

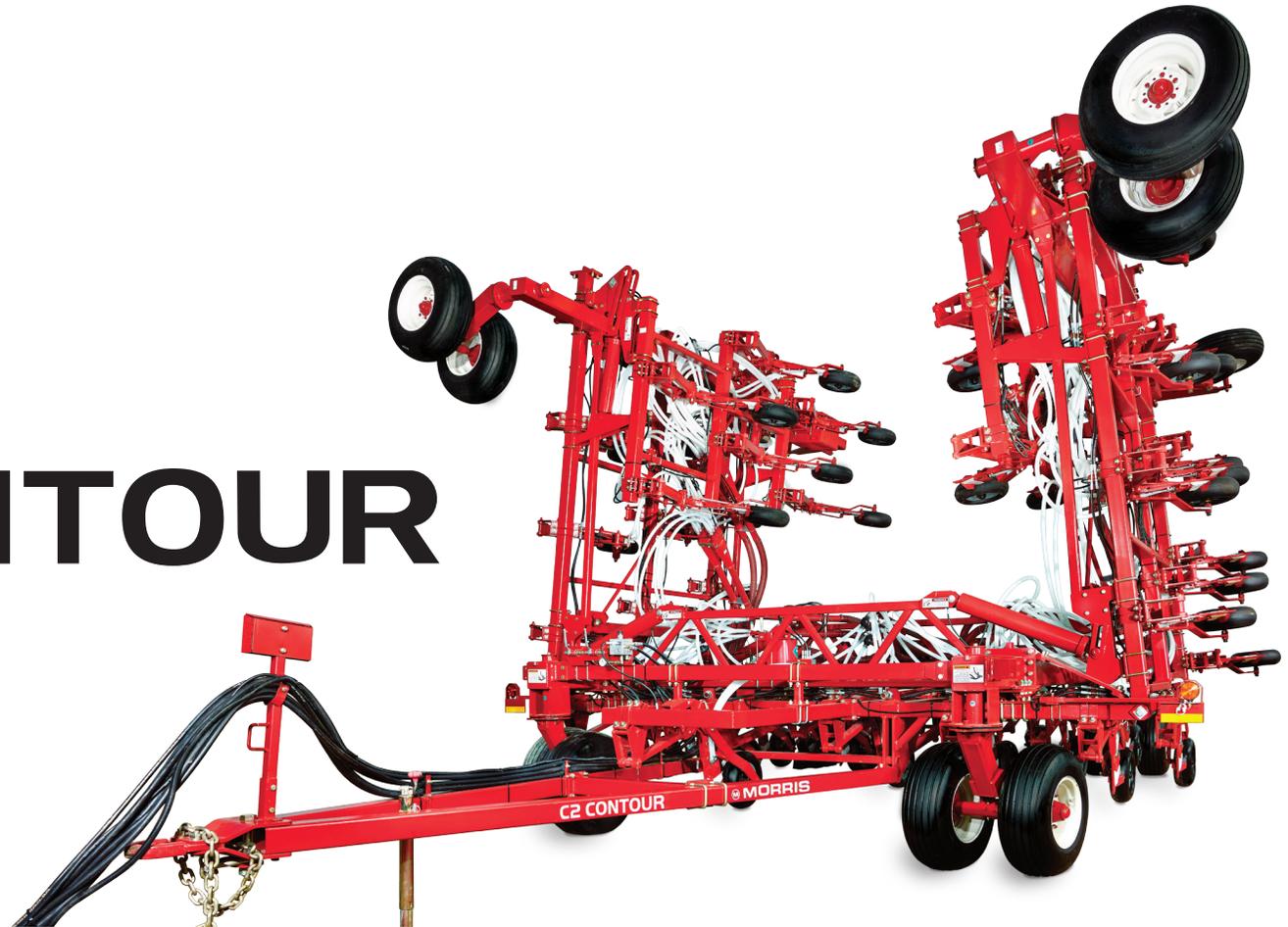
MORRIS



Customer Clinic 2018



C2 CONTOUR



C2 CONTOUR



General

- Check hose connections
- Check bolt torque on drill after two days of use

Lubrication – Grease (ref: sec 6-4 Operators Manual)

- Castor Fork – grease every 50 hrs until grease comes out the top and bottom
- Wheel Hubs – every 500 hrs
- Opener Wheel Hubs – every 200 hrs or seasonally (whichever comes first)
- Repack main wheel hubs yearly

Tire Pressure (ref: sec 6-3 Operators Manual)

- Inflate to proper tire pressure
- Check pneumatic opener tire pressure is minimum of 10psi (if equipped)

Transport (ref: sec 5-4 to 5-7)

- Tighten Wheel Bolts
- Transport Lock Valve is in use (wings)
- Openers Lock Valve is in use

C2 CONTOUR

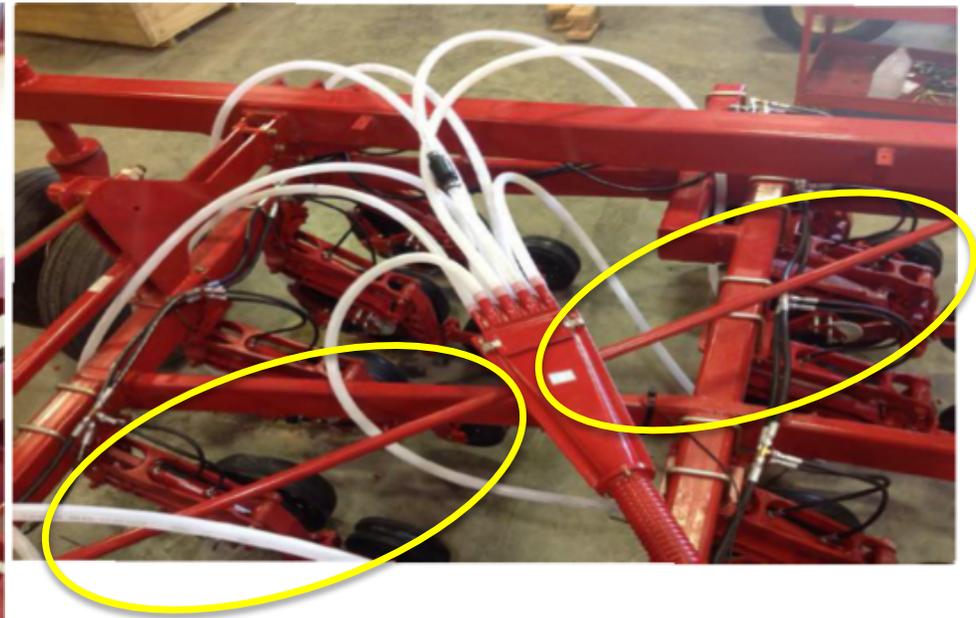
Unit Requirements

Hydraulic Flow & Horsepower

- C2 requires around 20gpm for lifting and lowering the openers quickly
- Flow can be set lower, lengthening cycle times accordingly
- We usually say you need 4.5-5.5 hp/opener to pull a C2 with common paired-row and double-shoot boot at 5mph



C2 CONTOUR



Frame

Frame & Opener Mount Bolts:

- Good practice to retorque all frame bolts after 50hrs of use

Truss Rods:

- Always Keep truss rods snug

C2 CONTOUR

Frame - Hitching

Important to note that C2 hitches are built to be pulled forward primarily. It is best practice to **NOT** pull the hitch sideways in any situation, especially if stuck, as damage can occur.



C2 CONTOUR

Transport



Openers Valve

Wing Valve

Wing Lock/Opener Lock Valves:

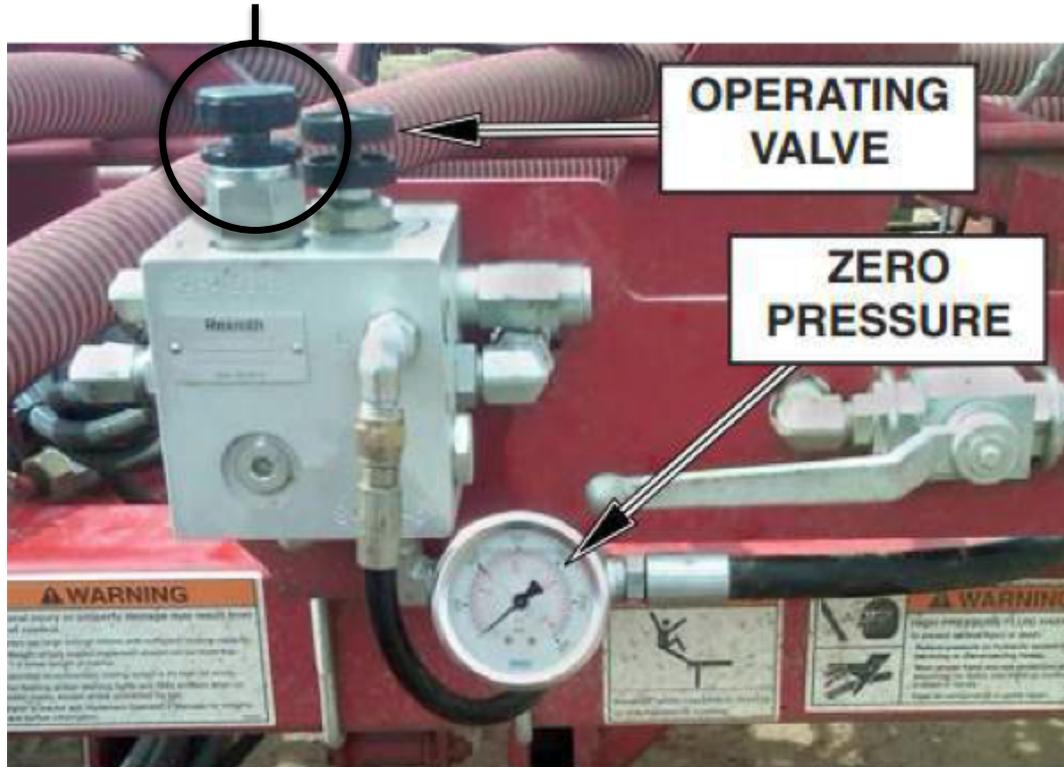
- Valves shown closed
- Close valves for transporting the drill
- Open valves before winging machine down or operating the openers

Notes:

C2 CONTOUR

Opener Hydraulics

Pressure Adjustment



CAUTION:

Pressure can be stored by the accumulator and must be relieved using operating valve before servicing

Operating Valve:

- Constant Pressure Operation: Operating Valve should be closed during drill operation
- Reducing Pressure On-the-Go: Open Operating Valve “set to Bleed Off/ Service Position” and put tractor remote in “Float” to bleed off pressure; use tractor remote to charge pressure back up when needed
- Open Operating Valve before servicing “set to Bleed Off/Service Position” and relieve pressure from opener circuit using tractor remote

