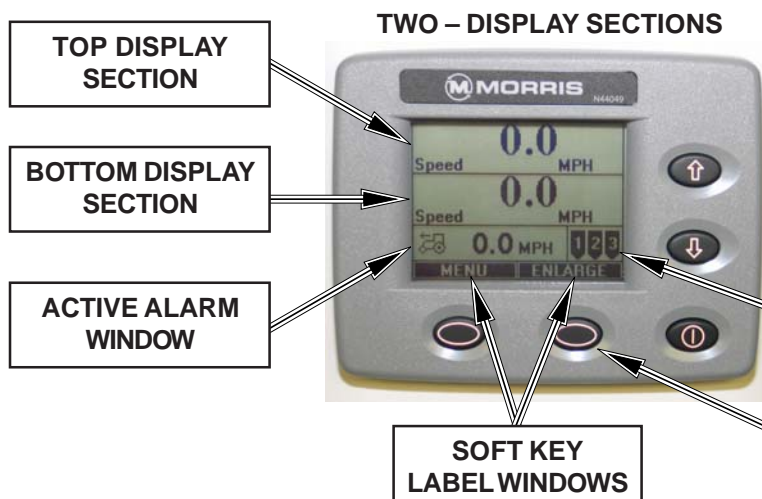
- Power Key** • Used to turn monitor on and off.
- Up Key** • Used for moving function selection icon. Also used to increment parameter when changing settings.
- Down Key** • Used for moving function selection. Also used for decrementing parameter when changing settings.
- Soft Keys** • Used to enter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



### ENLARGED DISPLAY SECTION



Pressing soft key under "Smaller" will switch the screen to the 2 - display sections.

Pressing soft key under "Enlarge" will switch the screen to the enlarged display section.

## Identifying Variable Rate Console Switches

The variable rate console provides the means to:

- Turn on or off each/all metering shaft(s).
- Increase or decrease the application rate of any given shaft.

### Master On/Off

Activates the shaft On/Off buttons. If any of the seed or fertilizer buttons are in an “On” state during a Master On, the variable rate controller will initiate any required motor rotation of the respective shaft at the currently selected application rate. Master Off will deactivate all the shaft On/Off buttons and stop all motor rotation. A LED indicates whether the button is on or off.

### Shaft 1 On/Off

Used to turn shaft 1 on and off. A LED indicates the current state of the button.

### Shaft 2 On/Off

Used to turn shaft 2 on and off. A LED indicates the current state of the button.

### Shaft 3 On/Off

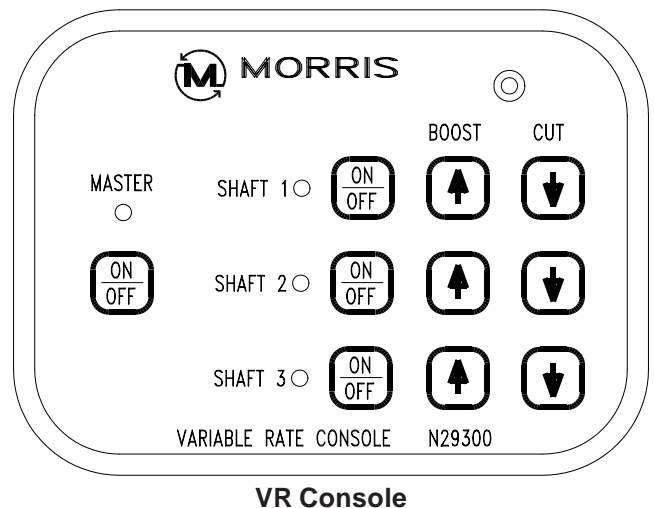
Used to turn shaft 3 on and off. A LED indicates the current state of the button.

### Boost

Each push of the Boost button **increases** the application rate by **5%** of the **nominal rate** to a maximum of 50%. The respective LED will flash quickly indicating the application rate is higher than the nominal rate. To return the application rate to nominal, the respective shaft On/Off button is pressed once. The LED will stop flashing and will stay on.

### Cut

Each push of the Cut button **decreases** the application rate by **5%** of the **nominal rate** to a minimum of 50%. The respective LED will flash slowly indicating the application rate is lower than the nominal rate. To return the application rate to nominal, the respective shaft On/Off button is pressed once. The LED will stop flashing and will stay on.



**Note:** The application rate can be increased or decreased up to 50%.

# Monitor

## Identifying Controller/Override Switches

The Controller/Override switches provide:

- Power to the variable rate control system.
- Manual override of the variable rate control system.

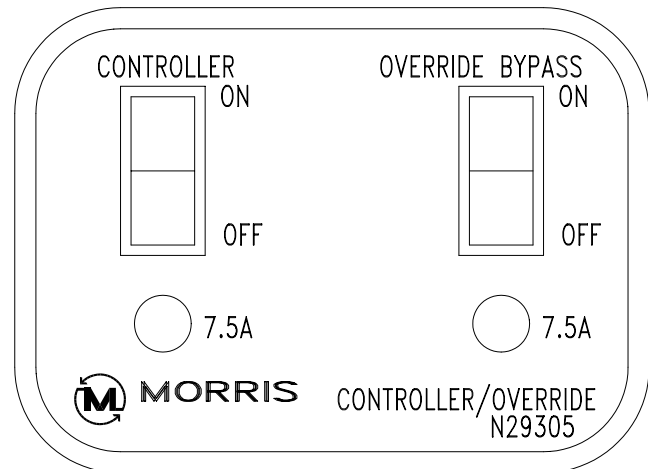
### Controller On/Off

Activates the variable rate control system by supplying power to valve body.

### Override Bypass

Used if a fault occurs in the electrical wiring of connections to the variable rate control system. The manual override system provides the ability to run the hydraulic motors at a fixed rate (not proportional to ground speed) and to turn the manual system on and off from the tractor cab. **This switch is normally left in OFF position.**

**Note: The Controller Switch must be turned on before the monitor.**



**Controller Switch**

## 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

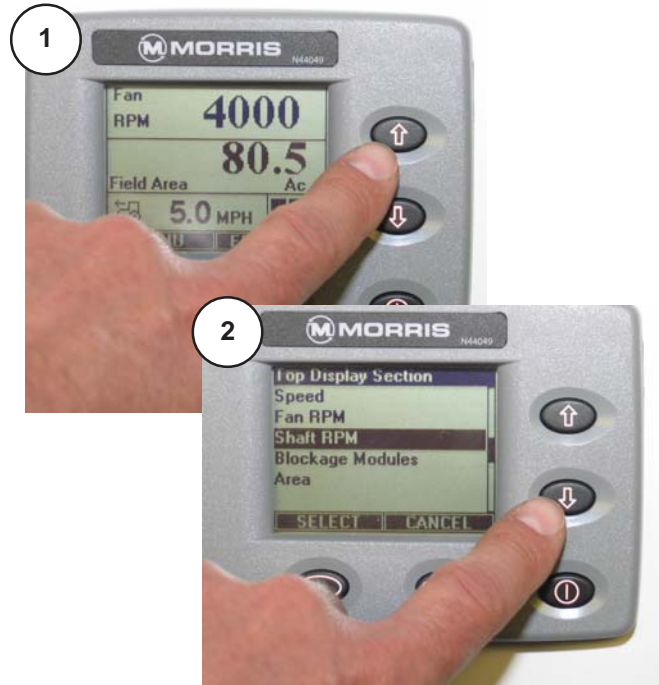
### Navigating the Operating Screen

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.

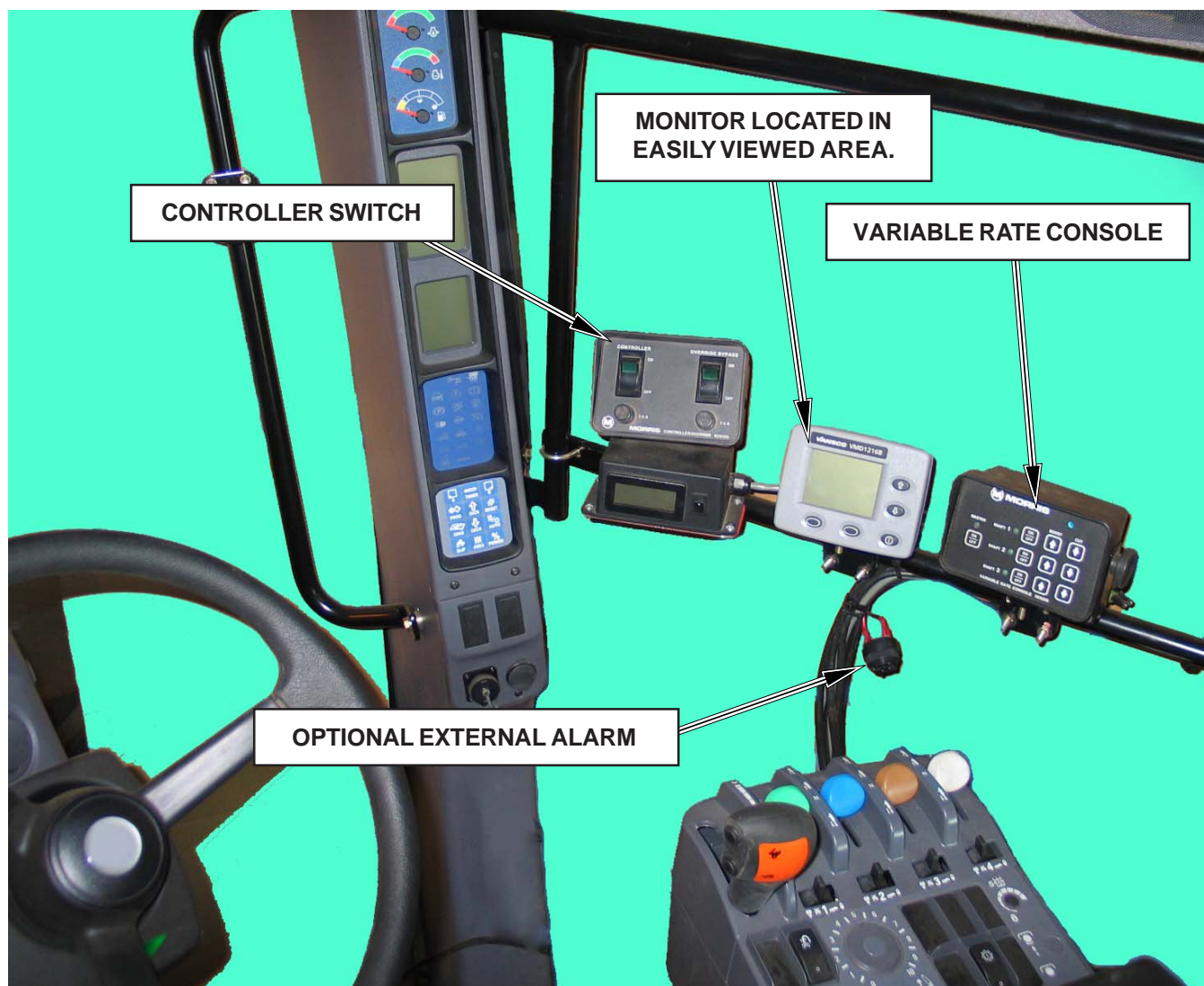
# Monitor

## Installing Monitor

- Locate monitor, variable rate console and controller/override 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

Turn power on in the following sequence:

1. **Controller Switch**
2. **Monitor**
3. **VRT Console** (To run metering system)

The VRT Hydraulic Motors will turn 1/2 revolution to check zero position when the tractor hydraulics are engaged to run the air cart System.

## 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 wakeup 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.

| Monitor ID     |
|----------------|
| Version Number |
|                |
|                |



Splash Screen



Operating Screen

**Note:** This forced 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

---

## 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*".

**Pin Sensors** - the blockage module **does not have to be removed from the harness** during initial system installation.

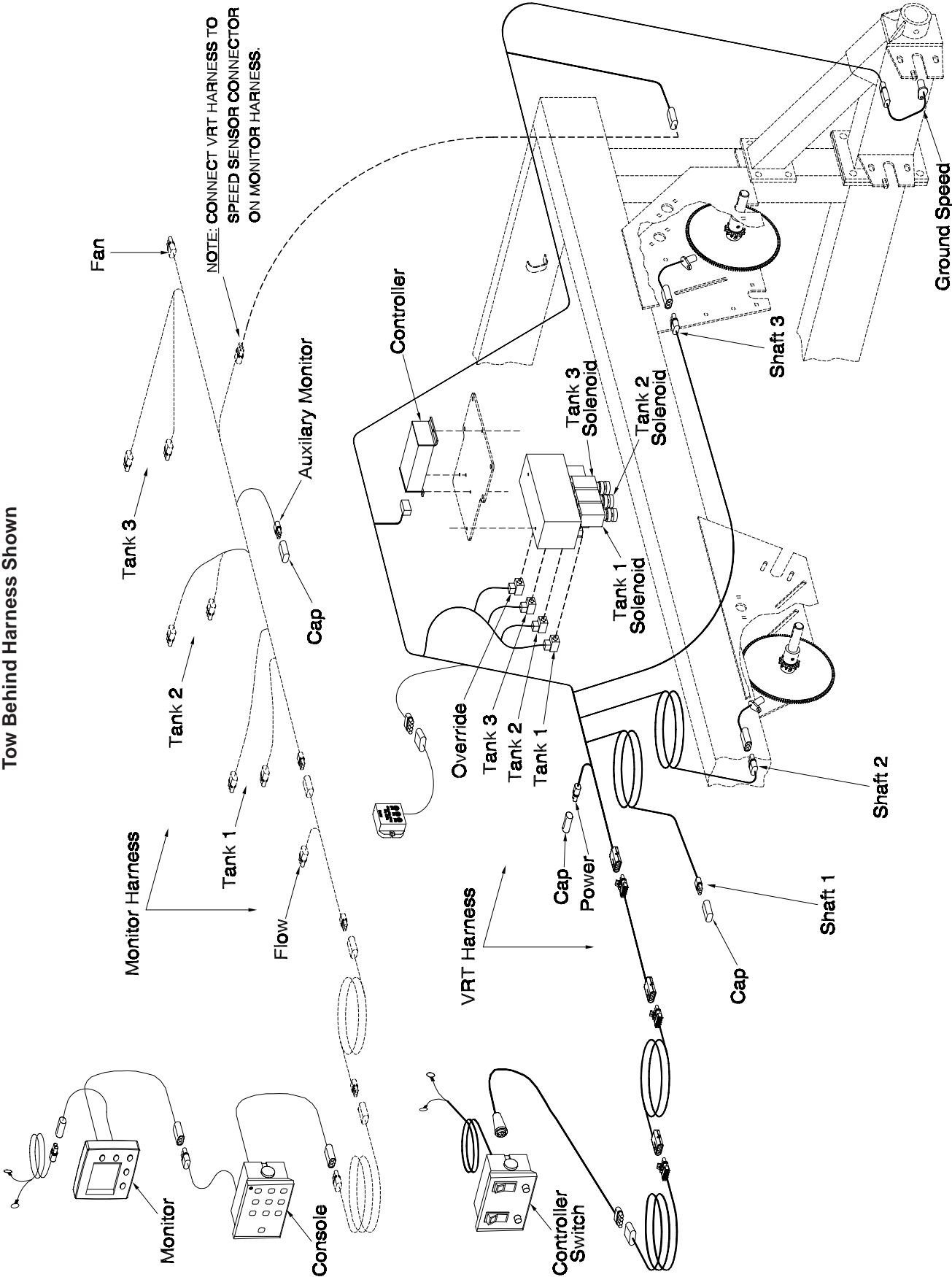
**Optical Sensors** - the blockage modules **have to be unplugged from the harness** before sensor installation can be performed and are connected like the other sensors requested by the monitor during sensor installation.

**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   |
| Shaft 1   |
| Shaft 2   |
| Shaft 3   |
| Tank 1  |
| Tank 2  |
| Tank 3  |
| VarCon (Variable Rate)<br>(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 on the air cart (**Black Coloured Connectors**).

**Note: Do not disconnect the VRT sensors (Blue Colored Connectors).**

**Disconnect** the Variable Rate Console (3 pin connector) from the harness.

**Connect** the harness (3 pin connector) into the monitor.

2. Turn on the controller switch.

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.

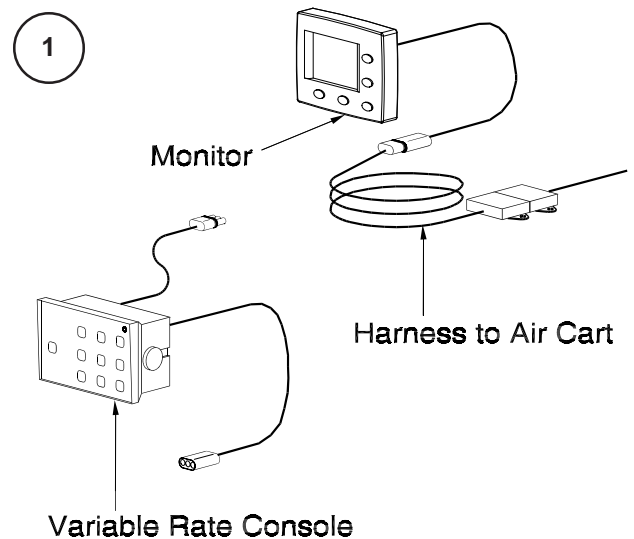
3. The monitor will ask if you want to proceed or exit.

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

4. 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.



# Monitor

## Sensor Installation - Continued

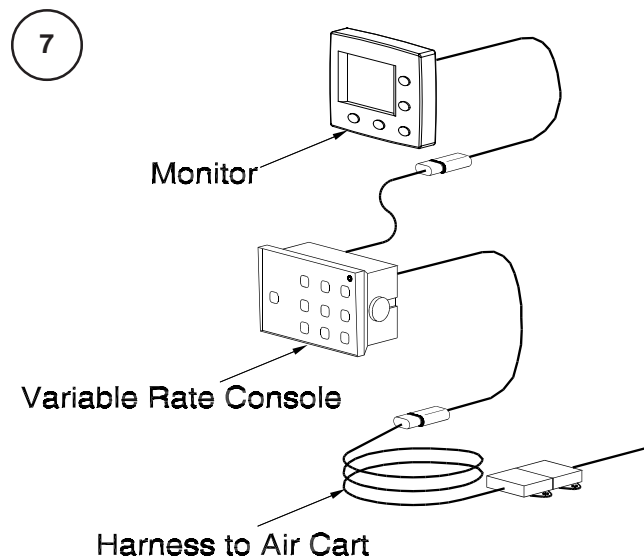
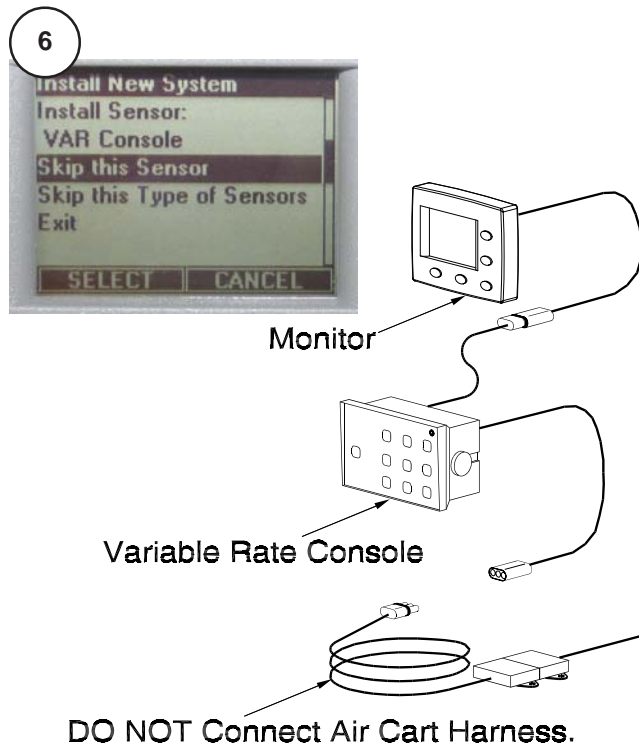
### Installation Procedure - Continued

5. 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.

6. When the monitor displays **VAR Console**, disconnect the harness from the monitor and connect the Variable Rate Console into the monitor **only**.
7. Once monitor acknowledges the Console, the air cart harness can be plugged into the Variable Rate Console.

Continued on next page.





## Sensor Installation - Continued

### Installation Procedure - Continued

8. 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.

9. 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.



# 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.

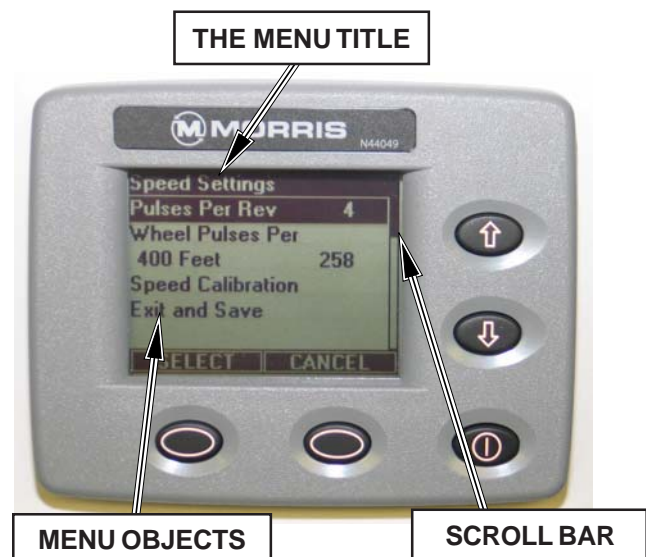
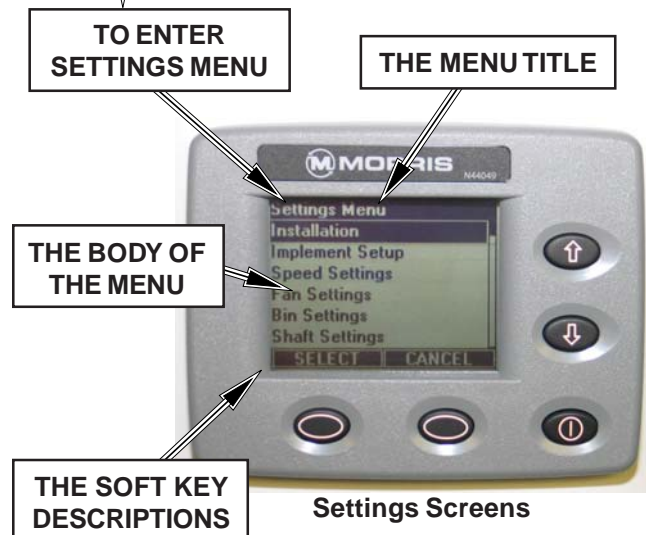
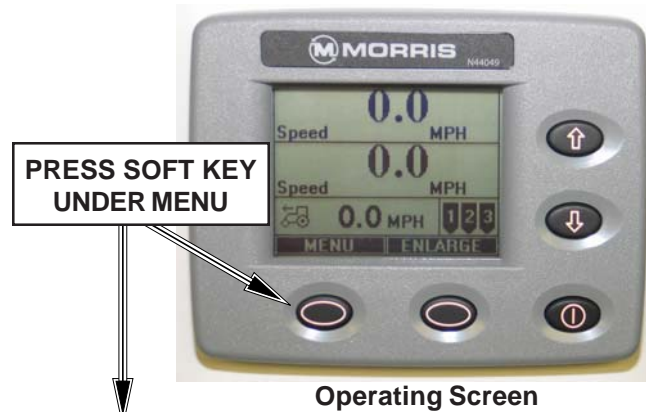
The menu title line is always highlighted so that it stands out from the rest of the screen.

#### 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.



## Monitor Settings - Continued

### Navigating Settings Screens - Continued

#### The Body of the Menu - Continued

When an object is selected, the value becomes highlighted.

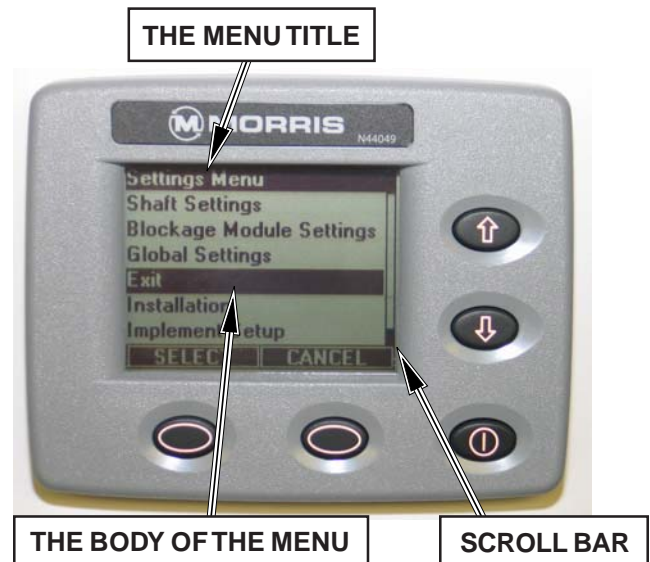
- Highlighted value can be changed with the Up and Down keys.
- Press “Select” key after changing value to enter value and return to object list.
- Select “Exit and Save” to keep any changes.

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.



# 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 - VRT 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"         |

## Important

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

### Speed Settings

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

### Shaft Settings

|                        |                   |   |
|------------------------|-------------------|---|
| Shaft 1 Settings _____ | App Rate          | Set product application rate.                       |
| Shaft 2 Settings _____ | Weight/Rev        | Set the weight of product per revolution of shaft.  |
| 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. |
|                        | Shaft Calibration | See "Rate Calibration" in Operation Section.        |

### 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).

# Monitor

## Monitor Settings - Continued

### Wheel Pulses Per 400 Feet (PP400) VRT Drive

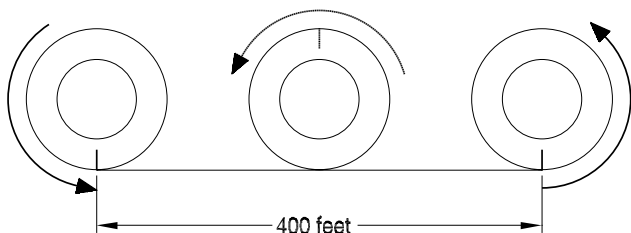
The chart contains average PP400 values, for the tire options offered by Morris.

| PP400 - VRT              |                    |        |       |
|--------------------------|--------------------|--------|-------|
| Tire Size<br>(Good-Year) | Tire Style         | Rating | PP400 |
| 16.5L x 16.1             | Softrac II         | 6 ply  | 2,905 |
|                          | Sure Grip Traction | 6 ply  | 2,802 |
| 21.5L x 16.1             | Softrac II         | 6 ply  | 2,560 |
|                          | Sure Grip Traction | 8 ply  | 2,539 |
|                          | Softrac II         | 10 ply | 2,560 |
|                          | Sure Grip Traction | 12 ply | 2,539 |
| 18.4L x 26               | AWT (Implement)    | 10 ply | 2,033 |
| 23.1L x 26               | AWT (Implement)    | 8 ply  | 1,919 |
|                          | TD8 Sure Grip      | 10 ply | 1,746 |
|                          | AWT (Implement)    | 12 ply | 1,919 |

### 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.



$$\text{New VRT - PP400 Value} = \left( \frac{109"}{\text{New Tire Circumference}} \right) \times 2,905$$

## 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.

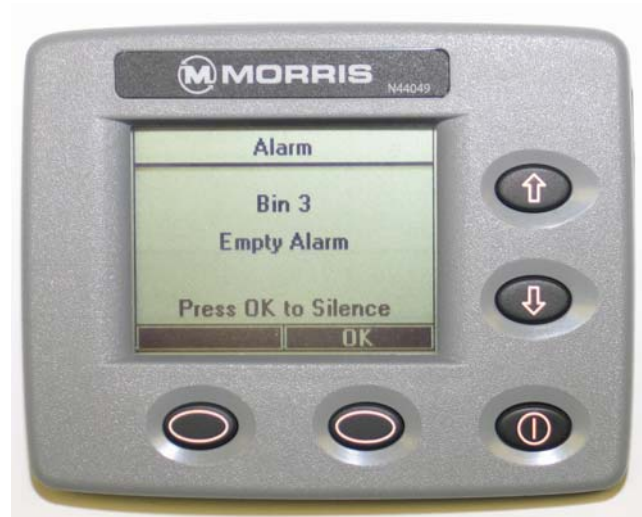
### Nuisance Shaft Alarm

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

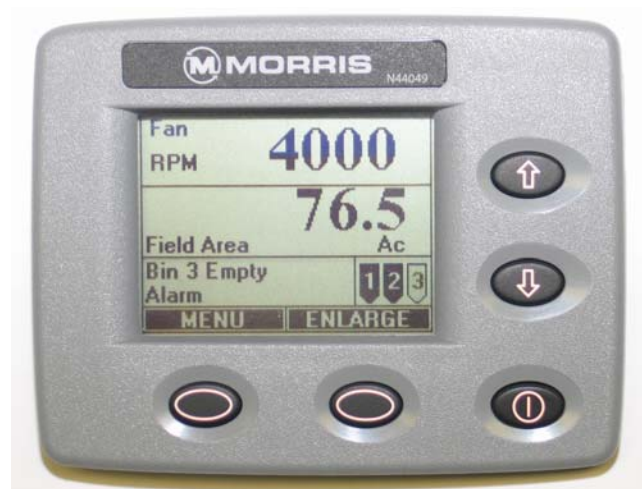
The low shaft rpm will cause the monitor to give a shaft alarm, since the shaft is rotating below the default alarm threshold of 2 rpm.

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”.



### 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”.

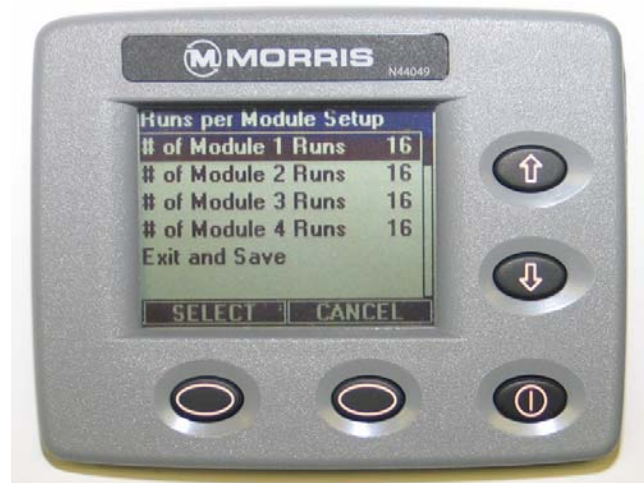
When pin sensors are added, the number of sensors is set in each module on the seeding unit and the number of blockage modules is set in the monitor.

### 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”.

**Pin Sensors** the number of runs connected is set on each individual blockage module on the seeding unit. Refer to “Pin Sensor Installation” Section 10.



### 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".

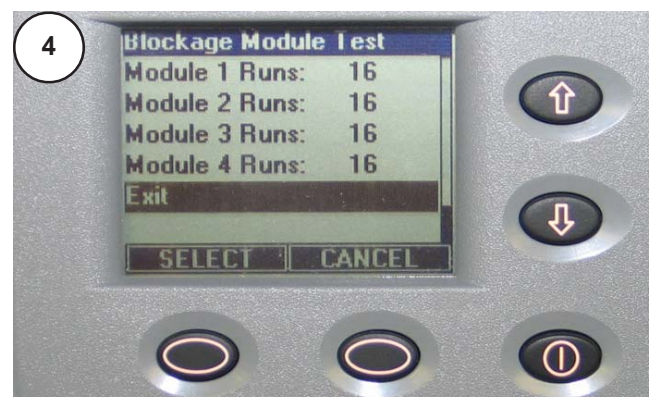
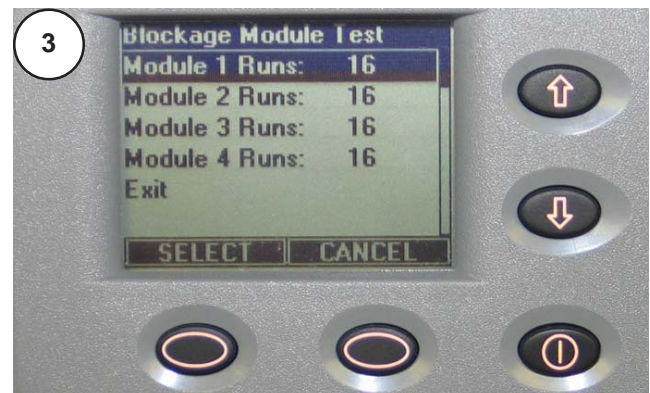
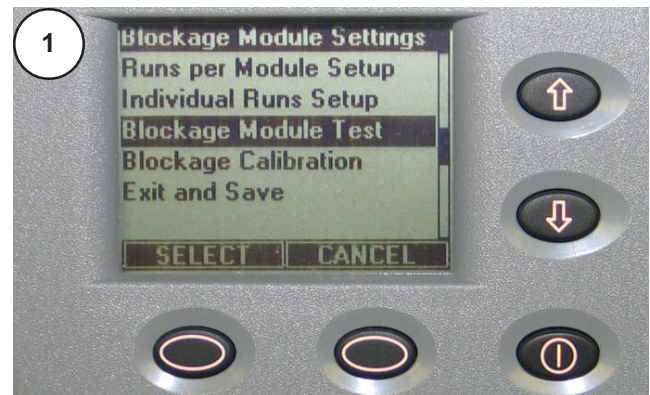
Use the Up/Down keys to highlight "Blockage Module Settings" press the SELECT key to enter the function.

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.



# 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.

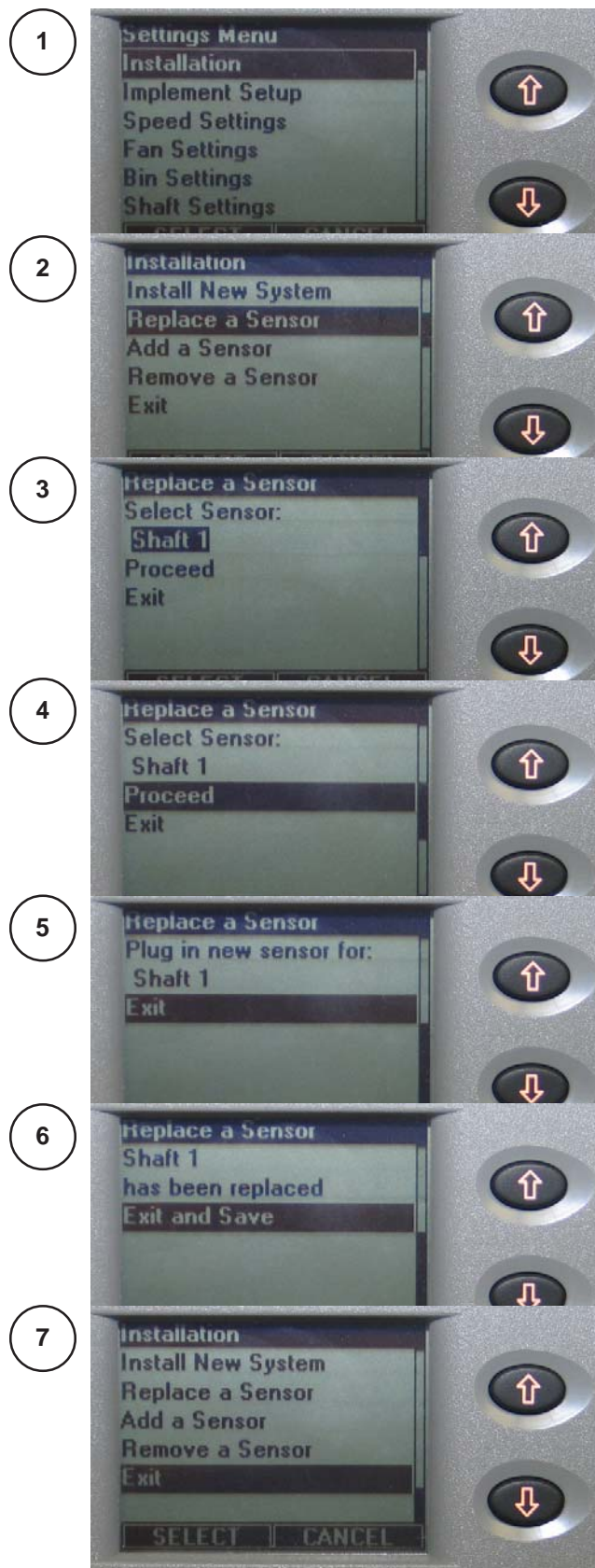
5. The monitor will then display "Plug in new sensor for: Shaft 1". Unplug the old sensor and plug in the new sensor.

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

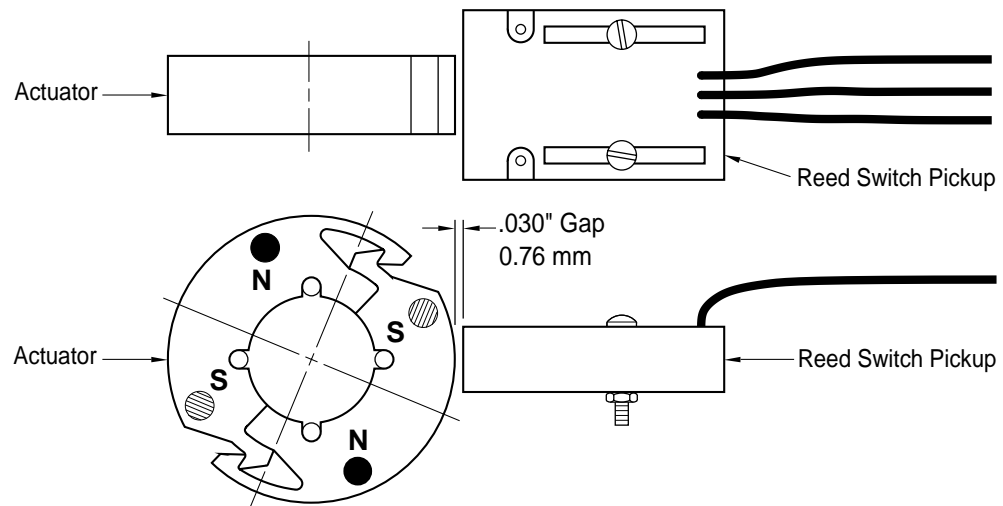
## Sensor Gap Settings

### 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.

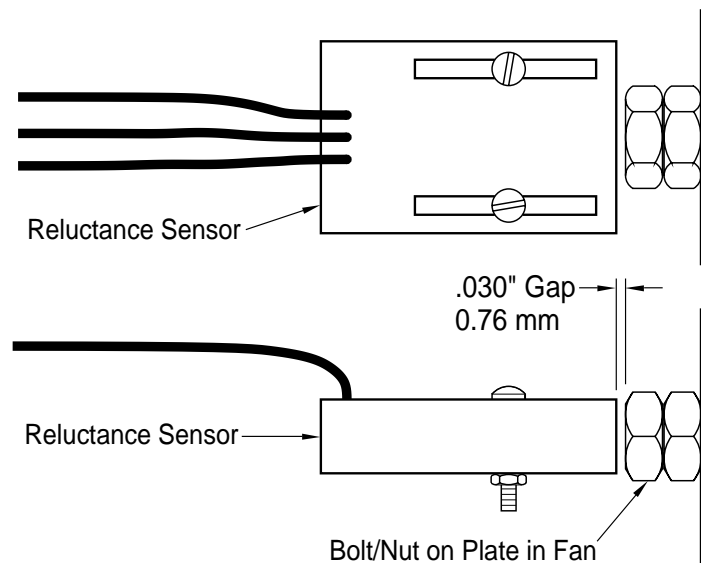


### Variable Reluctance Sensors

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.





## Sensor Gap Settings - continued

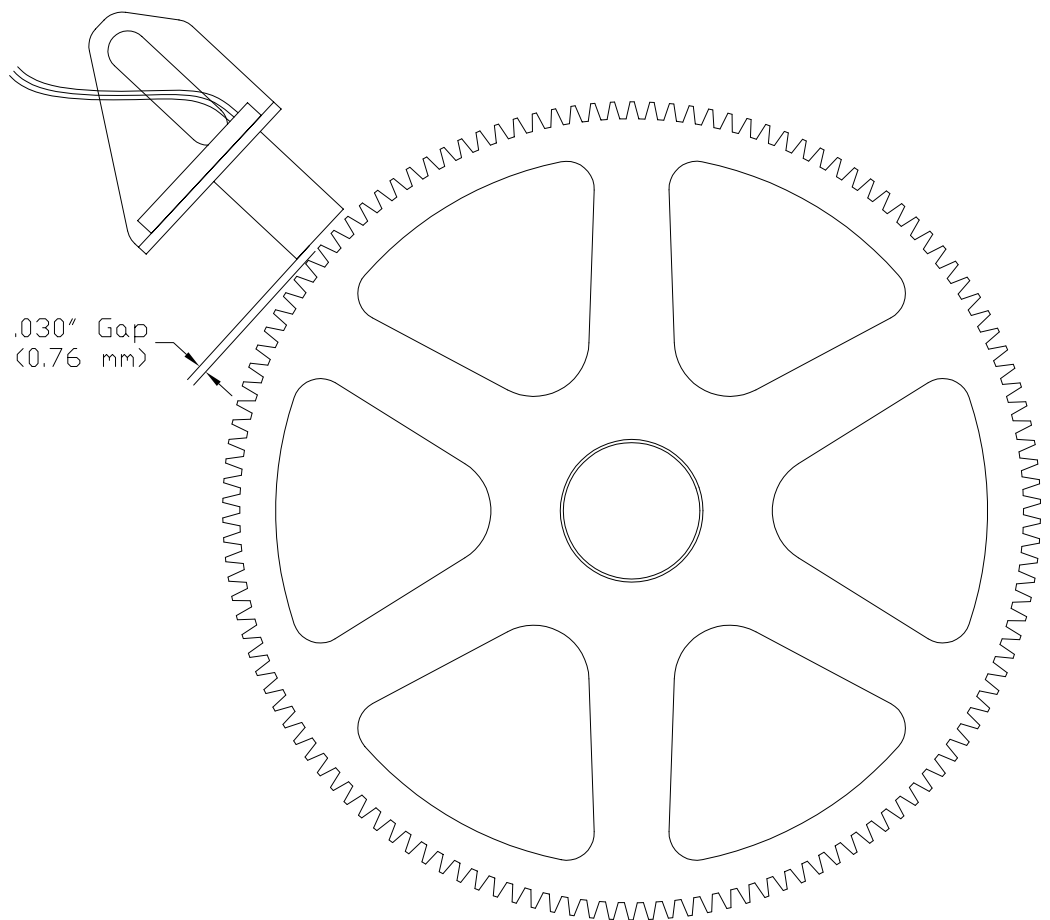
### Hall Effect Sensors

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

Sensor wheel to sensor gap and position is critical with these sensors.

A gap of .030 inch is recommended.

The sensor must be centred on the sensor wheel.



# Monitor

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## 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.

# Section 6: Operation

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# Operation

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## CAUTION



**BE ALERT**

## SAFETY FIRST

**REFER TO SECTION 1 AND REVIEW ALL  
SAFETY RECOMMENDATIONS.**

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## Application

The Morris 7000 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 7000 series Granular Applicator the Morris 7000 series Air Cart can apply granular herbicide or other fine seeds. With the addition of the Third Tank the Morris 7000 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

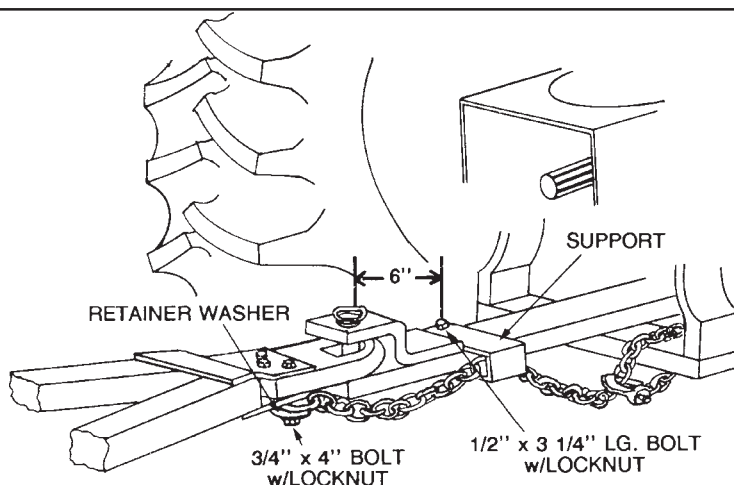
**Do not search for high pressure hydraulic leaks without hand and face protection. A tiny, almost invisible leak can penetrate skin, that requires immediate medical attention.**

## 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.



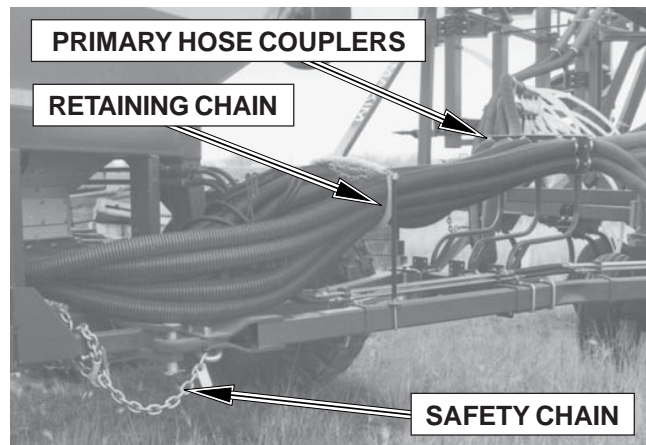
# Operation

## 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.

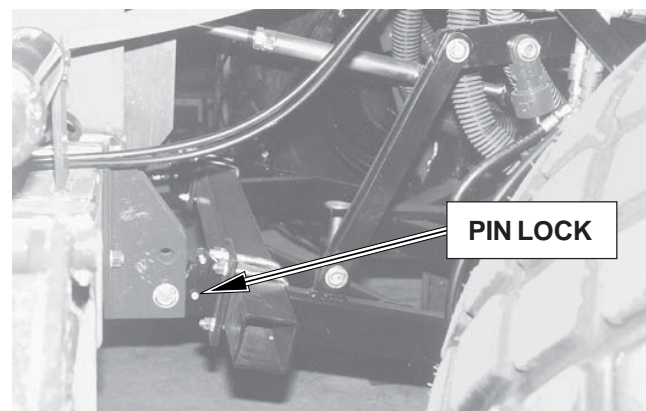
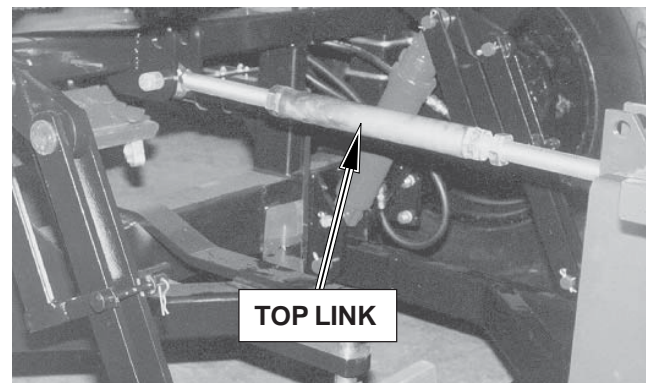
**Note: Provide only enough slack in chain to permit turning.**

- 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.



## Hitching Tool Bar (Three Point Hitch)

- Connect seed cart to tractor.
- Back seed cart into position, aligning tool bar hitch pins with three point hitch.
- Secure hitch pins to three point hitch clevis with pin lock.
- Secure pin lock with a 1/2" pin and hair pin.
- Attach top link (turnbuckle) to tool bar.
- Connect hydraulic hose quick couplers.
- Connect air hose couplers.

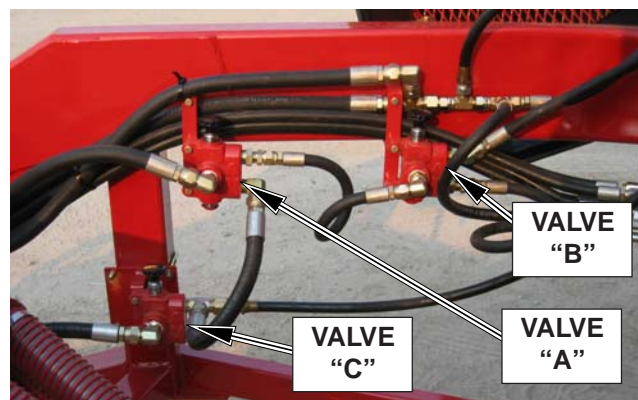


## Hitching Xpress Air Drill

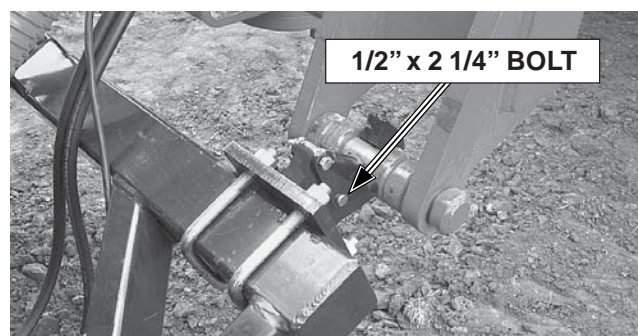
- Connect the Air Cart to the tractor.
- Attach Safety Chain to Air Cart.

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

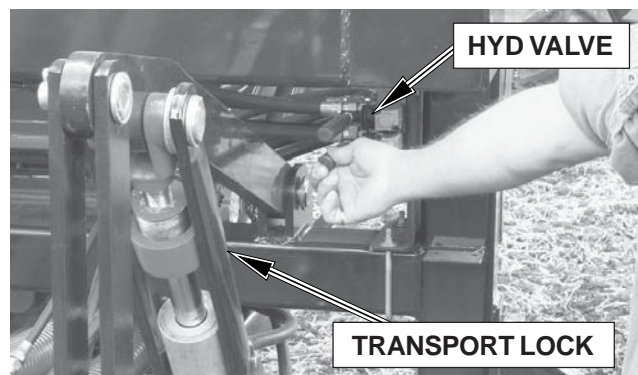
- Lower the Air Cart 3-point hitch by:
  - 1) Engage the fan hydraulic circuit valve in the tractor.
  - 2) Move Selector Valve "A", located on the front inner RHS Air Cart frame to the "Auger" position.
  - 3) Move selector Valve "B" to the "Aux Hyd" position.
  - 4) Lower 3-point hitch using the bottom hydraulic control valve located at the rear of the Air Cart.
- Back Air Cart into position, aligning Drill Unit hitch with Air Cart 3-point lift arms.
- Partially raise Air Cart 3-point hitch lift arms to fully engage hooks on Drill Unit hitch pins.
- Secure 3-point pin latches with 1/2" x 2 1/4" lg bolts and lock nuts.
- Connect hydraulic hoses matching labelled hoses with identically labelled female hydraulic couplers.
- Connect the air hose coupler to the Drill Unit.
- Connect the safety light cable from the Drill Unit to the Air Cart.
- Connect the remote clutch switch cable and flow monitoring cable if equipped.
- Fully raise Air Cart 3-point hitch and install 3-point hitch lift cylinder transport locks.
- Rotate parking stand to field position and retain with 1" x 8 3/8" pin and wire lock pin.
- Disengage the fan hydraulic circuit in the tractor cab.
- Disconnect Main Drive Chain on the Air Cart. See Pages 5-8 and 5-9 for details.
- The Air Drill is now ready to transport.



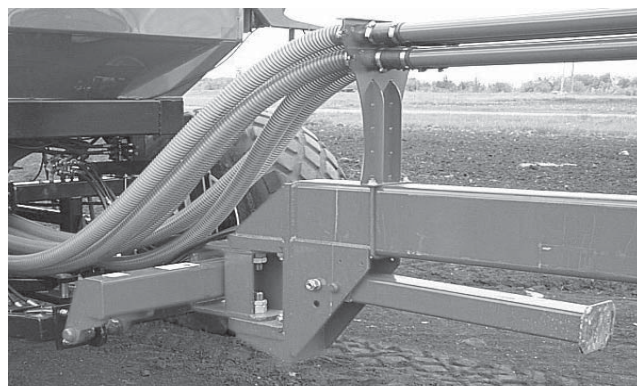
Selector Valves



3-Point Hitch



RHS Rear of Air Cart



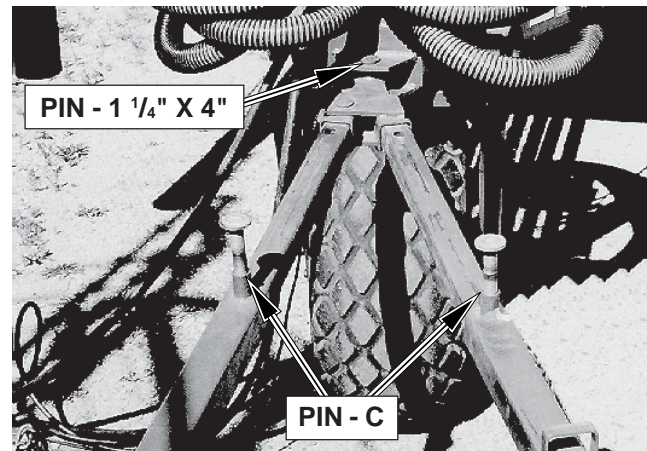
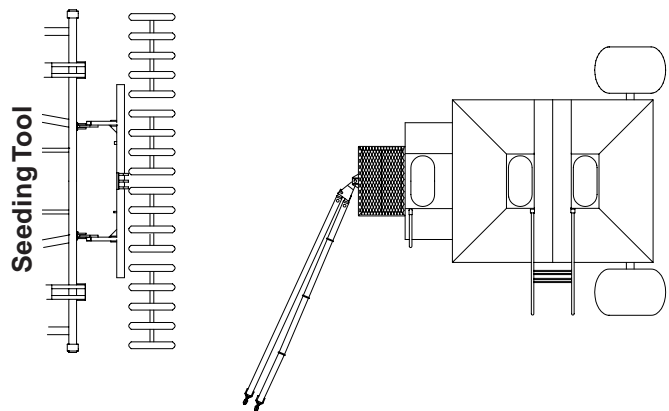
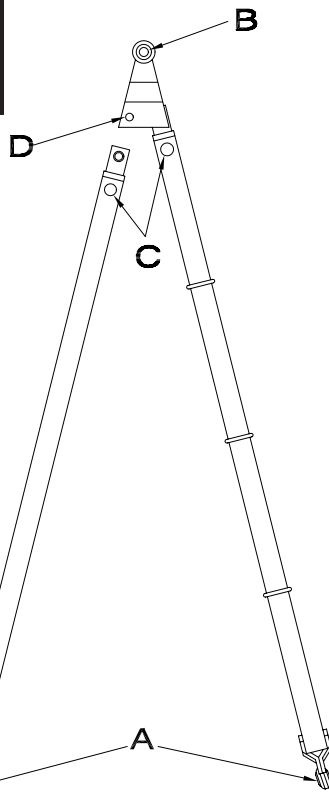
# Operation

## Hitching to Seeding Tool (Tow Behind Cart)

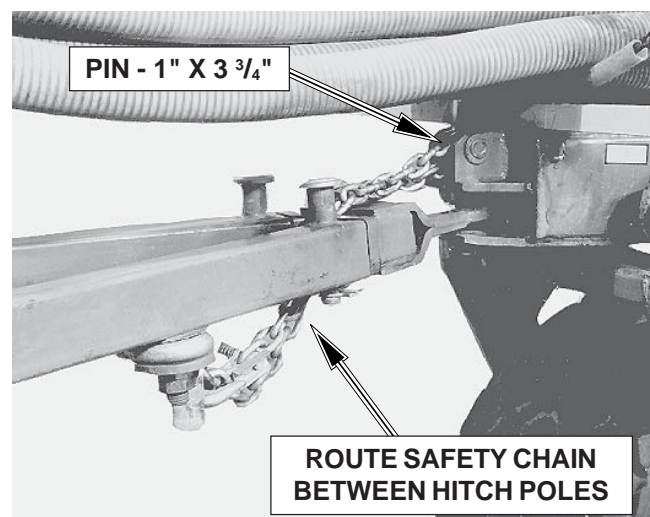
- Connect seeding tool to tractor.
- Attach hitch to air cart with 1 1/4" x 4" pin.
- Back seeding tool into position with seed cart.
- Extend the telescopic hitch arms and connect the seed cart to seeding tool using 1 1/8" x 3 11/16" pins.
- Block the tires of the seed cart and insert the 1" x 5 13/32" 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

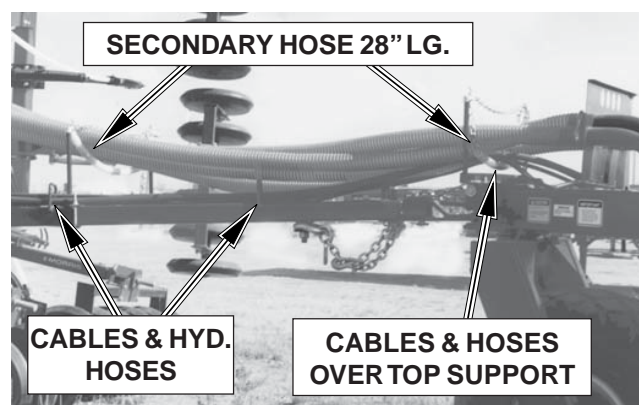
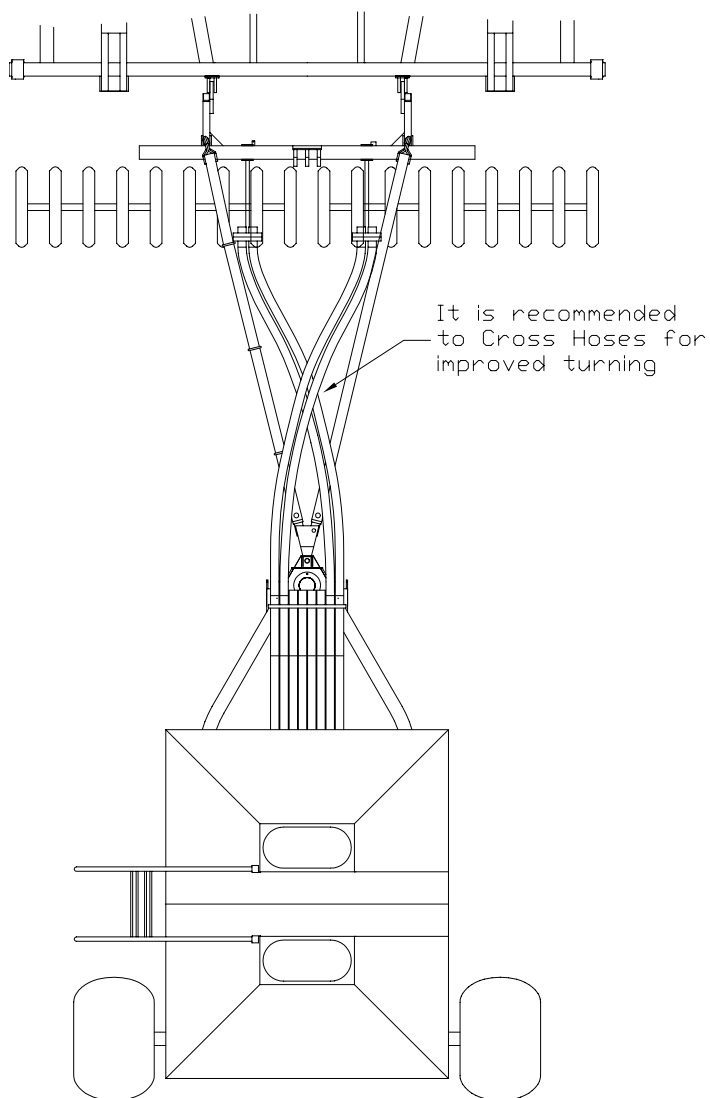


Safety Chain

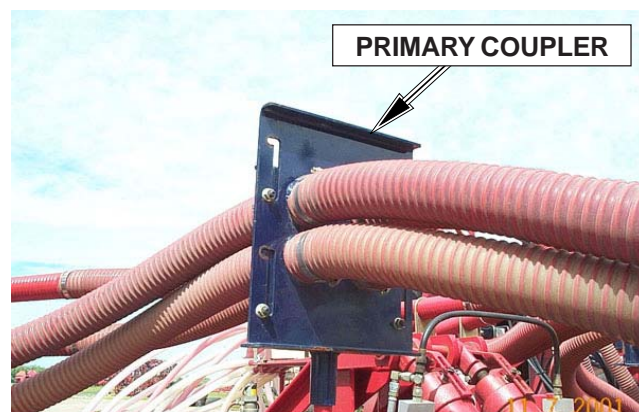


## Hitching to Seeding Tool (Tow Behind Cart) - Continued

- Route VRT controller 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



Double Shoot Primary Hose Coupler Shown

# Operation

## Hitching to Seeding Tool (Tow Behind Cart) - Continued

### Hydraulic Connections

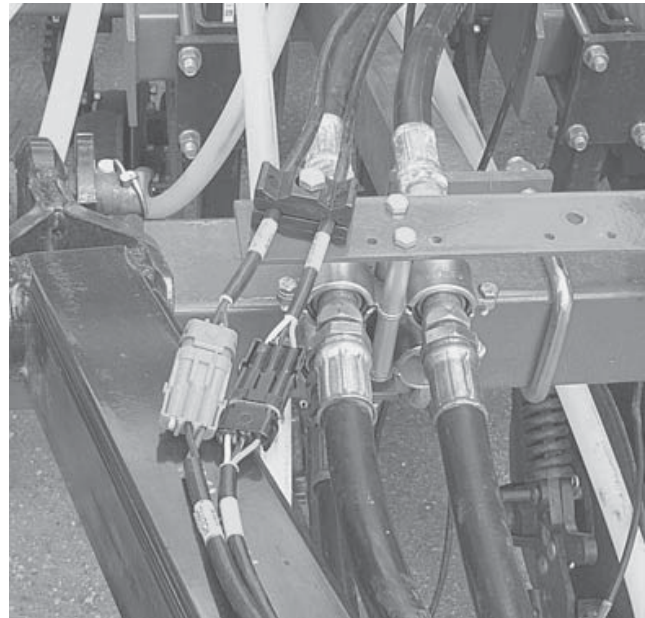
- Connect the monitor and VRT controller quick connectors at both the tractor/seeding tool and the seeding tool/air cart connections.
- **If hydraulic fan drive**, then connect the fan hydraulic quick couplers at both the tractor/seeding tool and the seeding tool/air cart connections. Ensure couplers are clean and dirt free.
- **If engine fan drive**, then connect the auger quick couplers (if unit is so equipped) at both the tractor/seeding tool and the seeding tool/air cart connections. Ensure couplers are clean and dirt free.



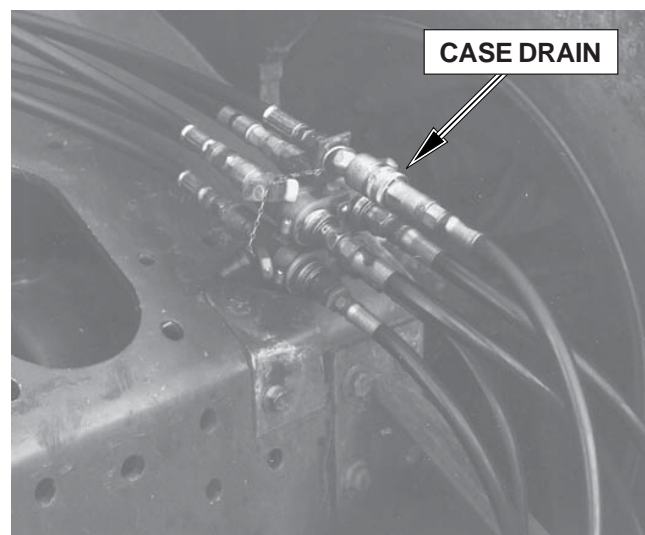
## CAUTION

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" 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.



Seeding Tool Coupling



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.



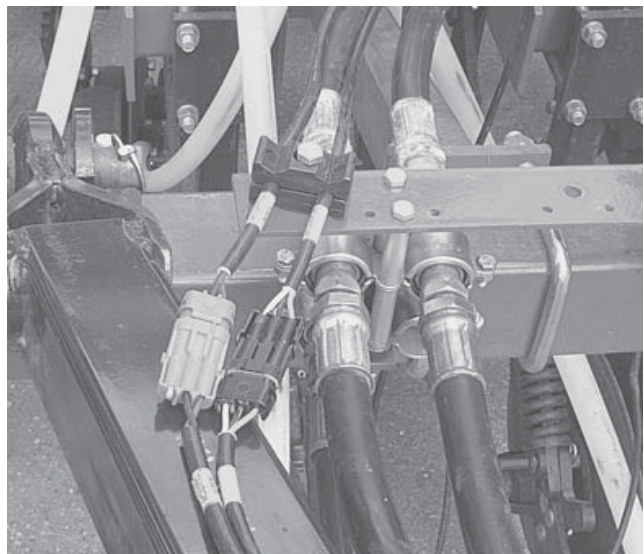
**Tow Between Cart**



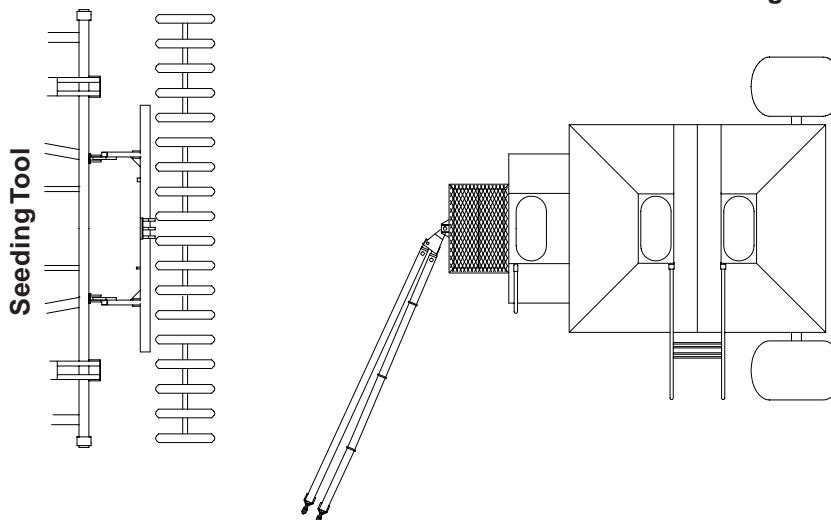
# Operation

## 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 VRT controller 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.

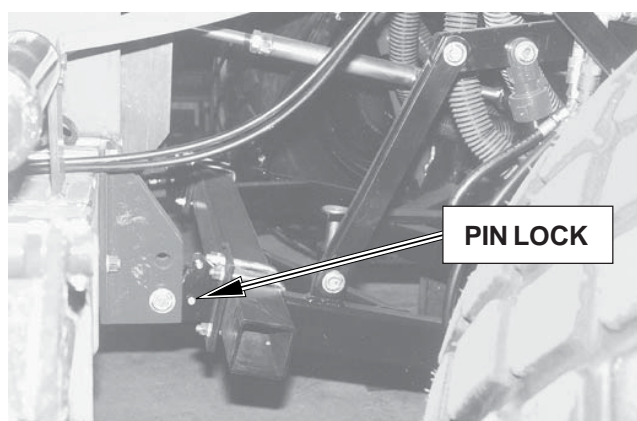
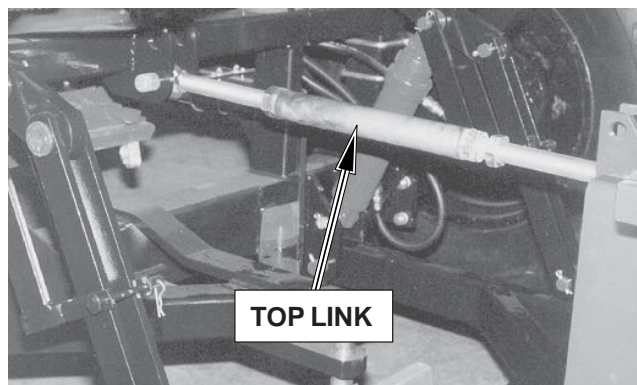


**Seeding Tool Coupling**



## Unhitching from Tool Bar (Tow Between Cart)

- Lower toolbar stands to desired position.
- Lower toolbar enough to remove weight from the tool bar hitch pins.
- Disconnect air hose couplers.
- Disconnect top link (turnbuckle).
- Remove 1/2" pin from pin lock, freeing toolbar hitch pins.
- Lower three point hitch until toolbar hitch pins are clear.
- 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.
- Slowly move seed cart away from toolbar.

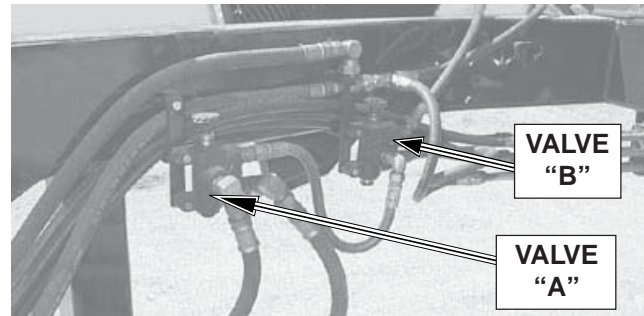


# Operation

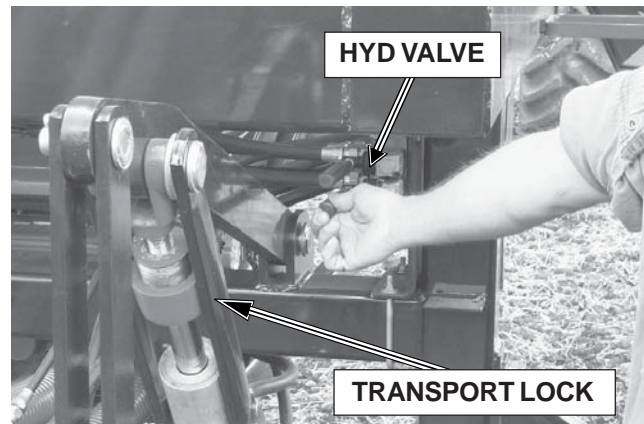
## Unhitching Xpress Air Drill from Air Cart

**DRILL UNIT MUST BE DISCONNECTED FROM THE AIR CART ON LEVEL GROUND.**

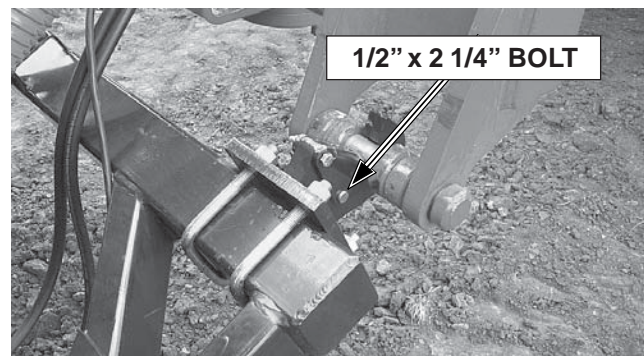
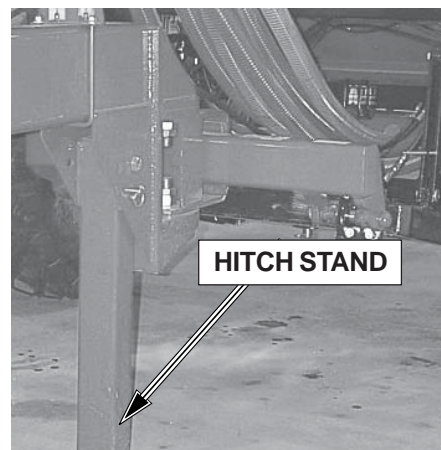
- Refer to the Drill Unit Operator's manual for the correct procedure for placing the drill into transport position.
- Raise the 3-point hitch fully by:
  - 1) Engage the fan hydraulic circuit valve in the tractor.
  - 2) Move Selector Valve "A" to the "Auger" position.
  - 3) Move selector Valve "B" to the "Aux Hyd" position.
  - 4) Raise the 3-point hitch using the lower control valve located at the rear of the Air Cart.
- Lower parking stand on the Drill Unit and lock with the 1 inch pin provided.
- Disengage the 3-point pin latches and fully lower the 3-point hitch using the bottom hydraulic valve body on the rear of the Air Cart, labelled 3pt hitch.
- Relieve pressure in the hydraulic hoses by:
  - 1) Positioning tractor hydraulic levers in "float" position or turn tractor engine off and cycle lever back and forth several times.
  - 2) Cycle hydraulic valve levers at the rear of the Air Cart back and forth several times.
- Disconnect the hydraulic hoses.
- Disconnect the remote clutch switch cable and flow monitoring cable if equipped.
- Disconnect the primary hose coupler.
- Slowly move seed cart away from the Drill Unit.
- Engage tractor hydraulic lever operating the fan circuit.
- Raise Air Cart 3-point hitch and install transport locks on the 3-point hitch cylinders.
- Move Selector Valve "A" to the "Fan" position.
- Disengage the fan hydraulic circuit in the tractor cab.



**Selector Valves**



**Rear of Air Cart**



**3-Point Hitch**



## Unhitching Xpress Air Drill Cart from Tractor

- Unpin Air Cart hitch jack from its storage position and place into work position.
- Lower the 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 and park on level ground.

- 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, safety light and monitor cables.
- Remove the safety chain.
- Remove the drawbar pin.



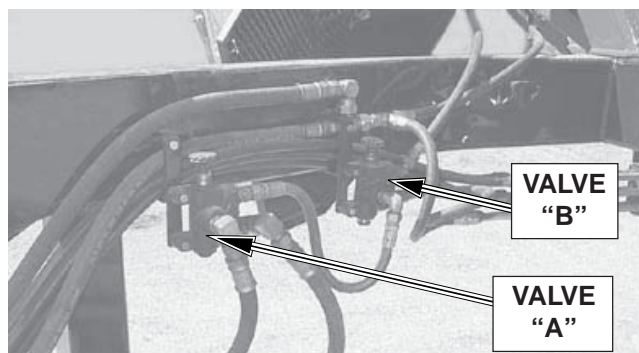
**Air Cart Hitch**

## Unhitching Xpress Air Drill Combination from Tractor

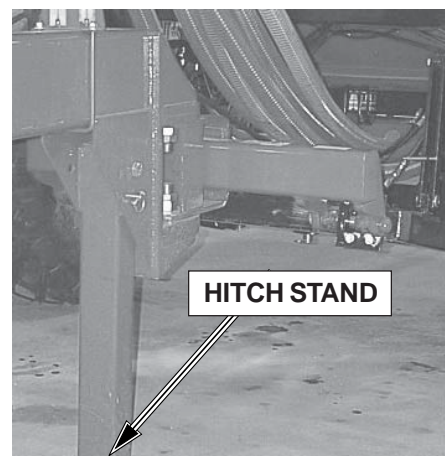
Refer to the Drill Unit Operator's manual for the correct procedure for folding the drill into transport position.

This same procedure for unhitching applies if the drill remains in field position.

- Raise the 3-point hitch fully by:
  - 1) Engage the fan hydraulic circuit valve in the tractor.
  - 2) Move Selector Valve “A” to the “Auger “ position.
  - 3) Move selector Valve “B” to the “Aux Hyd” position.
- 4) Raise the 3-point hitch using the lower control valve located at the rear of the Air Cart.
- Lower parking stand on the Drill Unit and lock with the 1 inch pin provided.
- Lower the 3-point hitch until the weight is taken off the 3-point hitch mechanism.



**Selector Valves**



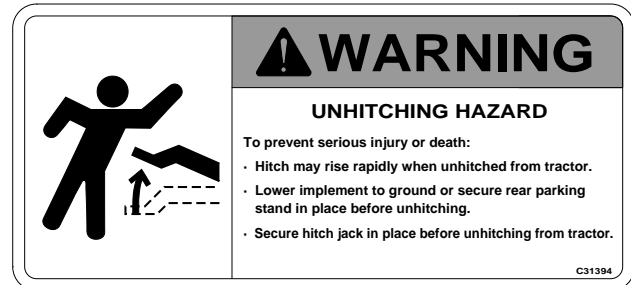
# Operation

## Unhitching Xpress Air Drill Combination from Tractor -Continued

- Relieve pressure in the hydraulic lines by positioning the tractor hydraulic levers in “float” position or turn tractor engine off and cycle levers back and forth several times.
- Remove Air Cart hitch jack from its storage position and place into work position.
- Lower the 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 and park on level ground.

- Disconnect the hydraulic hoses.
- Disconnect the VRT controller , safety light and monitor cables.
- Remove the safety chain.
- Remove the drawbar pin.
- Slowly move tractor away from the Air Cart.

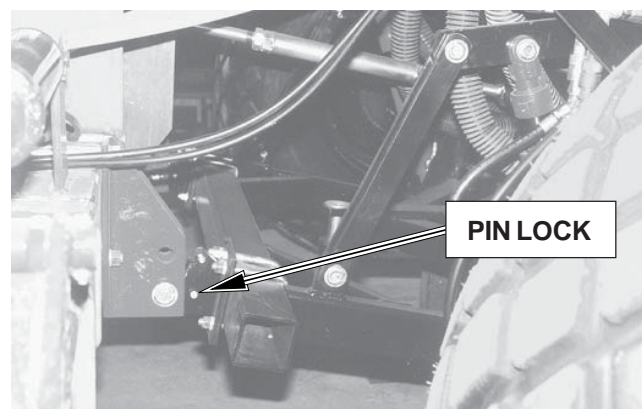
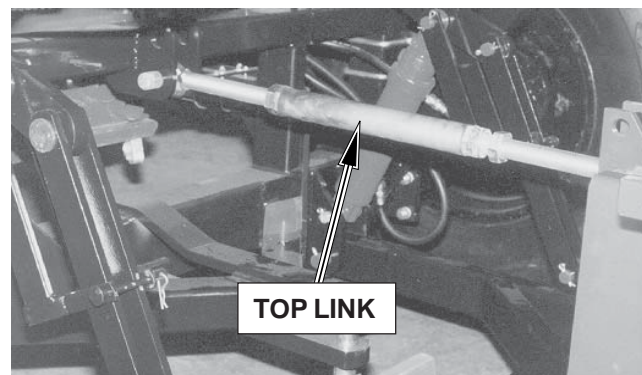


## Three Point Hitch

- Secure transport locks in field position.
- Lower tool bar into ground to desired working depth.
- Level tool bar front to back with top link (turn buckle).
- Adjust cylinder stroke control collars once desired working depth is attained.

## Rephasing

- Raise machine fully, holding hydraulic lever for several seconds to phase the system.
- This will equalize system pressure, cylinder stroke, and synchronize cylinders.
- **It is recommended that the unit be rephased at each turn on the headland.**



## 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.

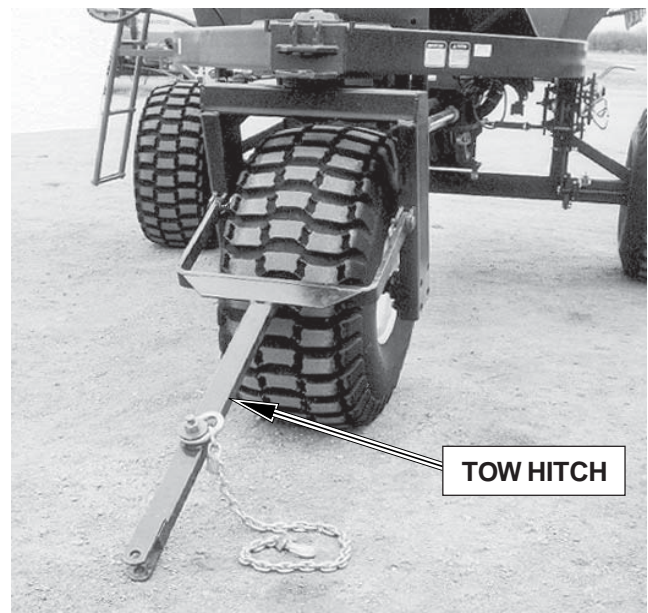
## Tow Hitch (Tow Behind Units)

- 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 - Xpress Air Drill Combination

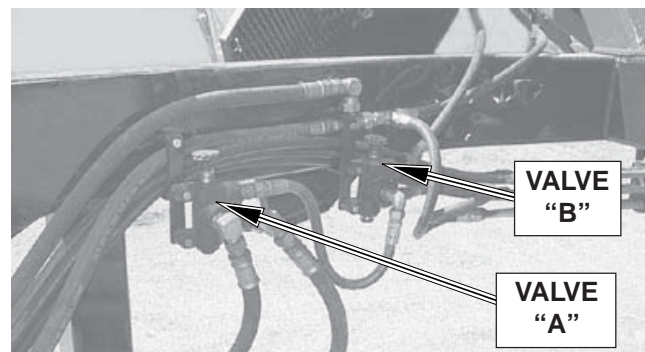
### Transport to Field Position

- Position machine on **level ground**.
- Stop tractor and engage park brake.
- Extend the frame depth cylinders fully on the XPRESS Air Drill, lowering end wheels.
- Lock tractor hydraulic lever for fan operation.
- Switch selector valve "A" to "Auger" position and selector valve "B" to "Aux Hyd" position.
- Remove wing transport lock pin.
- Remove three point hitch transport locks.

**Note:** Refer to XPRESS Air Drill Operator's Manual for more details.



**End Wheels - Lowered**



**Selector Valves**



**Three Point Hitch**



**XPRESS Transport Lock Bar**

## Transport - Xpress Air Drill Combination - Continued

### Transport to Field Position - Continued

- Operate the auxiliary hydraulic valve to lower three point hitch until transport lock bar unlatches wings and clears hitch.
- Operate the auxiliary hydraulic valve, swinging the wings fully out into field position. Ensure Transport Lock Bar Clears Distribution Pipes.

**Note:** As a precaution, check surrounding area to be sure it is safe to swing wings out.

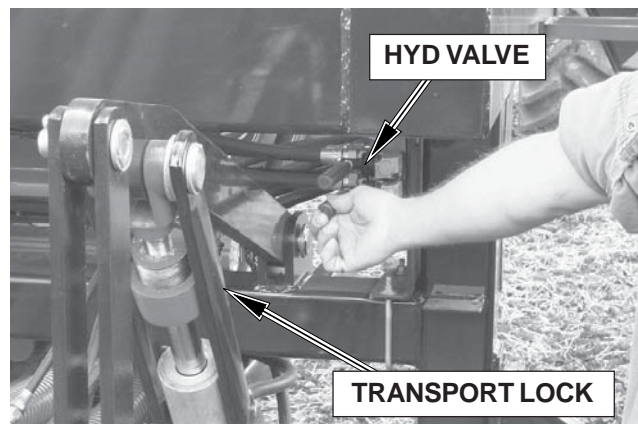
- Ensure wing lift cylinders are fully extended.

**Note:** Refer to XPRESS Air Drill Operator's Manual for more details.

### Danger

Always stay clear of wings being swung in or out of transport. Wings may swing rapidly causing injury or death.

**Note:** Relief valve is factory set at 1750 psi. In the event the field soil conditions are soft, the relief setting may require increasing in order to unfold/fold XPRESS wings. See "Relief Valve Adjustment".



Rear of Air Cart

ENSURE TRANSPORT LOCK BAR  
CLEARS DISTRIBUTION PIPES



XPRESS Transport Lock Bar





# Operation

## Transport - Xpress Air Drill Combination - Continued

### Transport to Field Position - Continued

- Engage slide lock to secure wings in field position.
- Operate the auxiliary hydraulic valve to lower three point hitch to field working position.
- Operate depth control hydraulics, to raise machine fully, holding the hydraulic lever for several seconds to phase the system.
- Switch selector valve “A” to “Fan” position and selector valve “B” to “Auger” position.



Slide Lock - Engaged

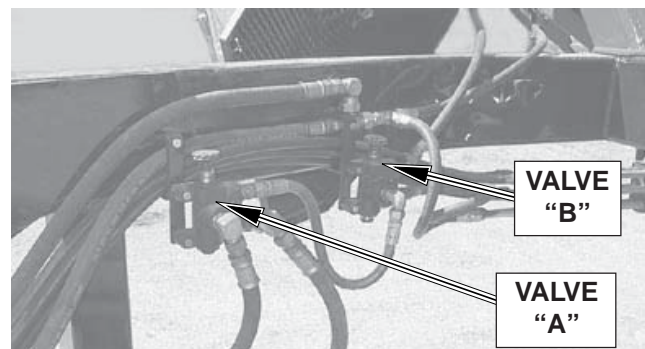
**Note:** Refer to XPRESS Air Drill Operator's Manual for more details.



Three Point Hitch - Field Position

### Field to Transport Position

- Position machine on **level ground**.
- Stop tractor, and engage park brake.
- Raise Xpress Air Drill to highest position, depth control hydraulics.
- Lock tractor hydraulic lever for fan operation.
- Switch selector valve “A” to “Auger” position and selector valve “B” to “Aux Hyd” position.



Selector Valves

## Transport - Xpress Air Drill Combination - Continued

### Field to Transport Position - Continued

- Disengage slide lock to allow wings to swing into transport position.
- Operate the auxiliary hydraulic valve, swinging the wings fully in. Ensure Transport Lock Bar Clears Distribution Pipes.

**Note:** As a precaution, check surrounding area to be sure it is safe to swing wings in.

- Operate the auxiliary hydraulic valve to raise three point hitch fully. Ensure wing lock latches.

**Note:** Refer to XPRESS Air Drill Operator's Manual for more details.

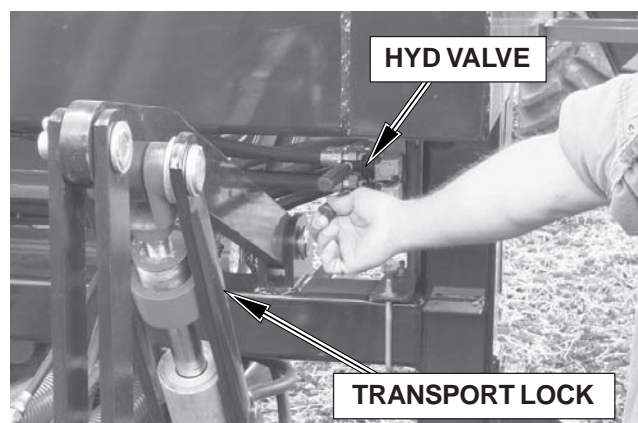
### Danger

Always stay clear of wings being swung in or out of transport. Wings may swing rapidly causing injury or death.

**Note:** Relief valve is factory set at 1750 psi. In the event the field soil conditions are soft, the relief setting may require increasing in order to unfold/fold XPRESS wings. See "Relief Valve Adjustment".



Slide Lock - Disengaged



Rear of Air Cart

ENSURE TRANSPORT LOCK BAR  
CLEARS DISTRIBUTION PIPES



XPRESS Transport Lock Bar

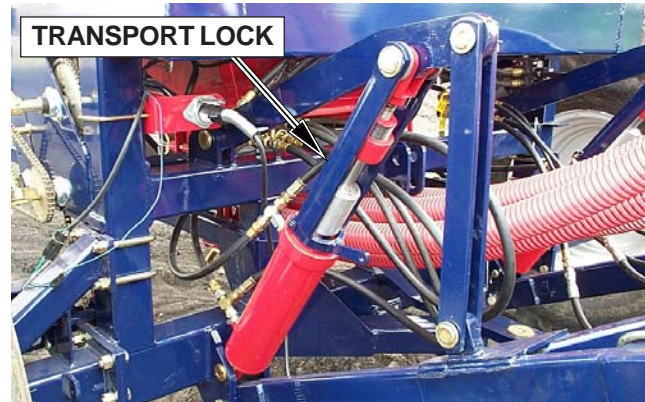


# Operation

## Transport - Xpress Air Drill Combination - Continued

### Field to Transport Position - Continued

- Install transport locks for three point hitch.
- Install transport lock bar pin.
- Unlock tractor hydraulic lever for fan operation.
- Retract XPRESS Air Drill frame depth cylinders, raising end wheels.
- Ensure safety chain is properly installed.
- **DO NOT TRANSPORT** with tanks more than half full.



Three Point Hitch

**Note:** Refer to XPRESS Air Drill Operator's Manual for more details.



XPRESS Transport Lock Bar

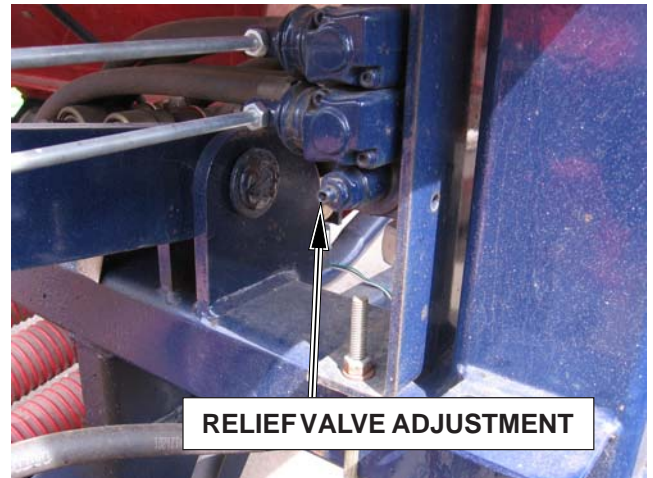


End Wheels - Raised

## Relief Valve Adjustment - Xpress Air Drill

The relief valve is factory set at 1750 psi. (12057 kPa). In the event the field soil conditions are soft, the relief setting may require increasing in order to unfold/fold XPRESS wings.

- To adjust relief valve setting;
- Loosen jam nut.
- Turn valve adjusting screw clockwise 1/2 turn.
- Test operation of unfolding/folding system.
- Repeat procedure if needed.
- Tighten jam nut.





# Operation

## Metering System

The 7000 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 7000 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:**

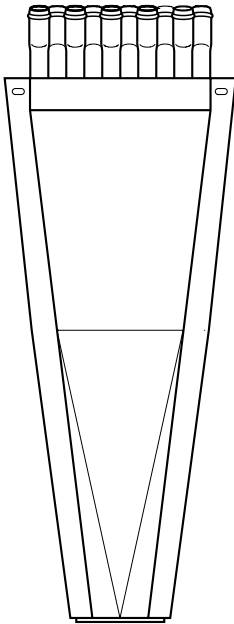
- (a) The slider plates are set correctly for product being applied.
- (b) The Clean-out doors are fully closed and sealed.
- (c) The plastic bag covering the fan is removed.

## 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)**

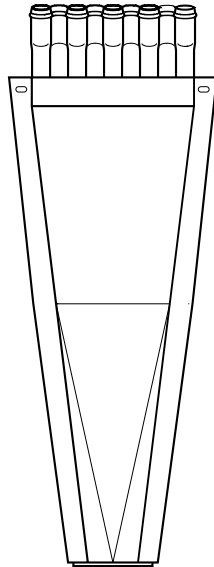
**Note: The number of outlets on the divider head must match the metering wheel size.**

10 Outlet Head



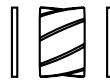
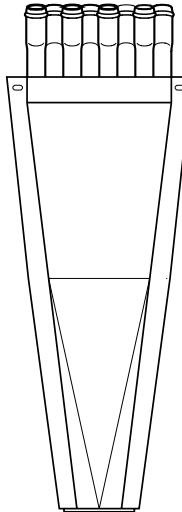
10 Outlet  
Metering Wheel  
with no spacer.

9 Outlet Head



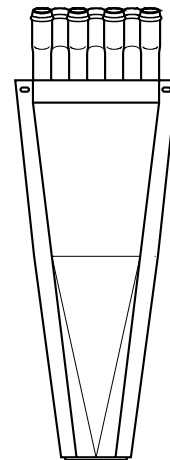
9 Outlet  
Metering Wheel  
with a single  
spacer.