C2 CONTOUR



Opener Pressure Adjustment:

- Reducing Valve can be set for maximum working pressure of the openers (divide gauge pressure by 1.5 to determine lbs of trip out force i.e. 800psi = 533lbs)
- Set pressure to 100-150psi above desired working pressure to allow for accumulator cooling and valve hysteresis
- Set valve by unscrewing locking nut and adjusting knob in or out for more or less pressure (make adjustments with no pressure in circuit)

NOTE:

- Divide gauge pressure by 1.5 to determine approximate trip force i.e. 800psi ~ 533lbs trip force
- Packer force is approx. 1/3 of trip force i.e. 533lbs trip force ~ 177lbs packer force

C2 CONTOUR

Hydraulic Pressure Setting

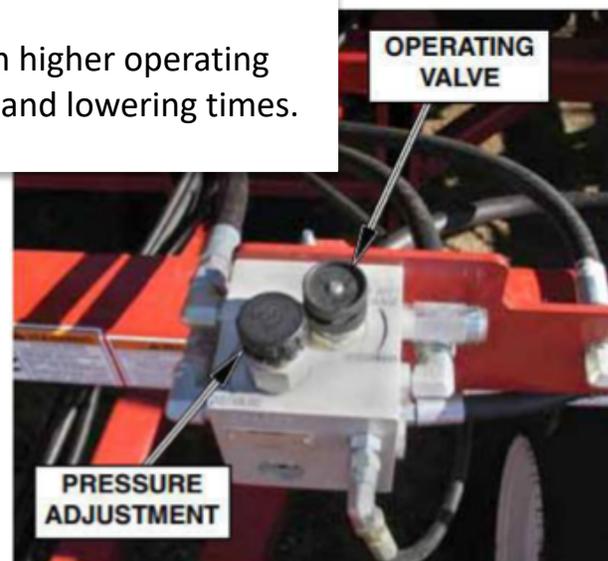
- Always turn “Operating” valve out to bleed off/service position and relieve hydraulic pressure from the system before performing maintenance or repairs.

Note: Accumulator can store pressure even when disconnected from tractor.

- The gas bladder in the hydraulic accumulator should be pre-charged with dry nitrogen gas before being mounted on the unit.
- Different accumulator pre-charge pressures will allow for different ranges of trip out force, as show in the chart.
- Pre-charge pressure should be set for the most common working conditions.
- Lower pre-charge pressures with higher operating pressures will give longer lifting and lowering times.

Accumulator Operating Range		
Nitrogen Pre-charge Pressure	Display Pressure	
	Minimum	Maximum
350 psi (2413 kPa)	450 psi (3102 kPa)	1200 psi (8274 kPa)

* Maximum system hydraulic pressure is 1200 psi or 4 times the pre-charge pressure, whichever is the lower number.

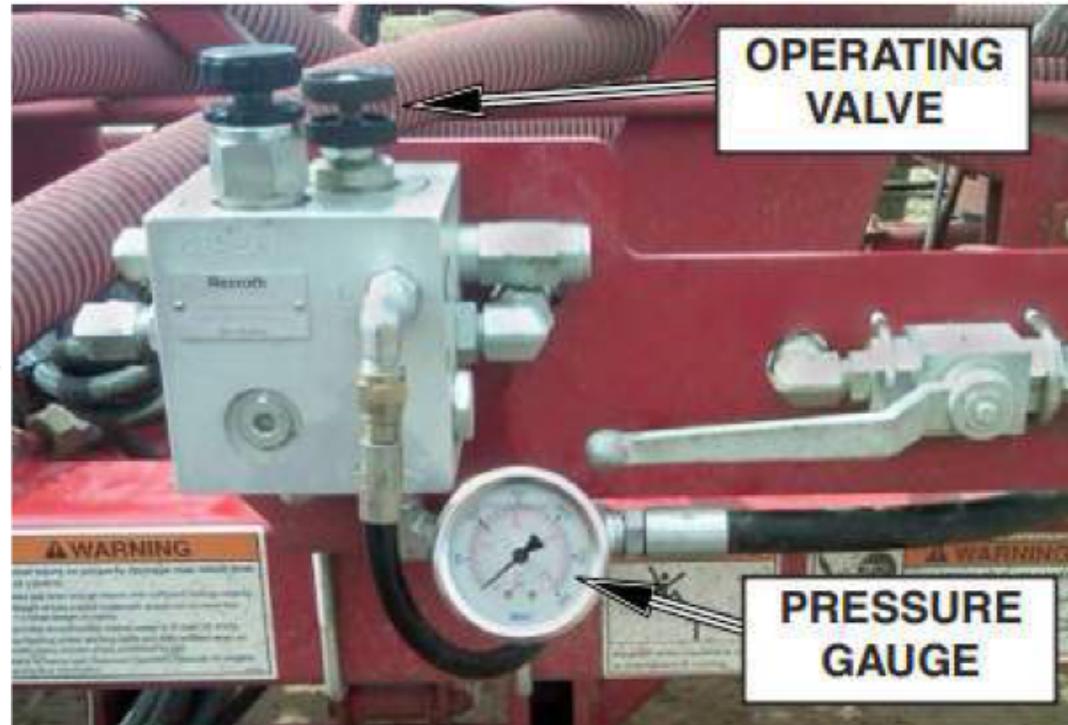


C2 CONTOUR

Bleeding Off Hydraulics

To Bleed all pressure from Opener Hydraulic system:

- Open “Operating” valve to service/bleed-off position
- Lift openers to transport position
- Let openers drop and pressure go to 0 psi (or near 0 psi) on gauge
- Lift openers to transport position and lock “Openers” valve



Bleeding Air From Opener Hydraulic System

The Contour Air drill hydraulic system should be thoroughly bled of any trapped air before being put into service. The following steps can be used to bleed the hydraulic system:

1. Assemble openers and hydraulic lines and fittings to frame and check the machine for leaks by operating hydraulics to move openers up and down.
2. Lift openers up and lock tractor remote in lift position.
3. With tractor hydraulics operating, open bleed-off ball valves on end of drill wings.

Note: If larger than 61' should do one bleed-off at a time so would take about an hour to bleed.

4. Allow oil to cycle for 15 minutes then change direction of tractor remote to lower openers and cycle for a another 15 minutes.
5. Close bleed-off ball valves and lift openers up.
6. Repeat steps 2 to 5 for a second time.
7. Close bleed-off ball valves and lift openers up.
8. Lock "Openers" valve and check to see that openers stay firmly in position.
9. If openers are spongy repeat procedure until air is gone.

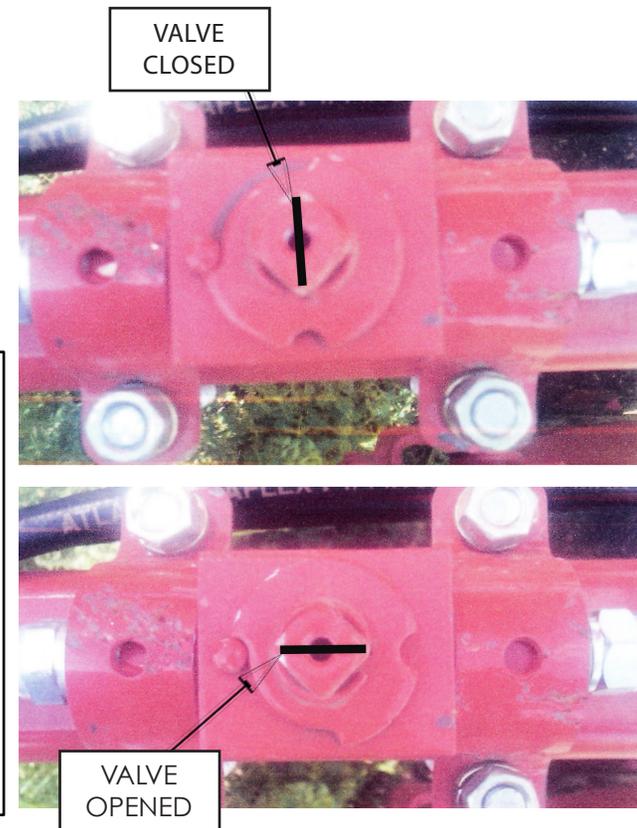
Important

Once air is purged from the cylinders, raise openers fully.

Place hydraulic lever into float position, all openers should drop to the ground under their own weight.

If it requires pressure to push an opener down to the ground during this procedure, one or more of the pivot bolts are over tightened.

Check and adjust pivot bolts as required.



C2 CONTOUR

Quick Tips

Shank trip force: Shank trip force (lbs) is calculated by dividing the display pressure by 1.5 (ex. 600psi display pressure = 400lbs shank trip force). Shank trip out pressure is generally set at the minimum pressure that keeps the shanks solid in the vertical position and prevents them from repeatedly “tripping out”, while still providing adequate packing. If you notice packer assemblies “bouncing” or frequently moving up and down, you may have too little packing pressure for your conditions. You can increase hydraulic pressure, decrease depth setting and decrease speed to correct this problem. Maximum recommended shank trip out pressure is 1200psi. NOTE: The shank trip out pressure needs to be determined by the operator for each field.

Packing force: Packing force is proportional to shank trip out force and is roughly 1/3 of the shank trip force (ex. 500lbs shank trip force would give approximately 167lbs of packing force).

Hydraulic system: The Contour air drill uses a passive hydraulic system (no constant flow is needed from the tractor during seeding). Maximum operating pressure is set using the reducing valve on the frame (see Operator’s Manual). Pressure can be changed on the fly to adjust for variable field conditions by using the tractor remote with the valve in the Bleed Off/Service position. NOTE: It is normal for the pressure to drop 100 to 150psi from the initial set point while the accumulator gas cools (the reducing valve can be set higher to account for this initial pressure drop). If the pressure continues to drop quickly, check the machine for a cylinder, fitting, or hydraulic line leak.

Hydraulic Requirements: With the passive system, active hydraulic flow is only needed in operation when raising and lowering the openers. Anywhere from **19-25gpm is recommended depending on the size of the drill.**

C2 CONTOUR

Quick Tips

Lifting and lowering the openers: The openers do not need to be completely cycled from working to fully lifted position while turning. Openers can be lifted just to the point that they do not contact the ground while turning. When transporting the drill, lift the openers and ensure that the display pressure goes down to zero.