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.

## Metering System - Continued

### Secondary Hose Installation

The lengths of the 15/16" 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" diameter do not run higher than 3" above the height of the flat fan divider head.
- Allow an extra 3" 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.

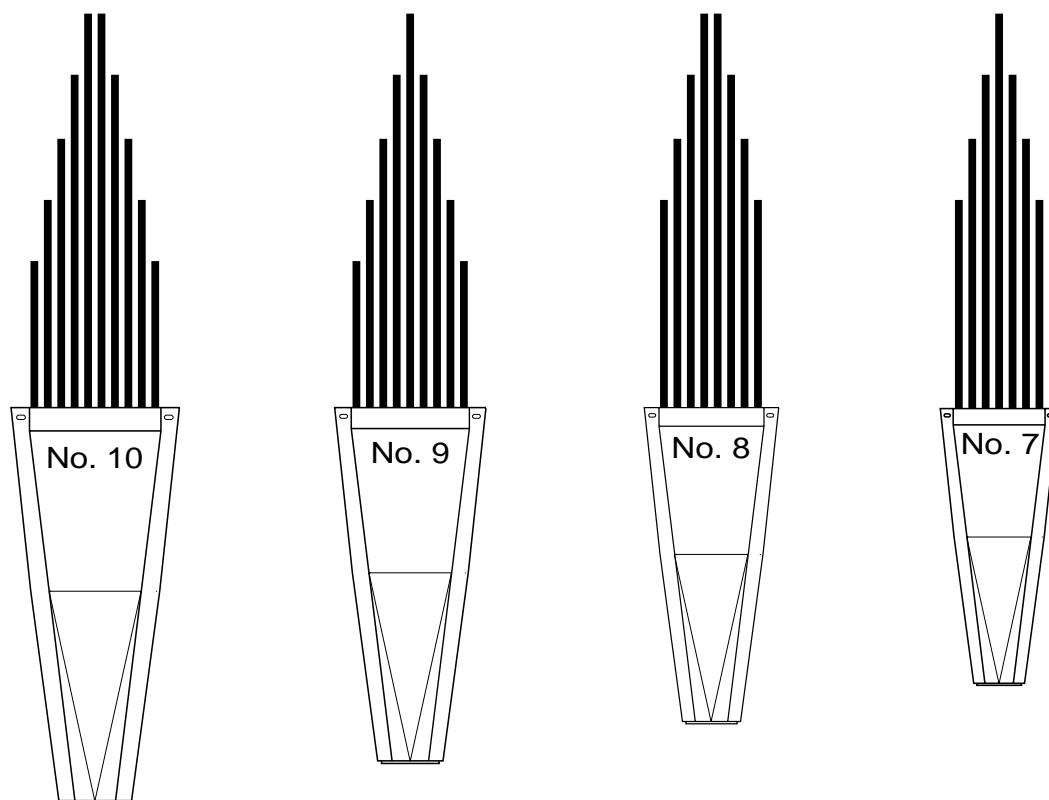
## Important

**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.**



# Operation

## 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.**

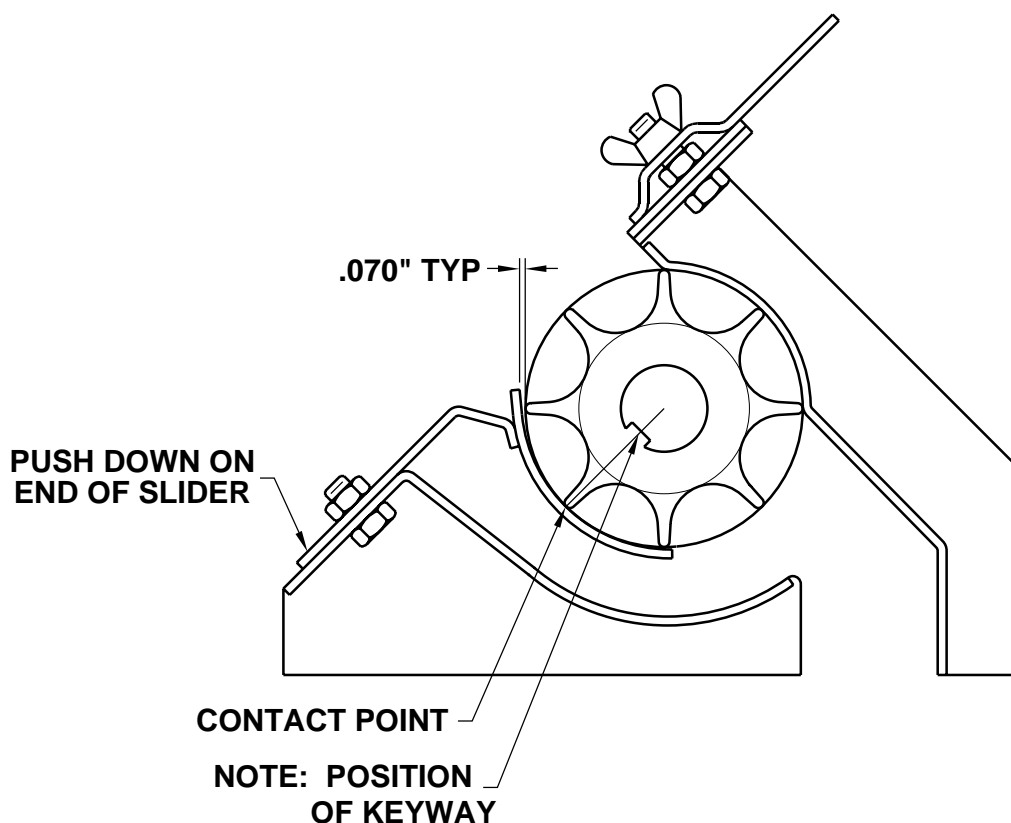
## Important

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.

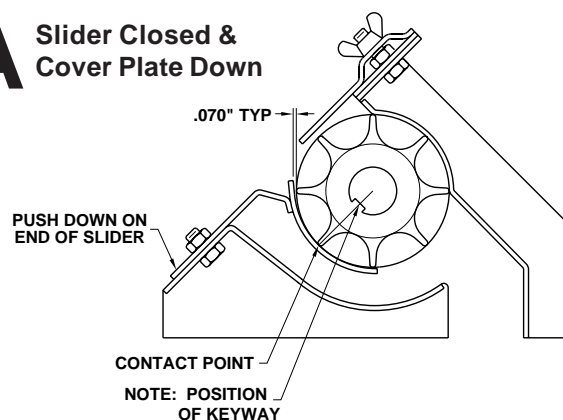
If the slider is tipped up when set to the closed position interference with the metering wheel will occur.

**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.**



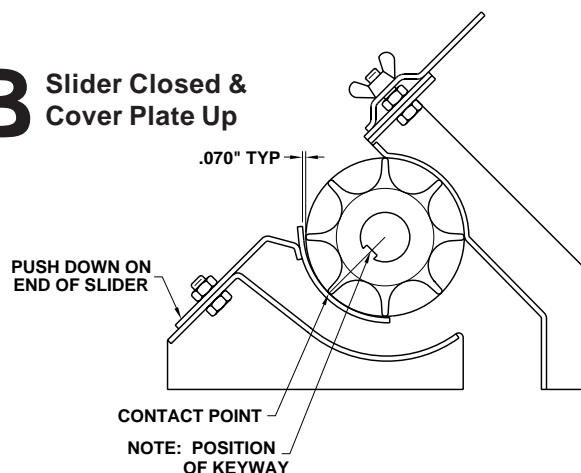
## Slider Setting - Continued

### A Slider Closed & Cover Plate Down

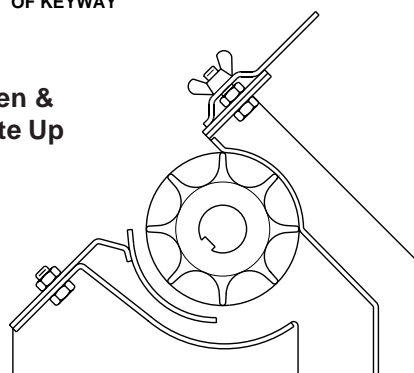


**Note:** For Oats or Coarse Grains, if it appears bridging is occurring, remove sliders and recalibrate.

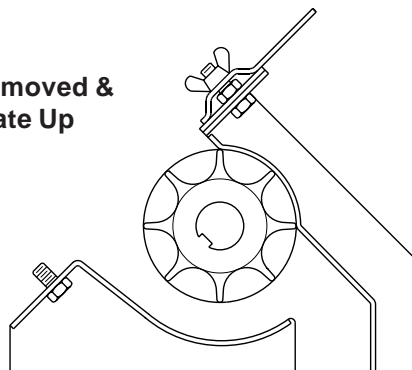
### B Slider Closed & Cover Plate Up



### C Slider Open & Cover Plate Up



### D Slider Removed & Cover Plate Up



**Slider Setting Chart**

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

# Operation

## Preparing VRT

### Zero Shaft Hydraulic Motor Solenoids

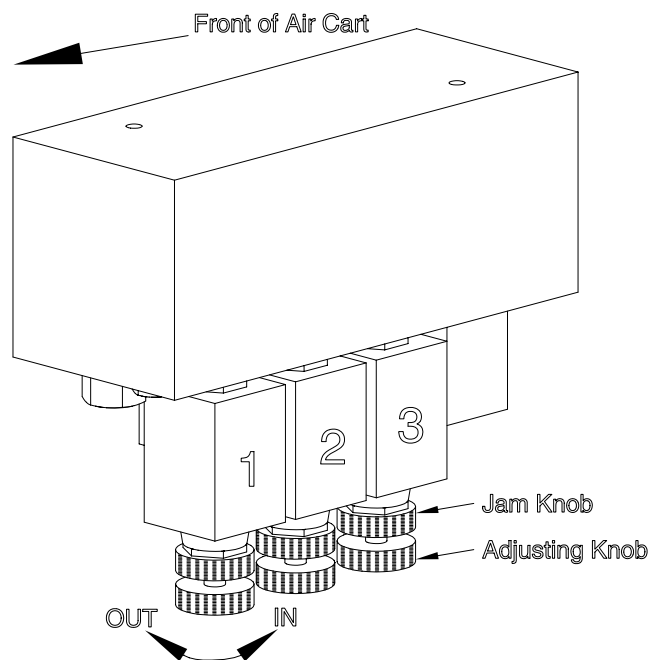
Upon initial setup the preload of the valves must be set to match the tractor hydraulics.

**Note: Tanks must be empty.**

Zero the shaft hydraulic motors by using the following procedure:

- Ensure there is no product in any tanks.
- Warm up hydraulic system by running fan system for 5-10 minutes. Hydraulic hoses at fan motor should be warm to touch.
- **Turn OFF** Monitor, VRT Console and Controller.
- Start with **all** adjusting Knobs **turned out fully**.
- Adjust each valve individually by following the procedure below:
  - Start with rear tank first Adjusting Knob '3'.
  - Loosen Jam Knob.
  - Turn Adjusting Knob IN until motor starts to turn.
  - Allow motor to turn for 1-2 minutes to allow for motor to reach optimal operating temperature.
  - Then turn Adjusting Knob OUT until motor stops turning.
  - Turn Adjusting Knob OUT an additional 1/2 turn.
  - Tighten Jam Knob to secure Adjusting Knob in place.
- Repeat the above procedure for the other valves.

**Note: If Air Cart is *NOT* equipped with a Third Tank or Granular Tank solenoid '1' must be unplugged and the adjusting Knob turned out fully.**



**Note: It is recommended to check the zero of the valves at the start of each season or if a different tractor is used on the system.**

## Filling Tank

The Morris 7000 Series Air Cart is equipped with 2 tanks. The front tank is for seed and the rear tank is for fertilizer. However, BOTH tanks can be used for the same product.

The capacity of the Air Cart Tanks are as follows:

| Tank Capacity |   |   |   |   |
|---------------|---|---|---|---|
| Model         | Front Tank  | Middle Tank   | Rear Tank   | Total Capacity                          |
| 7130          | 48 bushels<br>3,456 lbs.<br>62 ft. cu.<br>1,750 L     | N/A   | 82 bushels<br>5,904 lbs.<br>105 ft. cu.<br>2,980 L      | 130 bushels<br>167 ft. cu.<br>4,730 L   |
| 7180          | 71 bushels<br>5,112 lbs.<br>91 ft. cu.<br>2,580 L     | N/A   | 109 bushels<br>7,848 lbs.<br>140 ft. cu.<br>3,970 L     | 180 bushels<br>231 ft. cu.<br>6,550 L   |
| 7240          | 95 bushels<br>6,840 lbs.<br>122 ft. cu.<br>3,460 L    | N/A   | 145 bushels<br>10,440 lbs.<br>186 ft. cu.<br>5,270 L    | 240 bushels<br>308 ft. cu.<br>8,730 L   |
| 7252          | 71.3 bushels<br>5,134 lbs.<br>91.4 ft. cu.<br>2,590 L | 71.3 bushels<br>5,134 lbs.<br>91.4 ft. cu.<br>2,590 L | 109.3 bushels<br>7,881 lbs.<br>140.6 ft. cu.<br>3,990 L | 252 bushels<br>323.4 ft. cu.<br>9,170 L |
| 7300          | 120 bushels<br>8,640 lbs.<br>154 ft. cu.<br>4,360 L   | N/A   | 180 bushels<br>12,960 lbs.<br>231 ft. cu.<br>6,550 L    | 300 bushels<br>385 ft. cu.<br>10,910L   |

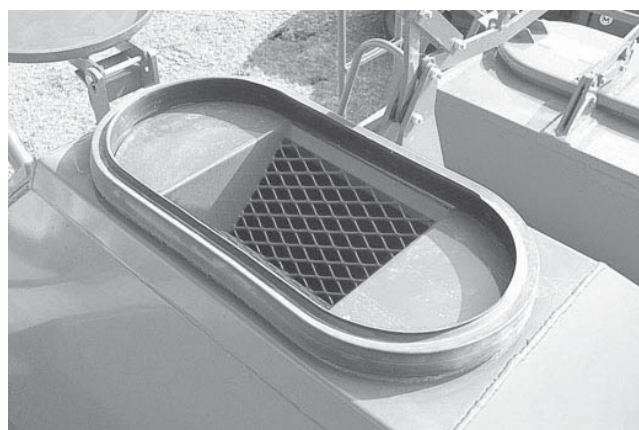
- Open lid fully on tank being filled.
- Check and remove any debris inside tank.
- Remove clean-out door.
- Check for debris inside metering body.
- Check for sheared metering wheels.
- Check the slider plates are set correctly.
- Fully close and seal the Clean-out door.
- Ensure the auger screen is 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:

- The slider plates are set correctly for product being applied.
- The clean-out doors are fully closed and sealed.
- The plastic bag covering the fan is removed.
- 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

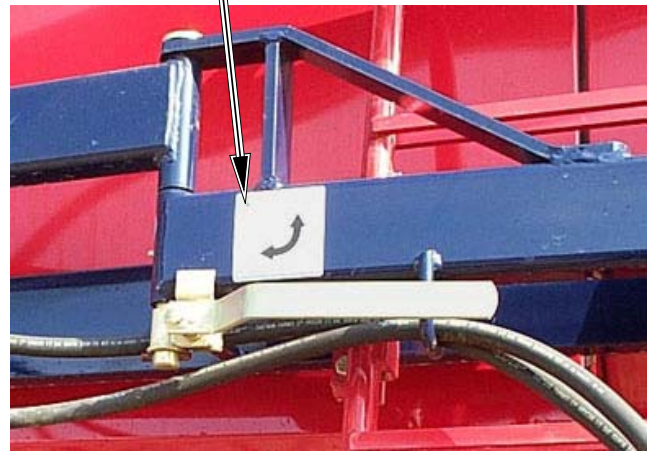
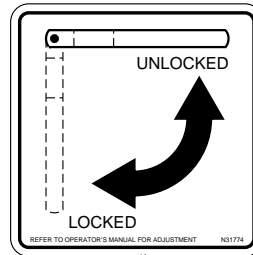
## Filling Tank - Continued

- Position right hand access ladder in line with the tank walkway.
- Position auger as described below, if so equipped.
- Unlock auger arm lock. (Located 7240, 7252 & 7300 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 7240, 7252 & 7300 only)

## Important

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

**Keyways may shear if the collector becomes plugged.**



**Auger Arm Lock**



**Auger Cradle**



**Front Pivot**

## Filling Tank - Continued

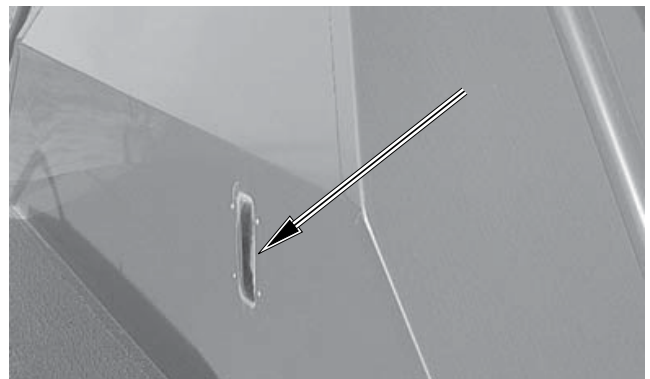
- Open lids on tank and insert spout.
- Back truck to the hopper and engage the hydraulic motor on the auger.
  - 1.If hydraulic fan drive then ensure selector valve is in correct position for auger operation and engage tractor hydraulics.
  - 2.If engine fan drive then engage tractor hydraulics to operate 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.



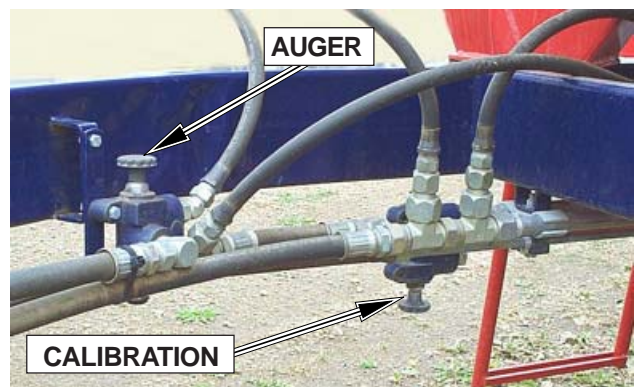
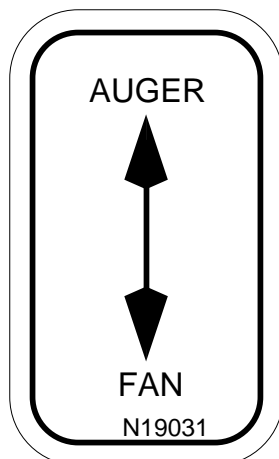
**Auger Positioned**

## Important

**Do not exceed 10 mph with tanks full.**



**Site Glass**



**Selector Valves**

# 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, screen maybe removed for easier cleanout.
- Reinstall auger screen.
- Unlock auger arm lock. (Located 7240, 7252 & 7300 only)
- Swing auger out making sure the motor end of the auger engages the arm pivot.
- Secure auger in transport position.
- Lock auger arm lock. (Located 7240, 7252 & 7300 only)
- 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 removed



Auger screen installed



## Danger



### ROTATING FLIGHTING HAZARD

Keep away from auger intake.

Keep intake shield in place and in good working order. Do not modify.

**FAILURE TO HEED WILL RESULT IN  
SERIOUS INJURY OR DEATH.**

**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.



Auger Cradle



## 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.
- 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:

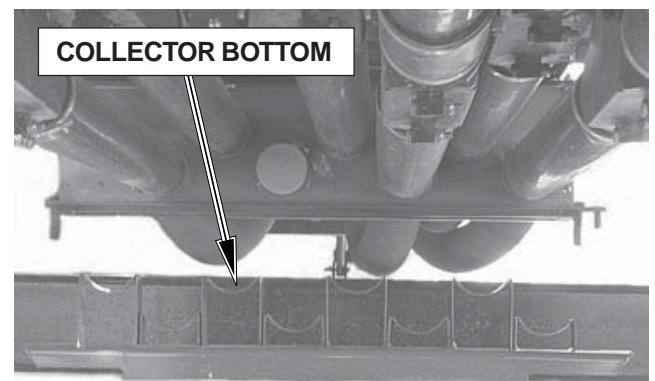
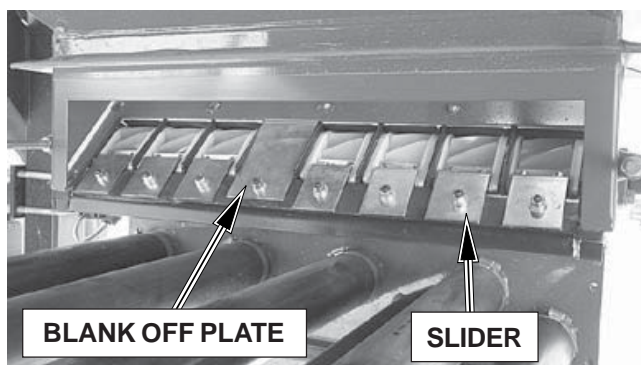
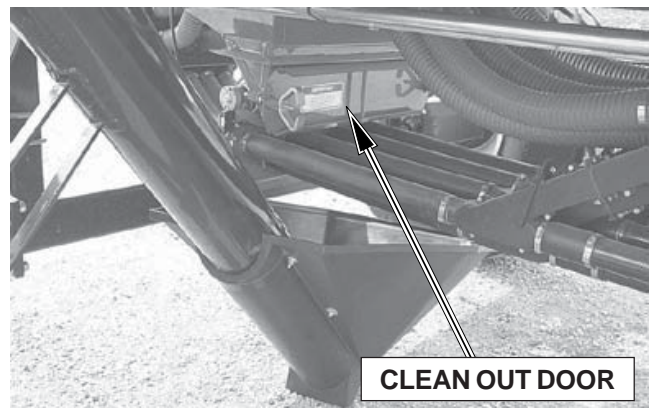
- Remove all sliders and blank off plates.
- Remove the collector bottom.
- Run fan until all remaining material has been blown out of the system.
- Reinstall the sliders, blank off plates, collector bottom, and clean-out doors.



## 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.

MOVE LADDER FORWARD



# Operation

## Rate Calibration

The practice of doing a rate calibration is strongly recommended as it will confirm the **actual** amounts of product per motor revolution (**WT/REV**).

The VRT system requires the **WT/REV** in order to determine the shaft motor rpm to deliver the correct application rate.

The following procedure should be followed for every change of product.

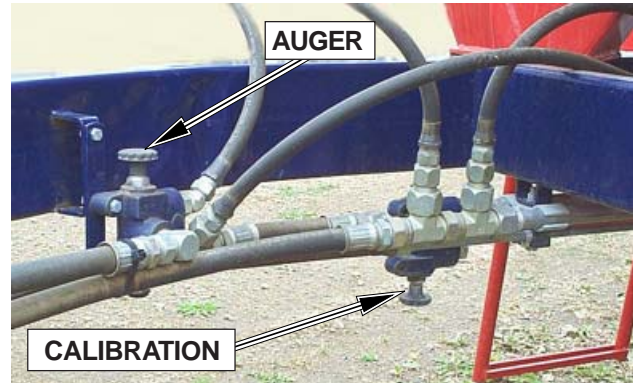
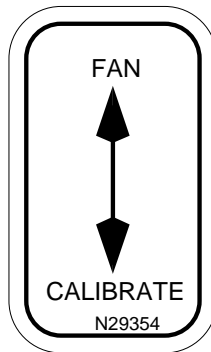
- Engage hydraulic lever to run Air Cart.
- **Turn off fan** by switching selector valve (located in the fan supply line) to calibration position.
- Remove the wing nuts on the collector bottom.
- Remove the bottom of the collector.
- Slide rate check box on the collector body.
- **Prime metering wheels first** by using the primer switch to start and stop the meter drive. Allow the drive to run until material begins to fall through the collector body.

**Note:** *Ensure the fan is not running.*

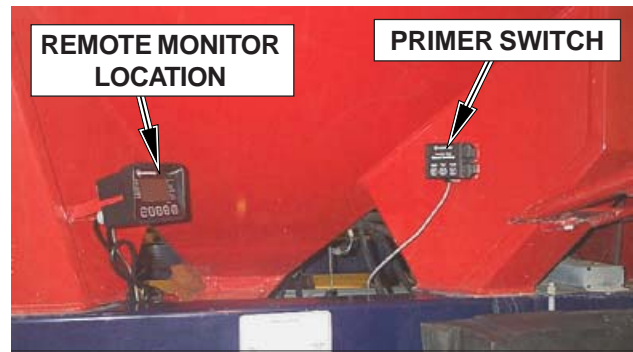
- Empty material from rate check box and reinstall it on the same collector.
- The monitor can be relocated to the remote monitor location for ease of calibration. The three pin plug connects to the monitor harness and the two pin connects to the VRT controller harness.

## Actual Sample

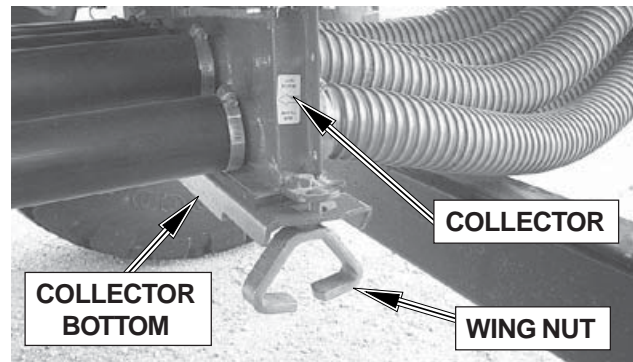
- Enter Calibration Mode for **actual sample**.
- Use the UP or DOWN button to move the triangle icon to the desired shaft.
- Hold the **ACK** button until 4 short beeps and 1 long beep sounds. Release button after the long beep.



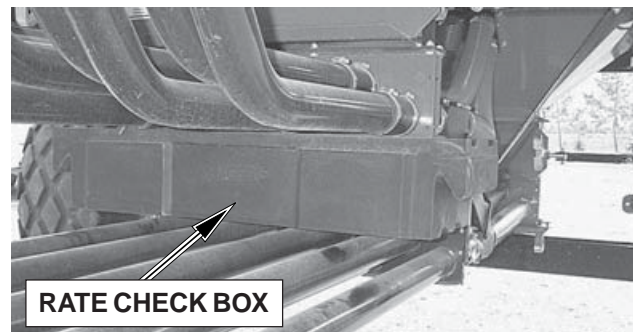
Selector Valves



Primer Switch



Collector Bottom



Rate Check Box



## Rate Calibration - Continued

### Actual Sample

Example: Calibrate Shaft 1.

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

Use the Up/Down keys to select "Shaft Settings" press the SELECT key to enter function.

2. Under "Shaft Settings" use the Up/Down keys to select "Shaft 1 Settings" press the SELECT key to enter function.

3. Use the Up/Down keys to select "Shaft 1 Calibration" press the SELECT key to enter function.

4. Press the SELECT key to enter "Number of Revolutions". Use the Up/Down keys to change the value to;

- 20 for Direct Drive

- 50 for Slow Speed Drive

**Note:** *Ensure the fan is not running.*

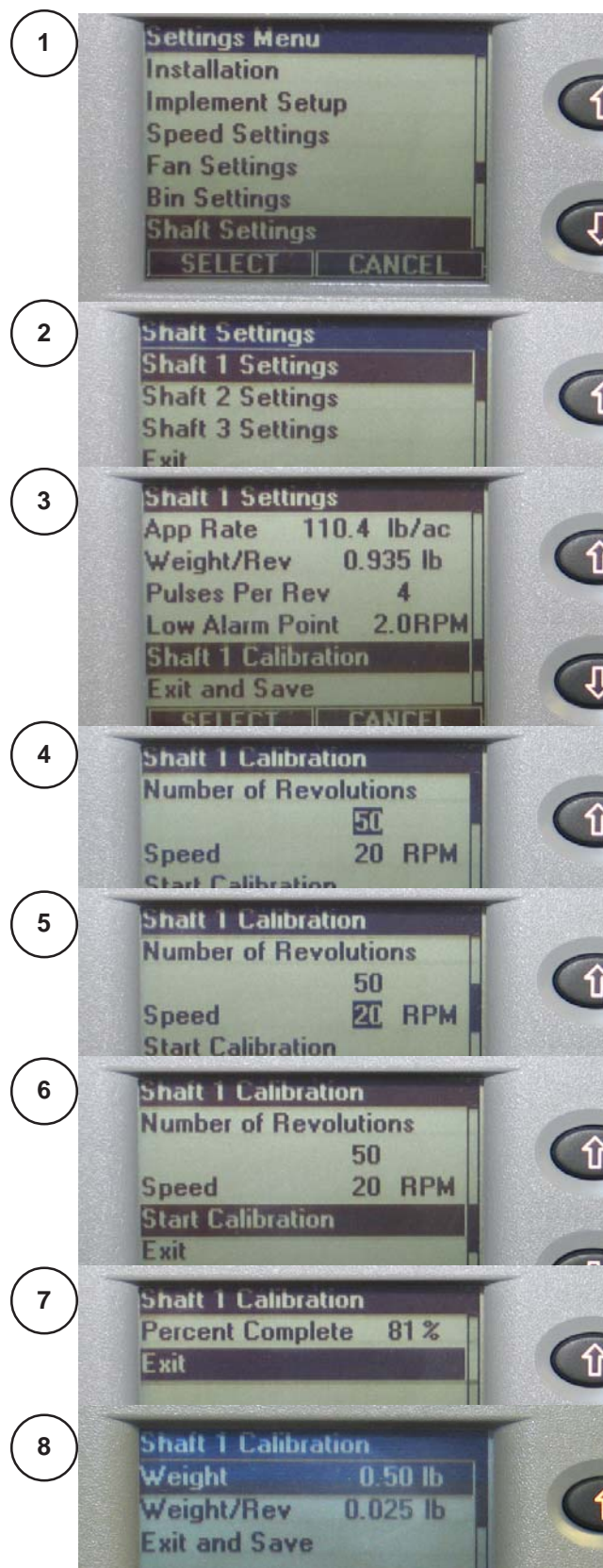
Press the SELECT key to enter the value and move to the next parameter "Speed" in the list.

5. Press the SELECT key to enter "Speed". Use the Up/Down keys to change the value to **20 rpm**.

6. Press the SELECT key to enter the value and move to the next parameter "Start Calibration" in the list.

7. Press the SELECT key to enter "Start Calibration". The monitor will display "Percent Complete" and shaft 1 motor will start turning the desired number of revolutions.

8. Once the monitor displays "Percent Complete 100%" the shaft motor will come to a stop and the monitor will now display "Weight".



# Operation

## Rate Calibration - Continued

### Actual Sample - Continued

9. Remove the rate check box from the collector body.

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. Accuracy of sample is critical for actual application rate accuracy.

10. Press the SELECT key to enter "Weight". Use the Up/Down keys to change the value to the sample weight.

**Note:** The "Weight/Rev" is automatically calculated for the value being entered under "Weight".

Press the SELECT key to enter the value and move to the next parameter "Weight/Rev" in the list. **Do not modify this value.**

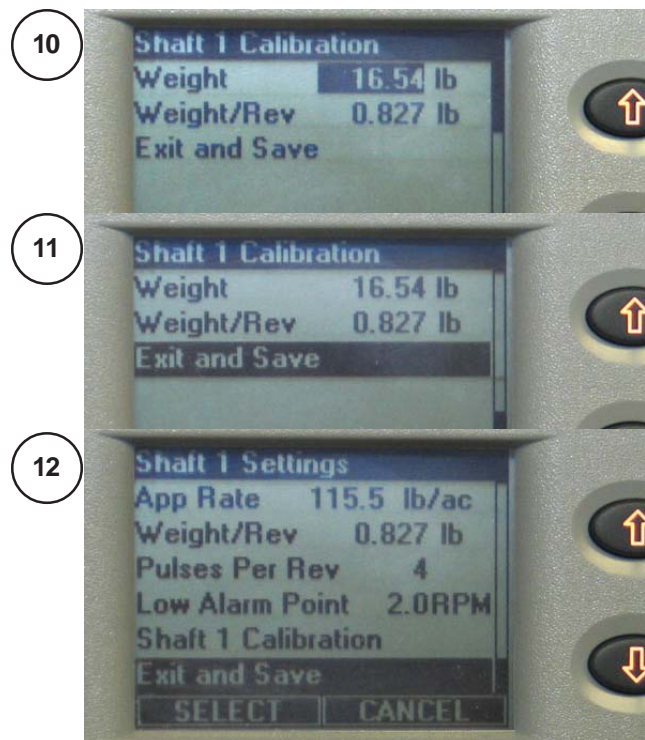
11. Use the Up/Down keys to select "Exit and Save" press the SELECT key to save the changes and return to "Shaft 1 Settings" menu.

**Note:** The new "Weight/Rev" will appear under the "Weight/Rev" line of the "Shaft 1 Settings" menu.

12. Use the Up/Down keys to select "Exit and Save" press the SELECT key to save the changes and return to "Shaft Settings" menu.

13. Replace the bottom of the collector. Place rate check box into storage bracket.

Follow the above procedure to check the rate of the other tanks.



## Calibration Chart - Imperial

### 7000 SERIES AIRSEEDER - VARIABLE RATE - CALIBRATION CHART WT/REV (LBS./REV)

| GRANULAR APPLICATOR |      |      |      |      |      |         |       |       |       | SEED TANK / FERTILIZER TANK / THIRD TANK |       |       |       |         |      |      |      |      |      |      |      |      | GRANULAR APPLICATOR: SLOW SPEED DRIVE |       |       |       |       |         |      |      |      |      |      |      |      |      |      |       |       |       |       |      |
|---------------------|------|------|------|------|------|---------|-------|-------|-------|--|-------|-------|-------|---------|------|------|------|------|------|------|------|------|---------------------------------------|-------|-------|-------|-------|---------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|------|
| SLOW SPEED DRIVE    |      |      |      |      |      |         |       |       |       | DIRECT DRIVE                             |       |       |       |         |      |      |      |      |      |      |      |      | CALIBRATION MATERIAL                  |       |       |       |       |         |      |      |      |      |      |      |      |      |      |       |       |       |       |      |
| GA-1                | GA-2 | GA-3 | GA-4 | GA-5 | GA-6 | OUTLETS | SSD-1 | SSD-2 | SSD-3 | SSD-4                                    | SSD-5 | SSD-6 | SSD-7 | OUTLETS | DD-1 | DD-2 | DD-3 | DD-4 | DD-5 | DD-6 | DD-7 | DD-8 | DD-9                                  | DD-10 | DD-11 | DD-12 | DD-13 | OUTLETS | DD-1 | DD-2 | DD-3 | DD-4 | DD-5 | DD-6 | DD-7 | DD-8 | DD-9 | DD-10 | DD-11 | DD-12 | DD-13 |      |
| 21                  | 025  | 027  | 029  | 032  | 040  | 055     | 21    | 023   | 027   | 029                                      | 032   | 034   | 036   | 055     | 21   | 116  | 166  | 210  | 260  | 302  | 305  | 326  | 330                                   | 368   | 418   | 443   | 458   | 550     | 21   | 116  | 176  | 220  | 260  | 302  | 305  | 326  | 330  | 368   | 418   | 443   | 458   | 550  |
| 22                  | 026  | 029  | 031  | 033  | 042  | 057     | 22    | 024   | 028   | 030                                      | 033   | 035   | 037   | 057     | 22   | 121  | 174  | 220  | 273  | 317  | 319  | 341  | 345                                   | 385   | 438   | 464   | 501   | 576     | 22   | 121  | 174  | 220  | 273  | 317  | 319  | 341  | 345  | 385   | 438   | 464   | 501   | 576  |
| 23                  | 028  | 030  | 032  | 035  | 044  | 060     | 23    | 025   | 029   | 031                                      | 034   | 036   | 039   | 060     | 23   | 127  | 182  | 230  | 285  | 331  | 334  | 357  | 361                                   | 403   | 458   | 485   | 501   | 603     | 23   | 127  | 182  | 230  | 285  | 331  | 334  | 357  | 361  | 403   | 458   | 485   | 501   | 603  |
| 24                  | 029  | 031  | 034  | 038  | 046  | 062     | 24    | 026   | 030   | 032                                      | 035   | 038   | 041   | 062     | 24   | 132  | 190  | 240  | 298  | 346  | 348  | 372  | 377                                   | 420   | 478   | 506   | 523   | 629     | 24   | 132  | 190  | 240  | 298  | 346  | 348  | 372  | 377  | 420   | 478   | 506   | 523   | 629  |
| 25                  | 030  | 033  | 036  | 040  | 048  | 065     | 25    | 028   | 033   | 035                                      | 038   | 041   | 062   | 25      | 138  | 198  | 250  | 310  | 360  | 363  | 388  | 393  | 438                                   | 498   | 528   | 545   | 655   | 25      | 138  | 198  | 250  | 310  | 360  | 363  | 388  | 393  | 438  | 498   | 528   | 545   | 655   |      |
| 26                  | 031  | 034  | 038  | 042  | 050  | 068     | 26    | 029   | 034   | 036                                      | 039   | 042   | 068   | 26      | 143  | 205  | 260  | 322  | 374  | 377  | 403  | 408  | 455                                   | 517   | 549   | 567   | 681   | 26      | 143  | 205  | 260  | 322  | 374  | 377  | 403  | 408  | 455  | 517   | 549   | 567   | 681   |      |
| 27                  | 032  | 035  | 039  | 043  | 051  | 070     | 27    | 030   | 035   | 038                                      | 041   | 043   | 064   | 070     | 27   | 149  | 213  | 270  | 335  | 389  | 392  | 419  | 424                                   | 473   | 537   | 570   | 589   | 707     | 27   | 149  | 213  | 270  | 335  | 389  | 392  | 419  | 424  | 473   | 537   | 570   | 589   | 707  |
| 28                  | 033  | 036  | 040  | 044  | 052  | 073     | 28    | 031   | 036   | 039                                      | 042   | 045   | 064   | 073     | 28   | 154  | 221  | 280  | 347  | 403  | 406  | 434  | 440                                   | 490   | 557   | 591   | 610   | 734     | 28   | 154  | 221  | 280  | 347  | 403  | 406  | 434  | 440  | 490   | 557   | 591   | 610   | 734  |
| 29                  | 034  | 038  | 042  | 046  | 054  | 075     | 29    | 032   | 038   | 041                                      | 044   | 046   | 065   | 075     | 29   | 160  | 229  | 290  | 360  | 418  | 421  | 450  | 455                                   | 508   | 577   | 612   | 632   | 760     | 29   | 160  | 229  | 290  | 360  | 418  | 421  | 450  | 455  | 508   | 577   | 612   | 632   | 760  |
| 30                  | 035  | 039  | 043  | 047  | 055  | 078     | 30    | 033   | 039   | 042                                      | 045   | 048   | 061   | 078     | 30   | 165  | 237  | 300  | 372  | 432  | 435  | 465  | 471                                   | 525   | 597   | 633   | 654   | 786     | 30   | 165  | 237  | 300  | 372  | 432  | 435  | 465  | 471  | 525   | 597   | 633   | 654   | 786  |
| 31                  | 036  | 040  | 044  | 048  | 056  | 081     | 31    | 034   | 040   | 043                                      | 047   | 050   | 063   | 081     | 31   | 171  | 245  | 310  | 384  | 446  | 450  | 481  | 487                                   | 543   | 617   | 654   | 676   | 812     | 31   | 171  | 245  | 310  | 384  | 446  | 450  | 481  | 487  | 543   | 617   | 654   | 676   | 812  |
| 32                  | 037  | 041  | 045  | 049  | 057  | 082     | 32    | 035   | 042   | 045                                      | 048   | 051   | 064   | 083     | 32   | 176  | 253  | 320  | 397  | 461  | 464  | 496  | 502                                   | 560   | 637   | 675   | 698   | 838     | 32   | 176  | 253  | 320  | 397  | 461  | 464  | 496  | 502  | 560   | 637   | 675   | 698   | 838  |
| 33                  | 038  | 043  | 046  | 050  | 058  | 086     | 33    | 036   | 043   | 046                                      | 050   | 053   | 056   | 086     | 33   | 182  | 261  | 330  | 409  | 475  | 479  | 512  | 518                                   | 576   | 657   | 696   | 719   | 865     | 33   | 182  | 261  | 330  | 409  | 475  | 479  | 512  | 518  | 576   | 657   | 696   | 719   | 865  |
| 34                  | 039  | 044  | 048  | 052  | 060  | 088     | 34    | 037   | 044   | 048                                      | 051   | 054   | 058   | 088     | 34   | 187  | 269  | 340  | 422  | 490  | 493  | 527  | 534                                   | 595   | 677   | 717   | 743   | 891     | 34   | 187  | 269  | 340  | 422  | 490  | 493  | 527  | 534  | 595   | 677   | 717   | 743   | 891  |
| 35                  | 040  | 044  | 048  | 052  | 061  | 091     | 35    | 038   | 046   | 049                                      | 053   | 056   | 060   | 091     | 35   | 193  | 277  | 350  | 434  | 504  | 508  | 543  | 550                                   | 613   | 697   | 739   | 763   | 917     | 35   | 193  | 277  | 350  | 434  | 504  | 508  | 543  | 550  | 613   | 697   | 739   | 763   | 917  |
| 36                  | 041  | 045  | 049  | 053  | 062  | 094     | 36    | 039   | 047   | 050                                      | 054   | 058   | 061   | 094     | 36   | 198  | 284  | 360  | 446  | 518  | 522  | 558  | 565                                   | 630   | 716   | 760   | 785   | 943     | 36   | 198  | 284  | 360  | 446  | 518  | 522  | 558  | 565  | 630   | 716   | 760   | 785   | 943  |
| 37                  | 042  | 046  | 050  | 054  | 063  | 096     | 37    | 040   | 048   | 052                                      | 056   | 059   | 063   | 096     | 37   | 204  | 292  | 370  | 459  | 533  | 537  | 574  | 581                                   | 648   | 736   | 781   | 807   | 969     | 37   | 204  | 292  | 370  | 459  | 533  | 537  | 574  | 581  | 648   | 736   | 781   | 807   | 969  |
| 38                  | 043  | 047  | 051  | 055  | 064  | 099     | 38    | 041   | 049   | 053                                      | 057   | 061   | 065   | 099     | 38   | 209  | 300  | 380  | 471  | 547  | 551  | 589  | 597                                   | 665   | 756   | 802   | 828   | 996     | 38   | 209  | 300  | 380  | 471  | 547  | 551  | 589  | 597  | 665   | 756   | 802   | 828   | 996  |
| 39                  | 044  | 048  | 052  | 056  | 065  | 101     | 39    | 042   | 050   | 054                                      | 058   | 062   | 066   | 101     | 39   | 215  | 308  | 390  | 484  | 562  | 566  | 605  | 612                                   | 683   | 776   | 823   | 850   | 1022    | 39   | 215  | 308  | 390  | 484  | 562  | 566  | 605  | 612  | 683   | 776   | 823   | 850   | 1022 |
| 40                  | 045  | 049  | 053  | 057  | 066  | 104     | 40    | 043   | 051   | 055                                      | 059   | 063   | 067   | 104     | 40   | 220  | 316  | 400  | 496  | 576  | 580  | 620  | 628                                   | 700   | 796   | 844   | 872   | 1048    | 40   | 220  | 316  | 400  | 496  | 576  | 580  | 620  | 628  | 700   | 796   | 844   | 872   | 1048 |
| 41                  | 046  | 050  | 054  | 058  | 067  | 107     | 41    | 044   | 052   | 056                                      | 060   | 064   | 068   | 107     | 41   | 226  | 324  | 410  | 506  | 590  | 595  | 636  | 644                                   | 718   | 816   | 865   | 894   | 1074    | 41   | 226  | 324  | 410  | 506  | 590  | 595  | 636  | 644  | 718   | 816   | 865   | 894   | 1074 |
| 42                  | 047  | 051  | 055  | 059  | 068  | 109     | 42    | 045   | 053   | 057                                      | 061   | 065   | 069   | 109     | 42   | 231  | 332  | 420  | 521  | 605  | 609  | 651  | 659                                   | 735   | 836   | 886   | 916   | 1100    | 42   | 231  | 332  | 420  | 521  | 605  | 609  | 651  | 659  | 735   | 836   | 886   | 916   | 1100 |
| 43                  | 048  | 052  | 056  | 060  | 069  | 112     | 43    | 046   | 054   | 058                                      | 062   | 066   | 070   | 112     | 43   | 237  | 340  | 430  | 533  | 619  | 624  | 667  | 675                                   | 753   | 856   | 907   | 937   | 1127    | 43   | 237  | 340  | 430  | 533  | 619  | 624  | 667  | 675  | 753   | 856   | 907   | 937   | 1127 |
| 44                  | 049  | 053  | 057  | 061  | 070  | 114     | 44    | 047   | 055   | 059                                      | 063   | 067   | 071   | 114     | 44   | 242  | 348  | 440  | 546  | 634  | 638  | 682  | 691                                   | 770   | 876   | 928   | 959   | 1153    | 44   | 242  | 348  | 440  | 546  | 634  | 638  | 682  | 691  | 770   | 876   | 928   | 959   | 1153 |
| 45                  | 050  | 054  | 058  | 062  | 071  | 117     | 45    | 048   | 056   | 060                                      | 064   | 068   | 072   | 117     | 45   | 248  | 356  | 450  | 558  | 648  | 653  | 698  | 707                                   | 788   | 896   | 950   | 981   | 1179    | 45   | 248  | 356  | 450  | 558  | 648  | 653  | 698  | 707  | 788   | 896   | 950   | 981   | 1179 |
| 46                  | 051  | 055  | 059  | 063  | 072  | 120     | 46    | 049   | 057   | 061                                      | 065   | 069   | 073   | 120     | 46   | 253  | 363  | 460  | 570  | 662  | 667  | 713  | 722                                   | 805   | 915   | 971   | 1003  | 1205    | 46   | 253  | 363  | 460  | 570  | 662  | 667  | 713  | 722  | 805   | 915   | 971   | 1003  | 1205 |
| 47                  | 052  | 056  | 060  | 064  | 073  | 122     | 47    | 050   | 058   | 062                                      | 066   | 070   | 074   | 122     | 47   | 259  | 371  | 470  | 583  | 672  | 682  | 729  | 738                                   | 823   | 935   | 992   | 1025  | 1231    | 47   | 259  | 371  | 470  | 583  | 672  | 682  | 729  | 738  | 823   | 935   | 992   | 1025  | 1231 |
| 48                  | 053  | 057  | 061  | 065  | 074  | 125     | 48    | 051   | 059   | 063                                      | 067   | 071   | 075   | 125     | 48   | 264  | 379  | 480  | 595  | 691  | 696  | 744  | 754                                   | 840   | 955   | 1014  | 1068  | 1258    | 48   | 264  | 379  | 480  | 595  | 691  | 696  | 744  | 754  | 840   | 955   | 1014  | 1068  | 1258 |
| 49                  | 054  | 058  | 062  | 066  | 075  | 127     | 49    | 052   | 060   | 064                                      | 068   | 072   | 076   | 127     | 49   | 270  | 387  | 490  | 606  | 706  | 711  | 760  | 769                                   | 858   | 975   | 1033  | 1088  | 1284    | 49   | 270  | 387  | 490  | 606  | 706  | 711  | 760  | 769  | 858   | 975   | 1033  | 1088  | 1284 |
| 50                  | 055  | 059  | 063  | 067  | 076  | 130     | 50    | 053   | 061   | 065                                      | 069   | 073   | 077   | 130     | 50   | 275  | 395  | 500  | 620  | 720  | 725  | 775  | 785                                   | 875   | 995   | 1055  | 1090  | 1310    | 50   | 275  | 395  | 500  | 620  | 720  | 725  | 775  | 785  | 875   | 995   | 1055  | 1090  | 1310 |
| 51                  | 056  | 060  | 064  | 068  | 077  | 133     | 51    | 054   | 062   | 066                                      | 070   | 074   | 078   | 1       |      |      |      |      |      |      |      |      |                                       |       |       |       |       |         |      |      |      |      |      |      |      |      |      |       |       |       |       |      |



# Operation

## Metering Rate Adjustment

The metering rate adjustment for all tanks is done in the same manner. The rate varies with the speed of the metering wheels. A new rate is achieved by changing the APP RATE and or the WEIGHT/REV under the shaft program mode of the monitor.

**Note:** It is recommended to set WT/REV by doing a "Rate Calibration".

If desired the product WT/REV can be determined from the chart located on the previous page. To determine a products WT/REV from the chart follow the steps outlined below:

- Determine which "Chart Column" the product to be applied falls into from the "Calibration Material" columns on the left.
- Go to the specific "Chart Column" and follow column down to the number of outlets on seeding tool. It is recommended to use a highlighter to make the line easier to follow.
- At this intersection will be the required **WT/REV** for the product.

Change the **APRATE** and **WT/REV** on monitor as follows:

Example: Adjust metering rate for Shaft 1.

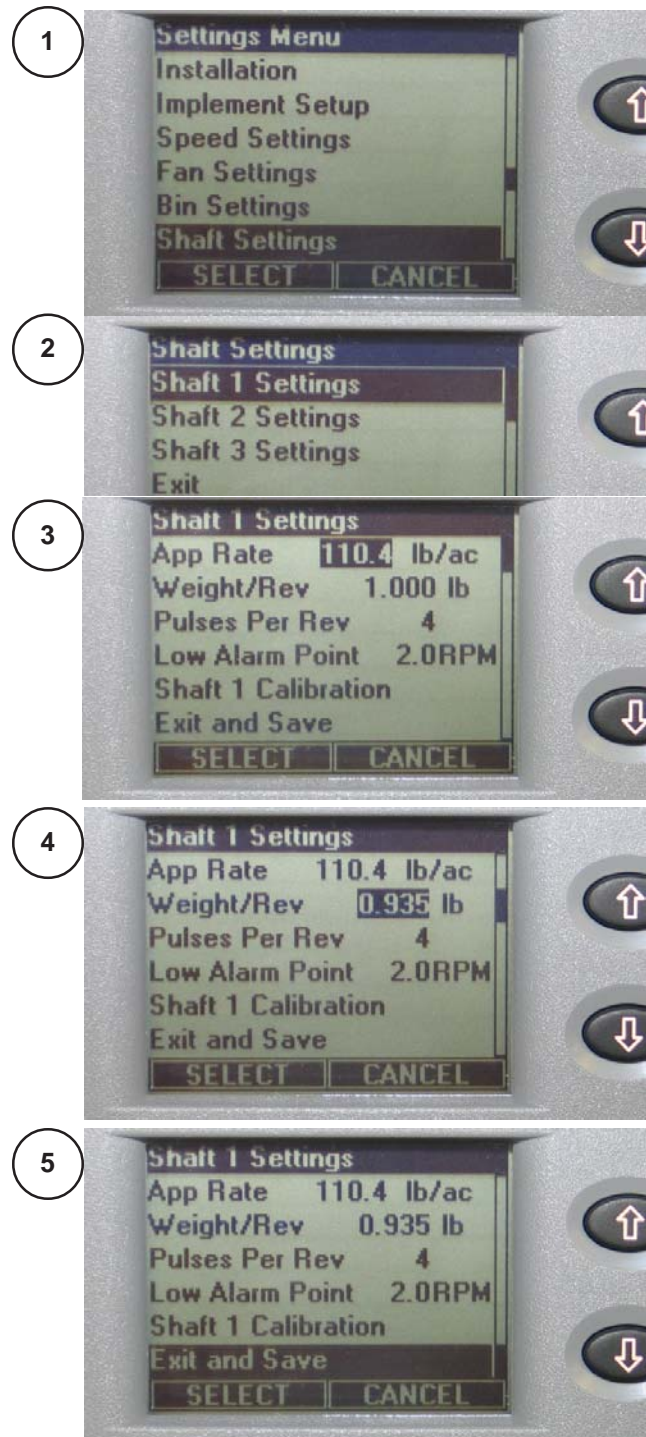
1. From the "Operating Screen" press the MENU key to enter the "Settings Menu". Use the Up/Down keys to select "Shaft Settings" press the SELECT key to enter function.
2. Under "Shaft Settings" use the Up/Down keys to select "Shaft 1 Settings" press the SELECT key to enter function.
3. Press the SELECT key to enter "App Rate". Use the Up/Down keys to change the value to the desired application rate. Press the SELECT key to enter the value and move to the next parameter "Weight/Rev" in the list.
4. Press the SELECT key to enter "Weight/Rev". Use the Up/Down keys to enter desired weight per rev of product from calibration chart. Press the SELECT key to enter the value and move to the next parameter "Pulses Per Rev" in the list.

**Note:** It is recommended to set WT/REV by doing a "Rate Calibration".

5. Use the Up/Down keys to select "Exit and Save" press the SELECT key to save the changes and return to "Shaft Settings" menu.

Follow the above procedure to check the rate of the other tanks.

**Note:** 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".



## 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.

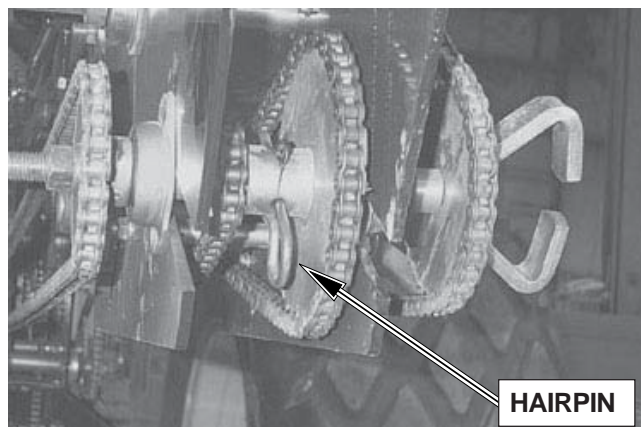
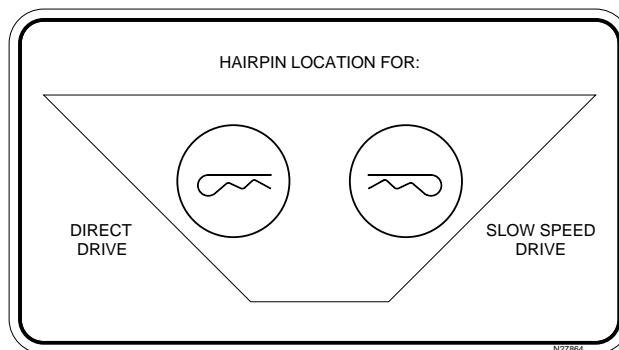
The slow speed transmission is incorporated in the **FRONT** Posi-Drive Transmission.

- 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 orbit motor on the fan requires tractor to have either a load sensing hydraulic system or a closed centre hydraulic system with flow control.

Maximum flow required is 13 U.S. g.p.m. minimum pressure of 2000 p.s.i. However smaller flows can be used depending on the product being metered.

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.

**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.

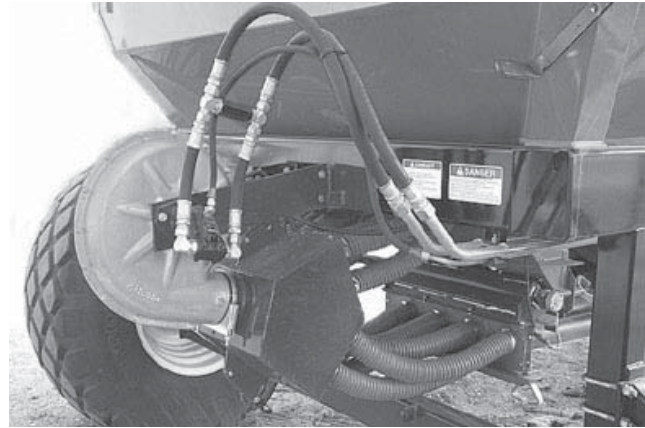
Ensure couplers are free of dirt and are clean when connecting the fan hydraulics to the tractor.

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

**Note:** Always warm-up hydraulic fluid by running hydraulic fan drive at lowest rpm possible (1,000-2,000) for 5-10 minutes before operating at set rpm. Cold hydraulic fluid will cause pressure spikes in the system that will damage the case drain seal in the orbit motor.

## Fan Speed Setting

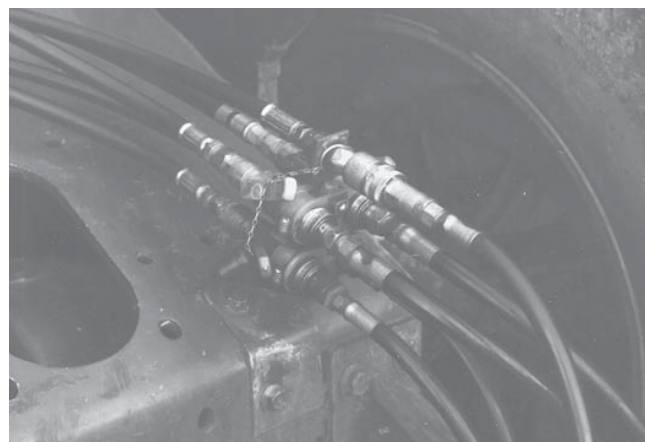
Fan speed is adjusted by increasing the amount of oil being delivered to the motor. This is done by adjusting the respective flow control valve until the desired rpm is displayed on the monitor.



Orbit Motor Drive

## IMPORTANT

Typical shaft seal failures occur when the case drain quick coupler is not attached properly or if the Air Cart is started in cold weather - cold weather makes the hydraulic oil very viscous - any time the *Air Cart is started in cold weather the tractor hydraulics should be allowed to warm up first; then the fan should be started and run at the slowest speed possible for 5-10 minutes before going to full speed.*



Hydraulic Coupling

## 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 <i>Minimum</i> Fan RPM  |                             |                              |                   |              |
|---|-----------------------------|------------------------------|-------------------|--------------|
| Product   | Application Rate            |                              | Fan Speed Setting |              |
|   | Seed                        | Fertilizer                   | Single Shoot      | Double Shoot |
| Fine Seeds  | All Rates                   | All Rates                    | 3000 RPM          | 3000 RPM     |
| Lentils   | All Rates                   | All Rates                    | 3800 RPM          | 3800 RPM     |
| Coarse Grains   | 90 lbs/acre<br>(100 kg/ha)  | 50 lbs/acre<br>(56 kg/ha)    | 4300 RPM          | 3800 RPM     |
|   | 90 lbs/acre<br>(100 kg/ha)  | 100 lbs/acre<br>(112 kg/ha)  | 4500 RPM          | 3800 RPM     |
|   | 90 lbs/acre<br>(100 kg/ha)  | >150 lbs/acre<br>(168 kg/ha) | 4800 RPM          | 4000 RPM     |
| Large Seeds   | 180 lbs/acre<br>(200 kg/ha) | 40 lbs/acre<br>(45 kg/ha)    | 4400 RPM          | 4000 RPM     |
| Fertilizer Light  | * * * * *                   | <100 lbs/acre<br>(112 kg/ha) | 4000 RPM          | * * * * *    |
| Fertilizer Heavy  | * * * * *                   | >100 lbs/acre<br>(112 kg/ha) | 4500 RPM          | * * * * *    |
| <b>Note:</b> Fan Speeds given are when applying product.<br>It is normal for fan speed to drop when not applying product. |                             |                              |                   |              |

# 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.

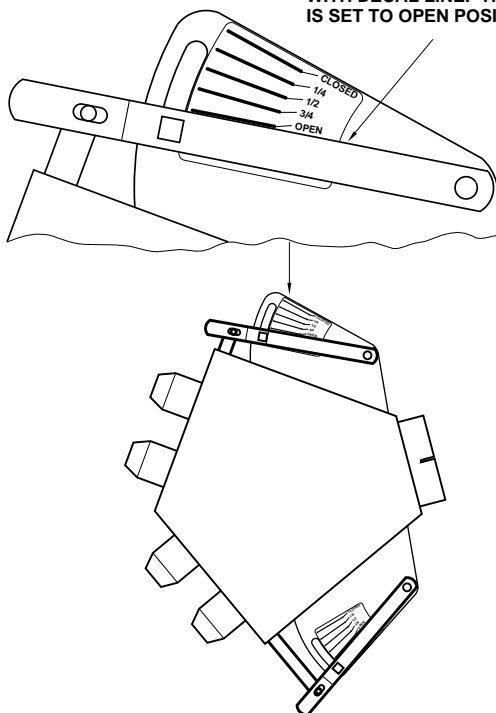
1. Double Shoot - Handles in Double Shoot Position.
2. Single Shoot - Handles in Single Shoot Position.

## Quick Coupler (Tow Behind Only)

The Quick Coupler located on the rear of the seeding tool has two positions. In order to maintain correct product flow the coupler must be set in correct position as outlined on next page.

1. Double Shoot - Top Position
2. Single Shoot - Lower Position

SET PLENUM DAMPER SO THAT TOP EDGE OF STRAP ALIGNS WITH DECAL LINE. THIS DAMPER IS SET TO OPEN POSITION.

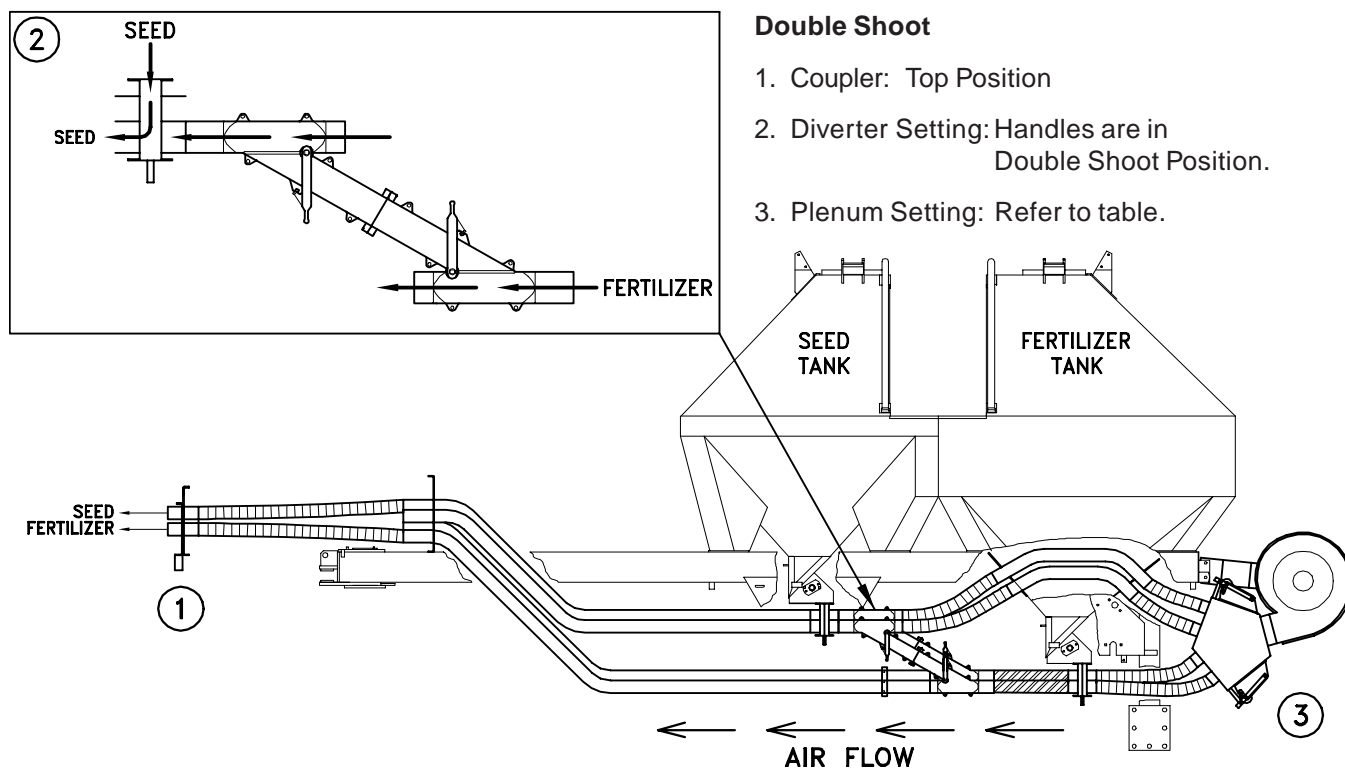


| Suggested Plenum Settings<br>for Average Rates |   |                   |                         |                   |
|--|---|-------------------|-------------------------|-------------------|
| Product  | Seed  |                   | Fertilizer              |                   |
|  | Rate<br>lb/acre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

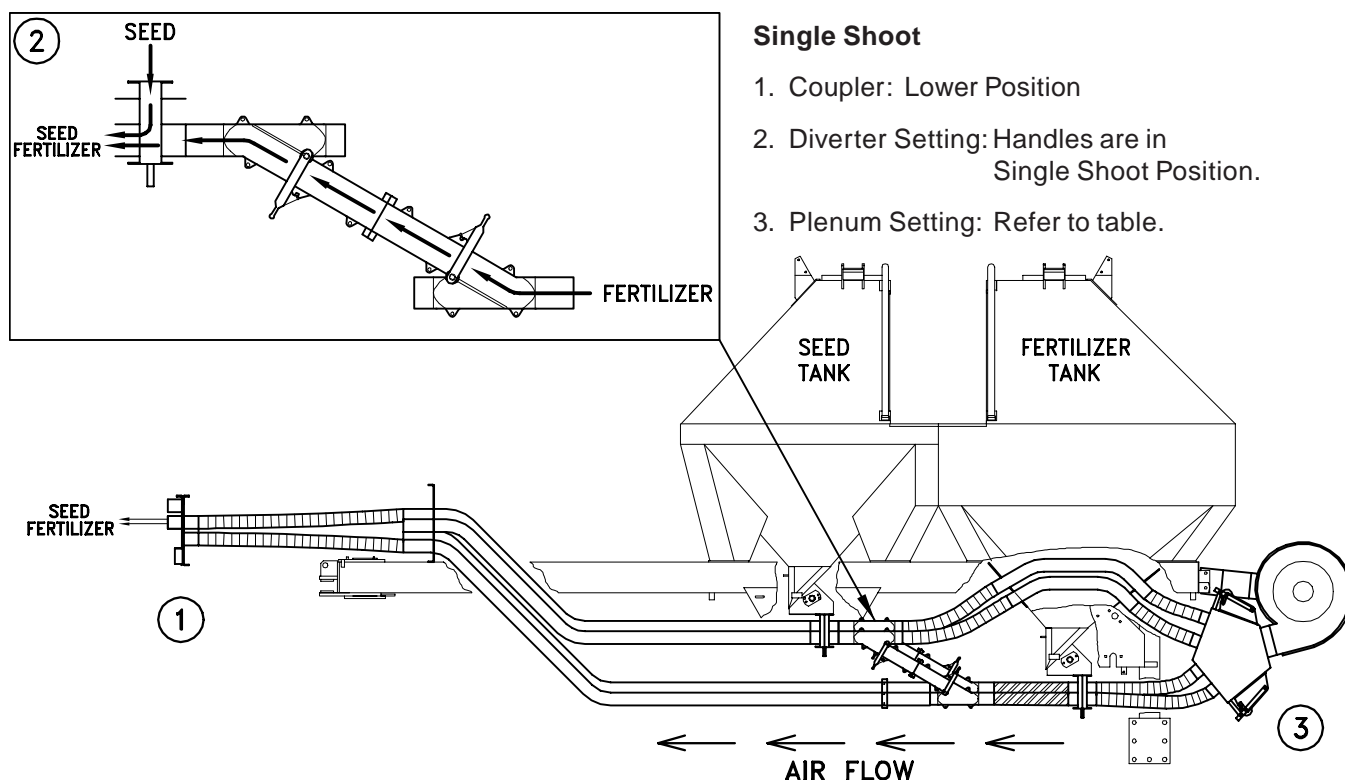
**Note: See “Fan Speeds” for Fan RPM.**

## Double Shoot Settings - Continued

### Double Shoot Tow Behind



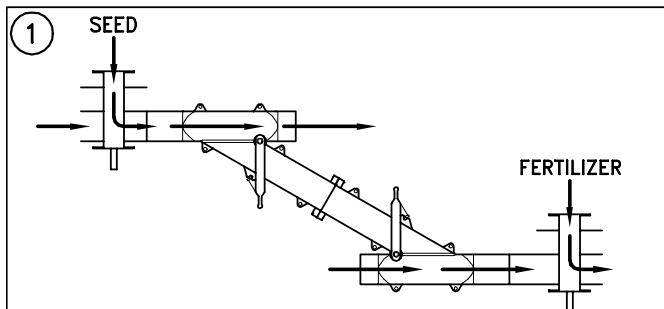
### Single Shoot Tow Behind



# Operation

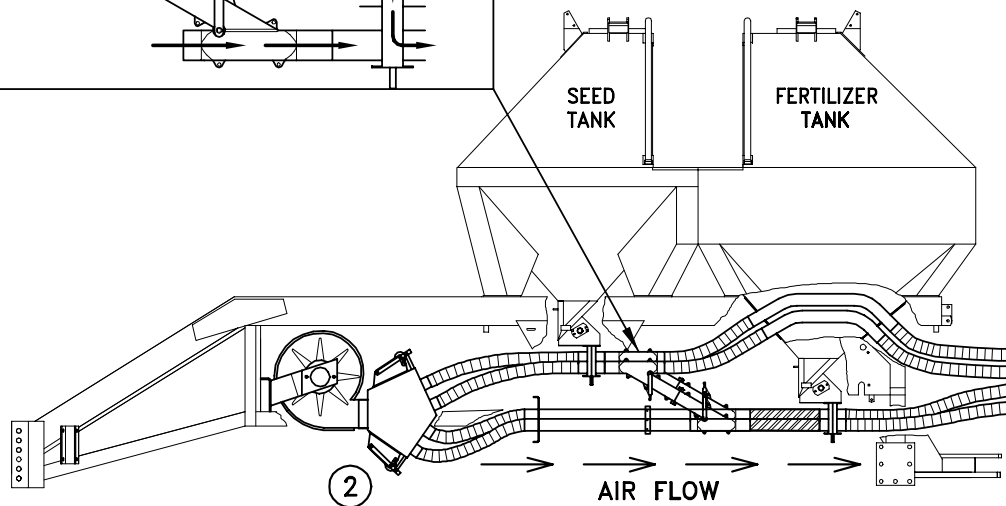
## Double Shoot Settings - Continued

### Double Shoot Tow Between

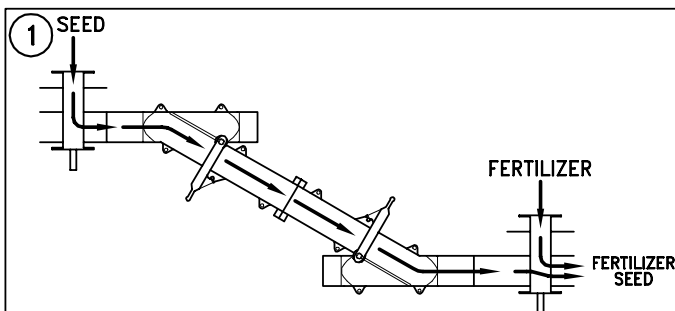


#### Double Shoot

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

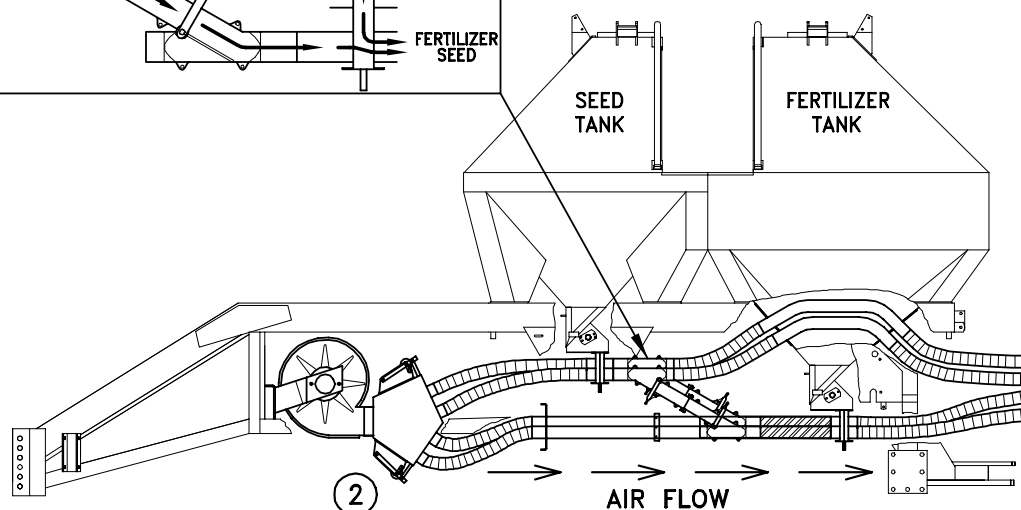


### Single Shoot Tow Between



#### 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

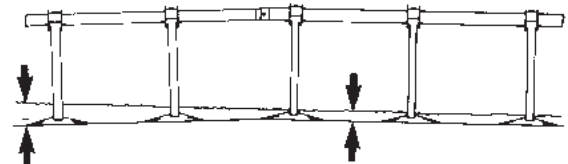
- Poor front to rear levelling causes ridging as shown.
- Check the depth of two adjacent shanks normally one on the front row and one on the rear row.
- Adjust level as necessary. See seeding tool manual for more details.

### Worn Seeding Tool Parts

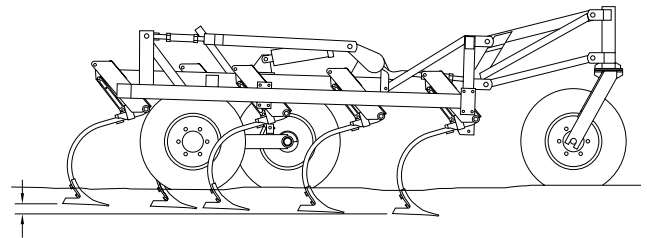
- Shanks that are bent cause uneven depth and they should be repaired or replaced.
- Trip mechanisms that are worn can also cause poor depth control and any worn parts should be repaired or replaced.

### Packing

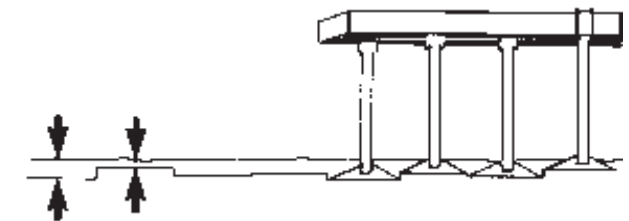
- Packing behind the seeding unit is strongly recommended. This improves germination and helps reduce moisture loss and erosion.
- In wet conditions the head land should be done last to prevent over packing.



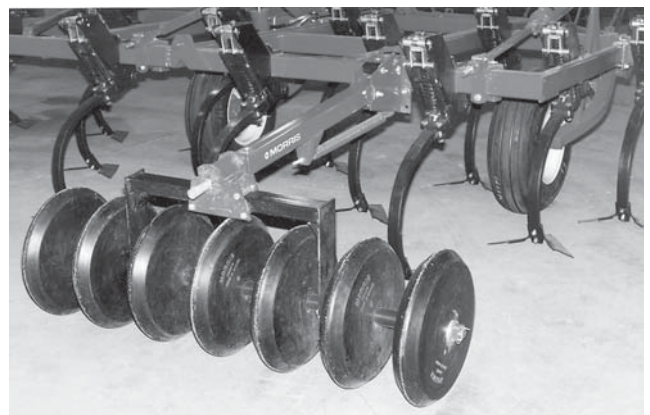
Side to Side Level



Front to Back Level



Ridging Front to Back



Mounted Packers

# Operation

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## 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 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 1" diameter secondary and the 2 1/2" 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.**

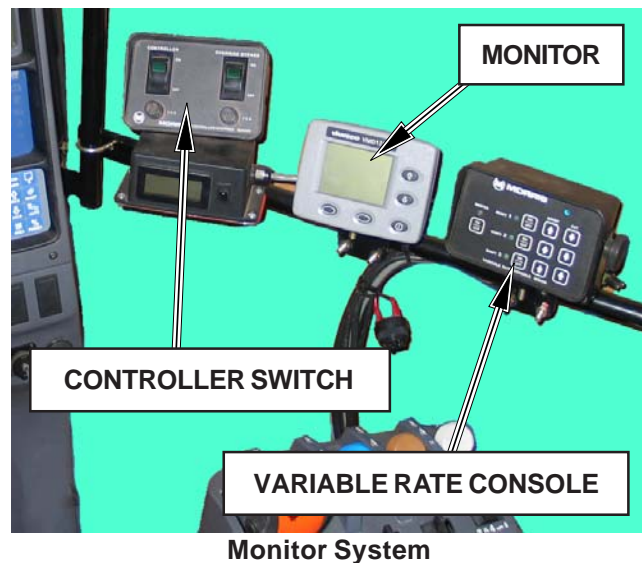
**Note : Check Seed Flow as described above, after running fan for 5 minutes.**

# 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.



## Opener Adjustments - Double Shoot Boots

Improperly adjusted or worn seed openers can cause poor seed/fertilizer separation and plugging which could result in poor emergence.

It is important that the seed openers be properly adjusted.

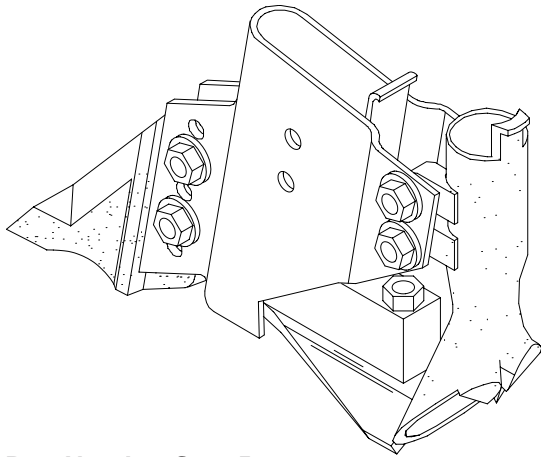
**Note:** Points should be adjusted according to wear and deflectors replaced when worn.

Listed below are guidelines for seed openers S25962, S28158, S29000, and S29140.

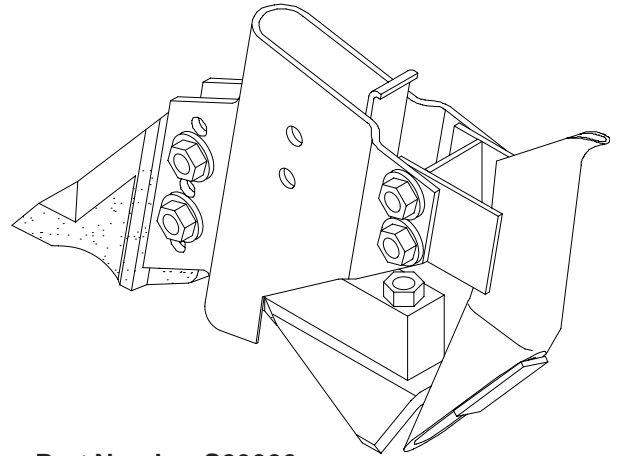
**Note:** When applying Anhydrous Ammonia it is strongly recommended to consult local agricultural extension offices for allowable rates which are dependent on soil moisture and soil type.

| Soil Condition | Point Position       |  |   |
|----------------|----------------------|--|---|
|                | Top                  | Middle (Factory Setting)                                   | Bottom  |
| Light Soil     | Soil moisture medium | Soil moisture wet<br>NH <sup>3</sup> or liquid application | Soil moisture dry<br>NH <sup>3</sup> or liquid application<br>Worn Point adjustment |
| Medium Soil    | Soil moisture medium | Soil moisture wet<br>NH <sup>3</sup> or liquid application | Soil moisture dry<br>NH <sup>3</sup> or liquid application<br>Worn Point adjustment |
| Heavy Soil     | Soil moisture dry    | Soil moisture wet<br>NH <sup>3</sup> or liquid application | Not recommended<br>Worn Point adjustment  |

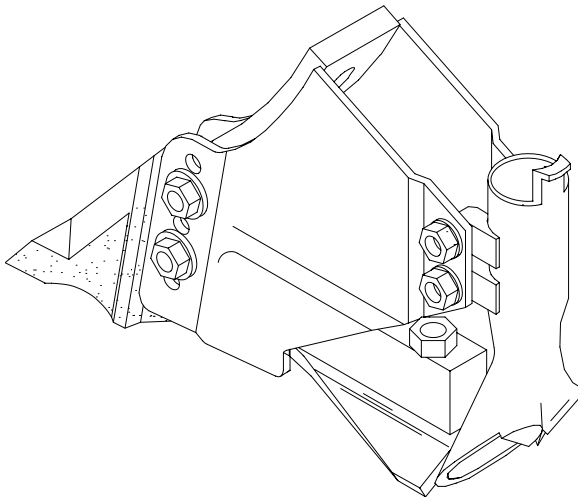
## Opener Adjustments (Double Shoot Boots) - Continued



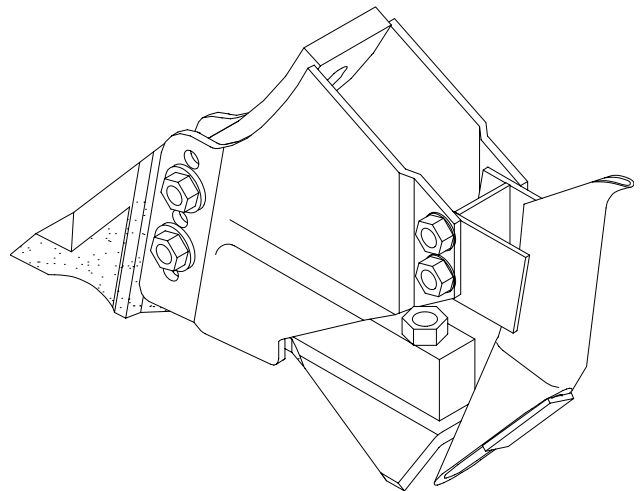
Part Number S28158



Part Number S29000



Part Number S25962



Part Number S29140

### Important

Re-tighten all bolts after initial 10 hours.  
Check tightness periodically thereafter.

### Component Replacement

- Tighten all bolts evenly.
- Drift head of bolts with hammer to seat shoulder of bolt head.
- Re-tighten bolts evenly to specified torque.
  - 3/8" bolts torque to 30 ft. lb.
  - 7/16 bolts Grade 8 torque to 70 ft. lb.



# Operation

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## General Field Operation

- Follow guidelines outlined in *“Operating Guidelines”*.
- Switch monitor on as outlined in the Monitor Section.
- 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 systems as outlined in the “Monitor Section” under *“Identifying Variable Rate Console Switches”*.
- Lower seeding tool into ground.
- Rates can be varied accross field as desired by using the boost and cut buttons for the appropriate product. See *“Identifying Variable Rate Console Switches”* under Monitor Section.
- Turning at headland: Switch metering systems off with the Master On/Off Switch, immediately raise seeding tool fully rephasing hydraulics (see seeding tool manual).
- Once turned engage metering systems with the Master On/Off Switch 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 approximately 15 feet of forward travel @6 M.P.H. before product reaches the seed openers.

## Manual Override

If the variable rate control system fails, the independent manual override system can be used to maintain seeder operation.

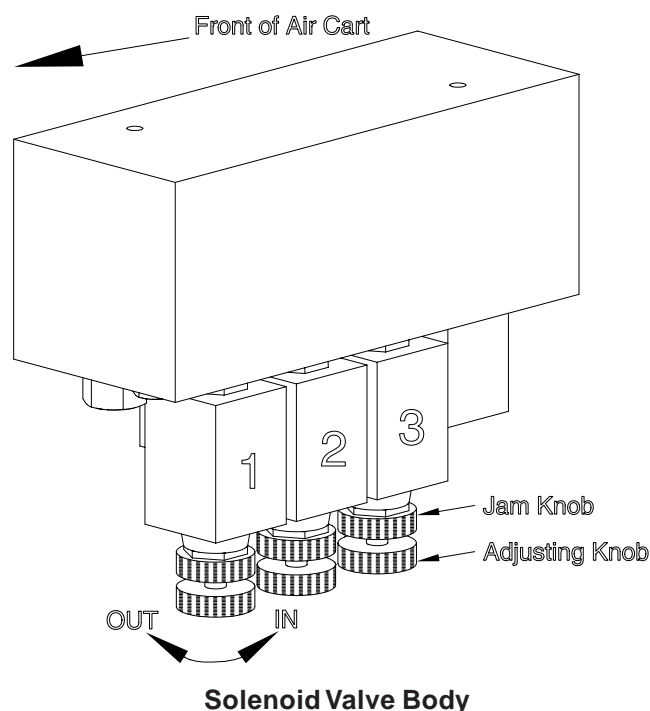
The manual override system provides the ability to run the hydraulic motors at a fixed rate (**not proportional to ground speed**) and to turn the manual system ON and OFF from the tractor cab.

## Rate Setting

To set the manual override system use the following procedure:

- Turn Monitor, VRT Console and Controller Switch OFF.
- Empty product from tanks.
- Refer to the appropriate “*Ground Speed Chart*” on the following pages or use the calculations below to determine the Shaft Motor RPM for the desired product.
- Adjust Shaft Motor RPM using following procedure:
  - Place hand held tachometer onto motor shaft.
  - Loosen Jam Knob.
  - Turn Adjusting Knob IN (Clockwise) until motor turns desired RPM.
  - Tighten Jam Knob to secure Adjusting Knob in place.
- Repeat the above procedure for the other motors.

**Note:** Re-zero shaft hydraulic motors once normal operation of system is resumed.



## Calculating Shaft RPM

If it is desired to calculate the exact rpm for a more specific ground speed use the following:

### Know parameters:

|                  |  |
|------------------|--|
| Working Width    | The operating width of seeding tool. (feet)                                    |
| Working Speed    | Operating ground speed. (mph)  |
| Application Rate | Weight of product. (lbs/acre)  |
| Product WT/REV   | Known from calibration mode or can determine from Calibration Chart. (lbs/rev) |

# Operation

## Manual Override - Continued

### Calculating Shaft RPM

Determine in the following order:

- 1) Travel Distance (feet per acre) =  $43560 \text{ ft}^2 / \text{Working Width (ft)}$
- 2) Travel Speed (feet per minute) =  $\text{Working Speed (MPH)} \times 5280 \text{ ft/mile} / 60 \text{ min/hr}$
- 3) Travel Time (minutes per acre) =  $\text{Travel Distance ft/acre} / \text{Travel Speed (ft/min)}$
- 4) Motor Revs per acre =  $\text{Application rate (lbs/acre)} / \text{WT/REV (lbs/rev)}$
- 5) **RPM** =  $\text{Motor Revs (revs/acre)} / \text{Travel Time (min/acre)}$
- 6) **Meter Shaft RPM**
  - Direct Drive =  $\text{Motor RPM} / 2$
  - Slow Speed Drive =  $\text{Motor RPM} / 16$

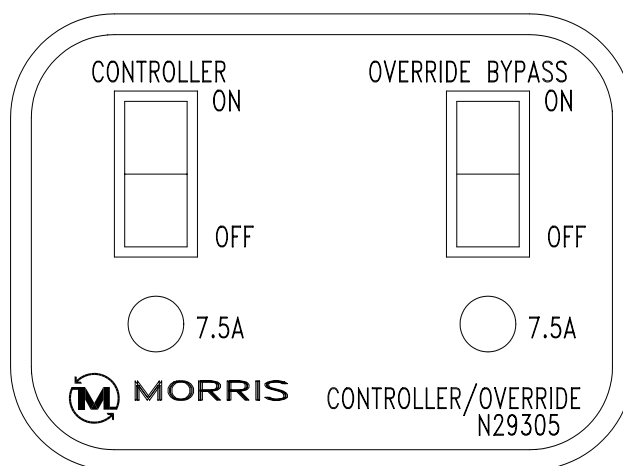
## Operating in Manual Override

- Refill tanks.
- Switch Controller switch OFF and Override **Bypass** switch to ON, this will shut off the Shaft Motors.
- Start Fan.
- Move forward with seeding tool at desired speed.

**Note:** It is important to maintain a constant ground speed since product application rate will not adjust to any changes in ground speed.

- Engage metering system by turning OFF Override Bypass switch.
- Lower seeding tool into ground.
- Turning at headland:
  - Disengage metering system by turning ON Override **Bypass** switch, immediately raise seeding tool fully rephasing hydraulics (see seeding tool manual).
  - Once turned engage metering system by turning OFF Override Bypass switch and lower seeding tool into ground.

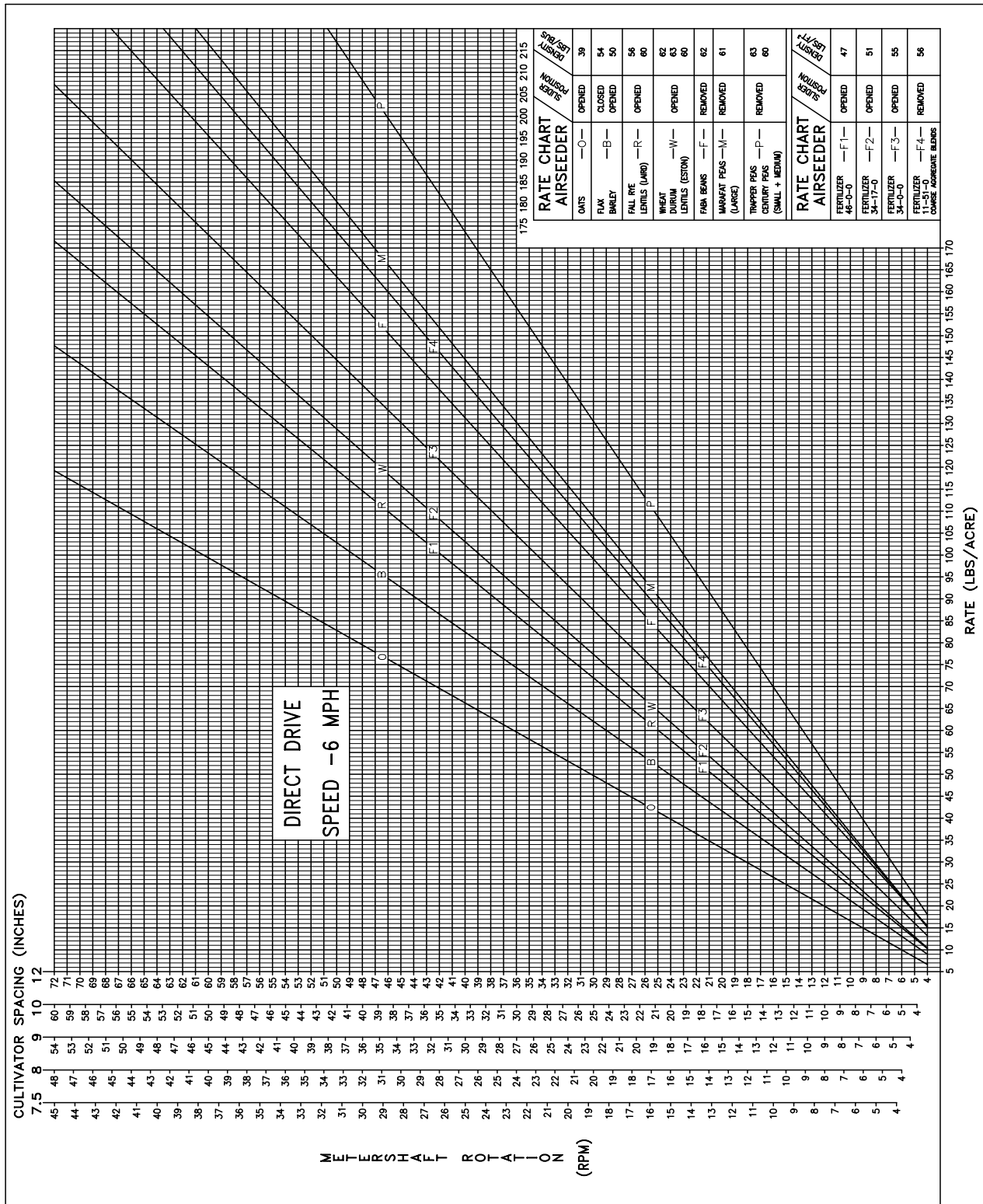
**Note:** Re-zero shaft hydraulic motors once normal operation of system is resumed.