Setting the seed depth: Seed depth is measured from the packed soil surface to the seed. Set the seed depth on the drill by setting a few openers across the drill to different depths and seeding a test patch. Always seed the test patch at the same ground speed and opener pressure that you intend to maintain during regular seeding conditions. Then check the seed depth of these openers, pick the depth setting that you prefer, and set all openers to the desired letter setting on the depth adjustment cam. The openers perform best while seeding from 1/2" to 1-1/2" seed depth, but each customer is responsible for choosing their own depth setting according to their preferences and experience. Each adjustment notch on the adjustment cam is 1/4" adjustment. Shallow depth settings can be consistently maintained with the Contour air drill system.

NOTE: Be sure to check tractor and/or air cart tracks to see if the added soil compaction has affected the seed depth; the independent openers can be adjusted separately to compensate for wheel tracks.

C2 CONTOUR

Quick Tips

Seeding conditions: The Contour air drill is meant to be used as a minimum to no-till seeding system and care should be taken when attempting to seed into loose or pre-worked soil conditions. Shallow seeding depth, reducing operating speed and operating pressure may help reduce soil throw and ridging in soft conditions. The packer tire should be appropriately sized to the opener in order to seed into worked conditions (i.e. 550 tire matched to paired row opener).

NOTE: Soil throw onto adjacent seed rows also occurs on conventional air drills with gang style packers, but is less visible because the gang packers pack all rows simultaneously at the back of the drill.

Air drill frame: The Contour air drill frame is a simple slab frame system, designed to let the parallel link openers do the work of depth control and leveling during seeding. No leveling of the frame is required. During normal operation of the drill there will be very little weight on the rear tires of the frame. The rear tires may even leave the ground while traveling through sharp gullies; this is normal, and it will not affect the seed depth control of the openers. If the tires are lifted in the air consistently, optional weight kits can be applied to the depth beams near the rear axles.

Relieve System Pressure

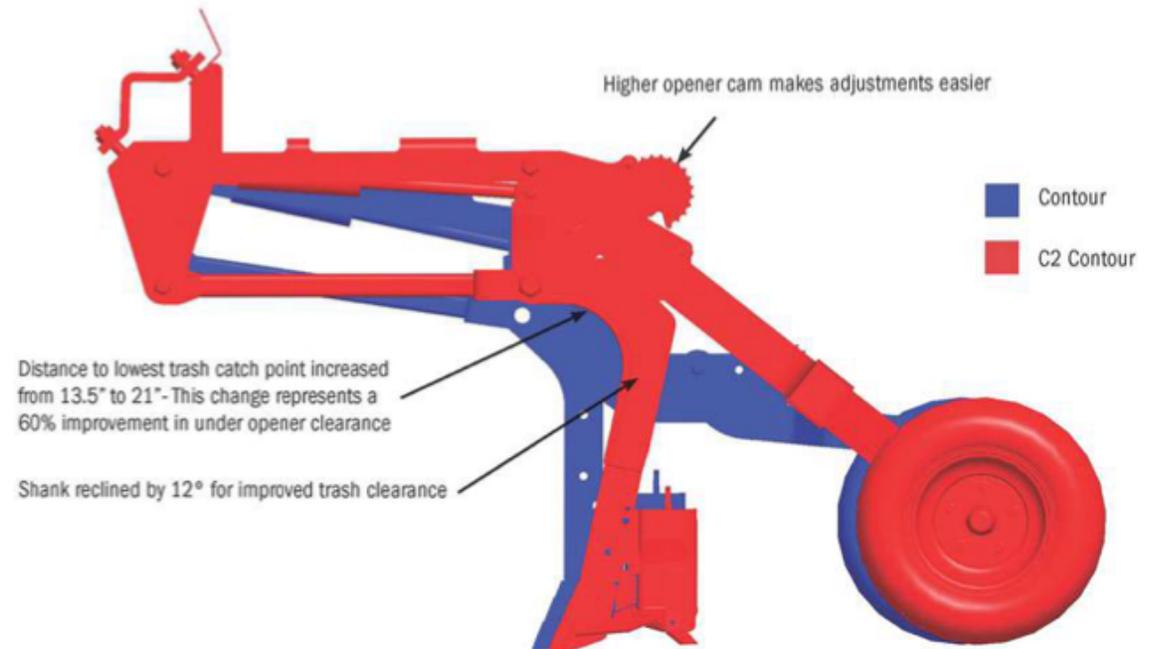
- To bleed all pressure from Opener hydraulic system:
- Open “Operating” valve to service/bleed-off position.
- Lift openers to transport position.
- Put tractor remote in “float” position.
- Let openers drop and pressure go to 0 psi (or near 0 psi) on gauge.
- Lift openers to transport position and lock “Openers” valve.

C2 CONTOUR

General

- Parallel linkage for excellent ground following capability
- Hydraulic cylinder used for shank trip-out/down-force and lifting/lowering of the opener
- One depth adjustment on each opener
- Single or double shoot boots available
- 4.8" air filled packers, 4.8" & 5.5" semi-pneumatic packer, 4.5" & 5.5" semi-pneumatic Otico packers or V-packer semi-pneumatic tires available
- **OPENER MAINTENANCE**
(ref sec 6-5-14)

C2 Contour:



C2 CONTOUR



Depth Setting:

- Lift openers and lock in transport position using “Openers” ball valve
- Start by adjusting a few openers across the drill and seeding a short distance until you have found your ideal depth setting
- Adjust the remaining openers to your ideal depth setting
- To adjust opener depth, remove lynch pin from 1/2” diameter depth pin and pull pin from adjustment cam notch - depth can be set in 1/4” increments
- Rotate depth adjustment cam and re-insert pin at desired depth; re-install depth pin and secure lynch pin
- Re-check depth and check wheel tracks to see if openers in wheel tracks need more/less depth setting
- A good starting point for depth settings would be setting “D”

C2 CONTOUR

Packer Wheel Options

			
<p>4.8" & 5.5" semi-pneumatic packers</p> <ul style="list-style-type: none">• Ultimate low maintenance packer• Well suited to most soil types• Ideal for double shoot applications• Improved field finish with 5.5"	<p>4.8" pneumatic 'air filled' packer</p> <ul style="list-style-type: none">• Infinitely adjustable Packers• Economical option	<p>4.5" & 5.5" semi-pneumatic Otico packer tire</p> <ul style="list-style-type: none">• Excellent "mud shedding" characteristics due to tremendous flexibility	<p>V-packer semi-pneumatic</p> <ul style="list-style-type: none">• Suited for single shoot narrow knife applications• Very good in winter wheat planting where defined furrows are desired

C2 CONTOUR

Packer Wheels



INTRODUCING

SHIELDCORE™

DURABLE, LONG-LASTING GROUND ENGAGEMENT TOOLS

A revolutionary line of parts with an innovative carbide coating technology that significantly improves the durability and lifespan of Morris parts by shielding the surfaces from wear and impact.

MORRIS

MORRIS

SHIELDCORE™

DURABLE, LONG-LASTING GROUND ENGAGEMENT TOOLS

OPENERS

PRECISION WELDING

Traps soil between surface beads, making soil wear on soil, not steel

OPTIMIZED WELD BEAD SIZE

Avoids excess soil build-up on opener while protecting all surfaces

INCREASED SHANK TIP ANGLE

For excellent ground penetration in wet soil conditions



LARGER PROTECTION AREA

3x larger surface is protected compared to previous generation openers

INCREASED WEAR LIFE

New wear guard extends life to protect IP openers



TINES

INCREASED WEAR LIFE

4 INCH CARBIDE COATED TIP

LESS MAINTENANCE REQUIRED

WEAR LIFE MATCHES SPRING COIL LIFE*



**INNOVATION
UNEARTHED**

On your land, excuses are the only thing that won't grow. At Morris, we're unearthing innovations and building products that withstand the elements and stand the test of time.

ShieldCore™ is our newest innovation on a journey that will change the landscape of farming, forever. And it's only the beginning...

Your land – it's where innovation grows.

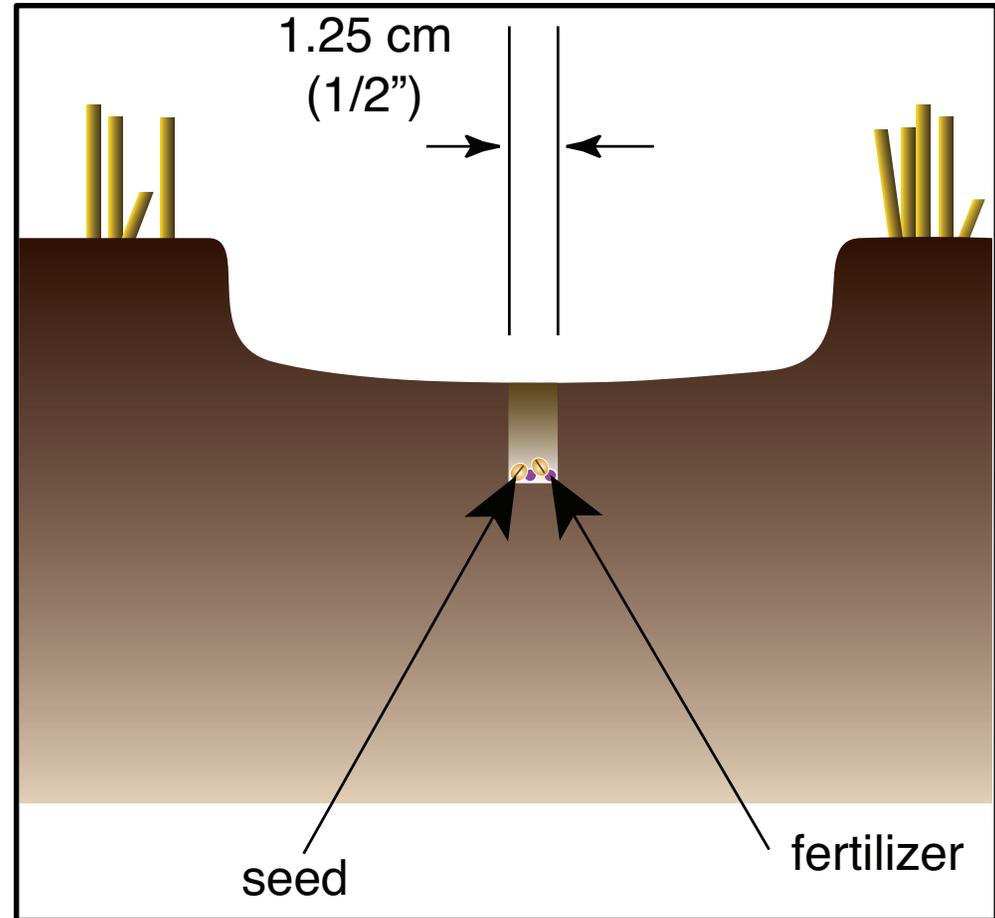
Discover more at Innovationunearthed.com