Controller/Override Switches

## Manual Override - Continued

### Ground Speed Chart - Direct Drive 6 mph

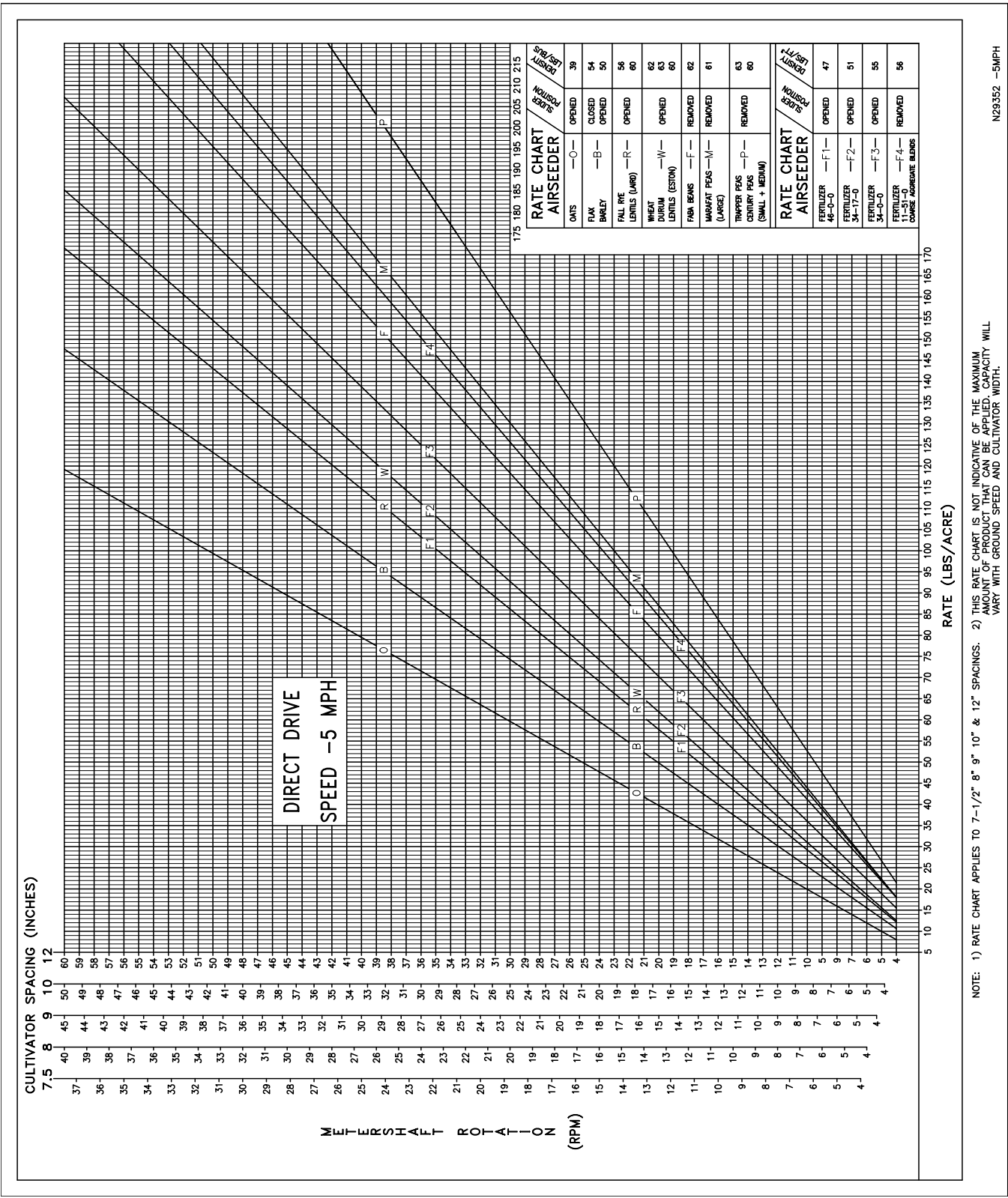


N29352 -6MPH

# Operation

## Manual Override - Continued

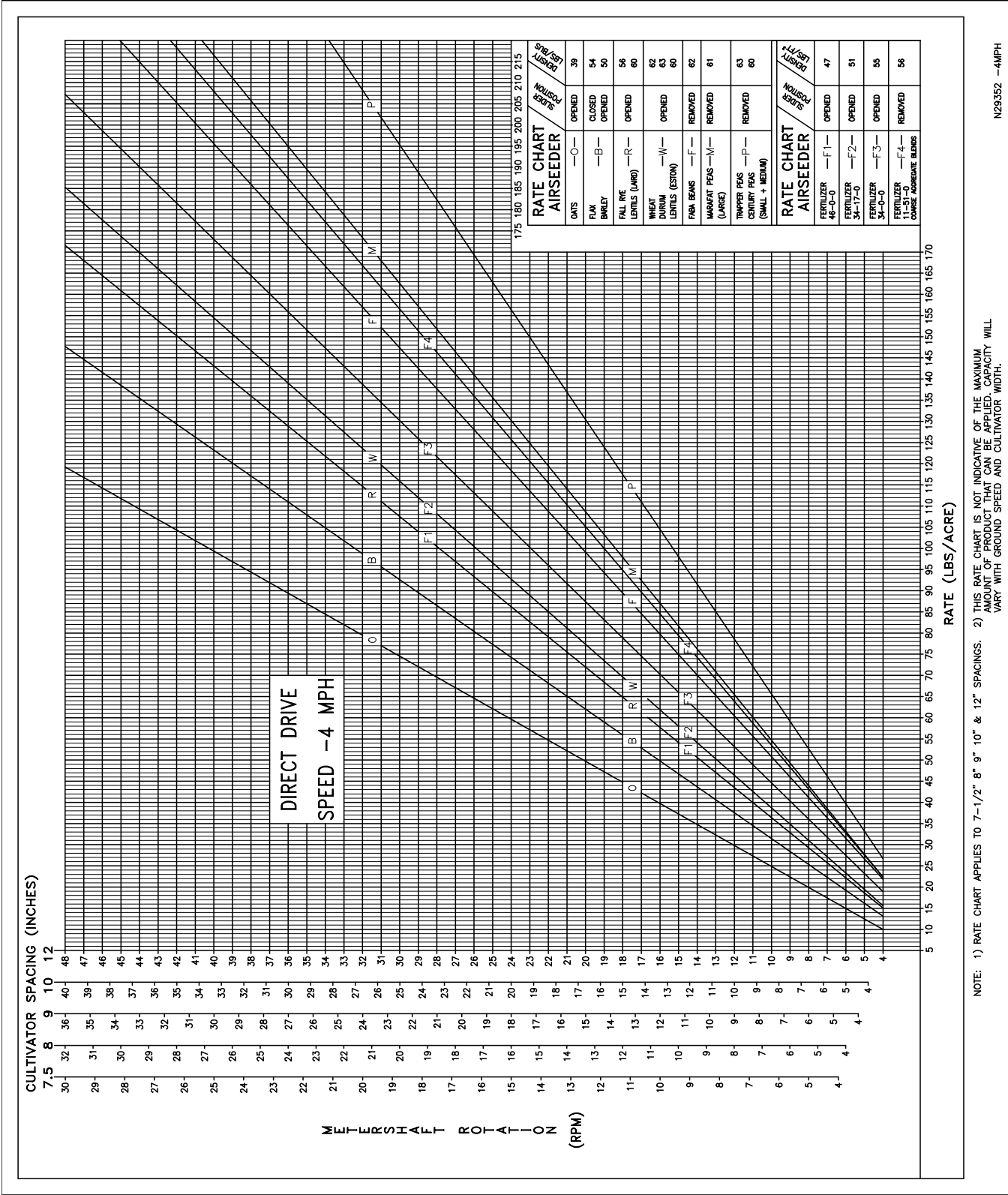
### Ground Speed Chart - Direct Drive 5 mph





Manual Override - Continued

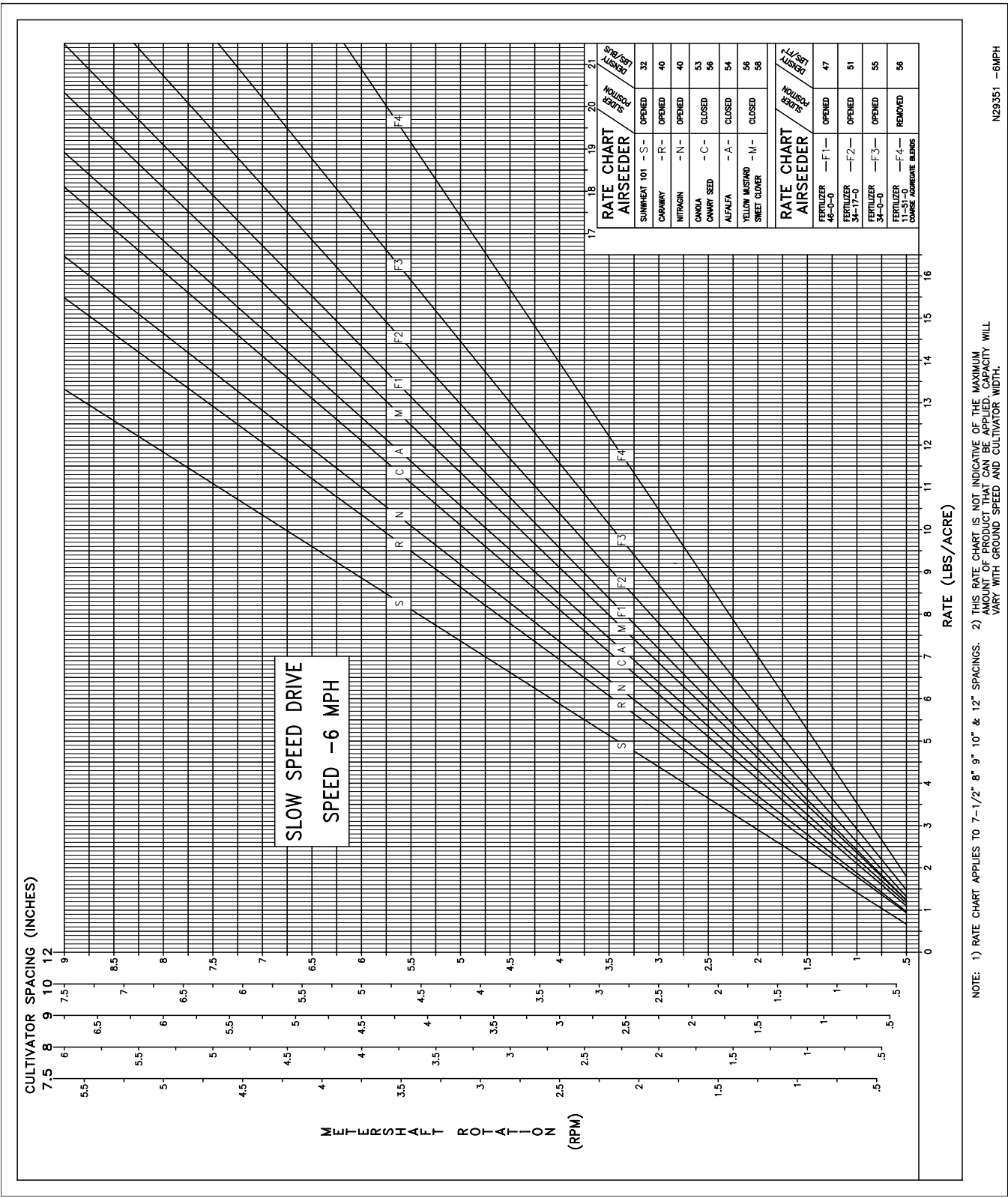
Ground Speed Chart - Direct Drive 4 mph



# Operation

## Manual Override - Continued

### Ground Speed Chart - Slow Speed 6 mph

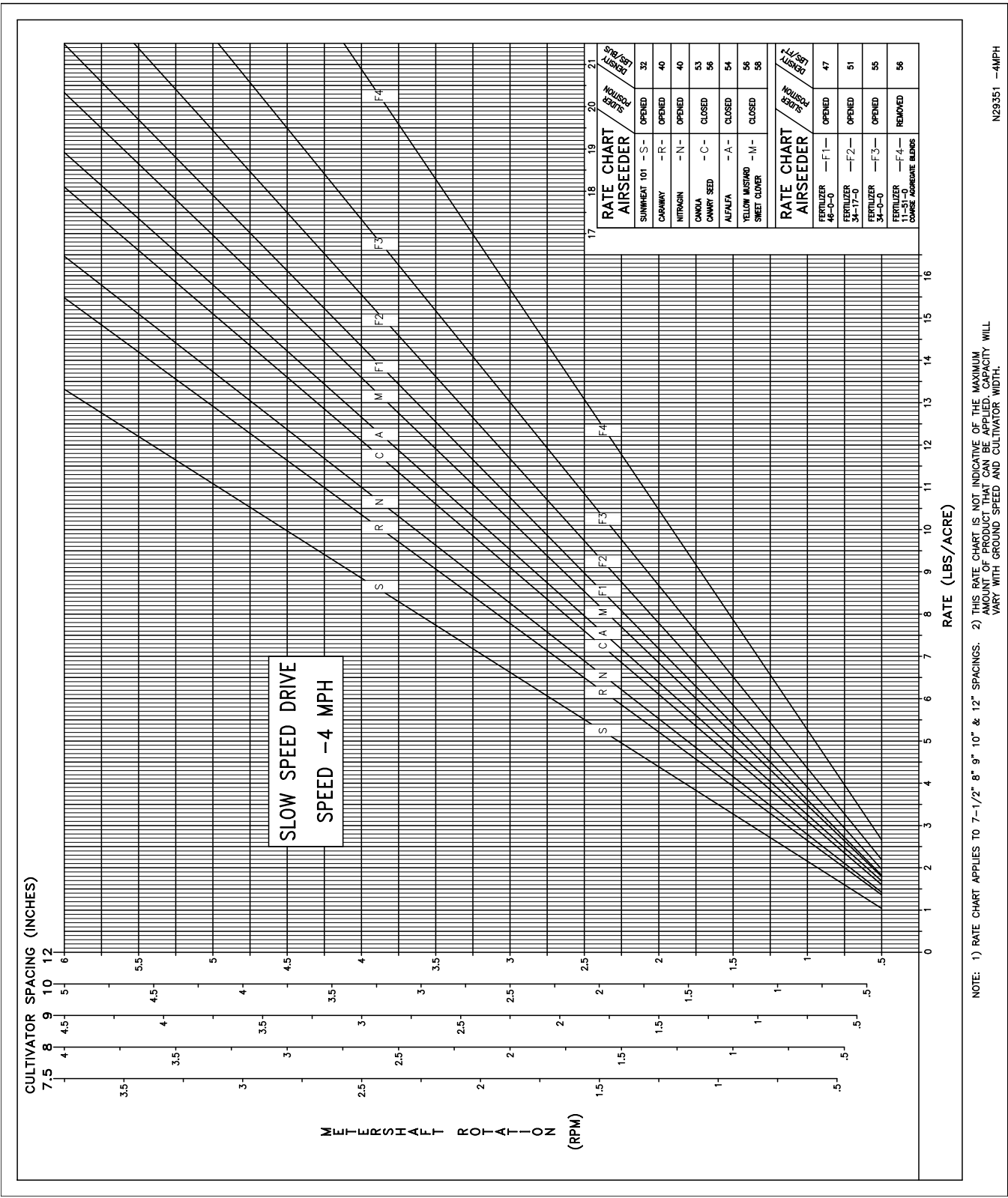




# Operation

## Manual Override - Continued

### Ground Speed Chart - Slow Speed 4 mph



# Section 7: Maintenance

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# Maintenance

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## CAUTION



**BE ALERT**

## SAFETY FIRST

**REFER TO SECTION 1 AND REVIEW ALL  
SAFETY RECOMMENDATIONS.**

### 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<br>Bolt Marking<br> |         | Bolt<br>Size | Grade 8<br>Bolt Marking<br> |      |
| 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.



## Caution

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

| Tire Specifications      |                    |        |           |
|--------------------------|--------------------|--------|-----------|
| Tire Size<br>(Good-Year) | Tire Style         | Rating | Pressure  |
| 16.5L x 16.1             | Softrac II         | 6 ply  | 24 P.S.I. |
|                          | Sure Grip Traction | 6 ply  | 24 P.S.I. |
| 21.5L x 16.1             | Softrac II         | 6 ply  | 24 P.S.I. |
|                          | Sure Grip Traction | 8 ply  | 24 P.S.I. |
|                          | Softrac II         | 10 ply | 28 P.S.I. |
|                          | Sure Grip Traction | 12 ply | 32 P.S.I. |
| 18.4L x 26               | AWT (Implement)    | 10 ply | 26 P.S.I. |
| 23.1L x 26               | AWT (Implement)    | 8 ply  | 20 P.S.I. |
|                          | TD8 Sure Grip      | 10 ply | 28 P.S.I. |
|                          | AWT (Implement)    | 12 ply | 24 P.S.I. |

## 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.

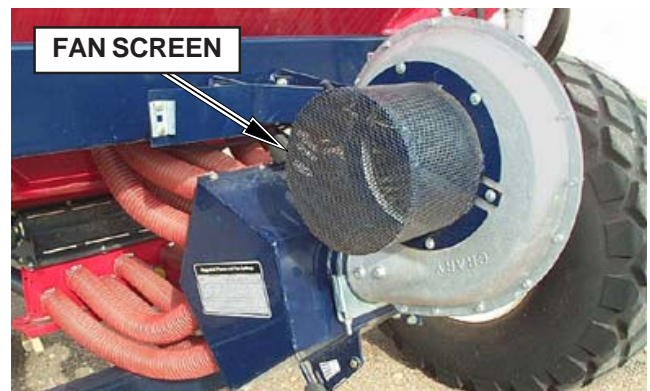
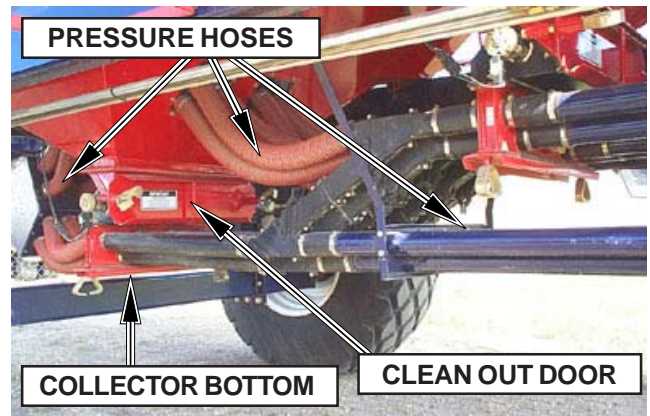
- Assure fan screen is clear of debris.

**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.
- 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.

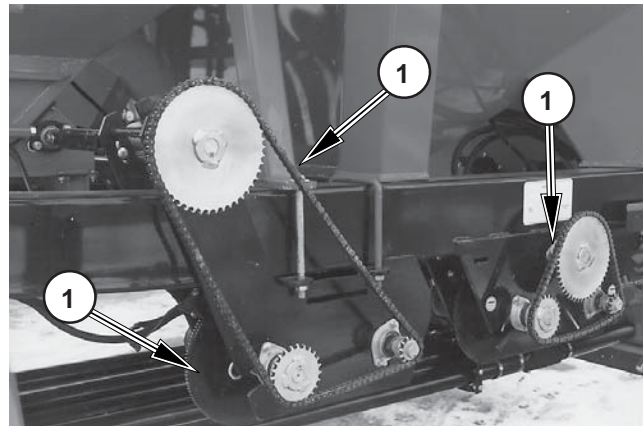
Refer to the photos on **page 7-6** and **7-7** for grease fitting locations.

### 1. Drive Chains

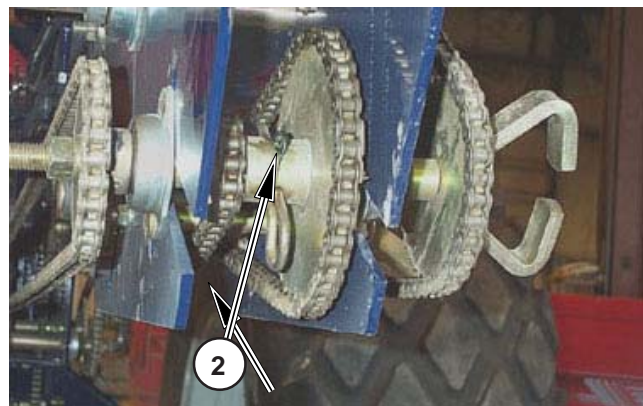
- Oil every 50 hours.

### 2. Slow Speed Drive

- Grease every 50 hours.



1. Drive Chains



2. Slow Speed Drive



## Lubrication - continued

### 3. Front Castor Wheel Bearings

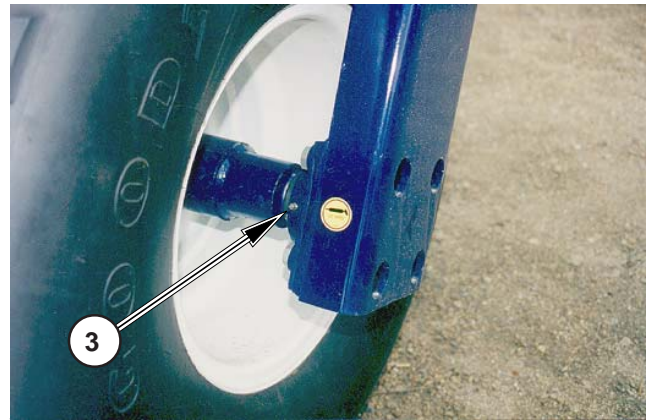
- Grease every 50 hours.

### 4. Castor Fork Pivot (7130 and 7180 only)

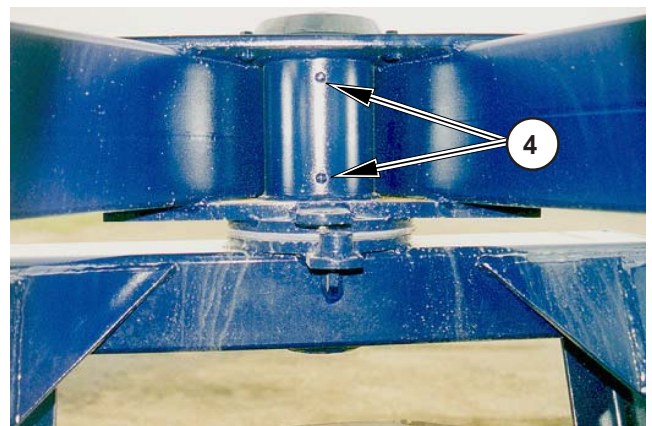
- Grease every 50 hours.

### 5. Auger Pivots

- Grease every 100 hours.



3. Front Castor Wheel bearings



4. Castor Fork Pivot (7130 and 7180 only)



5. 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.**

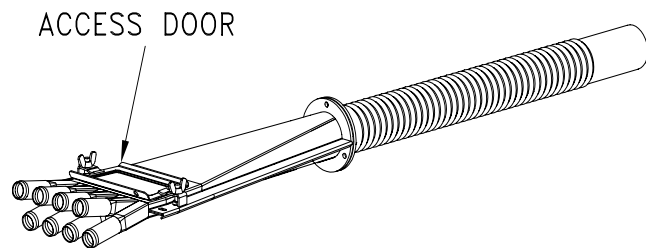
- Regularly check that all hoses are free from kinks or blockages throughout the day. To check for blockages raise seeding tool out of the ground and with the fan running turn crank a couple of turns. Equal amounts of material should be deposited under each boot if not check the following for blockage:
  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.
  10. Couplers between seeder and cultivator.
  11. 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.**

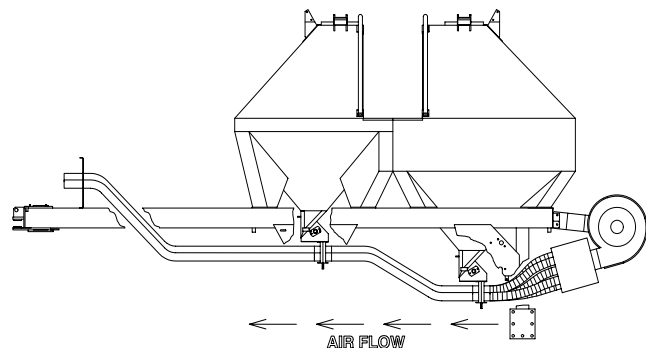
- Once a year check for wear of primary and secondary hoses.

### Caution

Care should be taken when working near the Air Cart while the fan is running. Product blowing out of the system could cause personal injury.



**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.



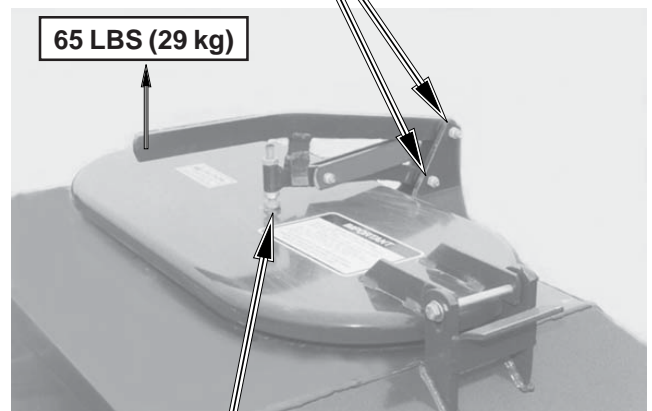
**Note:** This bolt should be loose enough to allow lid to float in the slot.

## 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

### 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.

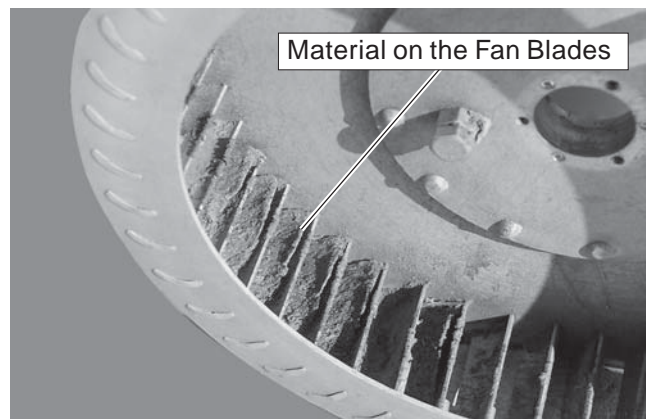
### Fan Impeller

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.



**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.

### 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.



# Maintenance

## Air Delivery System - Continued

### Impeller Clearance

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

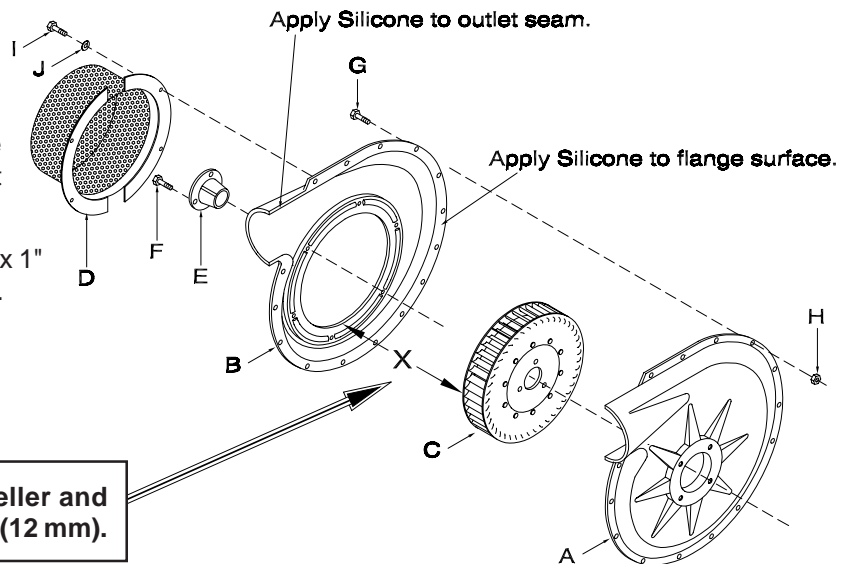
The distance "X" between the impeller and housing inlet, when centred, will be approximately 3/8" (9 mm) to 1/2" (12 mm).

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

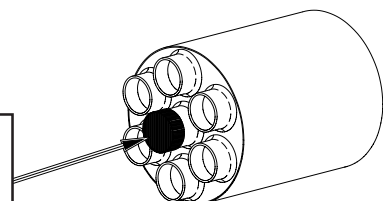
Inspect air delivery hoses for wear and replace as required. Check areas where hoses maybe exposed to moving parts such as hitch hinge area. At the Air Cart hitch area, place a piece of 2 1/2" (64 mm) hose 12" (305 mm) long over top of the two hitch extension pins to protect air hoses from contacting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

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

To optimize the 7000 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.

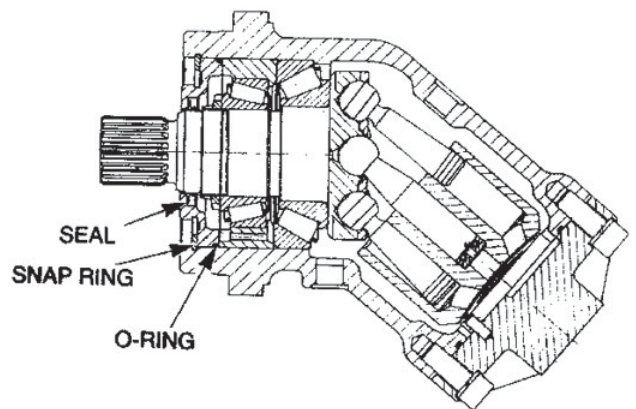
**Note:** The shaft should never be hammered on or forced in as this will result in motor damage upon startup.

- 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.



# 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.

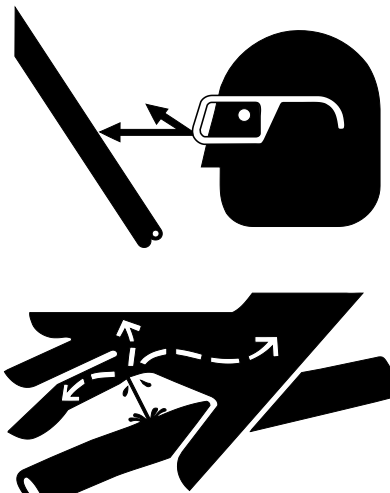


Contact your nearest Dealer for genuine repair parts. Dealers carry ample stocks and are backed by the manufacture and regional associations.

### 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

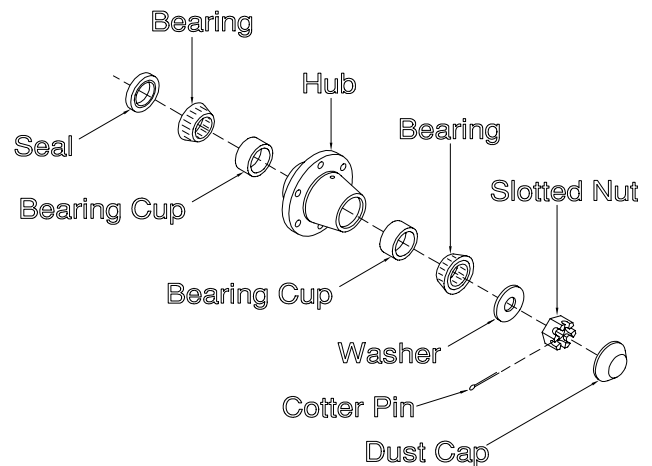
#### HIGH-PRESSURE FLUID HAZARD

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 7240 and 7300 Air Cart 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.

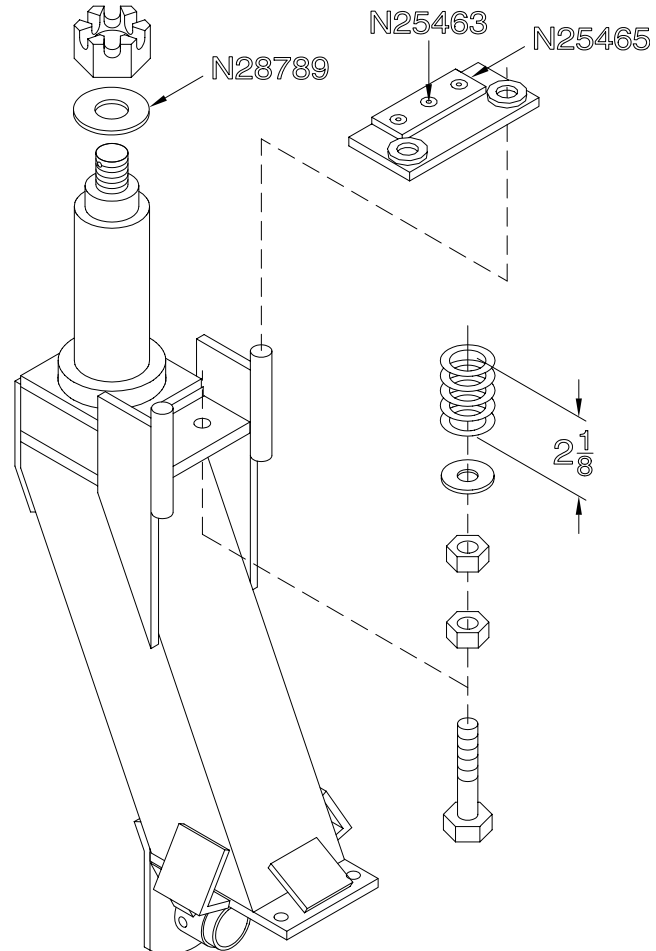
Adjust the castor brake as follows:

- 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.**

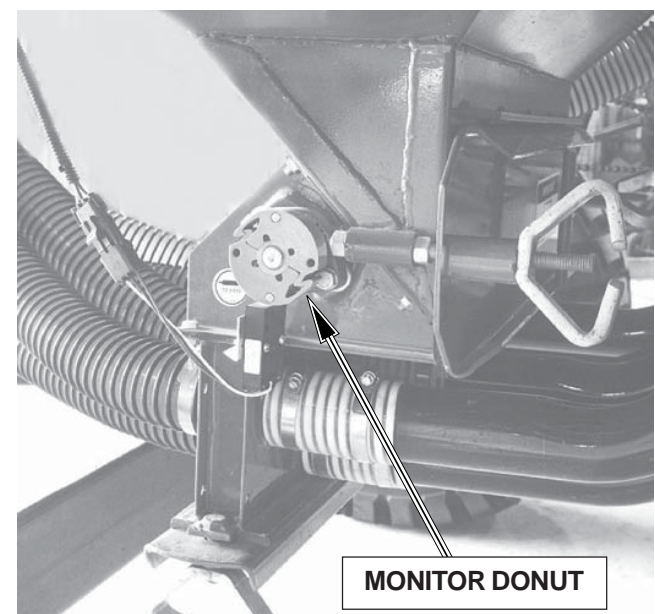
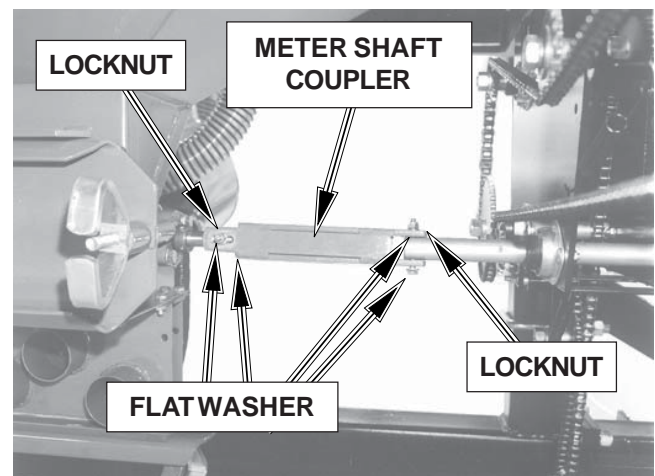
- Place all metering wheels and spacers back into the metering body in the same order they came out of.

**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.

**Table 1**

| Divider Head | Metering Wheel |        | Spacer |             |
|--------------|----------------|--------|--------|-------------|
| Outlets      | Number         | Width  | Number | Width       |
| 7            | 7              | 1 3/4" | 2      | 1/2" & 1/4" |
| 8            | 8              | 2"     | 2      | 1/4" & 1/4" |
| 9            | 9              | 2 1/4" | 1      | 1/4"        |
| 10           | 10             | 2 1/2" | -      | -           |

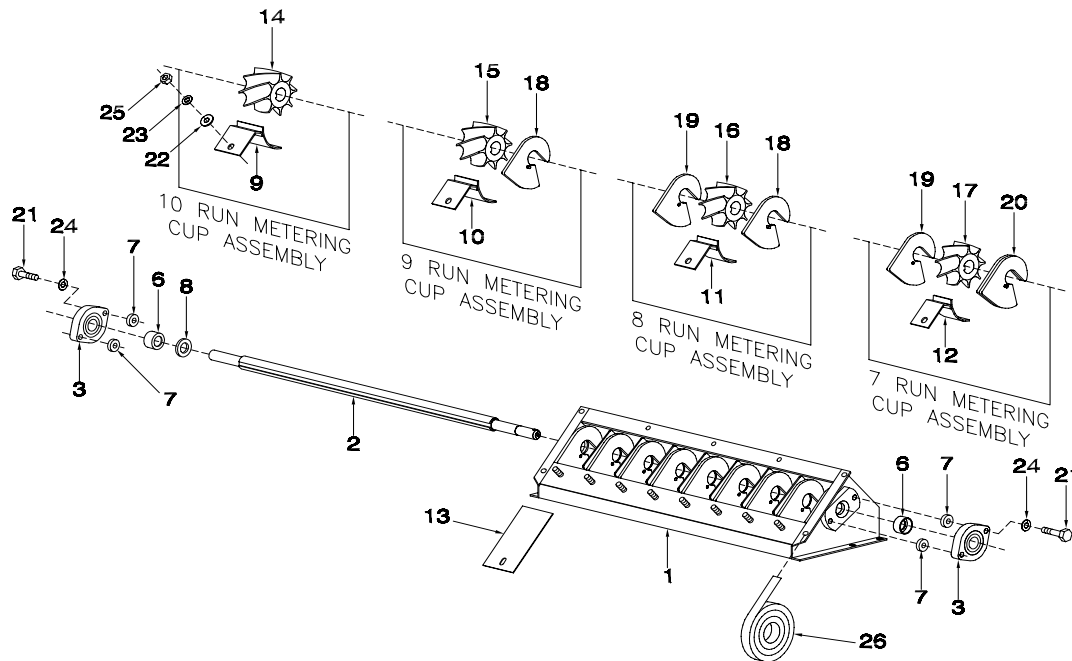


# Maintenance

## Metering - Continued

### Standard Metering Body

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

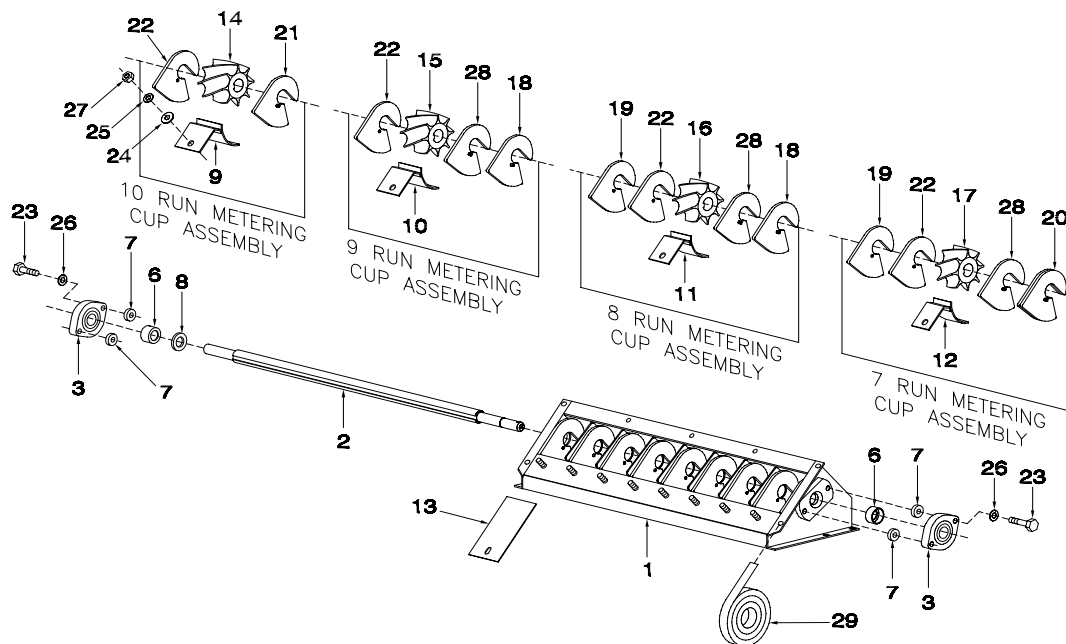


| Item | Part No. | Description   | Qty    |
|------|----------|---|--------|
| 1    | N27100   | Metering Body .....                                     | 1      |
| 2    | N19687   | Metering Shaft - 8 Outlet .....                         | 1      |
| 3    | N19269   | Bearing Assembly - NTN - 2 Bolt Flange .....            | 2      |
| 6    | N21659   | Seal .....  | 2      |
| 7    | N21602   | Spacer .....  | 4      |
| 8    | N21612   | Backing Washer .....                                    | 1      |
| 9    | N27090   | Slider - #10 Wheel .....                                | As req |
| 10   | N27089   | Slider - #9 Wheel .....                                 | As req |
| 11   | N27088   | Slider - #8 Wheel .....                                 | As req |
| 12   | N27087   | Slider - #7 Wheel .....                                 | As req |
| 13   | N27605   | Cover - Blank Off .....                                 | As req |
| 14   | N42130   | Wheel - #10 Metering (Cream Colored) (2.50 width) ..... | As req |
| 15   | N42129   | Wheel - #9 Metering (Cream Colored) (2.25 width) .....  | As req |
| 16   | N42128   | Wheel - #8 Metering (Cream Colored) (2.00 width) .....  | As req |
| 17   | N42127   | Wheel - #7 Metering (Cream Colored) (1.75 width) .....  | As req |
| 18   | N27099   | Spacer Plate - #9 Wheel (Single - Left) .....           | As req |
| 19   | N27098   | Spacer Plate - #8 Wheel (Single - Right) .....          | As req |
| 20   | N27097   | Spacer Plate - #7 Wheel (Double - Left) .....           | As req |
|      | N28492   | Roll Pin - used in Spacer Plates (Not Shown) .....      | As req |
| 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 .....   | As req |
| 10   | N27089   | Slider - #9 Wheel .....  | As req |
| 11   | N27088   | Slider - #8 Wheel .....  | As req |
| 12   | N27087   | Slider - #7 Wheel .....  | As req |
| 13   | N27605   | Cover - Blank Off .....  | As req |
| 14   | N42130   | Wheel - #10 Metering (Cream Colored) (2.50 width) .....              | As req |
| 15   | N42129   | Wheel - #9 Metering (Cream Colored) (2.25 width) .....               | As req |
| 16   | N42128   | Wheel - #8 Metering (Cream Colored) (2.00 width) .....               | As req |
| 17   | N42127   | Wheel - #7 Metering (Cream Colored) (1.75 width) .....               | As req |
| 18   | N27099   | Spacer Plate - #9 Wheel (Single - Left) .....                        | As req |
| 19   | N27098   | Spacer Plate - #8 Wheel (Single - Right) .....                       | As req |
| 20   | N27097   | Spacer Plate - #7 Wheel (Double - Left) .....                        | As req |
| 21   | N28927   | Plastic Spacer - Wheel (Left) .....                                  | 8      |
| 22   | N28929   | Plastic Spacer - Wheel (Right) .....                                 | 1      |
|      | N28492   | Roll Pin - Used in Spacer Plates (Not Shown) .....                   | As req |
| 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.

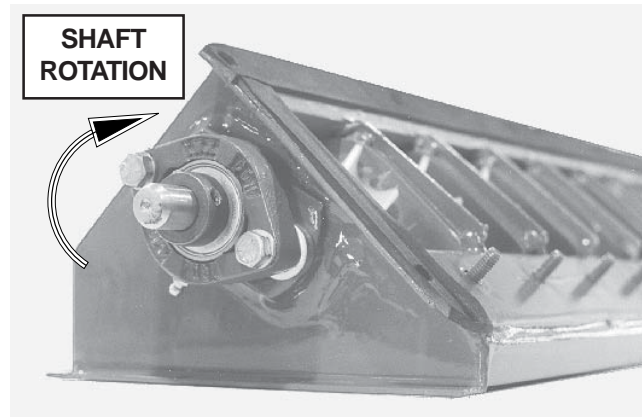
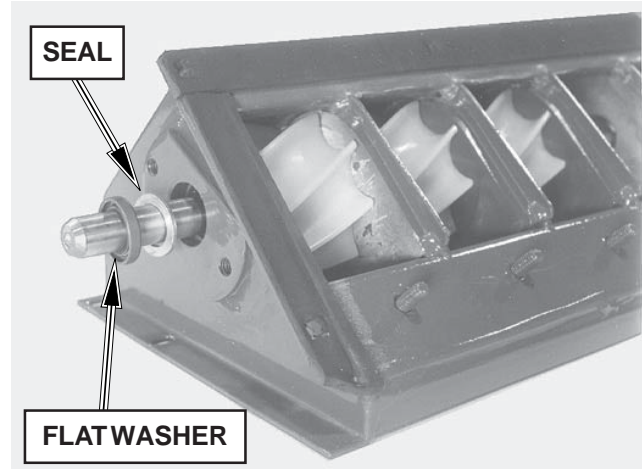
**Note:** Care must be taken that the key ways are aligned, otherwise damage to the key in the wheels may occur.

- 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

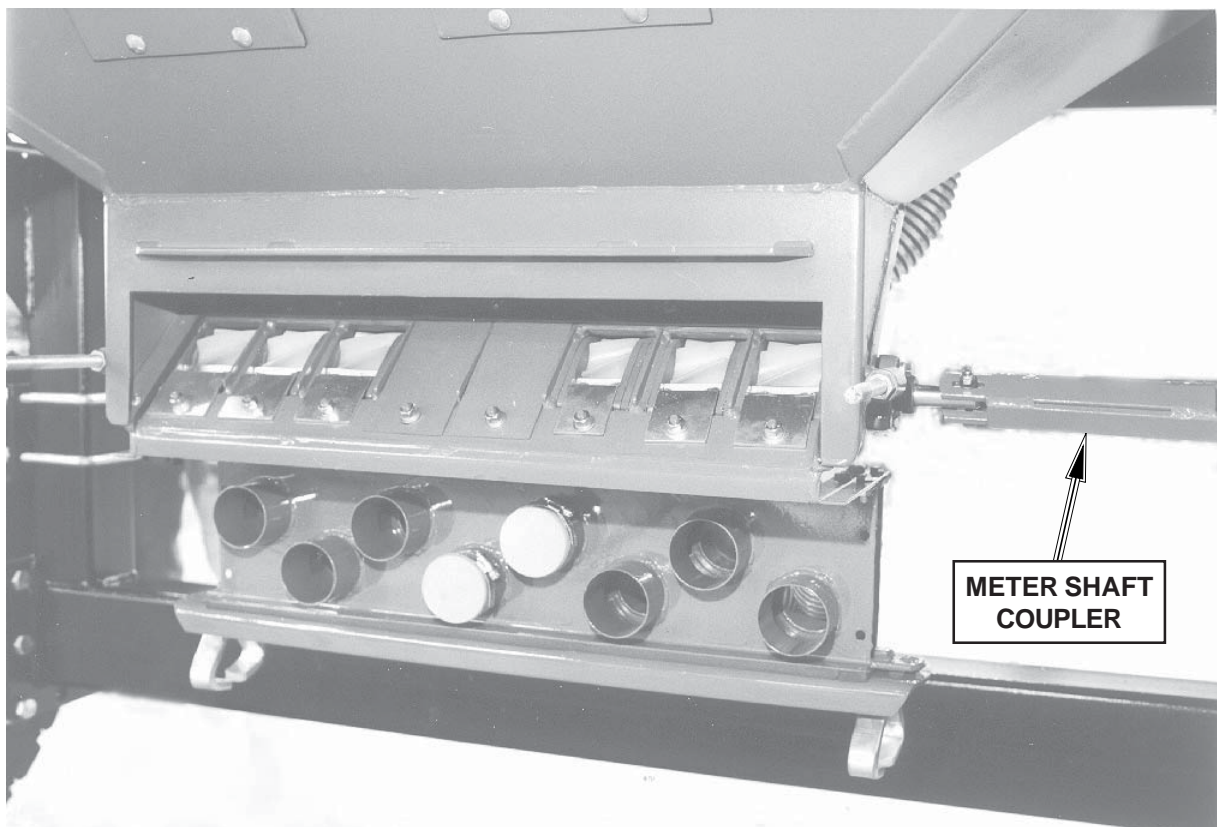
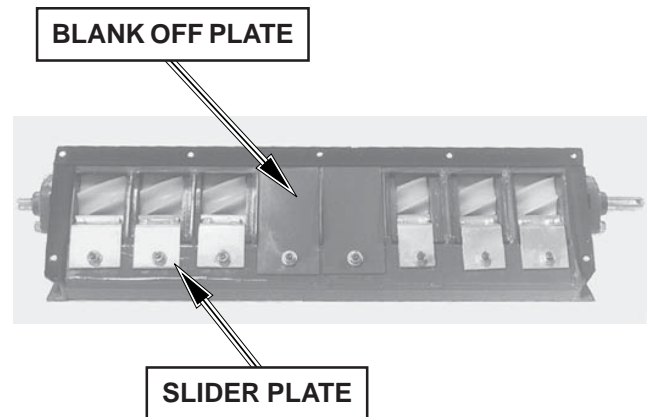


## Metering - Continued

- 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.**

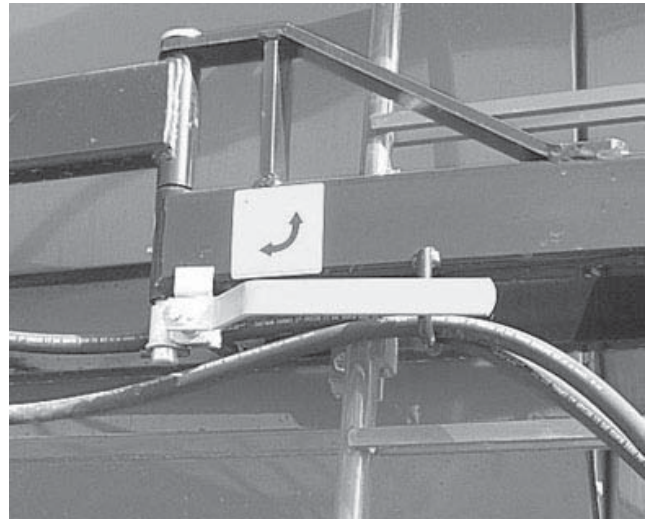
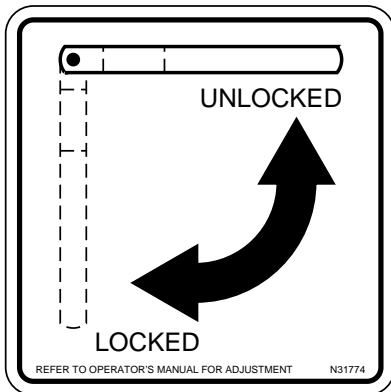




# Maintenance

## 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.



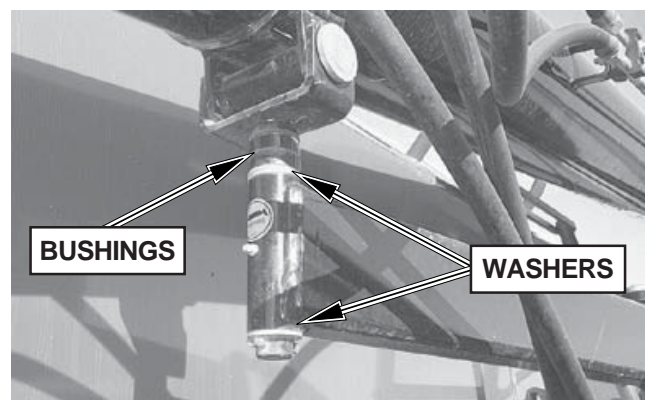
Auger Arm Lock

## 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.



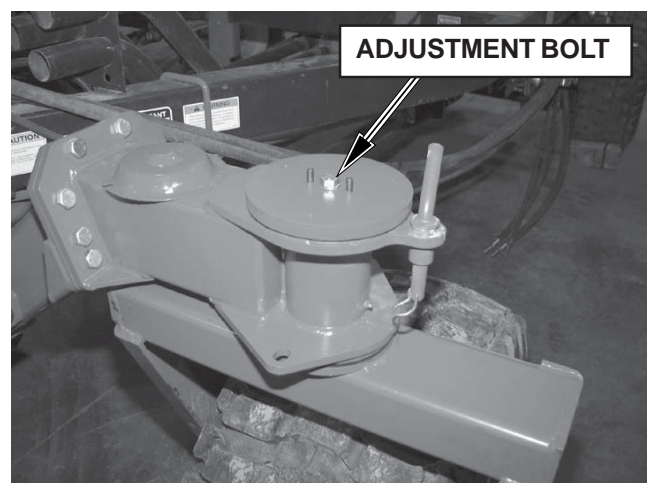
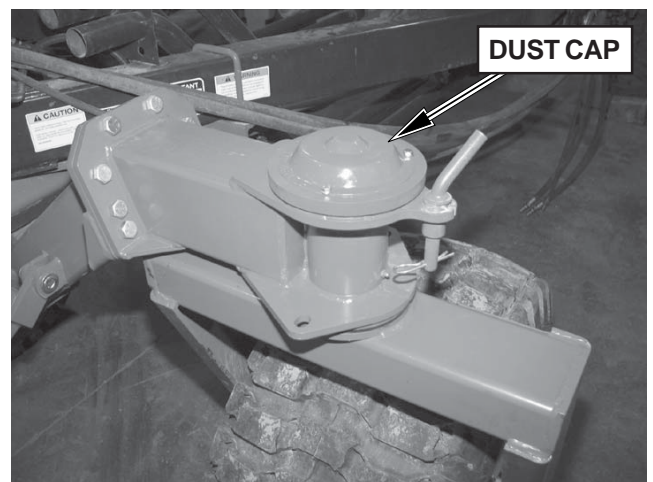
Middle Pivot Saddle

## 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

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Notes

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# Section 8: Storage

## Section Contents

|                             |     |
|-----------------------------|-----|
| Preparing for Storage ..... | 8-2 |
| General .....               | 8-2 |
| Metering Body Storage ..... | 8-3 |
| Removing From Storage ..... | 8-4 |
| General .....               | 8-4 |
| Monitor .....               | 8-4 |
| Auger .....                 | 8-4 |

# Storage

## Preparing for Storage

### General

- To insure longer life and satisfactory operation, store the 7000 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.
- 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

### Spray Cans:

| Part Number | Description            |
|-------------|------------------------|
| W-4647      | Red MORRIS Spray Can   |
| W-4648      | Blue MORRIS Spray Can  |
| N31087      | White MORRIS Spray Can |

### Litre Cans:

| Part Number | Description             |
|-------------|-------------------------|
| Z-10        | Red MORRIS Paint/Litre  |
| Z-11        | Blue MORRIS Paint/Litre |



## Preparing for Storage - Continued

### Metering Body Storage

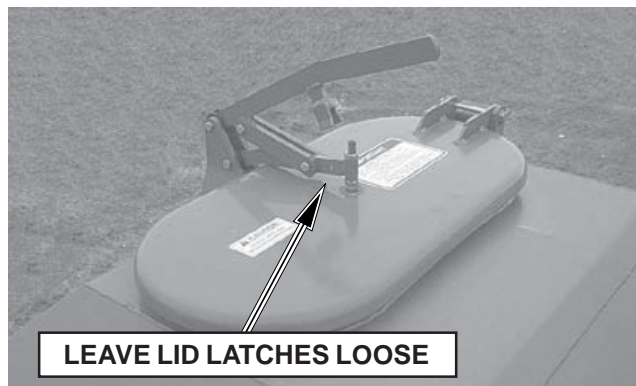
It is extremely important that the metering system is thoroughly cleaned before storing for any length of time.

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.

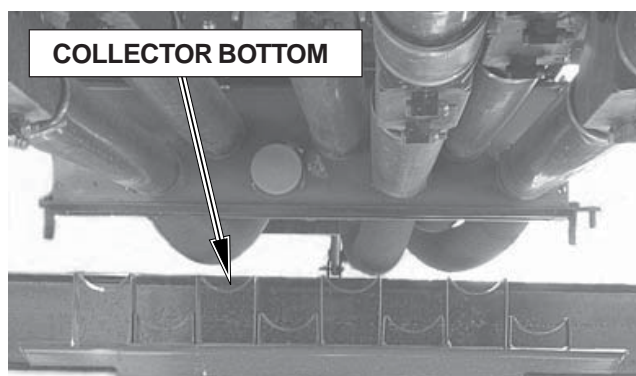
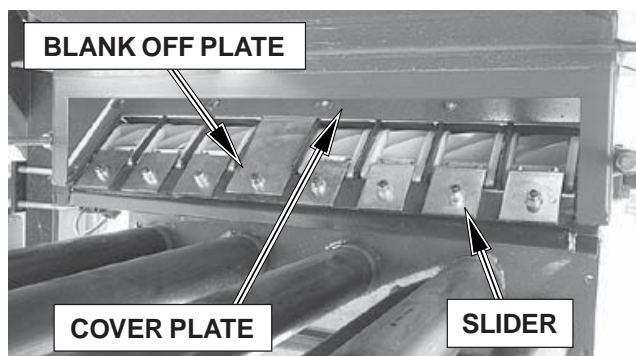
**Note: Diesel fuel will harm seals.**

- 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

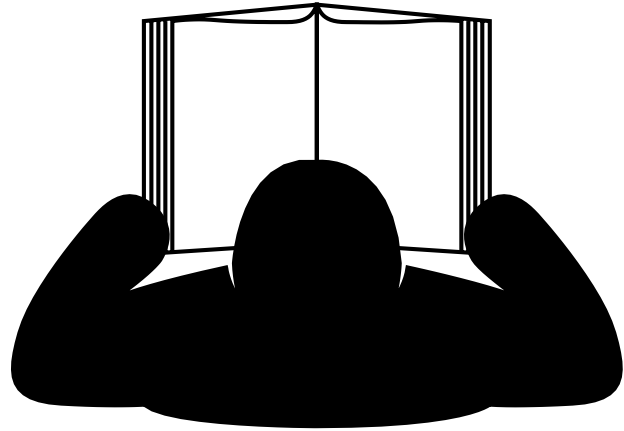
# Storage

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## Removing From Storage

### General

- Review Operator's Manual.
- Check tire pressure (Refer to Tire Pressure List)
- Clean machine thoroughly.
- Tighten lid latches.
- 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.

### 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   |
|---|--|--|
| <b>General</b>                                      |  |  |
| Delivery hoses plugged.                             | Insufficient air flow.                             | Clean fan impeller blades.<br>Clean fan intake screen.<br>Increase fan rpm.  |
|   | Hose sag.  | Shorten hoses or add additional supports.  |
|   | Seed boots plugged with dirt.                      | Clean seed boots.<br>See <i>"Seed Boot Plugging"</i> 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.  |
|   | Poorly mounted hoses.                              | Reroute hoses.   |
|   | Pulleys loose on shaft.<br>ENGINE DRIVE ONLY       | Properly fix pulley to shaft.  |
| Hydraulic fan will not turn                         | Broken fan belts<br>ENGINE DRIVE ONLY              | Replace belts. Ensure fan is rotating clockwise facing the impeller.   |
|   | Loose fan belts<br>ENGINE DRIVE ONLY               | Tighten fan belt adjusting springs.  |
|   | Selector valve in wrong position.                  | Switch the selector to fan position.   |
| Fan turning too slow                                | Hydraulic hoses not connected properly to tractor. | Reverse hydraulic hoses.   |
|   | Insufficient oil flow.                             | Perform flow test.   |
| Front Castor moving too freely. (7240, 7252 & 7300) | Flow to hydraulic motor.                           | Increase flow control setting.   |
|   | Low hydraulic pressure.                            | Check hydraulic pressure min. 2100 psi.  |
|   | Brake Not adjusted properly.                       | Adjust brake as necessary. See <i>"Brake Adjustment"</i> in Maintenance Section.                                     |

# Troubleshooting

| Problem   | Cause   | Correction   |
|---|---|--|
| Front Castor moving too freely. (7240, 7252 & 7300)                       | Worn brake pad.   | Replace brake pad. See <i>"Brake Adjustment"</i> in Maintenance Section.   |
| 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.<br>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.<br>See <i>"Air Leaks"</i> in Maintenance Section.<br>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.<br>1 3/4" wide wheel for 7 outlet head.<br>2" wide wheel for 8 outlet head.<br>2 1/4" wide wheel for 9 outlet head.<br>2 1/2" wide wheel for 10 outlet head.<br>Be sure appropriate spacers are also used. |
|   | Incorrect spacing sprocket.                                   | Install correct sprocket on back of transmission.<br>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.<br>Replace damaged seals.<br>See Maintenance Section.  |

# Troubleshooting

---

| Problem  | Cause   | Correction  |
|--|---|---|
| <b>VRT System</b>                                      |   |   |
| Motors will not turn in Manual Mode (Controller OFF)   | Not equipped with a Third Tank or Granular Tank | Disconnect wire harness from solenoid '1' and turn adjusting knob fully out |
|  | Selector valve (Fan/Auger)                      | Switch selector valve to fan position                                       |
|  | Hydraulic oil flow                              | Ensure hydraulic lever is properly engaged                                  |
| Motors will not turn in Operation Mode (Controller ON) | Not equipped with a Third Tank or Granular Tank | Disconnect wire harness from solenoid '1' and turn adjusting knob fully out |
|  | Selector valve                                  | Switch selector valve to fan position                                       |
|  | Hydraulic oil flow                              | Ensure hydraulic lever is properly engaged                                  |
|  | Sensor Gap                                      | Check VRT sensors, gap should be .030                                       |
| Motors turn continuously in Operation Mode             | Shaft Motor Solenoids                           | Zero Shaft Motors   |
|  | Sensor Gap                                      | Check VRT sensors, gap should be .030                                       |
| Motors turn continuously in Calibration Mode           | Sensor Gap                                      | Check VRT sensors, gap should be .030                                       |

# Troubleshooting

| Problem                                      | Cause                                    | Correction  |
|--|--|---|
| <b>Monitor</b>                               |  |   |
| 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"                                |
|  | Faulty sensor.                           | Replace sensor.                                     |
|  | Broken or shorted wire.                  | Replace or repair harness.                          |
| No ground speed display                      | Broken or shorted wire.                  | See Above.  |
|  | Sensor to magnet gap too large.          |   |
|  | Faulty sensor.                           |   |
| No meter speed display.                      | Broken or shorted wire.                  | See Above.  |
|  | Sensor to magnet gap too large.          |   |
|  | Faulty sensor.                           |   |
| No display, no back light.                   | Switched off                             | Switch unit on.                                     |
|  | Poor power connections at the battery.   | Ensure good connections.                            |
| No display, no back light.                   | Failed fuse.                             | Replace fuse.                                       |
|  | Battery below 8 volts.                   | Check battery voltage.                              |
|  | Temperature below -10C or above +40C.    | Operate between -10C and +40C.                      |
| Blown fuse.                                  | Power hooked up backwards.               | Hook up correctly. <b>RED</b> to positive terminal. |

# Troubleshooting

---

| Problem                     | Cause                                       | Correction                       |
|-----------------------------|---|----------------------------------|
| Bin indicates always empty. | Broken wire.                                | Repair wire.                     |
|                             | Faulty sensor.                              | Replace sensor.                  |
|                             | Wires not hooked to sensor.                 | Hook up correctly.               |
| 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.                  |



# Section 10: Options Assembly

## Section Contents

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# Options Assembly

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## Section Contents - Continued

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## 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

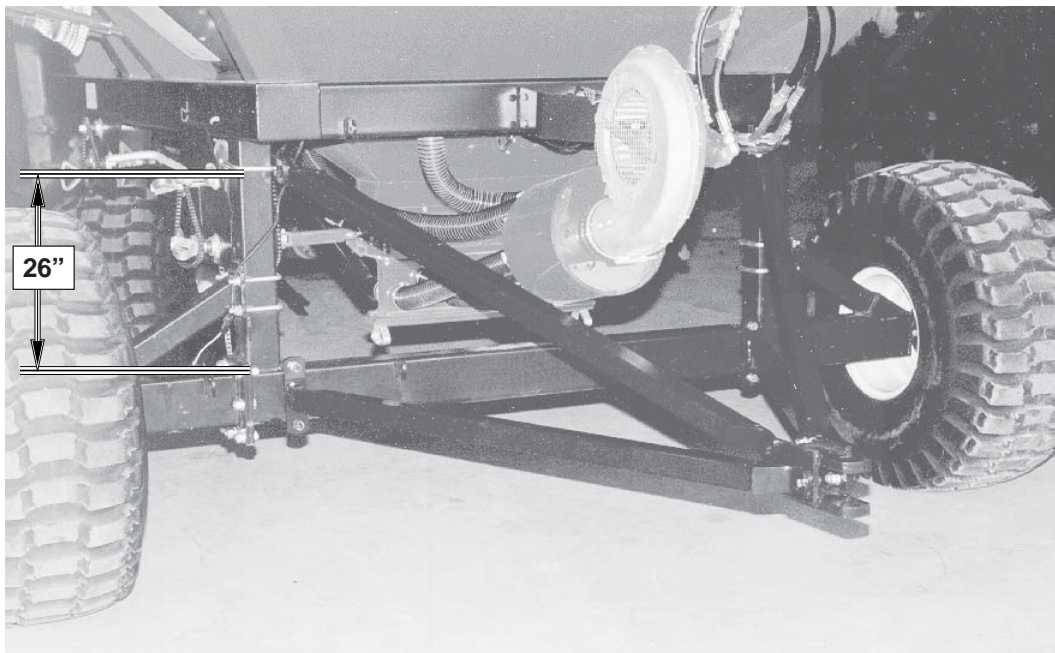
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## Rear Tow Hitch (Tow Behind)

### 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)

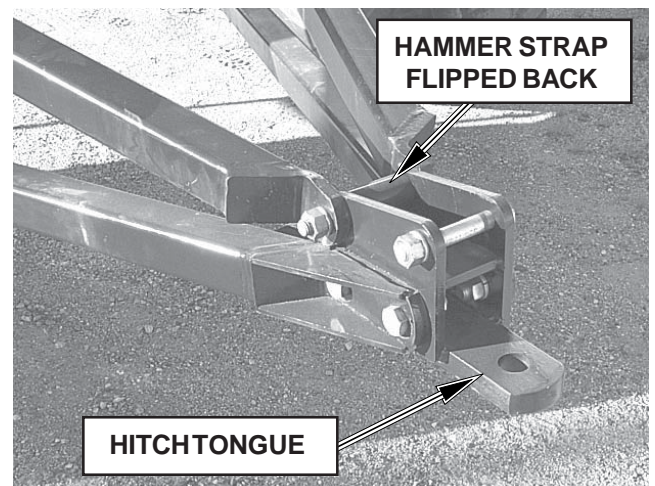
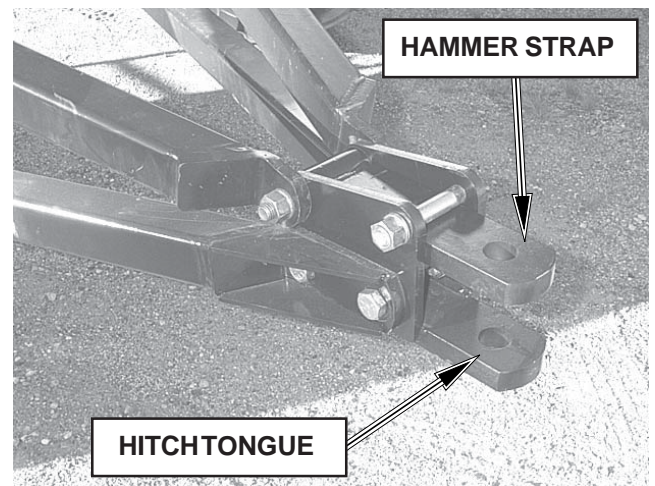
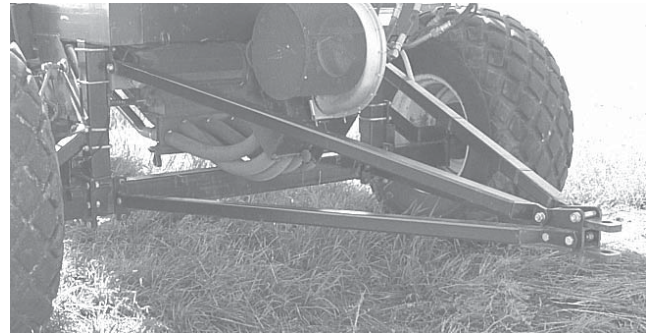
### Extended Hitch

- 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.

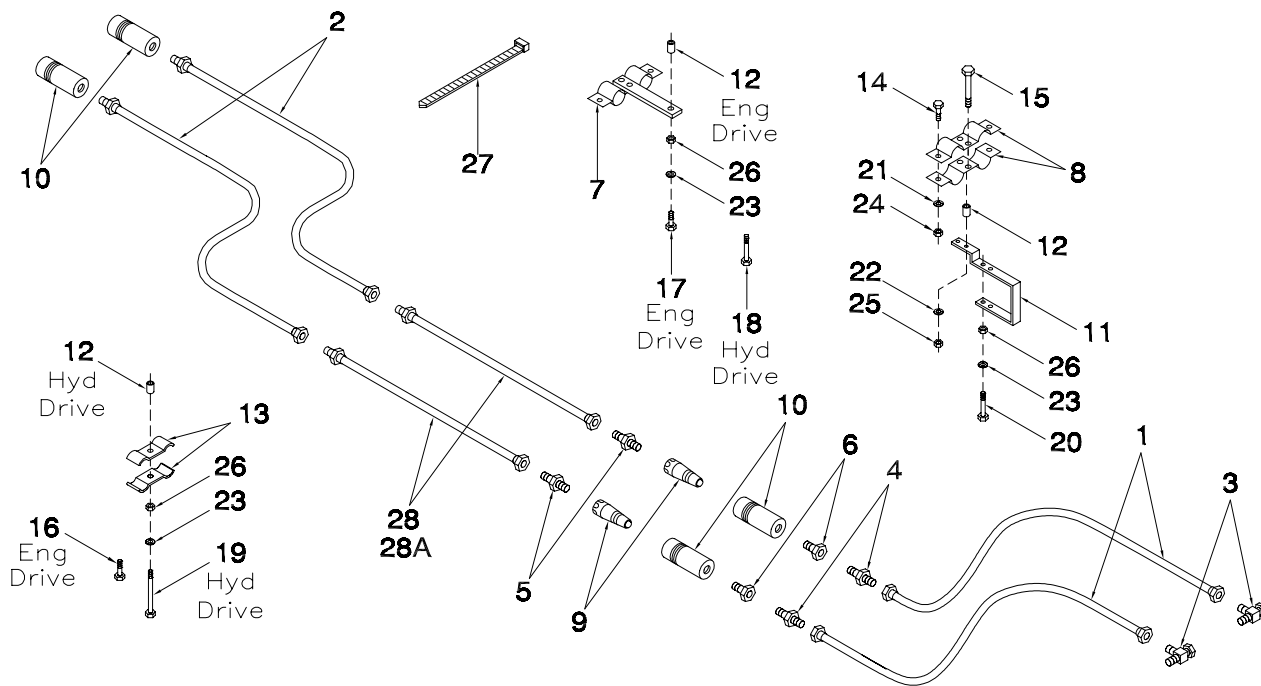
**Note:** Leave all bolts loose for initial assembly.





# Options Assembly

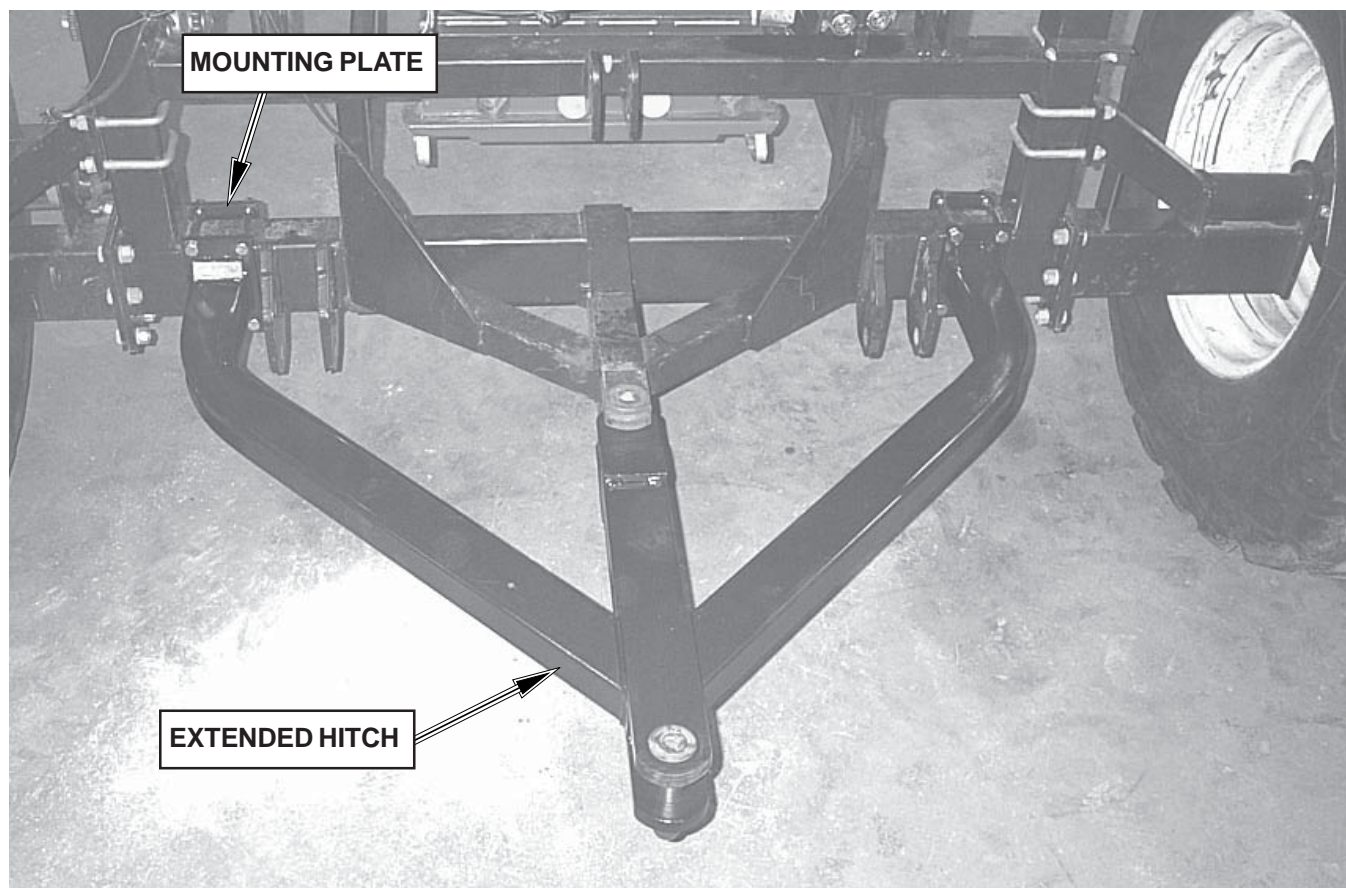
## Rear Tow Hitch (Tow Behind)



| 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   | C-4385   | Hyd Hose - 1/2 x 24 Lg w/7/8-14 MJIC x 7/8-14 FJIC 7130 /7180 .....            | 2   |
| 28A  | C15310   | Hyd Hose - 1/2 x 72 Lg w/7/8-14 MJIC x 7/8-14 FJIC 7240 / 7252 / 7300 .....    | 2   |
|      | H27842   | Kit - Hydraulic Extension - 7130 / 7180 (Includes All Items Except #28A)       |     |
|      | H25645   | Kit - Hydraulic Extension - 7240 / 7252 / 7300 (Includes All Items Except #28) |     |
|      |          | (ORDER THROUGH WHOLEGOODS)   |     |

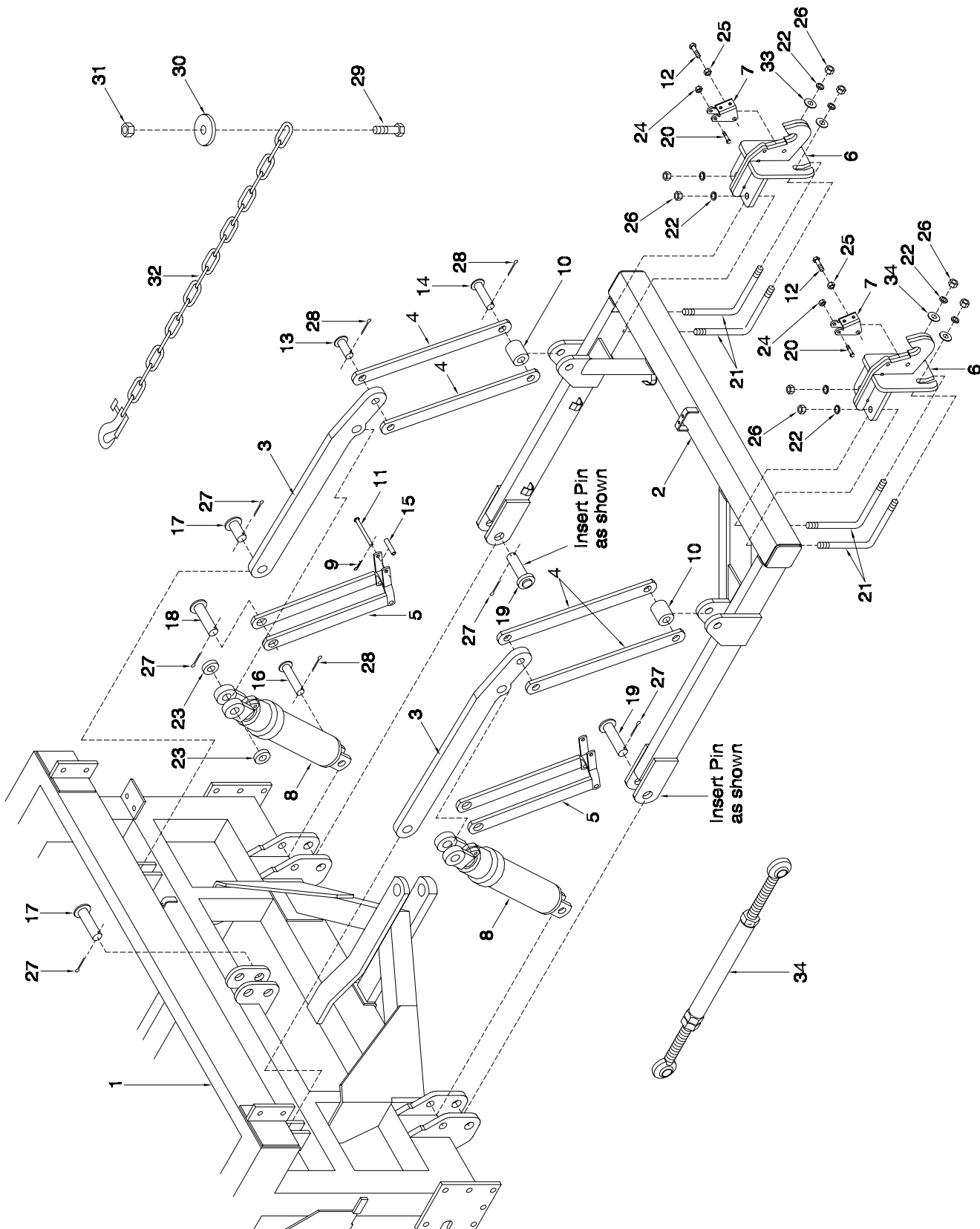
## Hitch Extension (Tow Between)

- 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

## Three Point Hitch



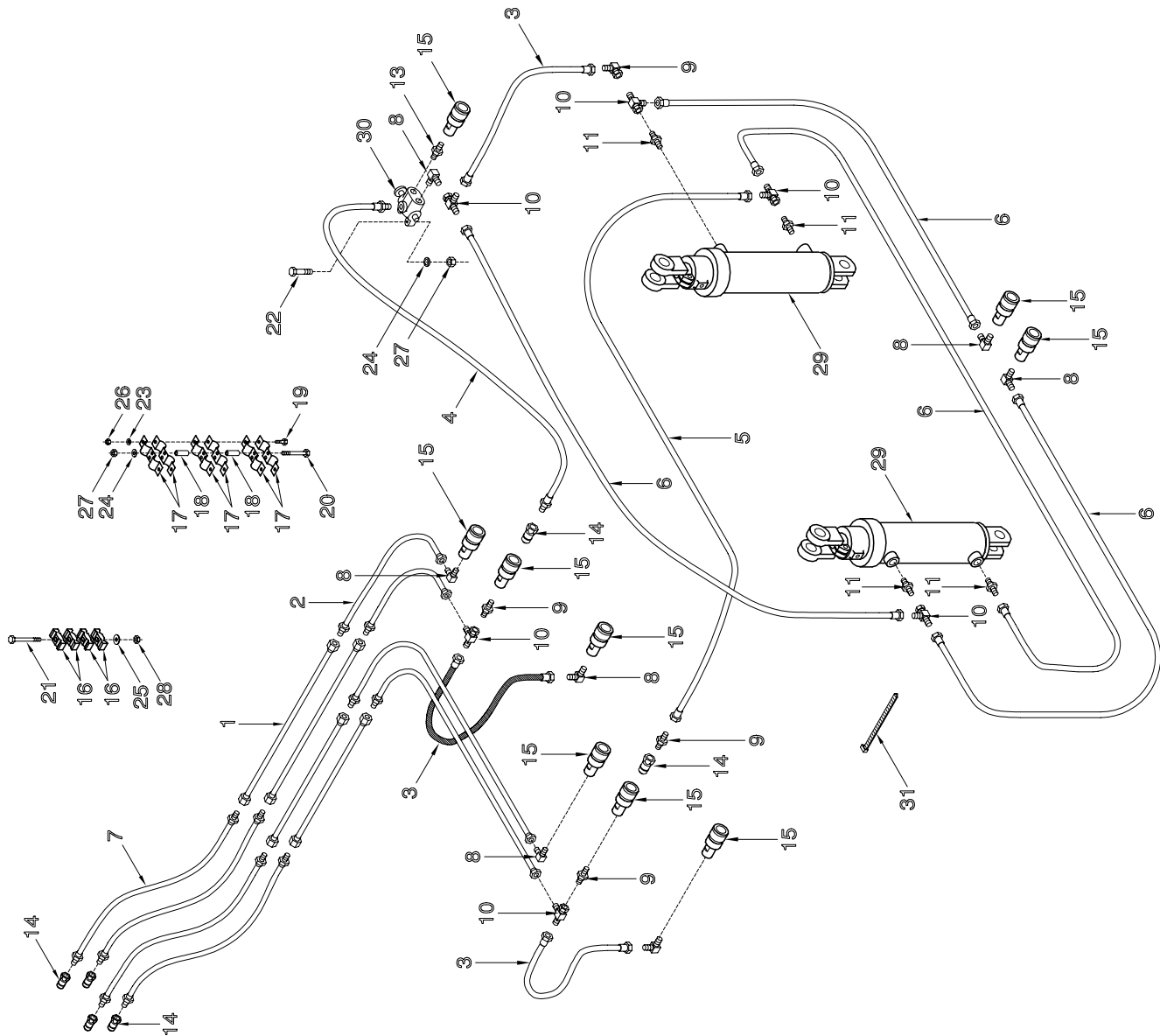
## Three Point Hitch - Continued

| Item  | Part No. | Description                                      | Qty |
|---|----------|--|-----|
| 1   | N28370   | Frame - 7180 Tow Between/Three Point Hitch ..... | 1   |
|   | N28375   | Frame - 7240 Tow Between/Three Point Hitch ..... | 1   |
| 2   | N28960   | Three Point Hitch Frame .....                    | 1   |
| 3   | N28954   | Lever Arm .....                                  | 2   |
| 4   | N28962   | Lift Arm .....                                   | 4   |
| 5   | N28390   | Transport Lock .....                             | 2   |
| 6   | N34550   | Lower Link .....                                 | 2   |
| 7   | N28966   | Rocker Plate .....                               | 2   |
| 8   | C26300   | Cylinder - 4 x 12 Lg .....                       | 2   |
| 9   | D17315   | Hairpin -#3 - 0.094 x 1 21/32 Lg .....           | 2   |
| 10  | N34361   | Bushing .....                                    | 2   |
| 11  | N28953   | Pin - 3/8 x 4 1/4 UL .....                       | 2   |
| 12  | W-489    | Hex Bolt - 1/2 x 2 1/4 Lg .....                  | 2   |
| 13  | W-558    | Pin - 1 x 2 1/4 UL .....                         | 2   |
| 14  | W-1429   | Pin - 1 x 3 3/8 UL .....                         | 2   |
| 15  | N31313   | Sleeve - Transport Lock Pin .....                | 2   |
| 16  | F-3645   | Pin - 1 x 5 1/4 UL .....                         | 2   |
| 17  | N28997   | Pin - 1 1/4 x 2 1/4 UL .....                     | 2   |
| 18  | N28994   | Pin - 1 1/4 x 4 1/4 UL .....                     | 2   |
| 19  | N32735   | Pin - 1 1/4 x 5 1/4 UL .....                     | 2   |
| 20  | W-479    | Hex Bolt - 3/8 x 2 1/4 Lg .....                  | 2   |
| 21  | N34554   | L-Bolt - 3/4 x 4 x 4 LL .....                    | 4   |
| 22  | W-527    | Lockwasher - 3/4 .....                           | 8   |
| 23  | N13962   | Washer - 2 1/2 OD x 1.281 ID x 1/4 .....         | 4   |
| 24  | M-3388   | Locknut - 3/8 Unitorque .....                    | 2   |
| 25  | F-3405   | Lock Nut - 1/2 .....                             | 2   |
| 26  | W-518    | Hex Nut - 3/4 .....                              | 8   |
| 27  | D-5239   | Cotter Pin - 1/4 x 2 1/4 Lg .....                | 6   |
| 28  | W-535    | Cotter Pin - 1/4 x 1 1/2 Lg .....                | 6   |
| 29  | N28971   | Turnbuckle .....                                 | 1   |
| 30  | C12609   | Hex Bolt - 1 x 4 1/2 Lg .....                    | 1   |
| 31  | N19605   | Washer .....                                     | 1   |
| 32  | T-5276   | Lock Nut .....                                   | 1   |
| 33  | C18761   | Chain - Safety - 3/8 P-7 AG - 30,000 lb .....    | 1   |
| 34  | W-541    | Washer - 2" OD x 0.813" ID x 10GA .....          | 2   |
| <br><b>Note: Turnbuckle is not supplied with Xpress three point hitch assembly.</b> |          |  |     |

# Options Assembly

## Three Point Hitch - Continued

### Standard Hydraulics



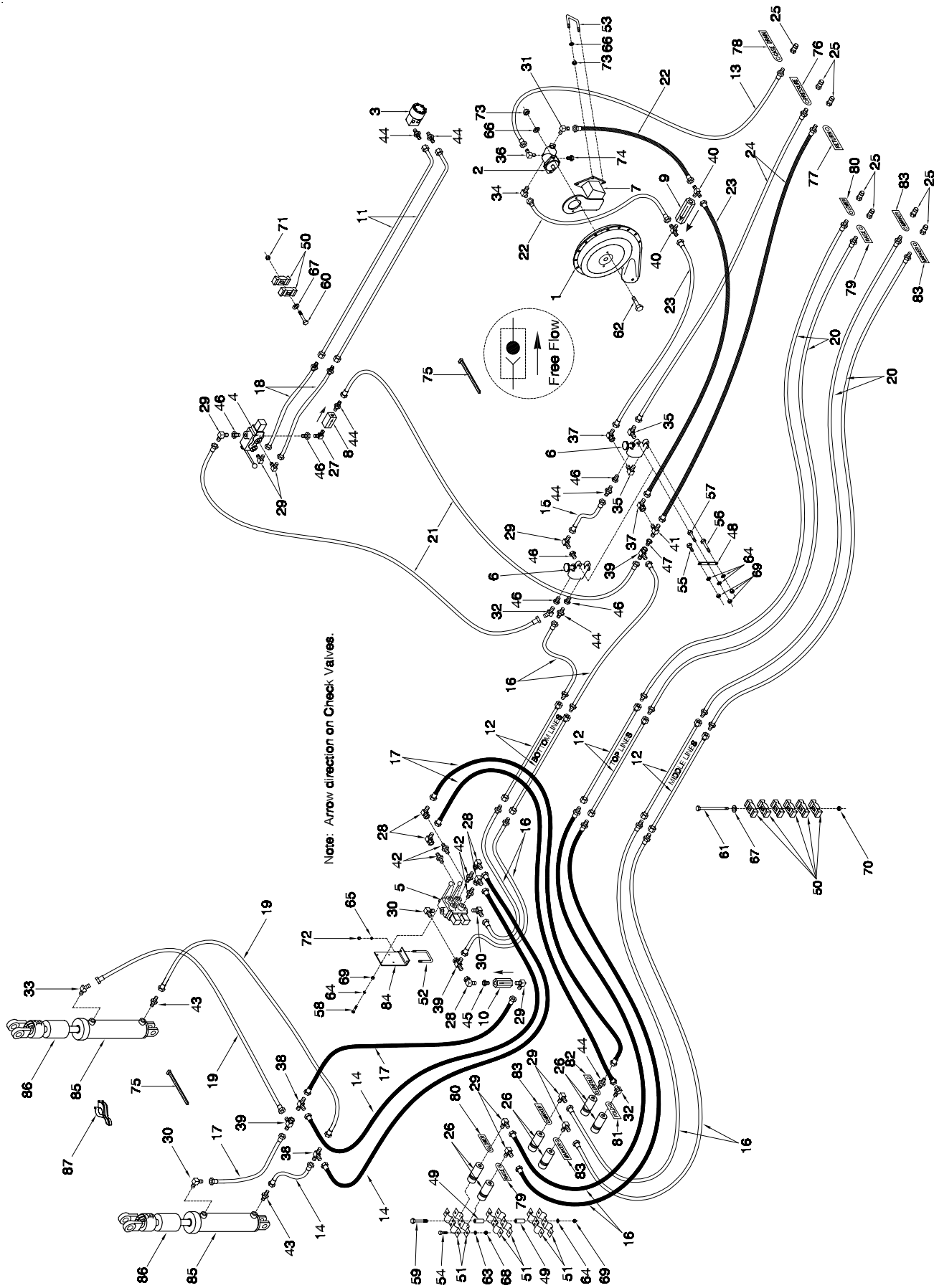


## Three Point Hitch - Continued

### Standard Hydraulics

| Item | Part No. | Description  | Qty |
|------|----------|--|-----|
| 1    | C-4367   | Oil Line - 5/8 x 80 Lg .....                             | 4   |
|      | C-4369   | Oil Line - 5/8 x 96 Lg .....                             | 4   |
| 2    | C-4385   | Hyd Hose - 1/2 x 24 Lg w/7/8-14 MJIC x 7/8-14 FJIC ..... | 4   |
| 3    | C-4468   | Hyd Hose - 1/2 x 24 Lg w/7/8-14 FJIC x 7/8-14 FJIC ..... | 3   |
| 4    | C-1482   | Hyd Hose - 1/2 x 32 Lg w/1/2 MNPT .....                  | 1   |
| 5    | C-4404   | Hyd Hose - 1/2 x 36 Lg w/7/8-14 FJIC x 7/8-14 FJIC ..... | 1   |
| 6    | C18779   | Hyd Hose - 1/2 x 72 Lg w/7/8-14 FJIC x 7/8-14 FJIC ..... | 4   |
| 7    | N19548   | Hyd Hose - 1/2 x 132 Lg w/7/8-14 MJIC x 1/2 MNPT .....   | 4   |
| 8    | C-4400   | 90 Elbow - 7/8-14 MJIC x 1/2 MNPT .....                  | 7   |
| 9    | K-5806   | 90 Swivel Elbow - 7/8 MJIC x 7/8 FJIC .....              | 1   |
| 10   | H18746   | Swivel Tee - 2 x 7/8-14 MJIC x 7/8-14 FJIC .....         | 6   |
| 11   | C14840   | Male Connector - 1/2 Morb x 5/8 MJIC .....               | 4   |
| 12   | C-4399   | Male Connector - 7/8-14 MJIC & 1/2 MNPT .....            | 3   |
| 13   | K21212   | NPT Male Union .....                                     | 1   |
| 14   | C-817    | Male Pioneer Tip - 1/2 FNPT .....                        | 6   |
| 15   | C-818    | Pioneer Coupler - 1/2 FNPT .....                         | 9   |
| 16   | C-4698   | Nylon Oil Line Clamp .....                               | 8   |
| 17   | N16608   | Coupler Clamp - Female Pioneer .....                     | 6   |
| 18   | N19458   | Spacer - 2" .....  | 4   |
| 19   | W-469    | Hex Bolt - 1/4 x 3/4 Lg .....                            | 6   |
| 20   | N31314   | Hex Bolt - 5/16 x 5 1/2 Lg .....                         | 2   |
| 21   | C-1550   | Hex Bolt - 3/8 x 4 Lg .....                              | 2   |
| 22   | W-474    | Hex Bolt - 5/16 x 1 7/8 Lg .....                         | 2   |
| 23   | W-521    | Lockwasher - 1/4 .....                                   | 6   |
| 24   | W-522    | Lockwasher - 5/16 .....                                  | 4   |
| 25   | W-538    | Flatwasher - 3/8 .....                                   | 2   |
| 26   | W-512    | Hex Nut - 1/4 .....                                      | 6   |
| 27   | W-513    | Hex Nut - 5/16 .....                                     | 4   |
| 28   | M-3388   | Locknut - 3/8 Unitorque .....                            | 2   |
| 29   | C26300   | Cylinder - 4 x 12 Lg .....                               | 2   |
| 30   | S-4730   | Selector Valve - 2 Way (Seal Kit - N31601) .....         | 1   |
| 31   | D-4838   | Nylon Tie Strap - 14 1/2 Lg .....                        | 8   |