morris-industries.com

*Patent pending
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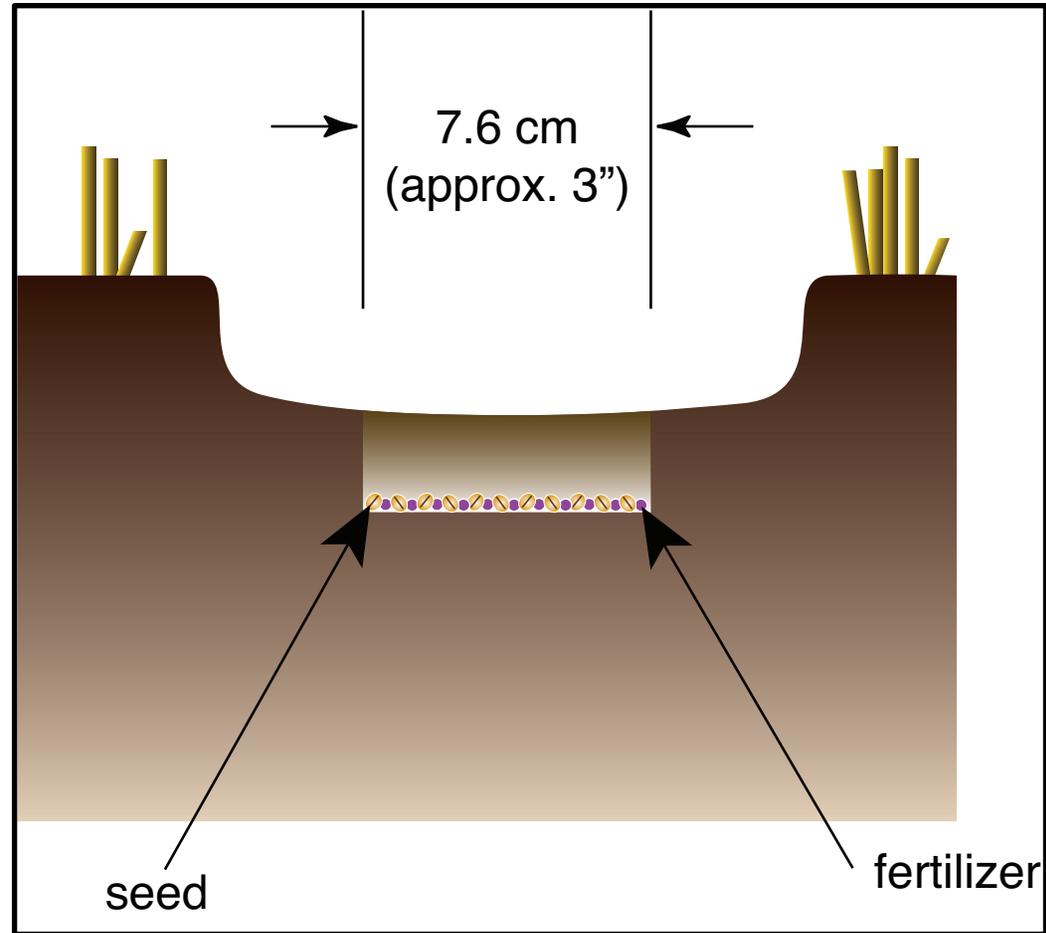
C2 CONTOUR

Single-Shoot Openers - Narrow Knife



C2 CONTOUR

Single-Shoot Openers - Spread Tip



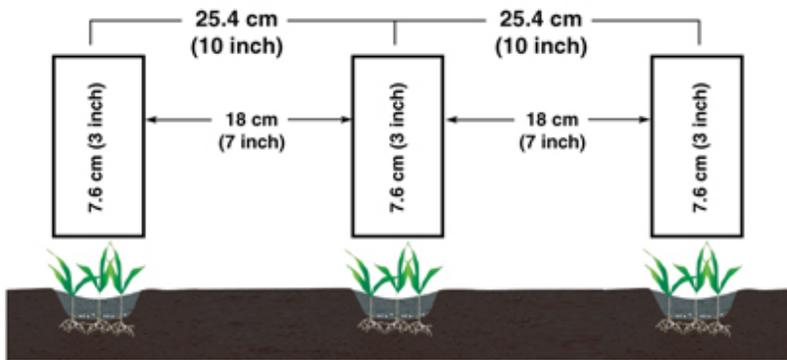
CONTOUR DRILL

Comparative SBU (Seed Bed Utilization)

Spreader Tip vs Single Shoot Opener

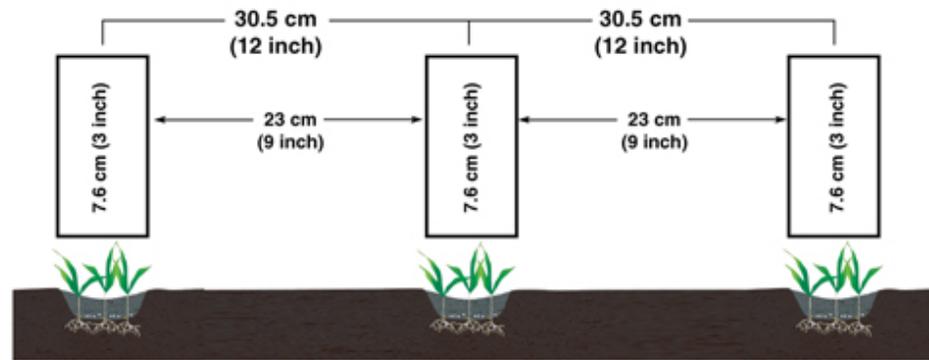
Spreader Tip

Spreader Tip 10 inch Spacing



SBU (Seed Bed Utilization) Spreader Tip 25.4 cm (10 inch) spacing = 30%

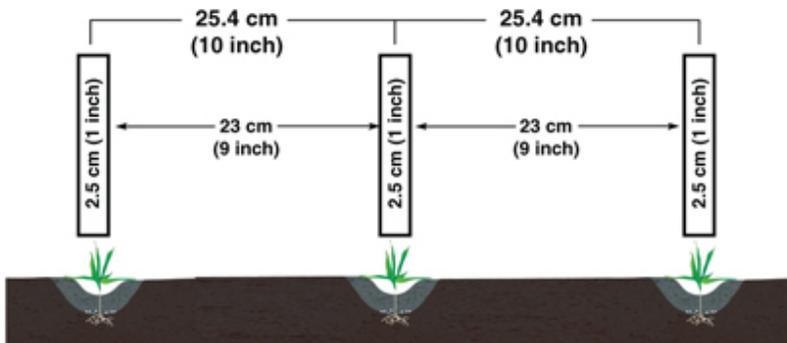
Spreader Tip 12 inch Spacing



SBU (Seed Bed Utilization) Spreader Tip 30.5 cm (12 inch) spacing = 25%

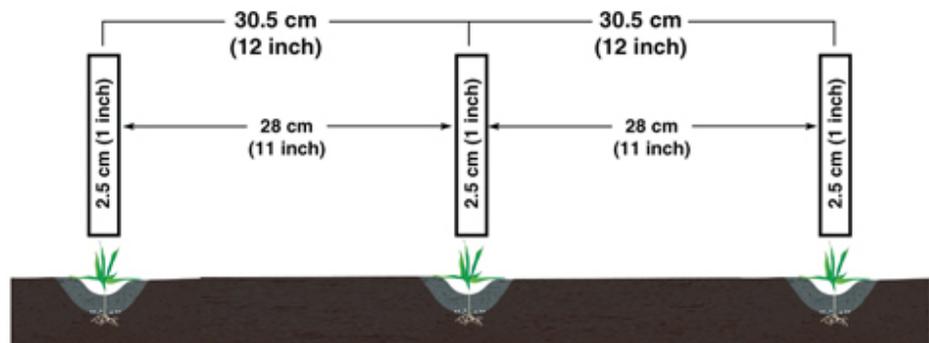
Single Shoot Opener

Single Shoot 10 inch Spacing



SBU (Seed Bed Utilization) Single Shoot 25.4 cm (10 inch) spacing = 10%

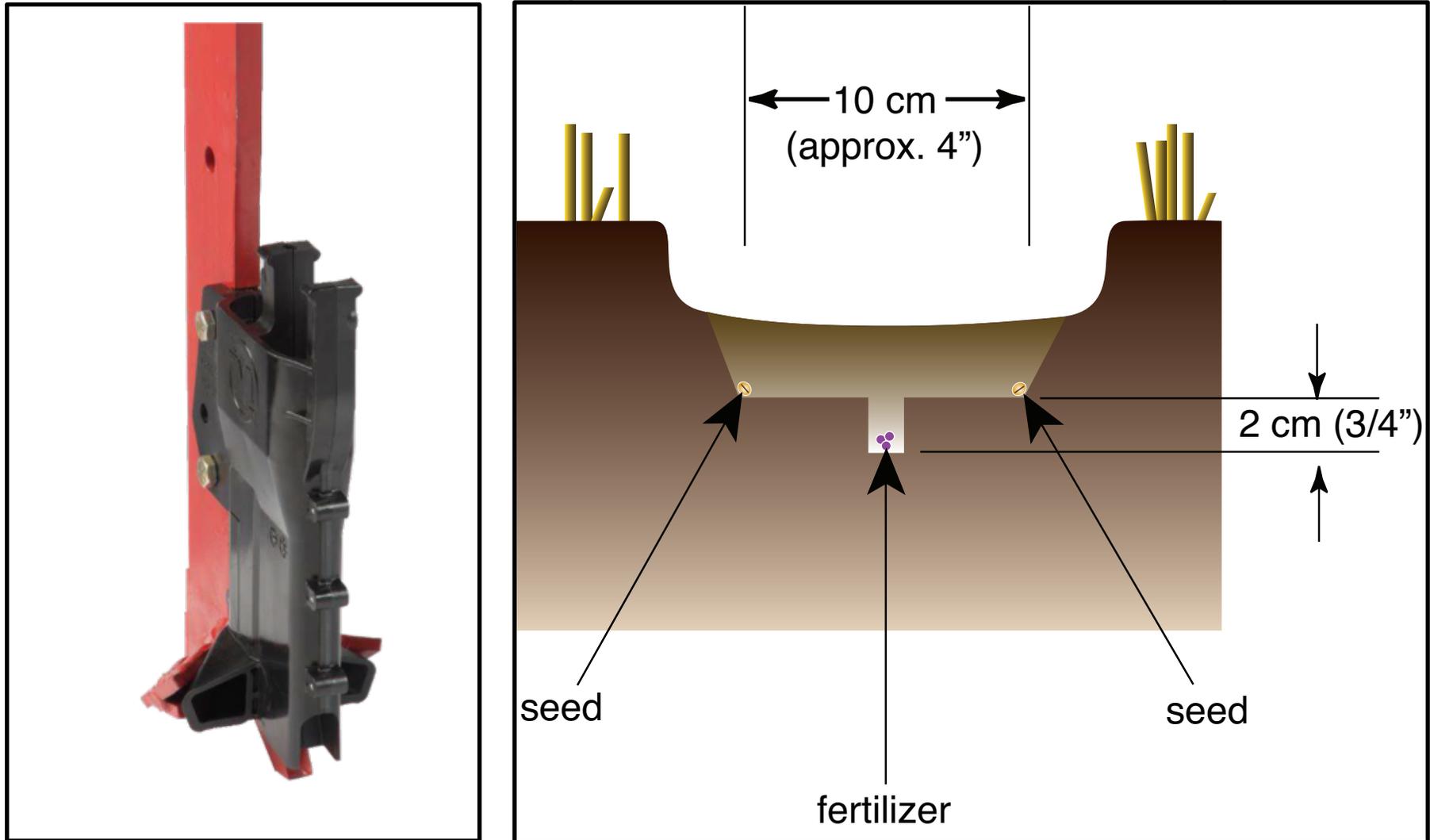
Single Shoot 12 inch Spacing



SBU (Seed Bed Utilization) Single Shoot 30.5 cm (12 inch) spacing = 8%

C2 CONTOUR

Double-Shoot Openers - Paired Row - IP Opener



C2 CONTOUR

Double-Shoot Openers - Paired Row



Allows more efficient use of your land by providing better seed bed utilization.