# Fan & Auger Drives Xpress Tow Between Hydraulic Drive



# Fan & Auger Drives - Xpress Tow Between Hydraulic Drive

| Item | Part No. | Description  | Qty | Item | Part No. | Description   | Qty |
|------|----------|--|-----|------|----------|---|-----|
| 1    | N16263   | Fan (See pg 7-2)   | 1   | 40   | N16388   | Male Tee - (2) 1 1/16-12 JIC x (1) 1 1/16-12 ORB            | 2   |
| 2    | N29372   | Hydraulic Motor - Rexroth - 12cc                           | 1   | 41   | N19549   | Male Tee - (3) 1 1/16-12 JIC                                | 1   |
|      | N25508   | Seal Kit for Rexroth Motors - 12cc                         |     | 42   | N34047   | Connector - 7/8-14 MJIC x 9/16-18 MORB                      | 4   |
| 3    | N25507   | Seal Only for Rexroth Motors 12cc                          |     | 43   | C14840   | Connector - 7/8-14 MJIC x 3/4-16 MORB                       | 2   |
|      | N15982   | Orbit Motor  | 1   | 44   | C-4399   | Connector - 7/8-14 MJIC x 1/2 MNPT                          | 5   |
|      | N16731   | Seal Kit for N15982  |     | 45   | N40509   | Connector - 7/8-14 FJIC x 1/2 MNPT                          | 1   |
|      | N25319   | Shaft for N15982   | 1   | 46   | N15032   | Reducer - 3/4 MNPT x 1/2 FNPT                               | 6   |
| 4    | N15024   | Control Valve  | 1   | 47   | N19337   | Reducer - 7/8-14 MJIC x 1 1/16-12 FJIC                      | 1   |
|      | N31605   | Seal Kit for N15024  |     | 48   | N19713   | Strap   | 2   |
|      | N24595   | Handle for N15024  | 1   | 49   | N19458   | Spacer - 2"   | 4   |
| 5    | N34048   | Control Valve - Dbl Spool                                  | 1   | 50   | C-4698   | Nylon Oil Line Clamp  | 16  |
|      | N34087   | Seal Kit for N34048  |     | 51   | N16608   | Coupler Clamp - Female Pioneer                              | 6   |
|      | N34051   | Handle for N34048  | 1   | 52   | N15098   | U-Bolt - 3/8 x 4 x 5  | 1   |
| 6    | N19340   | Selector Valve - 3/4 FNPT                                  | 2   | 53   | H21351   | U-Bolt - 1/2 x 6 1/16 x 5 1/16 (7180)                       | 2   |
|      | N31603   | Seal Kit for N19340  |     |      | N31034   | U-Bolt - 1/2 x 8 1/16 x 5 1/16 (7240)                       | 2   |
|      | C36358   | Knob for N19340  | 2   | 54   | W-469    | Hex Bolt - 1/4 x 3/4 Lg                                     | 6   |
| 7    | N31032   | Fan Mount Bracket 7180                                     | 1   | 55   | F-1767   | Hex Bolt - 5/16 x 3/4 Lg                                    | 2   |
|      | N31033   | Fan Mount Bracket 7240                                     | 1   | 56   | C-3035   | Hex Bolt - 5/16 x 1 3/4 Lg                                  | 2   |
| 8    | N15023   | Check Valve - 1/2 FNPT                                     | 1   | 57   | S-1303   | Hex Bolt - 5/16 x 2 Lg                                      | 2   |
| 9    | N16399   | Check Valve - 0 PSI - 1 1/16-12 ORB                        | 1   | 58   | S-1302   | Hex Bolt - 5/16 x 2 1/2 Lg                                  | 3   |
| 10   | H-5545   | Check Valve - 1/2 FNPT                                     | 1   | 59   | N31314   | Hex Bolt - 5/16 x 5 1/2 Lg                                  | 2   |
| 11   | F-4560   | Oil Line - 5/8 x 99 Lg w/90 Bend                           | 1   | 60   | W-479    | Hex Bolt - 3/8 x 2 1/4 Lg                                   | 2   |
| 12   | C-4367   | Oil Line - 5/8 x 80 Lg (7180)                              | 6   | 61   | C-3664   | Hex Bolt - 3/8 x 5 Lg                                       | 2   |
|      | C-4369   | Oil Line - 5/8 x 96 Lg (7240)                              | 6   | 62   | S-1189   | Hex Bolt - 1/2 x 1 3/4 Lg                                   | 2   |
| 13   | N16181   | Hyd Hose - 3/8 x 156 Lg w/9/16-18 FJIC x 1/2 MNPT          | 1   | 63   | W-521    | Lockwasher - 1/4  | 8   |
| 14   | N34366   | Hyd Hose - 1/2 x 12 Lg w/7/8-14 FJIC                       | 3   | 64   | W-522    | Lockwasher - 5/16   | 13  |
| 15   | C-4383   | Hyd Hose - 1/2 x 20 Lg w/7/8-14 FJIC                       | 1   | 65   | W-523    | Lockwasher - 3/8  | 2   |
| 16   | C-4385   | Hyd Hose - 1/2 x 24 Lg w/7/8-14 MJIC x 7/8-14 FJIC         | 8   | 66   | W-525    | Lockwasher - 1/2  | 6   |
| 17   | C-4468   | Hyd Hose - 1/2 x 24 Lg w/7/8-14 FJIC x 7/8-14 FJIC         | 4   | 67   | W-538    | Flatwasher - 3/8  | 4   |
| 18   | C-4387   | Hyd Hose - 1/2 x 36 Lg w/7/8-14 MJIC x 7/8-14 FJIC (7180)  | 2   | 68   | W-512    | Hex Nut - 1/4   | 8   |
|      | C-4389   | Hyd Hose - 1/2 x 60 Lg w/7/8-14 MJIC x 7/8-14 FJIC (7240)  | 2   | 69   | W-513    | Hex Nut - 5/16  | 13  |
| 19   | C18779   | Hyd Hose - 1/2 x 72 Lg w/7/8-14 FJIC x 7/8-14 FJIC         | 2   | 70   | M-3388   | Locknut - 3/8 Unitorque                                     | 2   |
| 20   | N19548   | Hyd Hose - 1/2 x 132 Lg w/7/8-14 MJIC x 1/2 MNPT           | 4   | 71   | D-5279   | Serrated Locknut - 3/8                                      | 2   |
| 21   | N19365   | Hyd Hose - 1/2 x 140 Lg w/7/8-14 MJIC x 7/8-14 FJIC (7180) | 2   | 72   | W-514    | Hex Nut - 3/8   | 2   |
|      | N21721   | Hyd Hose - 1/2 x 180 Lg w/7/8-14 MJIC x 7/8-14 FJIC (7240) | 2   | 73   | W-516    | Hex Nut - 1/2   | 6   |
| 22   | N25644   | Hyd Hose - 3/4 x 35 Lg w/1 1/16-12 FJIC                    | 2   | 74   | N16621   | Plug - 9/16-18 UNF ORB                                      | 1   |
| 23   | N25644   | Hyd Hose - 3/4 x 35 Lg w/1 1/16-12 FJIC                    | 2   | 75   | D-4838   | Nylon Tie Strap (black) - 14 1/2 Lg                         | 12  |
| 24   | N16454   | Hyd Hose - 3/4 x 130 w/1 1/16-12 FJIC x 1/2 MNPT           | 2   | 76   | N29962   | Tag - Hose ID - Air Tank - Fan/Auger - PRESSURE             | 1   |
| 25   | C-817    | Male Pioneer Tip - 1/2 FNPT                                | 7   | 77   | N29963   | Tag - Hose ID - Air Tank - Fan/Auger - RETURN               | 1   |
| 26   | C-818    | Pioneer Coupler - 1/2 FNPT                                 | 6   | 78   | N29964   | Tag - Hose ID - Air Tank - Fan/Auger - CASE DRAIN           | 1   |
| 27   | N15033   | 90 Male Elbow - 1/2 MNPT                                   | 1   | 79   | S29958   | Tag - Hose ID - Depth Control - RAISE                       | 2   |
| 28   | K-5806   | 90 Elbow - 7/8-14 FJIC x 7/8-14 MJIC                       | 5   | 80   | S29959   | Tag - Hose ID - Depth Control - LOWER                       | 2   |
| 29   | C-4400   | 90 Male Elbow - 7/8-14 MJIC x 1/2 MNPT                     | 9   | 81   | S29960   | Tag - Hose ID - Wing Lift - FOLD                            | 1   |
| 30   | C24585   | 90 Male Elbow - 7/8-14 MJIC x 3/4-16 ORB                   | 3   | 82   | S29961   | Tag - Hose ID - Wing Lift - UNFOLD                          | 1   |
| 31   | N16359   | 90 Male Elbow - 1 1/16-12 MJIC x 1 1/16-12 ORB             | 1   | 83   | N34364   | Tag - Hose ID - Wheel Marker                                | 4   |
| 32   | C-4402   | 45 Male Elbow - 1/2 MNPT x 7/8-14 MJIC                     | 2   | 84   | N34052   | Mounting Plate - Control Valve                              | 1   |
| 33   | C26333   | 45 Male Elbow - 3/4-16 MORB x 7/8-14 MJIC                  | 1   | 85   | C26300   | Cylinder - 4 x 12 Lg2                                       | 2   |
| 34   | N31096   | 45 Male Elbow - 1 1/16-12 MJIC x 1 1/16-12 ORB             | 1   | 86   | N32069   | Spacer - Stroke Control 1.375 ID (Aluminum)                 | 2   |
| 35   | N19341   | 90 Male Elbow - 1 1/16-12 MJIC x 3/4 MNPT                  | 2   | 87   | S25999   | Spacer - Cylinder Stroke (Aluminum) Not included with cylon | 2   |
| 36   | N16143   | 90 Male Elbow - 9/16-18 MJIC x 9/16-18 ORB                 | 1   |      | N19031   | Decal - Auger/Fan (Not Shown)                               | 1   |
| 37   | N21189   | 90 Male Elbow - 1 1/16-12 MJIC x 1 1/16-12 FJIC            | 2   |      | N34026   | Decal - Auger/Aux Hyd (Not Shown)                           | 1   |
| 38   | C-4994   | Male Tee - (3) 7/8-14 MJIC                                 | 2   |      | N34288   | Decal - Fold/Unfold (Not Shown)                             | 1   |
| 39   | H18746   | Swivel Tee - (2) 7/8-14 MJIC x 7/8-14 FJIC                 | 3   |      |          |   |     |

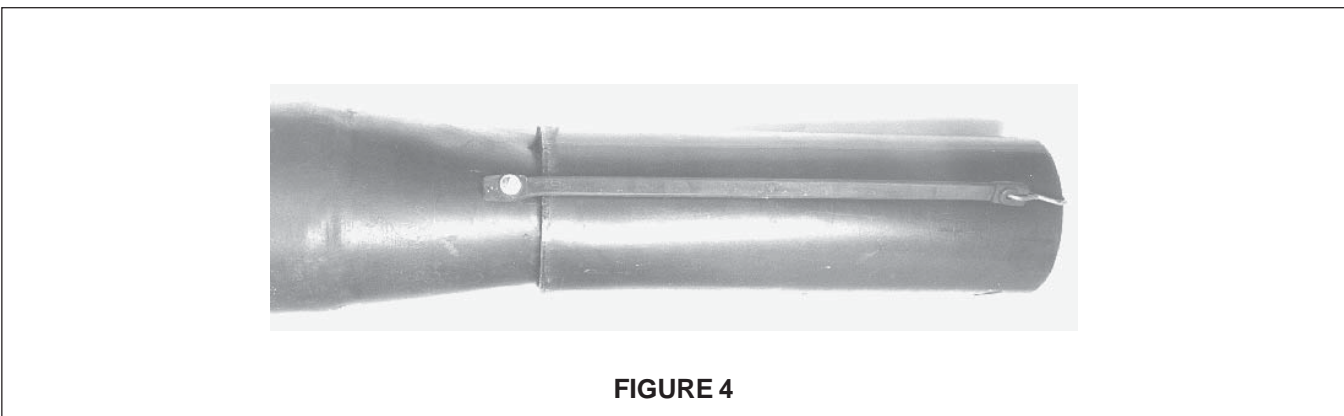
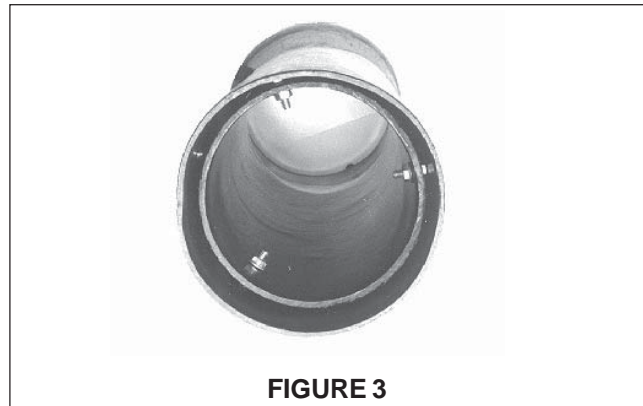
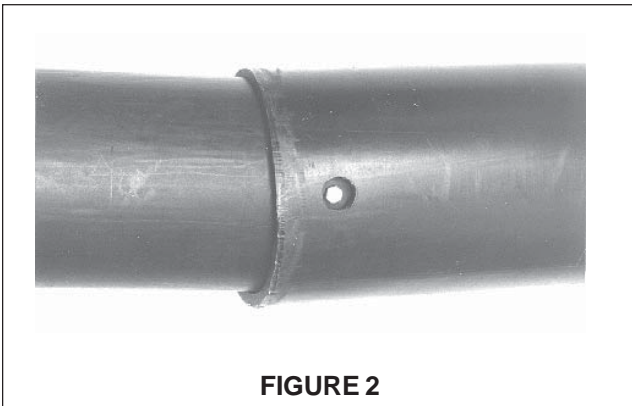
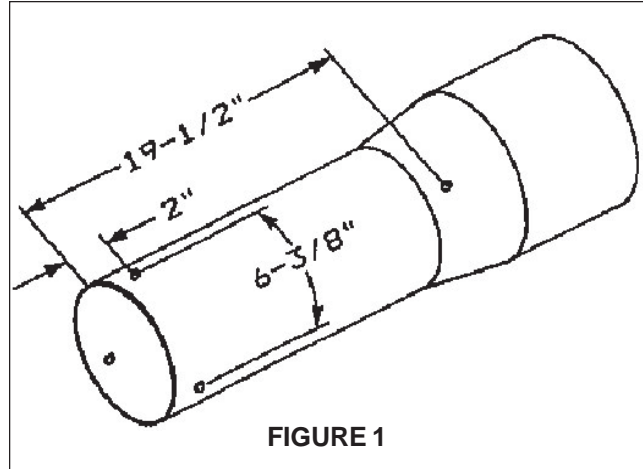
# Options Assembly

## 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

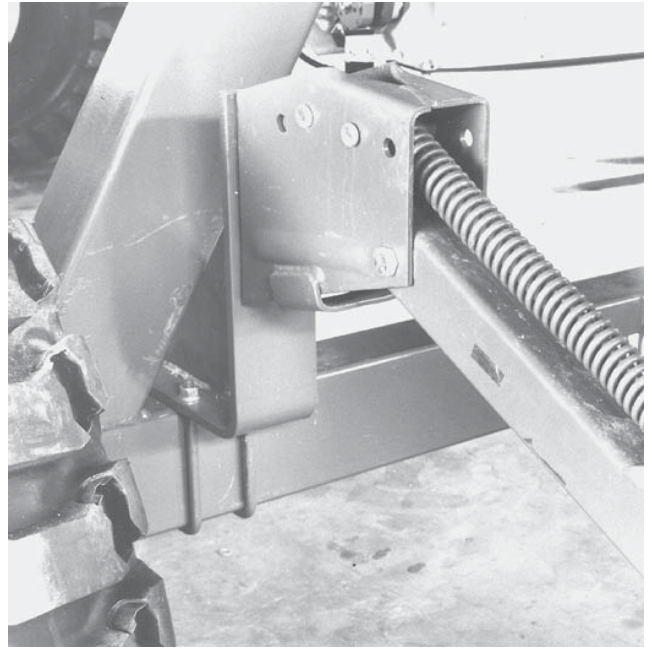
**Note:** Flatwashers may be required to shim the bolt heads for desired fit.

- 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.



## Mounted Harrow Kit

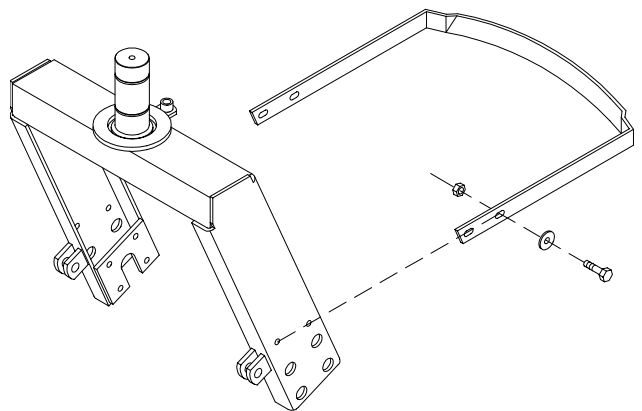
- Mount the harrow bracket as shown with two 1/2" U-bolts, lockwashers and nuts.
- Attach the harrow arm to the bracket with four 1/2" x 1 3/4" bolts, lockwashers and nuts.
- Mount harrow to the harrow arm.
- Repeat above procedure for the other harrow.



## Mud Scraper

### 7130 & 7180 Tow Behind

- Slide the mud scraper into place.
- Attach mud scraper with 5/8" x 1 1/2" bolts, lockwashers and nuts.
- Secure all the bolts.



## Important

**DO NOT EXCEED 20 M.P.H.**  
The front castor tire will contact the mud scraper if towing speeds exceed 20 M.P.H. causing severe damage to the tire and mud scraper.



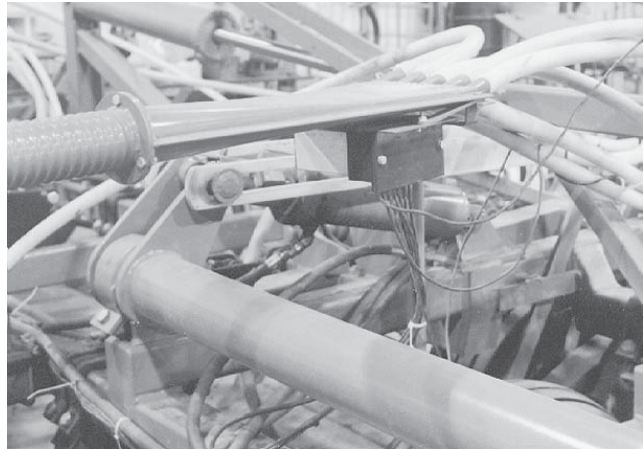
# Options Assembly

## Pin Blockage System

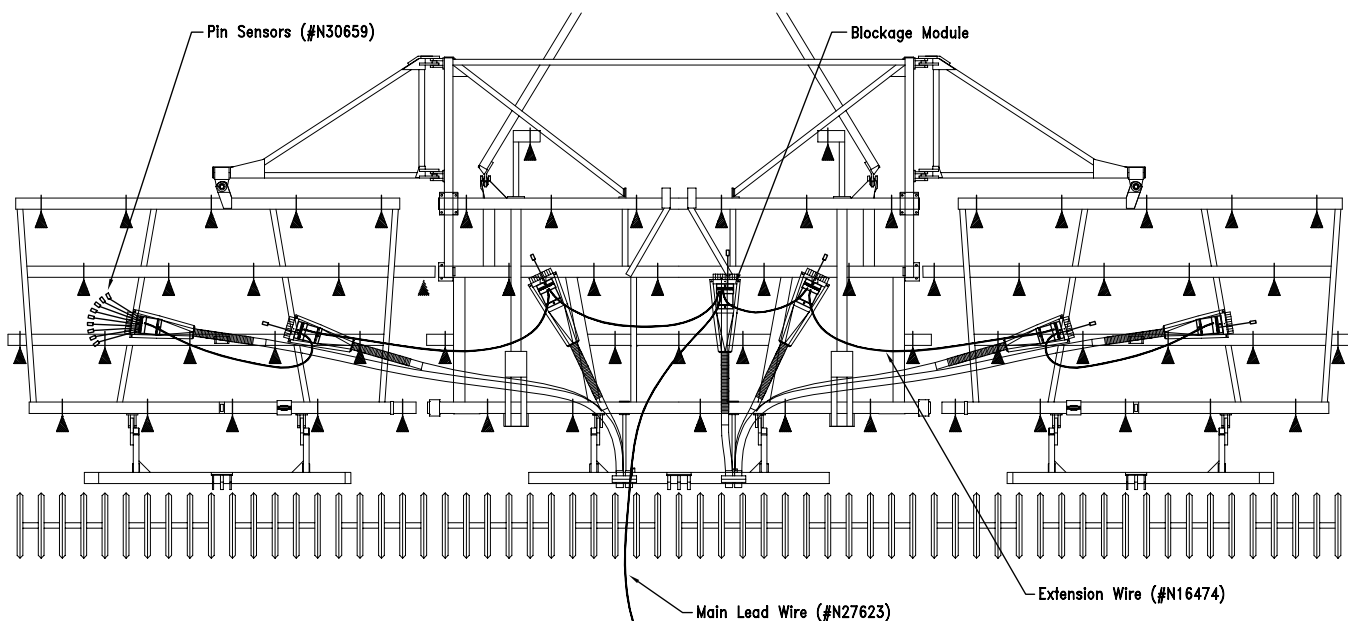
There are two options for mounting Blockage Modules and Pin Sensors.

### Option 'A' - Full System

- All Secondary Hoses have a Pin Sensor.
- One Module Kit #N27066 mounted on each Divider Head on Seeding Tool. (10 Modules Maximum)
- Main lead wire #N27623 (25 ft).
- Extension wire #N16474 (15 ft.) for each additional module **as req'd.**
- Pin Sensor Kits #N30659 (5 ft.) as req'd.



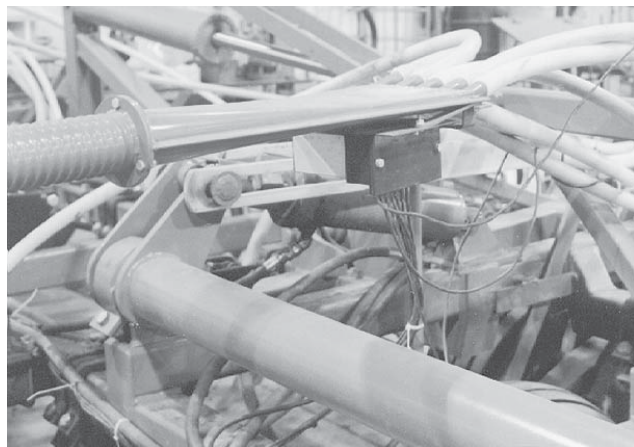
**Blockage Module attached to Divider Head**



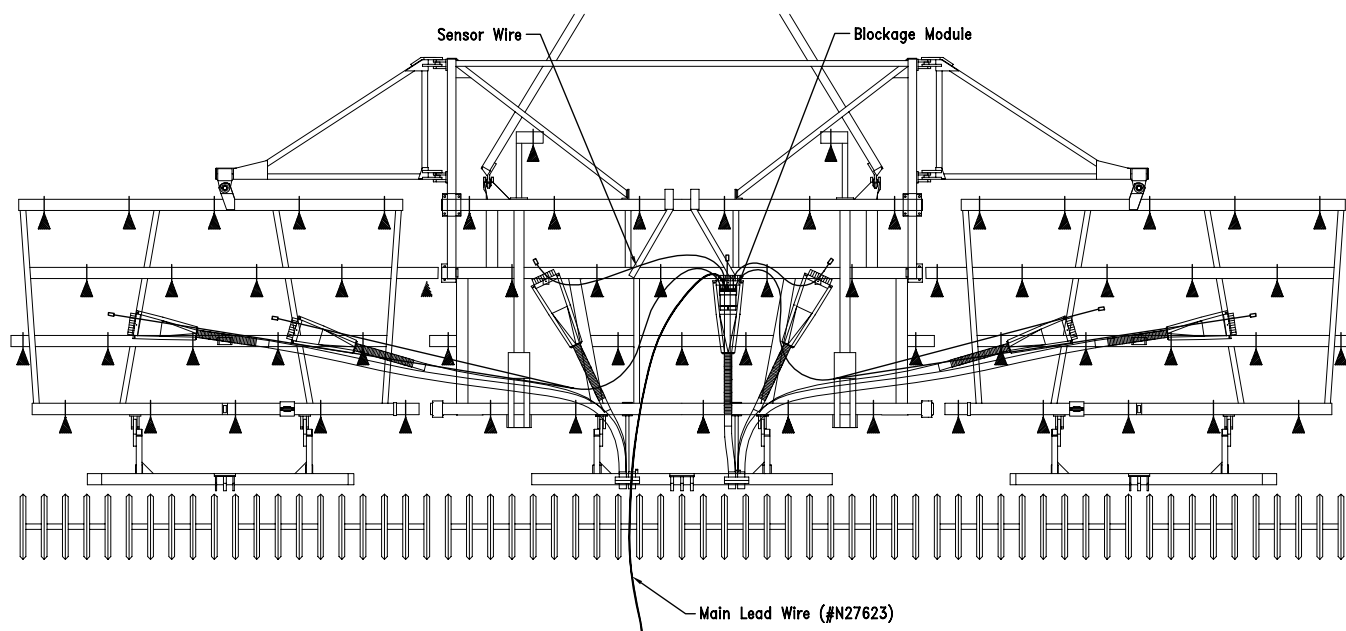
## Pin Blockage System - Continued

### Option 'B' - Partial System

- **Select** Secondary Hoses have a Pin Sensor.
- One Module Kit #N27066 mounted for each Divider Head - **as req'd (See Charts).**
- Main lead wire #N27623 (25 ft).
- Extension wire #N16474 (15 ft.) for each additional module - **as req'd.**
- Pin Sensor Kits - **as req'd (See Charts).**



**Blockage Module attached to Divider Head**



# Options Assembly

## Pin Blockage System - Continued

### Option 'B' - One Sensor per Head - Secondary Hoses

| One Sensor Per Head - Secondary Hoses |                          |                   |                   |                   |                   |               |
|---------------------------------------|--------------------------|-------------------|-------------------|-------------------|-------------------|---------------|
| Machine                               | Pin Sensor Kits Required |                   |                   |                   |                   | Modules Req'd |
|                                       | 5 foot<br>N30659         | 10 foot<br>N30660 | 15 foot<br>N30661 | 20 foot<br>N30662 | 30 foot<br>N30663 |               |
| Maxim II Air Drill<br>3 frame models  |                          |                   |                   |                   |                   |               |
| - 3 heads                             | 1                        | 0                 | 0                 | 2                 | 0                 | 1             |
| - 4 heads                             | 1                        | 1                 | 1                 | 1                 | 0                 | 1             |
| - 5 heads                             | 1                        | 2                 | 1                 | 1                 | 0                 | 1             |
| - 6 heads                             | 1                        | 3                 | 1                 | 1                 | 0                 | 1             |
| - 7 heads                             | 1                        | 2                 | 1                 | 3                 | 0                 | 1             |
| Maxim II Air Drill<br>5 frame models  |                          |                   |                   |                   |                   |               |
| - 6 heads                             | 1                        | 1                 | 1                 | 1                 | 2                 | 1             |
| - 7 heads                             | 2                        | 1                 | 0                 | 2                 | 2                 | 1             |
| - 8 heads (49 ft)                     | 2                        | 2                 | 1                 | 1                 | 2                 | 1             |
| - 8 heads (55 & 60ft)                 | 1                        | 1                 | 2                 | 2                 | 2                 | 1             |
| Concept 2000<br>3 frame models        |                          |                   |                   |                   |                   |               |
| - 3 heads                             | 1                        | 0                 | 0                 | 2                 | 0                 | 1             |
| - 4 heads                             | 1                        | 1                 | 1                 | 1                 | 0                 | 1             |
| - 5 heads (29 ft)                     | 1                        | 0                 | 0                 | 4                 | 0                 | 1             |
| - 5 heads (32 & 38 ft)                | 3                        | 0                 | 0                 | 2                 | 0                 | 1             |
| - 6 heads                             | 1                        | 1                 | 0                 | 3                 | 1                 | 1             |
| Concept 2000<br>5 frame models        |                          |                   |                   |                   |                   |               |
| - 5 heads                             | 1                        | 0                 | 0                 | 2                 | 2                 | 1             |
| - 6 heads                             | 1                        | 1                 | 1                 | 1                 | 2                 | 1             |
| - 7 heads                             | 2                        | 1                 | 0                 | 2                 | 2                 | 1             |
| - 8 heads                             | 0                        | 2                 | 2                 | 2                 | 2                 | 1             |

## Pin Blockage System - Continued

### Option 'B' - Two Sensors per Head - Secondary Hoses

| Two Sensors Per Head - Secondary Hoses |                          |                   |                   |                   |                   |               |
|--|--------------------------|-------------------|-------------------|-------------------|-------------------|---------------|
| Machine                                | Pin Sensor Kits Required |                   |                   |                   |                   | Modules Req'd |
|  | 5 foot<br>N30659         | 10 foot<br>N30660 | 15 foot<br>N30661 | 20 foot<br>N30662 | 30 foot<br>N30663 |               |
| Maxim II Air Drill<br>3 frame models   |                          |                   |                   |                   |                   |               |
| - 3 heads                              | 2                        | 0                 | 0                 | 4                 | 0                 | 1             |
| - 4 heads                              | 2                        | 2                 | 2                 | 2                 | 0                 | 1             |
| - 5 heads                              | 2                        | 4                 | 2                 | 2                 | 0                 | 1             |
| - 6 heads                              | 2                        | 6                 | 2                 | 2                 | 0                 | 1             |
| - 7 heads                              | 2                        | 4                 | 8                 | 0                 | 0                 | 2             |
| Maxim II Air Drill<br>5 frame models   |                          |                   |                   |                   |                   |               |
| - 6 heads                              | 2                        | 2                 | 2                 | 2                 | 4                 | 1             |
| - 7 heads                              | 6                        | 0                 | 4                 | 0                 | 4                 | 2             |
| - 8 heads (49 ft)                      | 8                        | 0                 | 4                 | 0                 | 4                 | 2             |
| - 8 heads (55 & 60ft)                  | 4                        | 0                 | 8                 | 0                 | 4                 | 2             |
| Concept 2000<br>3 frame models         |                          |                   |                   |                   |                   |               |
| - 3 heads                              | 2                        | 0                 | 0                 | 4                 | 0                 | 1             |
| - 4 heads                              | 2                        | 2                 | 2                 | 2                 | 0                 | 1             |
| - 5 heads (29 ft)                      | 2                        | 0                 | 0                 | 8                 | 0                 | 1             |
| - 5 heads (32 & 38 ft)                 | 6                        | 0                 | 0                 | 4                 | 0                 | 1             |
| - 6 heads                              | 2                        | 2                 | 0                 | 6                 | 2                 | 1             |
| Concept 2000<br>5 frame models         |                          |                   |                   |                   |                   |               |
| - 5 heads                              | 2                        | 0                 | 0                 | 4                 | 4                 | 1             |
| - 6 heads                              | 2                        | 2                 | 2                 | 2                 | 4                 | 1             |
| - 7 heads                              | 6                        | 0                 | 0                 | 4                 | 4                 | 2             |
| - 8 heads                              | 4                        | 0                 | 4                 | 4                 | 4                 | 2             |

# Options Assembly

## Pin Blockage System - Continued

### Option 'B' - Three Sensors per Head - Secondary Hoses

| Three Sensors Per Head - Secondary Hoses |                          |                   |                   |                   |                   |               |
|--|--------------------------|-------------------|-------------------|-------------------|-------------------|---------------|
| Machine                                  | Pin Sensor Kits Required |                   |                   |                   |                   | Modules Req'd |
|  | 5 foot<br>N30659         | 10 foot<br>N30660 | 15 foot<br>N30661 | 20 foot<br>N30662 | 30 foot<br>N30663 |               |
| Maxim II Air Drill<br>3 frame models     |                          |                   |                   |                   |                   |               |
| - 3 heads                                | 3                        | 0                 | 0                 | 6                 | 0                 | 1             |
| - 4 heads                                | 3                        | 3                 | 3                 | 3                 | 0                 | 1             |
| - 5 heads                                | 6                        | 3                 | 6                 | 0                 | 0                 | 2             |
| - 6 heads                                | 6                        | 6                 | 6                 | 0                 | 0                 | 2             |
| - 7 heads                                | 6                        | 3                 | 12                | 0                 | 0                 | 2             |
| Maxim II Air Drill<br>5 frame models     |                          |                   |                   |                   |                   |               |
| - 6 heads                                | 6                        | 0                 | 6                 | 0                 | 6                 | 2             |
| - 7 heads                                | 9                        | 0                 | 6                 | 0                 | 6                 | 2             |
| - 8 heads (49 ft)                        | 12                       | 0                 | 6                 | 0                 | 6                 | 2             |
| - 8 heads (55 & 60ft)                    | 6                        | 0                 | 12                | 0                 | 6                 | 2             |
| Concept 2000<br>3 frame models           |                          |                   |                   |                   |                   |               |
| - 3 heads                                | 3                        | 0                 | 0                 | 6                 | 0                 | 1             |
| - 4 heads                                | 3                        | 3                 | 3                 | 3                 | 0                 | 1             |
| - 5 heads (29 ft)                        | 9                        | 0                 | 3                 | 3                 | 0                 | 2             |
| - 5 heads (32 & 38 ft)                   | 9                        | 0                 | 6                 | 0                 | 0                 | 2             |
| - 6 heads                                | 6                        | 0                 | 0                 | 12                | 0                 | 2             |
| Concept 2000<br>5 frame models           |                          |                   |                   |                   |                   |               |
| - 5 heads                                | 6                        | 0                 | 3                 | 6                 | 0                 | 2             |
| - 6 heads                                | 6                        | 0                 | 6                 | 0                 | 6                 | 2             |
| - 7 heads                                | 9                        | 0                 | 0                 | 6                 | 6                 | 2             |
| - 8 heads                                | 6                        | 0                 | 6                 | 6                 | 6                 | 2             |



## Pin Blockage System - Continued

### Option 'B' - Four Sensors per Head - Secondary Hoses

| Four Sensors Per Head - Secondary Hoses |                          |                   |                   |                   |                   |               |
|---|--------------------------|-------------------|-------------------|-------------------|-------------------|---------------|
| Machine                                 | Pin Sensor Kits Required |                   |                   |                   |                   | Modules Req'd |
|   | 5 foot<br>N30659         | 10 foot<br>N30660 | 15 foot<br>N30661 | 20 foot<br>N30662 | 30 foot<br>N30663 |               |
| Maxim Air II Drill<br>3 frame models    |                          |                   |                   |                   |                   |               |
| - 3 heads                               | 4                        | 0                 | 0                 | 8                 | 0                 | 1             |
| - 4 heads                               | 8                        | 0                 | 8                 | 0                 | 0                 | 2             |
| - 5 heads                               | 8                        | 4                 | 8                 | 0                 | 0                 | 2             |
| - 6 heads                               | 16                       | 0                 | 8                 | 0                 | 0                 | 2             |
| - 7 heads                               | 12                       | 16                | 0                 | 0                 | 0                 | 3             |
| Maxim Air II Drill<br>5 frame models    |                          |                   |                   |                   |                   |               |
| - 6 heads                               | 8                        | 0                 | 8                 | 0                 | 8                 | 2             |
| - 7 heads                               | 16                       | 4                 | 8                 | 0                 | 0                 | 3             |
| - 8 heads (49 ft)                       | 16                       | 8                 | 8                 | 0                 | 0                 | 3             |
| - 8 heads (55 & 60ft)                   | 20                       | 4                 | 8                 | 0                 | 0                 | 3             |
| Concept 2000<br>3 frame models          |                          |                   |                   |                   |                   |               |
| - 3 heads                               | 4                        | 0                 | 0                 | 8                 | 0                 | 1             |
| - 4 heads                               | 8                        | 0                 | 8                 | 0                 | 0                 | 2             |
| - 5 heads (29 ft)                       | 12                       | 0                 | 4                 | 4                 | 0                 | 2             |
| - 5 heads (32 & 38 ft)                  | 12                       | 0                 | 8                 | 0                 | 0                 | 2             |
| - 6 heads                               | 8                        | 0                 | 0                 | 16                | 0                 | 2             |
| Concept 2000<br>5 frame models          |                          |                   |                   |                   |                   |               |
| - 5 heads                               | 8                        | 0                 | 4                 | 8                 | 0                 | 2             |
| - 6 heads                               | 8                        | 0                 | 8                 | 0                 | 8                 | 2             |
| - 7 heads                               | 20                       | 0                 | 8                 | 0                 | 0                 | 3             |
| - 8 heads                               | 20                       | 0                 | 4                 | 8                 | 0                 | 3             |

# Options Assembly

## Pin Blockage System - Continued

### Installation Procedure

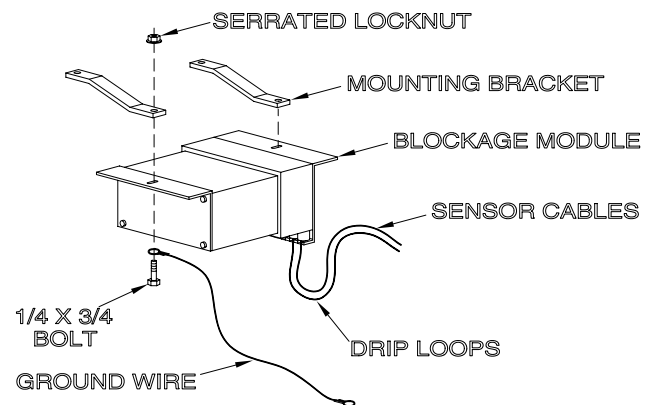
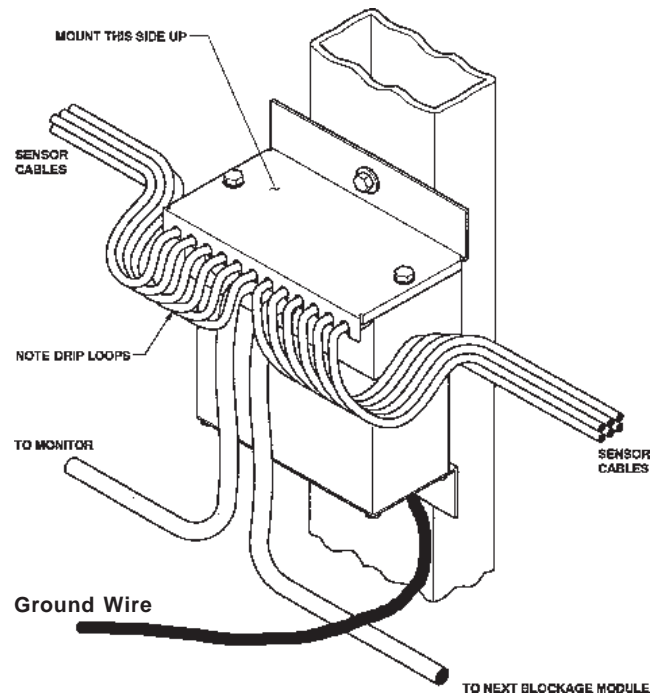
1. Module should be mounted vertically as shown or inverted under a Divider Head with 'Drip Loops'.
2. Module should be mounted on the Seeding Tool only. (Mounted to Divider Head)
3. The module must be grounded to Seeding Tool frame. Attach ground wire provided (or 10 GA wire as req'd) to the back mounting plate of module and to Seeding Tool frame for a good ground.

**Note: A good ground is essential. Remove paint from any ground contacts.**

4. Sensors should be mounted 2 ft away from the divider head to the top side of the secondary hose. Sensors should never be mounted on inside curve of a hose.
5. The pin sensor wire and the module lead wire should always have a 'Drip Loop' to ensure moisture is directed away from the module and pin sensors.
6. Splice secondary hose, connecting bubble into hose with hose clamps.

**Note: The sensors should be numbered and should be placed in an orderly fashion in the seed tubes, then connected sequentially to the connector panel (this will make it easier to identify blocked runs).**

7. Secure pin sensor to bubble with a tie strap.
8. Disconnect module from main wiring harness at Weather Pak connector when unhooking Air Cart from Seeding Tool.