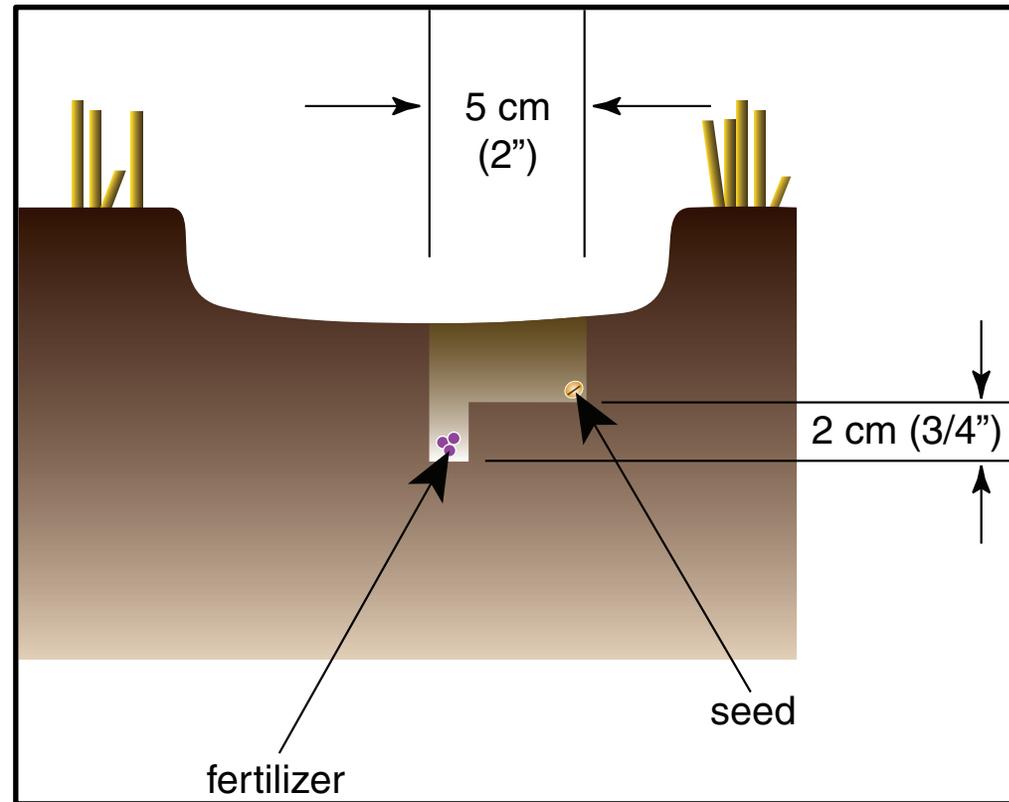
On 25.4 cm (10") spacing, the distance between rows is approximately 15.2 cm (6") and on 30.5 cm (12") spacing, the distance is approximately 20.3 cm (8"). And, the paired row ensures an excellent stand for swathing.

C2 CONTOUR

Double-Shoot Openers - Side Band - IP Opener



This is replaceable



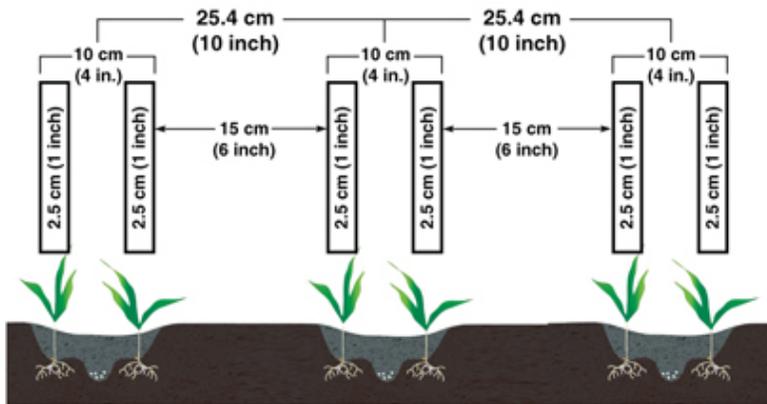
CONTOUR DRILL

Comparative SBU (Seed Bed Utilization)

Paired Row Opener vs Side Band Opener

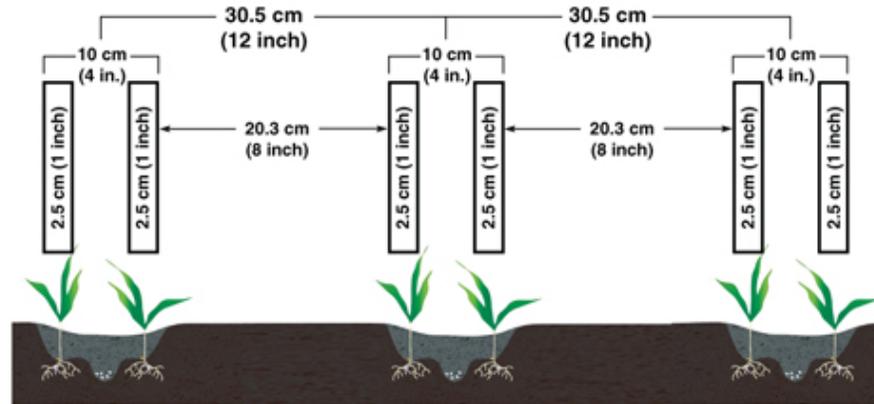
Paired Row Opener

Paired Row 10 inch Spacing



SBU (Seed Bed Utilization) Paired Row 25.4 cm (10 inch) spacing = 20%

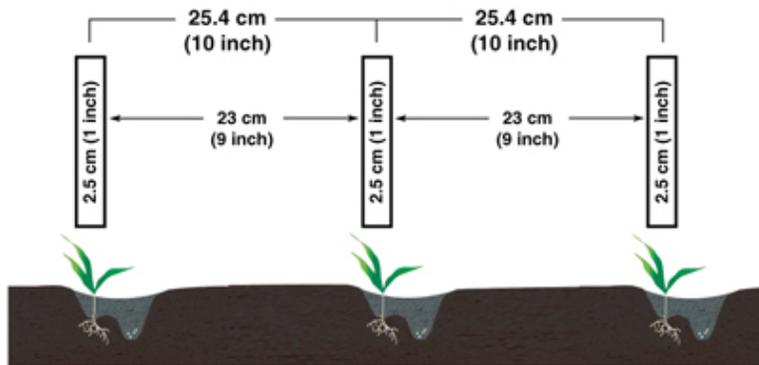
Paired Row 12 inch Spacing



SBU (Seed Bed Utilization) Paired Row 30.5 cm (12 inch) spacing = 17%

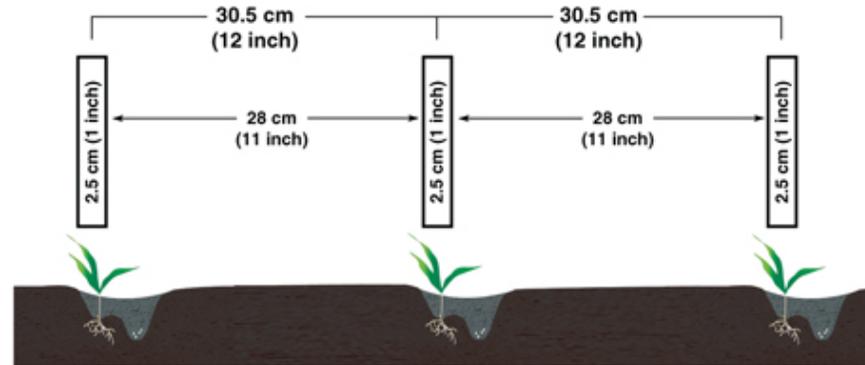
Side Band Opener

Side Band 10 inch Spacing



SBU (Seed Bed Utilization) Side Band 25.4 cm (10 inch) spacing = 10%

Side Band 12 inch Spacing



SBU (Seed Bed Utilization) Side Band 30.5 cm (12 inch) spacing = 8%

C2 CONTOUR



**Spring wheat planted by Contour drill
at the University of Saskatchewan in
2010.**



**Canola field west of Kindersley
planted by C2 Contour drill.**

Uniformity

Agronomists believe that crop emergence uniformity is critical to maximizing crop yield potential. Well designed seeding equipment results in crops that emerge rapidly and uniformly with minimal seed mortality.

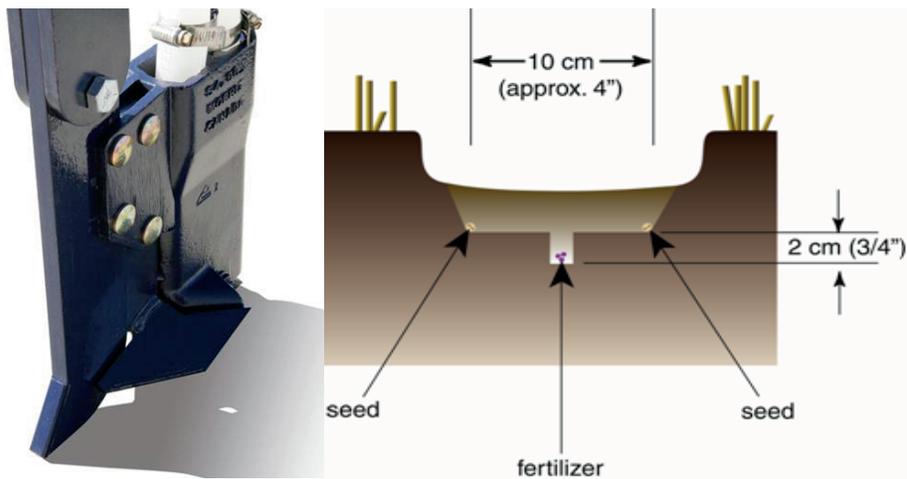
In order to achieve crop emergence uniformity seeding equipment must:

- A. Deliver consistent seed depth.
- B. Consistently achieve excellent soil-seed contact.
- C. Maintain distinct fertilizer-seed separation.

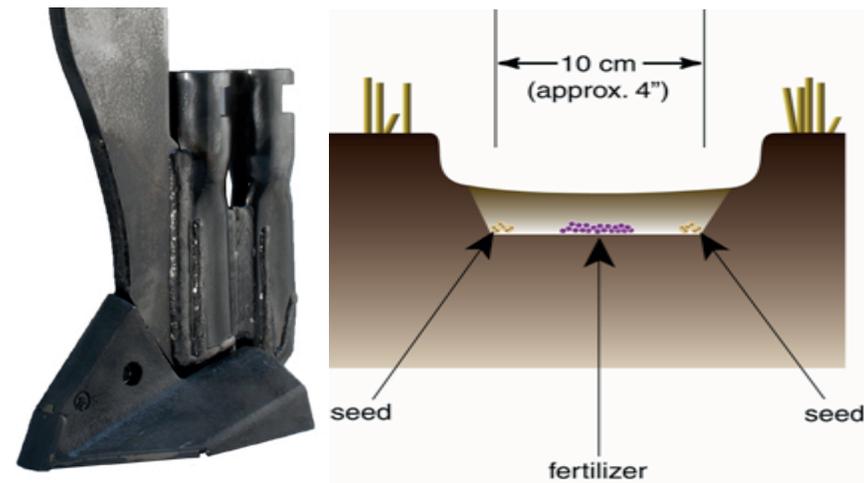
C2 CONTOUR

Machine related factors that influence crop establishment: soil-seed contact (soil fracturing).

Morris GETs
(fertilizer below)



Aftermarket GETs
(same plane)

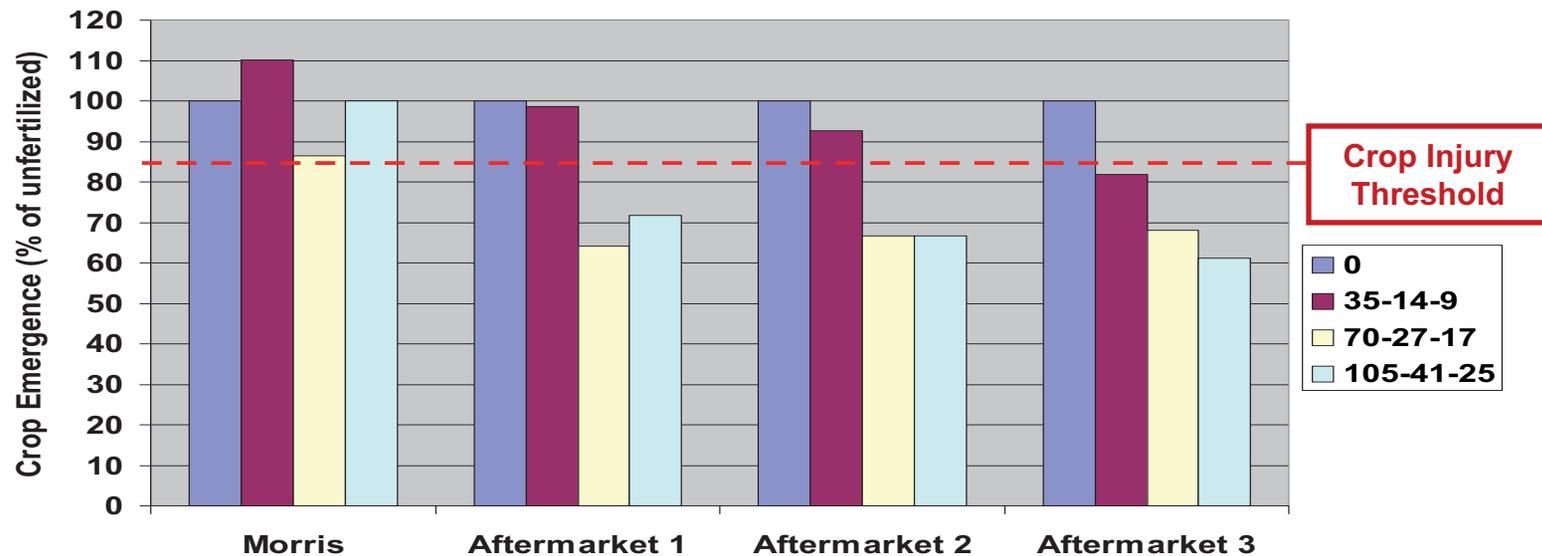


C2 CONTOUR

Fertilizer – seed separation

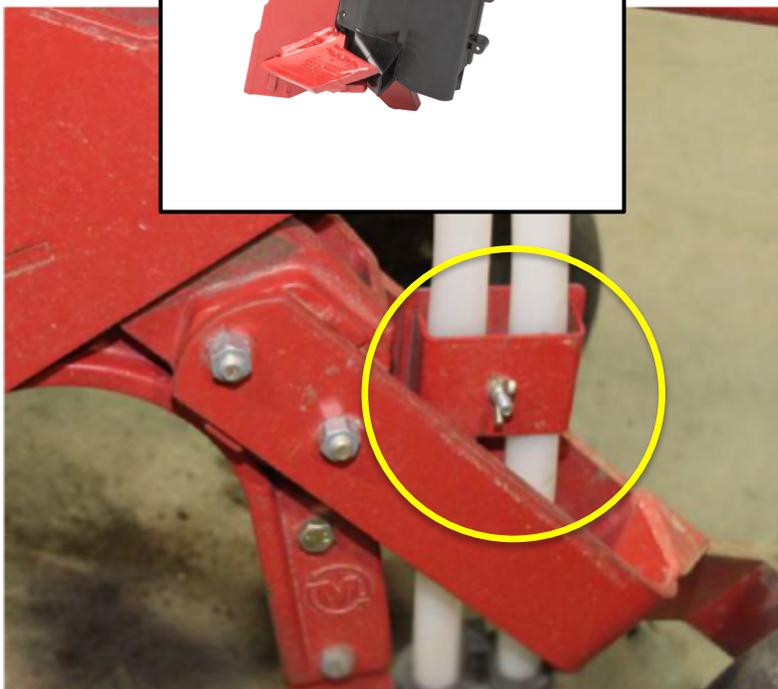
Crop injury thresholds are a tool that Agronomists can use to assess safe fertilizer application rates with double-shoot openers.

Winter Wheat Emergence - % change in emergence with fertilization (13 dap).



Note: Morris openers are at or above the crop injury threshold at all fertilizer rates evaluated.

C2 CONTOUR



Available Options

Side Band and Paired Row Openers are now available in either cast or injected polymer configurations

Secondary Hose Holders

Grommets

- Prevents foreign material from entering the boot
- Reduced plugging
- Recommended

Fertilizer Options

- Apply granular fertilizer
 - Single-shoot with the seed
 - Double-shoot banding - side band and paired row
 - Double-shoot with broadcast kit and single-shoot openers
- Apply NH₃ - with paired row
- Apply liquid fertilizer with Pattison Liquid Systems

C2 CONTOUR

Distribution

Flat-fan Divider Heads

- Most efficient airflow system
- Smooth, horizontal flow of product
- No abrupt directional changes from the metering to the furrow
- Gentle on seed
- Reduced airflow requirements
- 2 available sizes (15/16") or (1 & 1/8")



C2 CONTOUR

Large head to small
secondary hose adapter.

Part Number N62351







9 Series Air Cart

General

- Check if assembled correctly
- Proper chain tension
- Check hose connections
- Ensure cleanout door and tank lid are connected correctly
- Ensure case drain is hooked to zero pressure return

Lubrication - Grease

- Fan bearing - 17" fan - every 100 hrs
- Drive shaft bearing every 50 hrs
- Transmissions every 50 hrs
- Auger Pivots every 100 hrs

Lubrication - Oil

- Drive chains - oil every 50 hrs
- Tire Pressure (ref: sec 7-4 Operator's Manual)
- Check Tire Pressure