## Pin Blockage System - Continued

### Wiring Procedure

- Remove blockage module housing.
- Feed the cables through the holes in the housing and then attach the push-on connectors on the connector panel of the module as illustrated in figure 3.
- The cable seal and grommet should then be snugly pushed against the housing.
- Set switch **S1 SENSOR**, located on the front of the connector panel, to the number of sensors that are connected to that module.

| S1 SENSOR       |                   |
|-----------------|-------------------|
| Switch Position | Number of Sensors |
| 0               | Not Used          |
| 1 - 9           | 1 - 9             |
| A               | 10                |
| B               | 11                |
| C - F           | 12                |

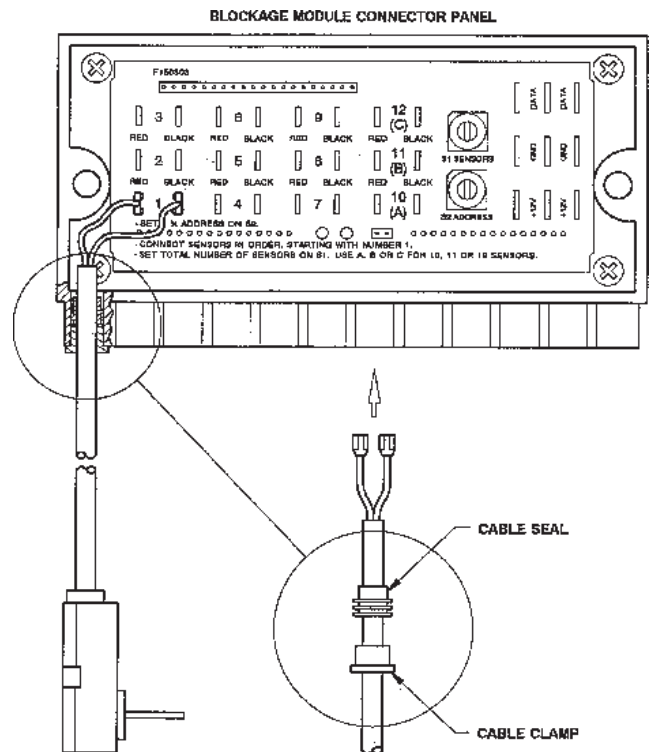


FIGURE 3: FLOW SENSOR ELECTRICAL CONNECTION

# Options Assembly

## Pin Blockage System - Continued

### Wiring Procedure - Continued

- Connect the first module on the system to the Air Cart wiring harness using the cable with a connector on it. **White or Red wire is +12VDC, Green or Brown is Data, and Black is Ground.** See figure 4.
- Connect module 1 to module 2 and module 2 to module 3 etc. See figure 5.
- Set switch **S2 ADDRESS**, located on the front of the connector panel. In a system where there are 3 blockage modules, the addresses must be 1, 2, and 3. The modules should be numbered in such a way that it is easy for the operator to identify them by the address displayed on the monitor.
- After all the sensors have been connected and electrical connections have been made, the covers should be replaced on the housings.

| S2 ADDRESS      |                   |
|-----------------|-------------------|
| Switch Position | Number of Modules |
| 1 - 9           | 1 - 9             |
| A - F           | 10 - 15           |
| 0               | 16                |

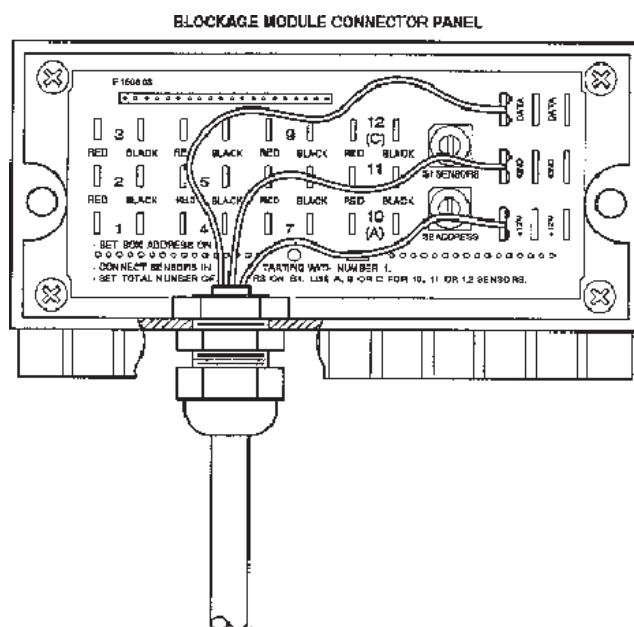


FIGURE 4: COMMUNICATION HARNESS ELECTRICAL CONNECTION

Pin Blockage System - Continued

Wiring Procedure - Continued

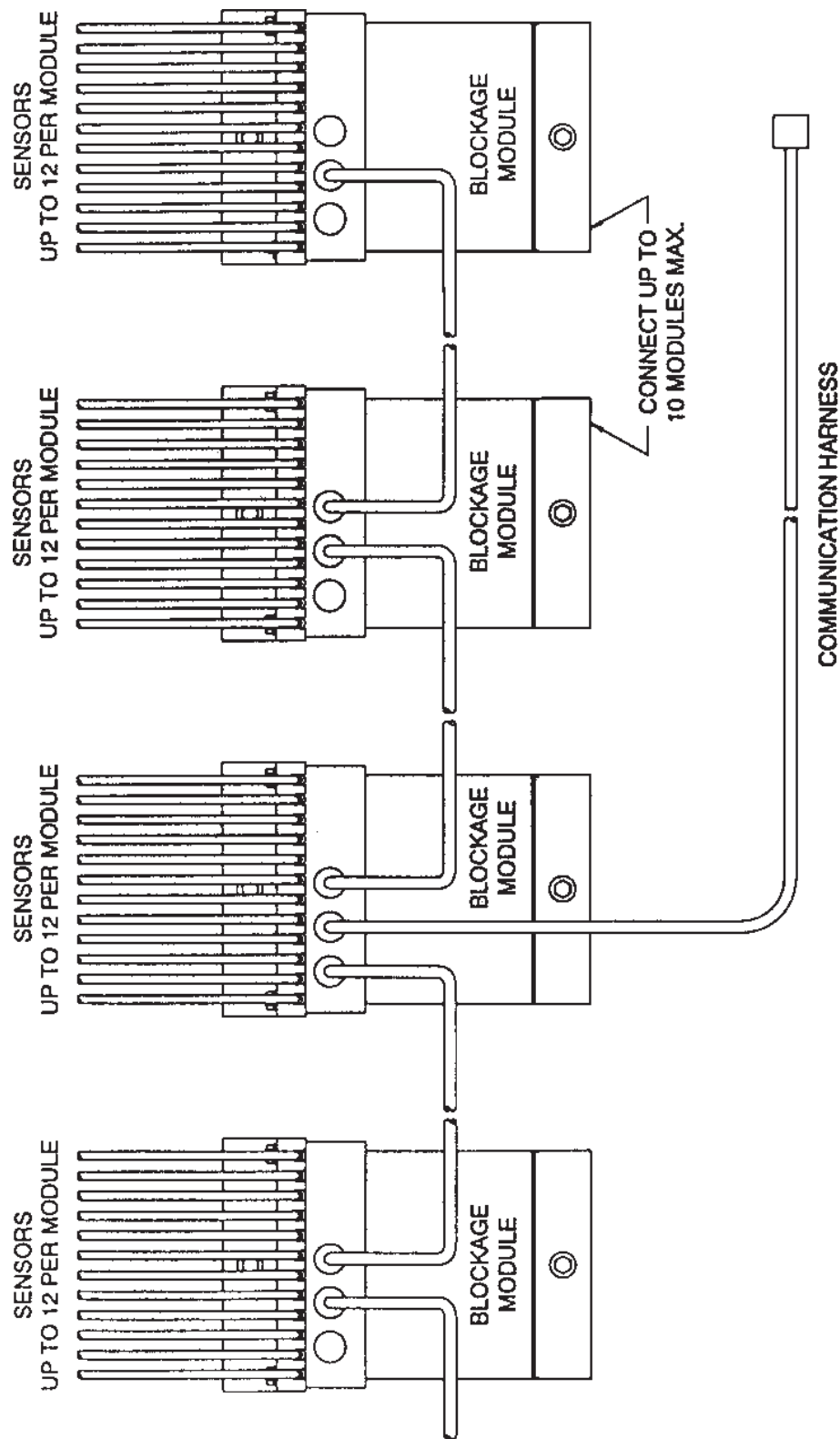


FIGURE 5: BLOCKAGE MODULE SYSTEM CONFIGURATION



# Options Assembly

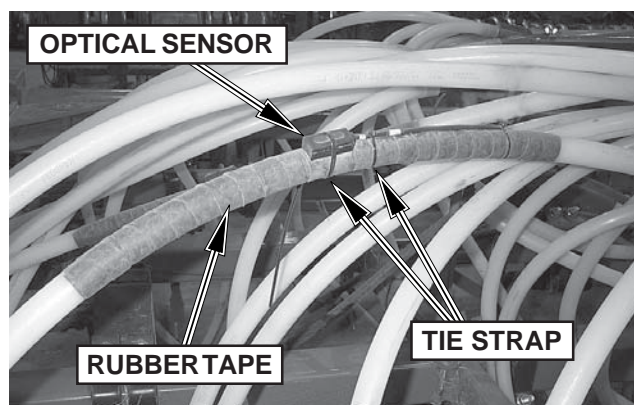
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## Optical Blockage System

There are two options for mounting Blockage Modules and Optical Sensors.

### Option 'A' - Full System

- **All** Secondary Hoses have a Optical Sensor.
- One Blockage Module #N37011 mounted for each Divider Head on Seeding Tool. (12 Modules Maximum)
- Main lead wire #N34795 (30 ft).
- 'Y' wire #N34791 for each additional module **as req'd.**
- Extension wire for each additional module **as req'd.** Extension wire lengths available are N34792 (5 ft), N34793 (10 ft), N34794 (20 ft), N34795 (30 ft).
- Optical Sensor Kits #N38652 as req'd.
- Optical Sensor extension cables as req'd. Optical extension cable lengths available are N37014 (5 ft), N37016 (10 ft), N37018 (20 ft), N37020 (30 ft).



Optical Sensor Installation

### Option 'B' - Partial System

- **Select** Secondary Hoses have a Optical Sensor.  
One Blockage Module #N37011 mounted for each set of 16 optical sensors. (12 Modules Maximum)
- Main lead wire #N34795 (30 ft).
- 'Y' cable #N34791 for each additional module **as req'd.**
- Extension wire for each additional module **as req'd.** Extension wire lengths available are N34792 (5 ft), N34793 (10 ft), N34794 (20 ft), N34795 (30 ft).
- Optical Sensor Kits #N38652 - **as req'd (See Charts).**
- Optical Sensor extension cables as req'd. Optical extension cable lengths available are N37014 (5 ft), N37016 (10 ft), N37018 (20 ft), N37020 (30 ft).

## Optical Blockage System - Continued

### Option 'B' - One Sensor per Head - Secondary Hoses

| One Optical Sensor Per Head - Secondary Hoses |                                  |                   |                   |                   |                            |
|---|----------------------------------|-------------------|-------------------|-------------------|----------------------------|
| Machine                                       | Sensor Extension Cables Required |                   |                   |                   | Modules<br>Req'd<br>N37011 |
|   | 5 foot<br>N37014                 | 10 foot<br>N37016 | 20 foot<br>N37018 | 30 foot<br>N37020 |                            |
| Maxim II Air Drill<br>3 frame models          |                                  |                   |                   |                   |                            |
| - 3 heads                                     | 0                                | 1                 | 0                 | 2                 | 1                          |
| - 4 heads                                     | 0                                | 0                 | 2                 | 2                 | 1                          |
| - 5 heads                                     | 0                                | 1                 | 2                 | 2                 | 1                          |
| - 6 heads                                     | 0                                | 0                 | 4                 | 2                 | 1                          |
| - 7 heads                                     | 0                                | 1                 | 2                 | 4                 | 1                          |
| - 8 heads                                     | 0                                | 2                 | 2                 | 4                 | 1                          |
| Maxim II Air Drill<br>5 frame models          |                                  |                   |                   |                   |                            |
| - 6 heads                                     | 0                                | 0                 | 2                 | 6                 | 1                          |
| - 7 heads                                     | 0                                | 0                 | 3                 | 6                 | 1                          |
| - 8 heads (49 ft)                             | 0                                | 0                 | 4                 | 6                 | 1                          |
| - 8 heads (55 & 60ft)                         | 0                                | 0                 | 4                 | 6                 | 1                          |
| - 9 heads (55 & 60ft)                         | 0                                | 0                 | 5                 | 6                 | 1                          |
| Concept 2000<br>3 frame models                |                                  |                   |                   |                   |                            |
| - 3 heads                                     | 0                                | 1                 | 2                 | 0                 | 1                          |
| - 4 heads                                     | 0                                | 2                 | 2                 | 0                 | 1                          |
| - 5 heads (29 ft)                             | 0                                | 1                 | 2                 | 2                 | 1                          |
| - 5 heads (32 & 38 ft)                        | 0                                | 1                 | 2                 | 2                 | 1                          |
| - 6 heads                                     | 0                                | 2                 | 2                 | 2                 | 1                          |
| - 7 heads                                     | 0                                | 2                 | 3                 | 2                 | 1                          |
| Concept 2000<br>5 frame models                |                                  |                   |                   |                   |                            |
| - 5 heads                                     | 0                                | 1                 | 1                 | 3                 | 1                          |
| - 6 heads                                     | 0                                | 2                 | 0                 | 4                 | 1                          |
| - 7 heads                                     | 2                                | 1                 | 2                 | 4                 | 1                          |
| - 8 heads                                     | 0                                | 2                 | 2                 | 4                 | 1                          |
| - 9 heads                                     | 0                                | 2                 | 3                 | 4                 | 1                          |

# Options Assembly

## Optical Blockage System - Continued

### Option 'B' - Two Sensor per Head - Secondary Hoses

| Two Optical Sensor Per Head - Secondary Hoses |                                  |                   |                   |                   |                            |
|---|----------------------------------|-------------------|-------------------|-------------------|----------------------------|
| Machine                                       | Sensor Extension Cables Required |                   |                   |                   | Modules<br>Req'd<br>N37011 |
|   | 5 foot<br>N37014                 | 10 foot<br>N37016 | 20 foot<br>N37018 | 30 foot<br>N37020 |                            |
| Maxim II Air Drill<br>3 frame models          |                                  |                   |                   |                   |                            |
| - 3 heads                                     | 0                                | 2                 | 0                 | 4                 | 1                          |
| - 4 heads                                     | 0                                | 0                 | 4                 | 4                 | 1                          |
| - 5 heads                                     | 0                                | 2                 | 4                 | 4                 | 1                          |
| - 6 heads                                     | 0                                | 0                 | 8                 | 4                 | 1                          |
| - 7 heads                                     | 0                                | 2                 | 4                 | 8                 | 1                          |
| - 8 heads                                     | 0                                | 4                 | 4                 | 8                 | 1                          |
| Maxim II Air Drill<br>5 frame models          |                                  |                   |                   |                   |                            |
| - 6 heads                                     | 0                                | 0                 | 4                 | 12                | 1                          |
| - 7 heads                                     | 0                                | 0                 | 6                 | 12                | 1                          |
| - 8 heads (49 ft)                             | 0                                | 0                 | 8                 | 12                | 1                          |
| - 8 heads (55 & 60ft)                         | 0                                | 0                 | 8                 | 12                | 1                          |
| - 9 heads (55 & 60ft)                         | 0                                | 0                 | 10                | 12                | 2                          |
| Concept 2000<br>3 frame models                |                                  |                   |                   |                   |                            |
| - 3 heads                                     | 0                                | 2                 | 4                 | 0                 | 1                          |
| - 4 heads                                     | 0                                | 4                 | 4                 | 0                 | 1                          |
| - 5 heads (29 ft)                             | 0                                | 2                 | 4                 | 4                 | 1                          |
| - 5 heads (32 & 38 ft)                        | 0                                | 2                 | 4                 | 4                 | 1                          |
| - 6 heads                                     | 0                                | 4                 | 4                 | 4                 | 1                          |
| - 7 heads                                     | 0                                | 4                 | 6                 | 4                 | 1                          |
| Concept 2000<br>5 frame models                |                                  |                   |                   |                   |                            |
| - 5 heads                                     | 0                                | 2                 | 2                 | 6                 | 1                          |
| - 6 heads                                     | 0                                | 4                 | 0                 | 8                 | 1                          |
| - 7 heads                                     | 4                                | 2                 | 4                 | 8                 | 1                          |
| - 8 heads                                     | 0                                | 4                 | 4                 | 8                 | 1                          |
| - 9 heads                                     | 0                                | 4                 | 6                 | 8                 | 2                          |

# Options Assembly

## Optical Blockage System - Continued

### Option 'B' - Three Sensor per Head - Secondary Hoses

| Three Optical Sensor Per Head - Secondary Hoses |                                  |                   |                   |                   |                            |
|---|----------------------------------|-------------------|-------------------|-------------------|----------------------------|
| Machine   | Sensor Extension Cables Required |                   |                   |                   | Modules<br>Req'd<br>N37011 |
|   | 5 foot<br>N37014                 | 10 foot<br>N37016 | 20 foot<br>N37018 | 30 foot<br>N37020 |                            |
| Maxim II Air Drill<br>3 frame models            |                                  |                   |                   |                   |                            |
| - 3 heads                                       | 0                                | 3                 | 0                 | 6                 | 1                          |
| - 4 heads                                       | 0                                | 0                 | 6                 | 6                 | 1                          |
| - 5 heads                                       | 0                                | 6                 | 6                 | 6                 | 1                          |
| - 6 heads                                       | 0                                | 0                 | 12                | 6                 | 2                          |
| - 7 heads                                       | 0                                | 3                 | 6                 | 12                | 2                          |
| - 8 heads                                       | 0                                | 6                 | 6                 | 12                | 2                          |
| Maxim II Air Drill<br>5 frame models            |                                  |                   |                   |                   |                            |
| - 6 heads                                       | 0                                | 0                 | 6                 | 18                | 2                          |
| - 7 heads                                       | 0                                | 0                 | 9                 | 18                | 2                          |
| - 8 heads (49 ft)                               | 0                                | 0                 | 12                | 18                | 2                          |
| - 8 heads (55 & 60ft)                           | 0                                | 0                 | 12                | 18                | 2                          |
| - 9 heads (55 & 60ft)                           | 0                                | 0                 | 15                | 18                | 2                          |
| Concept 2000<br>3 frame models                  |                                  |                   |                   |                   |                            |
| - 3 heads                                       | 0                                | 3                 | 6                 | 0                 | 1                          |
| - 4 heads                                       | 0                                | 6                 | 6                 | 0                 | 1                          |
| - 5 heads (29 ft)                               | 0                                | 3                 | 6                 | 6                 | 1                          |
| - 5 heads (32 & 38 ft)                          | 0                                | 3                 | 6                 | 6                 | 1                          |
| - 6 heads                                       | 0                                | 6                 | 6                 | 6                 | 2                          |
| - 7 heads                                       | 0                                | 6                 | 9                 | 6                 | 2                          |
| Concept 2000<br>5 frame models                  |                                  |                   |                   |                   |                            |
| - 5 heads                                       | 0                                | 3                 | 3                 | 9                 | 1                          |
| - 6 heads                                       | 0                                | 6                 | 0                 | 12                | 2                          |
| - 7 heads                                       | 6                                | 3                 | 6                 | 12                | 2                          |
| - 8 heads                                       | 0                                | 6                 | 6                 | 12                | 2                          |
| - 9 heads                                       | 0                                | 6                 | 9                 | 12                | 2                          |

# Options Assembly

## Optical Blockage System - Continued

### Option 'B' - Four Sensor per Head - Secondary Hoses

| Four Optical Sensor Per Head - Secondary Hoses |                                  |                   |                   |                   |                            |
|--|----------------------------------|-------------------|-------------------|-------------------|----------------------------|
| Machine  | Sensor Extension Cables Required |                   |                   |                   | Modules<br>Req'd<br>N37011 |
|  | 5 foot<br>N37014                 | 10 foot<br>N37016 | 20 foot<br>N37018 | 30 foot<br>N37020 |                            |
| Maxim II Air Drill<br>3 frame models           |                                  |                   |                   |                   |                            |
| - 3 heads                                      | 0                                | 4                 | 0                 | 8                 | 1                          |
| - 4 heads                                      | 0                                | 0                 | 8                 | 8                 | 1                          |
| - 5 heads                                      | 0                                | 4                 | 8                 | 8                 | 2                          |
| - 6 heads                                      | 0                                | 0                 | 16                | 8                 | 2                          |
| - 7 heads                                      | 0                                | 4                 | 8                 | 16                | 2                          |
| - 8 heads                                      | 0                                | 8                 | 8                 | 16                | 2                          |
| Maxim II Air Drill<br>5 frame models           |                                  |                   |                   |                   |                            |
| - 6 heads                                      | 0                                | 0                 | 8                 | 24                | 2                          |
| - 7 heads                                      | 0                                | 0                 | 12                | 24                | 2                          |
| - 8 heads (49 ft)                              | 0                                | 0                 | 16                | 24                | 2                          |
| - 8 heads (55 & 60ft)                          | 0                                | 0                 | 16                | 24                | 2                          |
| - 9 heads (55 & 60ft)                          | 0                                | 0                 | 20                | 24                | 3                          |
| Concept 2000<br>3 frame models                 |                                  |                   |                   |                   |                            |
| - 3 heads                                      | 0                                | 4                 | 8                 | 0                 | 1                          |
| - 4 heads                                      | 0                                | 8                 | 8                 | 0                 | 1                          |
| - 5 heads (29 ft)                              | 0                                | 4                 | 8                 | 8                 | 2                          |
| - 5 heads (32 & 38 ft)                         | 0                                | 4                 | 8                 | 8                 | 2                          |
| - 6 heads                                      | 0                                | 8                 | 8                 | 8                 | 2                          |
| - 7 heads                                      | 0                                | 8                 | 12                | 8                 | 2                          |
| Concept 2000<br>5 frame models                 |                                  |                   |                   |                   |                            |
| - 5 heads                                      | 0                                | 4                 | 4                 | 12                | 2                          |
| - 6 heads                                      | 0                                | 8                 | 0                 | 16                | 2                          |
| - 7 heads                                      | 8                                | 4                 | 8                 | 16                | 2                          |
| - 8 heads                                      | 0                                | 8                 | 8                 | 16                | 2                          |
| - 9 heads                                      | 0                                | 8                 | 12                | 16                | 3                          |



## Optical Blockage System - Continued

### Installation Procedure

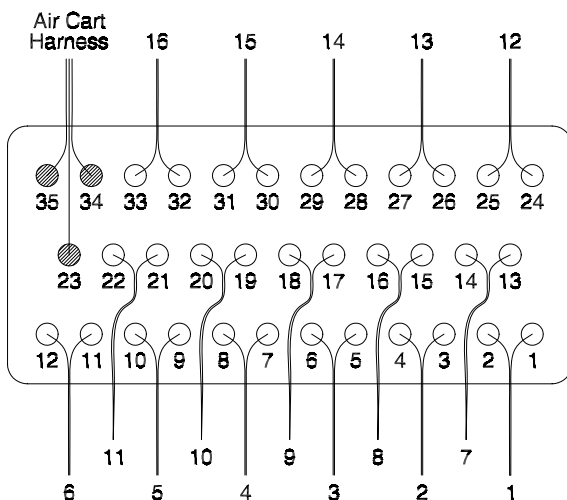
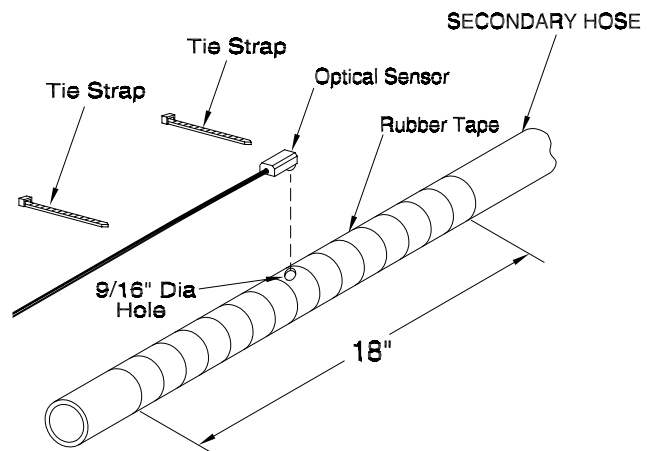
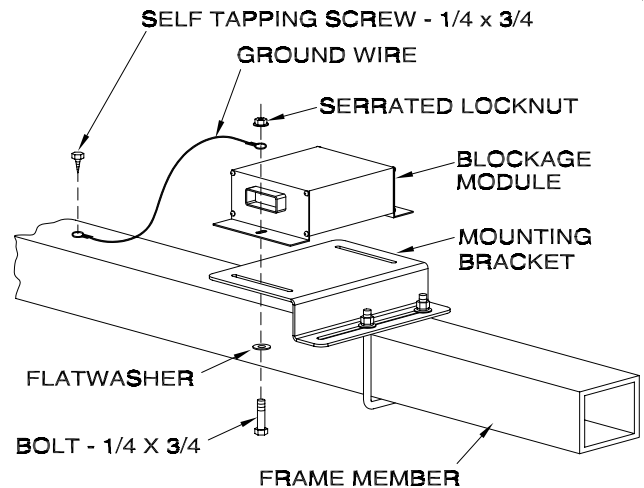
1. Module should be mounted horizontally as shown.
2. Module should be mounted on the Seeding Tool only.
3. The module must be grounded to Seeding Tool frame. Attach ground wire provided (or 10 GA wire as req'd) to the mounting plate of module and to Seeding Tool frame for a good ground.

**Note: A good ground is essential. Remove paint from any ground contacts.**

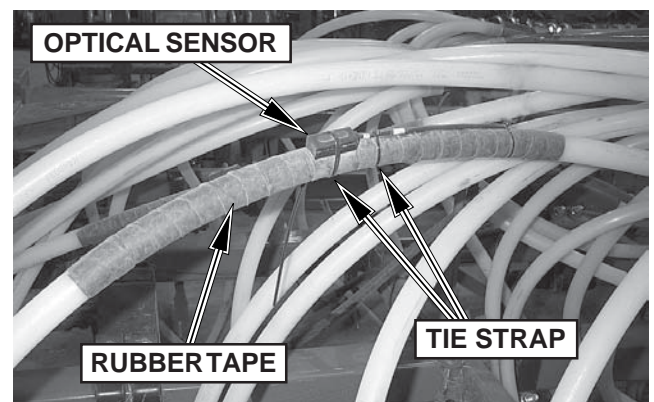
4. On a straight section of the secondary hose, wrap rubber tape for a length of 18 inches.
5. Drill a 9/16-inch diameter hole through one side of secondary hose at mid point of taped section.
6. Ensure hole is clean of debris.

**Note: The sensors should be numbered and should be placed in an orderly fashion in the seed tubes, then connected sequentially to the blockage module (this will make it easier to identify blocked runs).**

7. Secure the Optical Sensor and wire lead to hose with two tie straps.
8. Disconnect Blockage System wire harness from Air Cart wire harness when unhooking Air Cart from Seeding Tool.



Sensor Arrangement  
on Module Cable

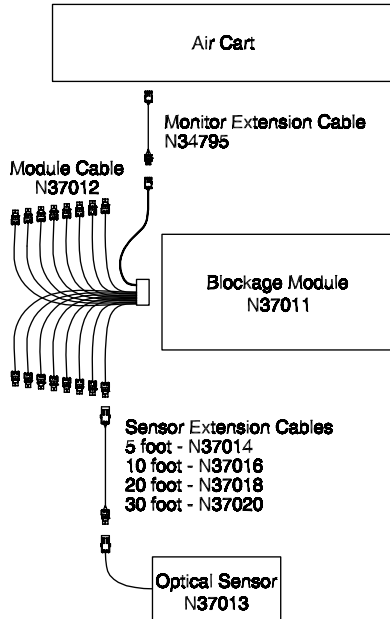


Optical Sensor Installation

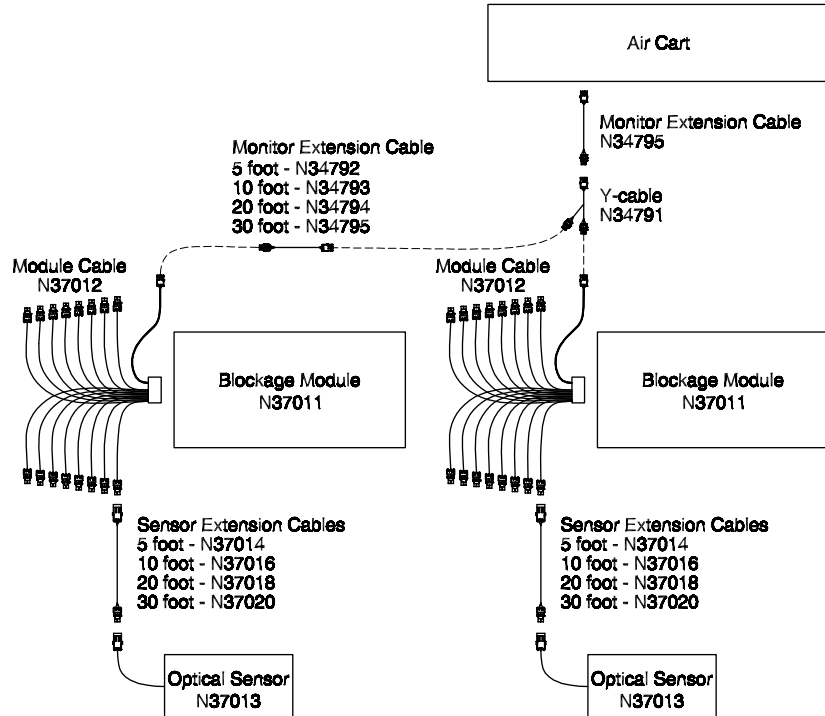
# Options Assembly

## Optical Blockage System - Continued

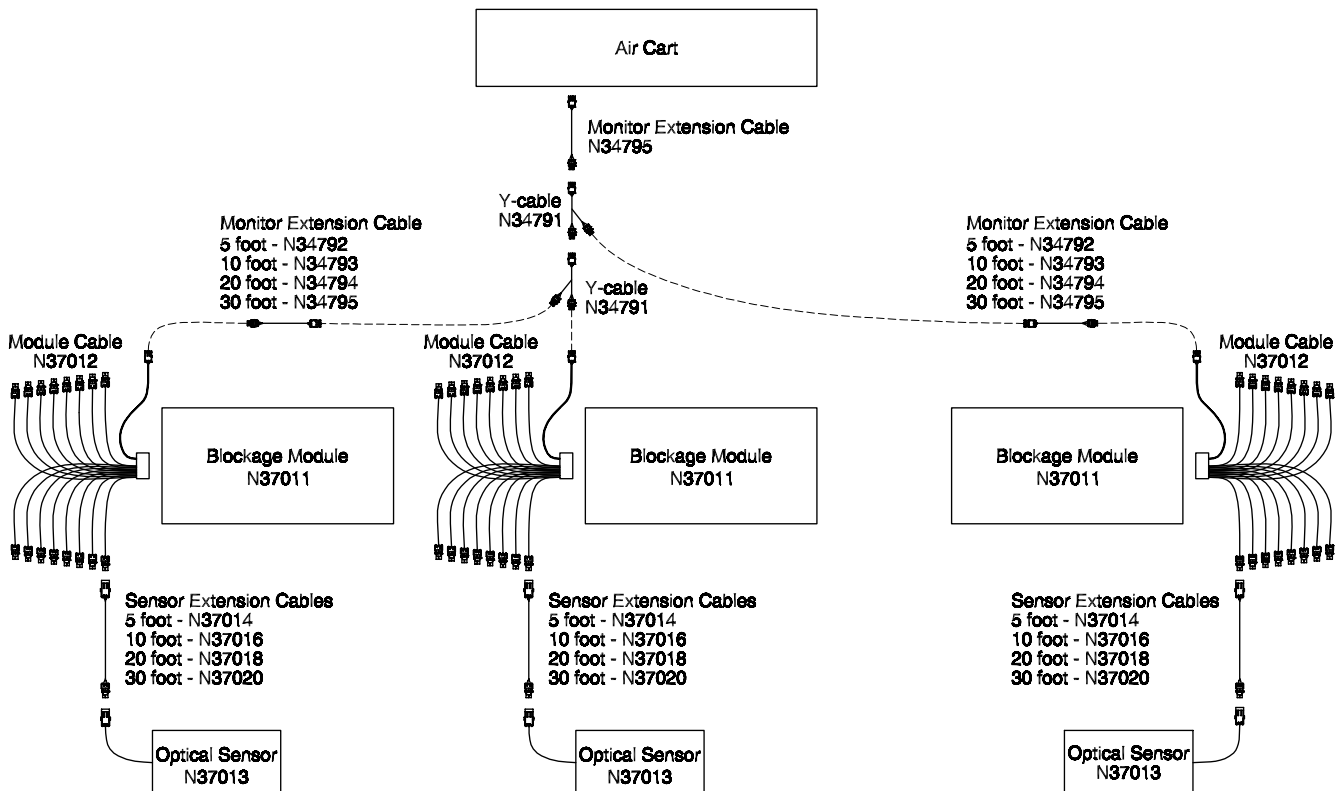
### Single Module



### Two Modules



### Multiple Modules



# Section 11: Metric

## Section Contents

|                                  |      |
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| Calibration Chart - Metric ..... | 11-2 |
|----------------------------------|------|

## Calibration Chart - Metric

7000 SERIES AIRSEEDER - VARIABLE RATE - CALIBRATION CHART  
WT/REV (KGS/REV)

| GRANULAR APPLICATOR |      |      |      |      |      |         |       |       |       | SEED TANK / FERTILIZER TANK / THIRD TANK |       |       |       |         |      |      |      |      |      | GRANULAR APPLICATOR: SLOW SPEED DRIVE |      |      |      |       |       |       |       |                 |                            |              |    |
|---------------------|------|------|------|------|------|---------|-------|-------|-------|--|-------|-------|-------|---------|------|------|------|------|------|---------------------------------------|------|------|------|-------|-------|-------|-------|-----------------|----------------------------|--------------|----|
| SLOW SPEED DRIVE    |      |      |      |      |      |         |       |       |       | DIRECT DRIVE                             |       |       |       |         |      |      |      |      |      | CALIBRATION                           |      |      |      |       |       |       |       |                 |                            |              |    |
| GA-1                | GA-2 | GA-3 | GA-4 | GA-5 | GA-6 | OUTLETS | SSD-1 | SSD-2 | SSD-3 | SSD-4                                    | SSD-5 | SSD-6 | SSD-7 | OUTLETS | DD-1 | DD-2 | DD-3 | DD-4 | DD-5 | DD-6                                  | DD-7 | DD-8 | DD-9 | DD-10 | DD-11 | DD-12 | DD-13 | SLOWER POSITION | DENSITY KGS/M <sup>2</sup> | CHART COLUMN |    |
| 21                  | 011  | 012  | 013  | 014  | 015  | 016     | 017   | 018   | 019   | 020                                      | 021   | 022   | 023   | 21      | 052  | 075  | 095  | 118  | 137  | 158                                   | 181  | 201  | 221  | 241   | 261   | 281   | 301   | NONE            | 609                        | GA-1         |    |
| 22                  | 012  | 013  | 014  | 015  | 016  | 017     | 018   | 019   | 020   | 021                                      | 022   | 023   | 024   | 22      | 055  | 079  | 101  | 124  | 144  | 165                                   | 185  | 205  | 225  | 245   | 265   | 285   | 305   | -               | 641                        | -            |    |
| 23                  | 013  | 014  | 015  | 016  | 017  | 018     | 019   | 020   | 021   | 022                                      | 023   | 024   | 025   | 23      | 058  | 082  | 104  | 129  | 150  | 171                                   | 191  | 211  | 231  | 251   | 271   | 291   | 311   | NONE            | 801                        | GA-2         |    |
| 24                  | 014  | 015  | 016  | 017  | 018  | 019     | 020   | 021   | 022   | 023                                      | 024   | 025   | 026   | 24      | 060  | 086  | 109  | 135  | 157  | 178                                   | 199  | 219  | 239  | 259   | 279   | 299   | 319   | NONE            | 673                        | GA-3         |    |
| 25                  | 015  | 016  | 017  | 018  | 019  | 020     | 021   | 022   | 023   | 024                                      | 025   | 026   | 027   | 25      | 062  | 090  | 114  | 141  | 163  | 185                                   | 206  | 226  | 246  | 266   | 286   | 306   | 326   | 24              | 673                        | 24           |    |
| 26                  | 016  | 017  | 018  | 019  | 020  | 021     | 022   | 023   | 024   | 025                                      | 026   | 027   | 028   | 26      | 065  | 093  | 118  | 146  | 170  | 191                                   | 211  | 231  | 251  | 271   | 291   | 311   | 331   | 26              | 673                        | 24           |    |
| 27                  | 017  | 018  | 019  | 020  | 021  | 022     | 023   | 024   | 025   | 026                                      | 027   | 028   | 029   | 27      | 067  | 097  | 123  | 152  | 176  | 198                                   | 219  | 239  | 259  | 279   | 299   | 319   | 339   | 28              | 721                        | 26           |    |
| 28                  | 018  | 019  | 020  | 021  | 022  | 023     | 024   | 025   | 026   | 027                                      | 028   | 029   | 030   | 28      | 070  | 100  | 127  | 157  | 183  | 184                                   | 197  | 199  | 222  | 253   | 268   | 277   | 333   | NONE            | 1105                       | GA-4         |    |
| 29                  | 019  | 020  | 021  | 022  | 023  | 024     | 025   | 026   | 027   | 028                                      | 029   | 030   | 031   | 29      | 072  | 104  | 132  | 163  | 189  | 191                                   | 211  | 231  | 251  | 271   | 291   | 311   | 331   | NONE            | 1362                       | GA-5         |    |
| 30                  | 020  | 021  | 022  | 023  | 024  | 025     | 026   | 027   | 028   | 029                                      | 030   | 031   | 032   | 30      | 075  | 107  | 136  | 169  | 196  | 197                                   | 211  | 231  | 251  | 271   | 291   | 311   | 331   | 351             | 28                         | 1362         | -  |
| 31                  | 021  | 022  | 023  | 024  | 025  | 026     | 027   | 028   | 029   | 030                                      | 031   | 032   | 033   | 31      | 077  | 111  | 141  | 174  | 202  | 204                                   | 221  | 241  | 261  | 281   | 301   | 321   | 341   | 361             | 30                         | 1362         | -  |
| 32                  | 022  | 023  | 024  | 025  | 026  | 027     | 028   | 029   | 030   | 031                                      | 032   | 033   | 034   | 32      | 080  | 115  | 145  | 180  | 209  | 211                                   | 225  | 228  | 254  | 289   | 306   | 316   | 380   | 32              | 673                        | 24           |    |
| 33                  | 023  | 024  | 025  | 026  | 027  | 028     | 029   | 030   | 031   | 032                                      | 033   | 034   | 035   | 33      | 082  | 118  | 150  | 185  | 215  | 217                                   | 232  | 235  | 262  | 298   | 315   | 326   | 392   | 34              | 673                        | 24           |    |
| 34                  | 024  | 025  | 026  | 027  | 028  | 029     | 030   | 031   | 032   | 033                                      | 034   | 035   | 036   | 34      | 085  | 122  | 154  | 191  | 222  | 224                                   | 239  | 242  | 267  | 297   | 315   | 326   | 396   | 36              | 673                        | 24           |    |
| 35                  | 025  | 026  | 027  | 028  | 029  | 030     | 031   | 032   | 033   | 034                                      | 035   | 036   | 037   | 35      | 087  | 125  | 159  | 197  | 229  | 230                                   | 247  | 250  | 276  | 298   | 316   | 335   | 346   | 416             | 38                         | 673          | 24 |
| 36                  | 026  | 027  | 028  | 029  | 030  | 031     | 032   | 033   | 034   | 035                                      | 036   | 037   | 038   | 36      | 090  | 129  | 163  | 202  | 235  | 237                                   | 253  | 256  | 282  | 305   | 345   | 356   | 428   | 40              | 673                        | 24           |    |
| 37                  | 027  | 028  | 029  | 030  | 031  | 032     | 033   | 034   | 035   | 036                                      | 037   | 038   | 039   | 37      | 092  | 132  | 168  | 208  | 242  | 243                                   | 260  | 263  | 294  | 334   | 354   | 366   | 440   | 42              | 673                        | 24           |    |
| 38                  | 028  | 029  | 030  | 031  | 032  | 033     | 034   | 035   | 036   | 037                                      | 038   | 039   | 040   | 38      | 095  | 136  | 173  | 214  | 248  | 250                                   | 267  | 271  | 302  | 342   | 364   | 376   | 451   | 44              | 673                        | 24           |    |
| 39                  | 029  | 030  | 031  | 032  | 033  | 034     | 035   | 036   | 037   | 038                                      | 039   | 040   | 041   | 39      | 097  | 140  | 177  | 219  | 255  | 257                                   | 274  | 278  | 310  | 352   | 373   | 386   | 463   | 46              | 673                        | 24           |    |
| 40                  | 030  | 031  | 032  | 033  | 034  | 035     | 036   | 037   | 038   | 039                                      | 040   | 041   | 042   | 40      | 100  | 143  | 182  | 225  | 261  | 263                                   | 281  | 285  | 311  | 361   | 383   | 396   | 475   | 48              | 673                        | 24           |    |
| 41                  | 031  | 032  | 033  | 034  | 035  | 036     | 037   | 038   | 039   | 040                                      | 041   | 042   | 043   | 41      | 102  | 147  | 186  | 230  | 268  | 270                                   | 288  | 292  | 326  | 370   | 392   | 405   | 487   | 50              | 673                        | 24           |    |
| 42                  | 032  | 033  | 034  | 035  | 036  | 037     | 038   | 039   | 040   | 041                                      | 042   | 043   | 044   | 42      | 105  | 150  | 191  | 236  | 274  | 276                                   | 295  | 299  | 333  | 379   | 402   | 415   | 499   | 52              | 673                        | 24           |    |
| 43                  | 033  | 034  | 035  | 036  | 037  | 038     | 039   | 040   | 041   | 042                                      | 043   | 044   | 045   | 43      | 107  | 154  | 195  | 242  | 281  | 283                                   | 302  | 306  | 341  | 388   | 412   | 425   | 511   | 54              | 673                        | 24           |    |
| 44                  | 034  | 035  | 036  | 037  | 038  | 039     | 040   | 041   | 042   | 043                                      | 044   | 045   | 046   | 44      | 110  | 158  | 200  | 247  | 287  | 290                                   | 309  | 313  | 349  | 397   | 421   | 435   | 523   | 56              | 673                        | 24           |    |
| 45                  | 035  | 036  | 037  | 038  | 039  | 040     | 041   | 042   | 043   | 044                                      | 045   | 046   | 047   | 45      | 112  | 161  | 204  | 253  | 294  | 296                                   | 316  | 320  | 357  | 406   | 431   | 445   | 535   | 58              | 673                        | 24           |    |
| 46                  | 036  | 037  | 038  | 039  | 040  | 041     | 042   | 043   | 044   | 045                                      | 046   | 047   | 048   | 46      | 115  | 165  | 209  | 259  | 300  | 303                                   | 323  | 328  | 365  | 414   | 440   | 455   | 545   | 60              | 673                        | 24           |    |
| 47                  | 037  | 038  | 039  | 040  | 041  | 042     | 043   | 044   | 045   | 046                                      | 047   | 048   | 049   | 47      | 117  | 168  | 213  | 264  | 307  | 309                                   | 330  | 335  | 373  | 424   | 450   | 465   | 558   | 62              | 673                        | 24           |    |
| 48                  | 038  | 039  | 040  | 041  | 042  | 043     | 044   | 045   | 046   | 047                                      | 048   | 049   | 050   | 48      | 120  | 172  | 218  | 270  | 313  | 316                                   | 337  | 342  | 381  | 433   | 459   | 475   | 570   | 64              | 673                        | 24           |    |
| 49                  | 039  | 040  | 041  | 042  | 043  | 044     | 045   | 046   | 047   | 048                                      | 049   | 050   | 051   | 49      | 122  | 175  | 222  | 275  | 320  | 322                                   | 342  | 349  | 389  | 442   | 469   | 485   | 582   | 66              | 673                        | 24           |    |
| 50                  | 040  | 041  | 042  | 043  | 044  | 045     | 046   | 047   | 048   | 049                                      | 050   | 051   | 052   | 50      | 125  | 179  | 227  | 280  | 327  | 329                                   | 352  | 356  | 397  | 452   | 479   | 495   | 594   | 68              | 673                        | 24           |    |
| 51                  | 041  | 042  | 043  | 044  | 045  | 046     | 047   | 048   | 049   | 050                                      | 051   | 052   | 053   | 51      | 127  | 183  | 232  | 287  | 333  | 336                                   | 359  | 363  | 405  | 461   | 488   | 504   | 606   | 70              | 673                        | 24           |    |
| 52                  | 042  | 043  | 044  | 045  | 046  | 047     | 048   | 049   | 050   | 051                                      | 052   | 053   | 054   | 52      | 129  | 186  | 236  | 292  | 340  | 342                                   | 366  | 370  | 413  | 470   | 498   | 514   | 618   | 72              | 673                        | 24           |    |
| 53                  | 043  | 044  | 045  | 046  | 047  | 048     | 049   | 050   | 051   | 052                                      | 053   | 054   | 055   | 53      | 132  | 190  | 241  | 298  | 346  | 349                                   | 373  | 377  | 421  | 479   | 507   | 524   | 630   | 74              | 673                        | 24           |    |
| 54                  | 044  | 045  | 046  | 047  | 048  | 049     | 050   | 051   | 052   | 053                                      | 054   | 055   | 056   | 54      | 134  | 193  | 245  | 303  | 353  | 356                                   | 380  | 384  | 429  | 488   | 517   | 534   | 642   | 76              | 673                        | 24           |    |
| 55                  | 045  | 046  | 047  | 048  | 049  | 050     | 051   | 052   | 053   | 054                                      | 055   | 056   | 057   | 55      | 137  | 197  | 250  | 309  | 359  | 362                                   | 387  | 392  | 437  | 497   | 526   | 544   | 653   | 78              | 673                        | 24           |    |
| 56                  | 046  | 047  | 048  | 049  | 050  | 051     | 052   | 053   | 054   | 055                                      | 056   | 057   | 058   | 56      | 139  | 200  | 254  | 313  | 363  | 366                                   | 394  | 399  | 445  | 506   | 535   | 554   | 665   | 80              | 673                        | 24           |    |
| 57                  | 047  | 048  | 049  | 050  | 051  | 052     | 053   | 054   | 055   | 056                                      | 057   | 058   | 059   | 57      | 142  | 204  | 259  | 318  | 372  | 375                                   | 401  | 406  | 453  | 515   | 545   | 564   | 677   | 82              | 673                        | 24           |    |
| 58                  | 048  | 049  | 050  | 051  | 052  | 053     | 054   | 055   | 056   | 057                                      | 058   | 059   | 060   | 58      | 144  | 208  | 263  | 322  | 379  | 382                                   | 408  | 413  | 461  | 524   | 555   | 574   | 689   | 84              | 673                        | 24           |    |
| 59                  | 049  | 050  | 051  | 052  | 053  | 054     | 055   | 056   | 057   | 058                                      | 059   | 060   | 061   | 59      | 147  | 211  | 268  | 327  | 385  | 388                                   | 415  | 420  | 468  | 533   | 565   | 584   | 701   | 86              | 673                        | 24           |    |
| 60                  | 050  | 051  | 052  | 053  | 054  | 055     | 056   | 057   | 058   | 059                                      | 060   | 061   | 062   | 60      | 149  | 215  | 272  | 331  | 392  | 395                                   | 422  | 427  | 474  | 542   | 574   | 593   | 713   | 88              | 673                        | 24           |    |
| 61                  | 051  | 052  | 053  | 054  | 055  | 056     | 057   | 058   | 059   | 060                                      | 061   | 062   | 063   | 61      | 152  | 218  | 277  | 336  | 398  | 401                                   | 429  | 434  | 484  | 551   | 584   | 603   | 725   | 90              | 673                        | 24           |    |
| 62                  | 052  | 053  | 054  | 055  | 056  | 057     | 058   | 059   | 060   | 061                                      | 062   | 063   | 064   | 62      | 154  | 222  | 281  | 340  | 405  | 408                                   | 436  | 441  | 492  | 560   | 593   | 613   | 737   | 92              | 673                        | 24           |    |
| 63                  | 053  | 054  | 055  | 056  | 0    |         |       |       |       |  |       |       |       |         |      |      |      |      |      |                                       |      |      |      |       |       |       |       |                 |                            |              |    |







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