Transport

- Tighten wheel bolts





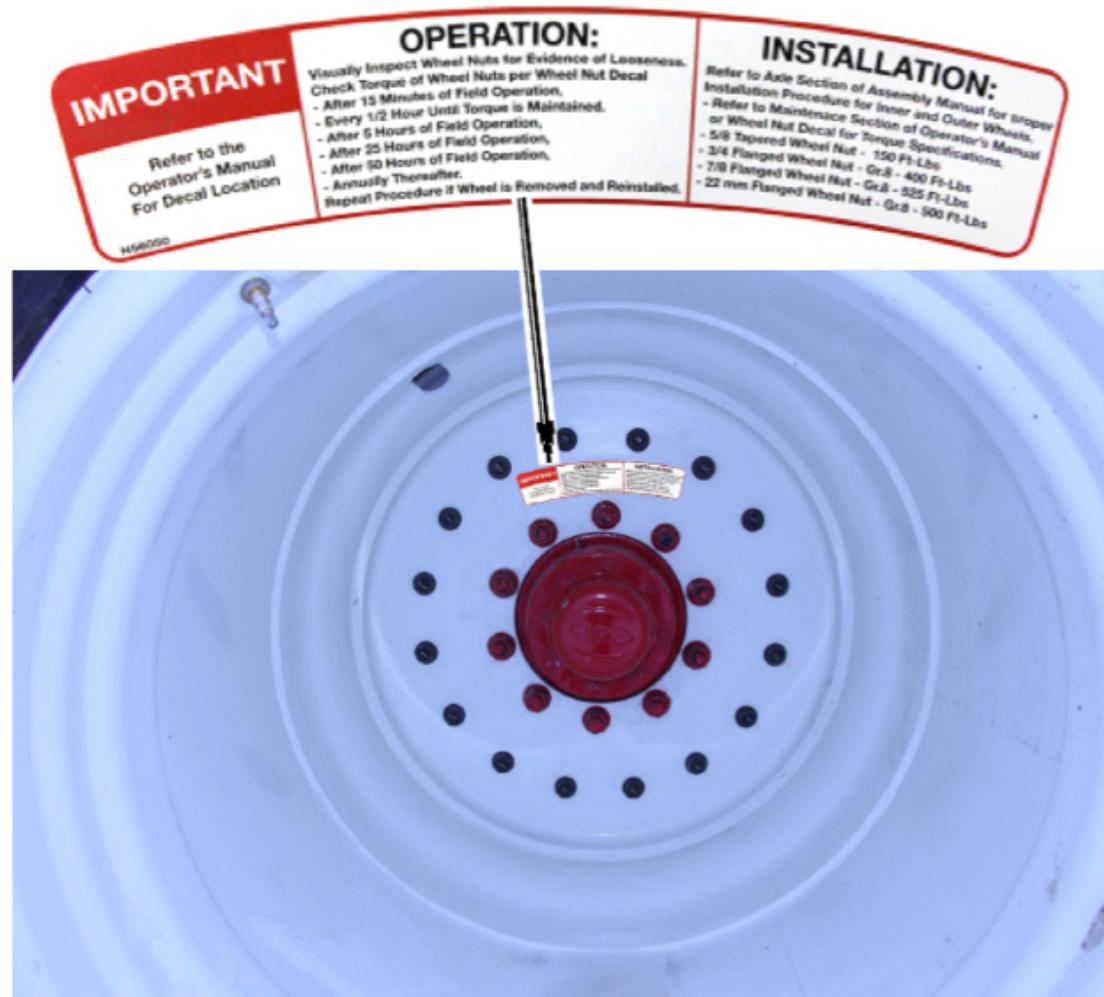
Wheel Nut Torque Check

Mandatory, check all 9 Series Air Carts to ensure Decal N56050 has been installed onto the rear rims. These decals will be sent directly to Dealers that sold 9 Series Air Carts, as well as to farmers who bought them. This is a duplication, but it is important to have them located on the rims.

It is **extremely** important that wheel nuts be checked after the first fifteen minutes of field operation and then every 1/2 hour **until torque is maintained**. Then check every 5 hours, 25 hours, 50 hours and annually thereafter. Repeat this procedure if a wheel is removed and re-installed.

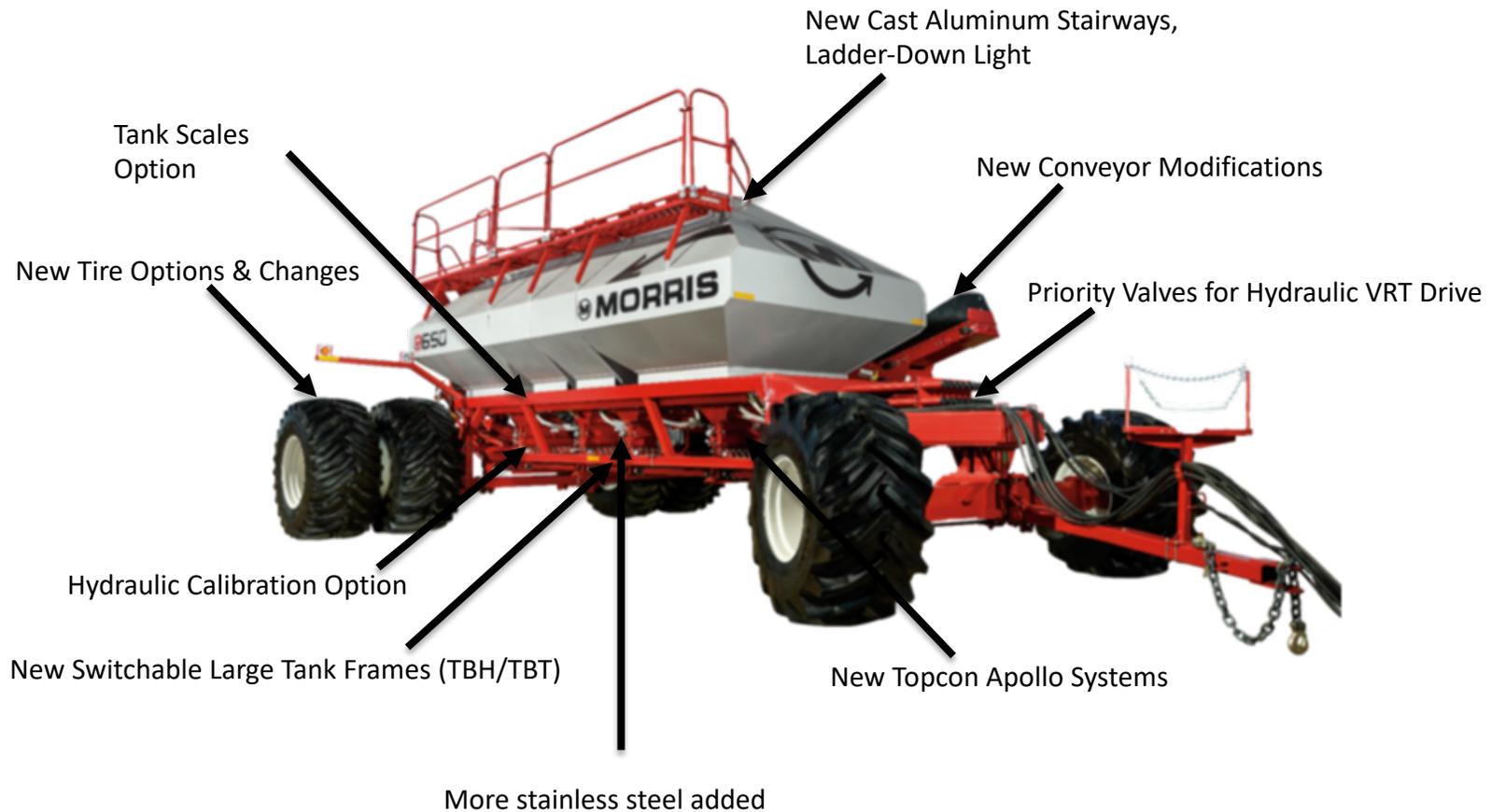
For torque specs please refer to the Maintenance section of the Air Cart Operators manual or decal N56050.

Note that once torque is maintained a marker can be used to mark the nut/rim position so that a visual check can be done periodically.





Updates for 2017/2018





Core Capabilities

Precision Metering

- Spiral-fluted Metering Wheel
 - Continuous product flow
- Widened for up to 10 wheels (ICT Only)





Priority Valve for VRT

- New VRT drive carts will have a standard priority valve for the metering drives.
- Allows for a wider range of desired fan speed settings, without losing flow to the transmissions.





Core Capabilities - Hydraulic Requirements

9 Series Hydraulic Oil Requirements			
Type	Consumption (Gal/Min)	Consumption (Litre/Min)	Fan Pressure (PSI)
Hydraulic Drive - Single Fan	21	80	2,750
Hydraulic Drive - Dual Fan	42	160	2,750
*VRT Drive - Single Fan	26.5	101	2,750
*VRT Drive - Dual Fan	47.5	181	2,750

***Note, VRT Drive adds an additional 5.5-6 Gal/Min**

****The need for a dual fan option will depend on a number of variables including the seeding unit width, number of primary runs, working speed and application rates for each tank.**



9 Series Air Cart

9 Series Horsepower Requirements		
Frame Size	For Tank in Normal Field Conditions (Full Cart)	Fan Requirement (hp)
Small (9365-9535)	50	25 (per fan)
Large (9445-9650)	75	25 (per fan)
X-Large (9550-9800)	100	25 (per fan)



Lubrication

Fan Bearings

- Grease every 100 hours



Greasing Pivot Points

- Drive shaft bearings - every 50 hours
- Oil chains every 50 hours

Notes:

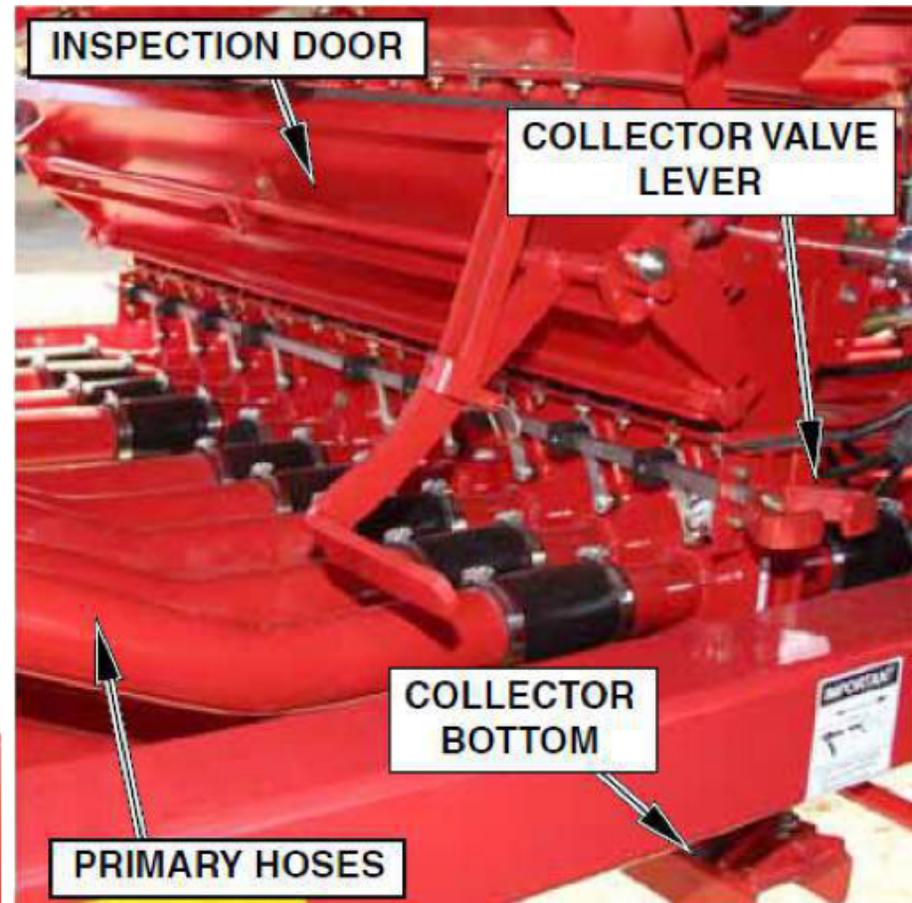


Daily Maintenance

Check for:

- Air leaks using a soapy water solution
- Fan screen and blade are free of debris
- Tank lids are sealing properly
- Chains are lubricated with oil
- Double shoot collector valve moves

Notes:



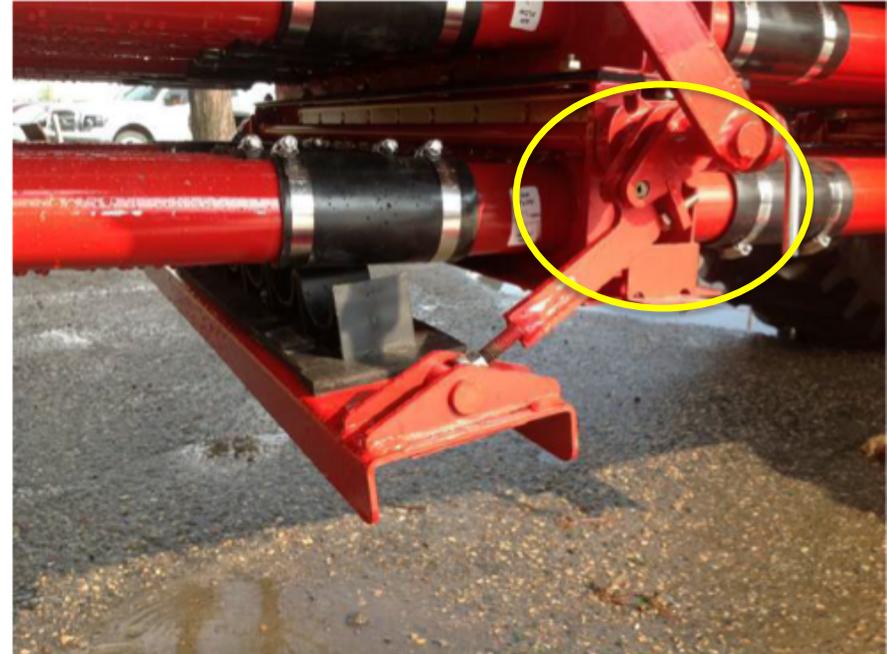
Double Shoot Shown



Operator Convenience

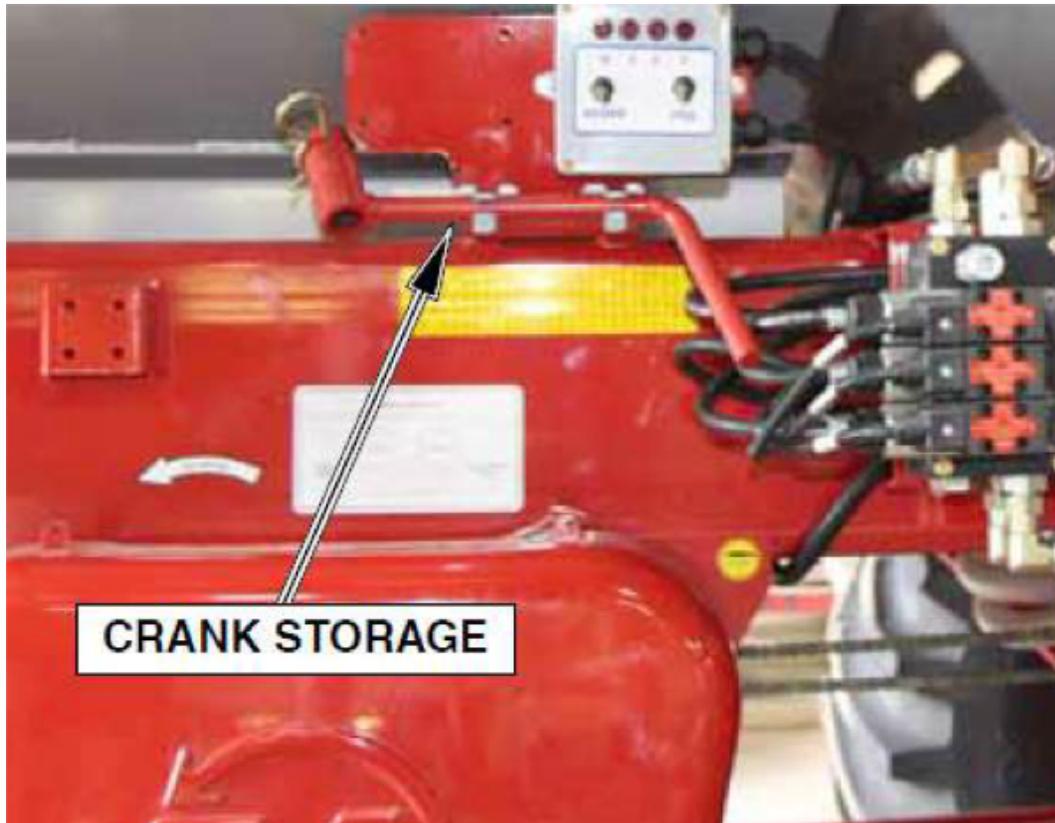
All new quick-latch systems on the left-hand side to make operation more convenient and efficient for operators.

- New seed plate door with one-sided lever
- Quick latch lids with gas shock assisted opening
- New cleanout plate/lever to replace wingnut method





Crank Operation/Storage



Note that the crank for Standard Drive carts is stored right under the full-bin indicators and operates on the 2nd transmission as opposed to previously being attached to the rear transmission on 8 Series Carts.



Main Drive Chain (Transport)



Main drive chain (ref section 5-17 of 9 Series Operator's Manual):

- Disconnect when transporting - this will help prevent premature wear on the drive.

Notes:

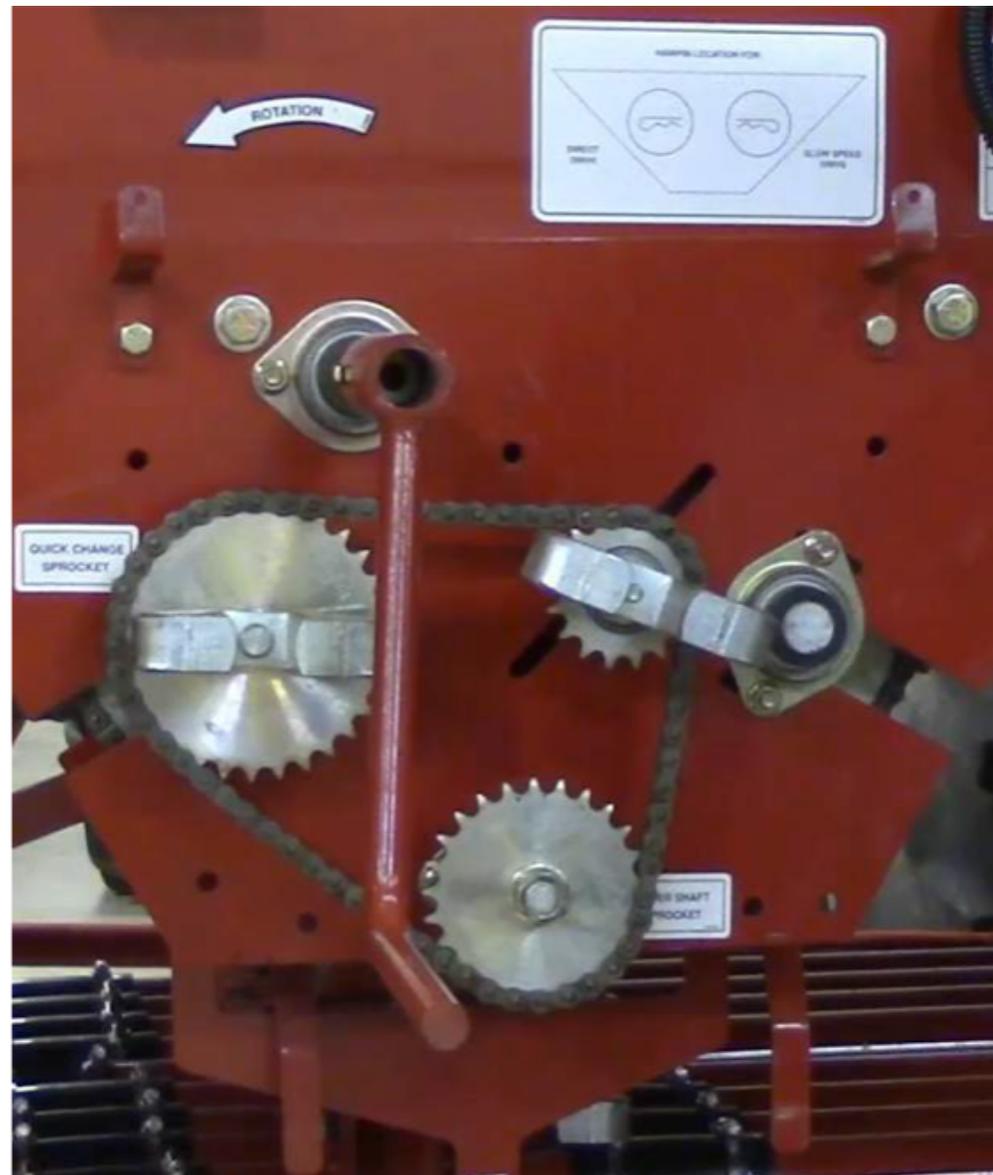


Meter Rate Adjustment

Rate change sprocket

- All transmission on the 9 Series can be direct or slow speed drive

Notes:



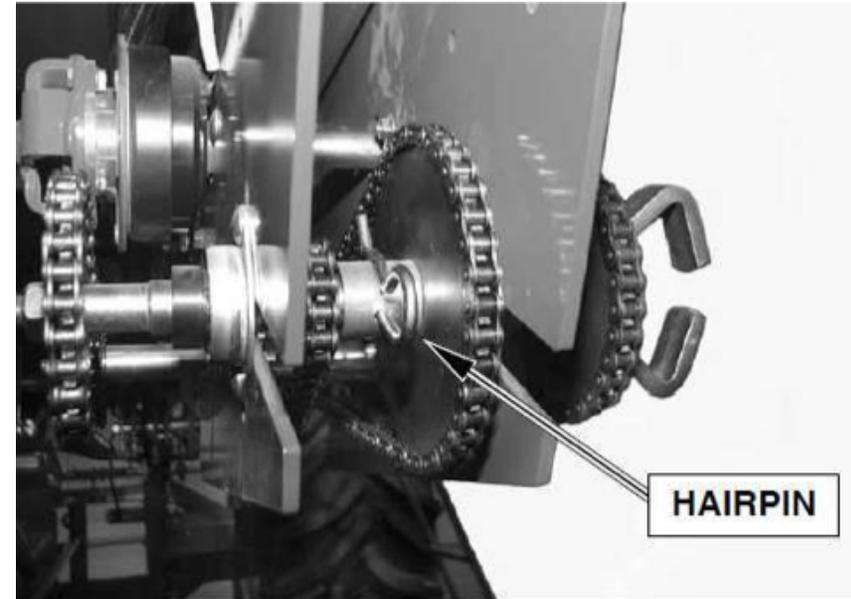


Seeding Fine Seeds

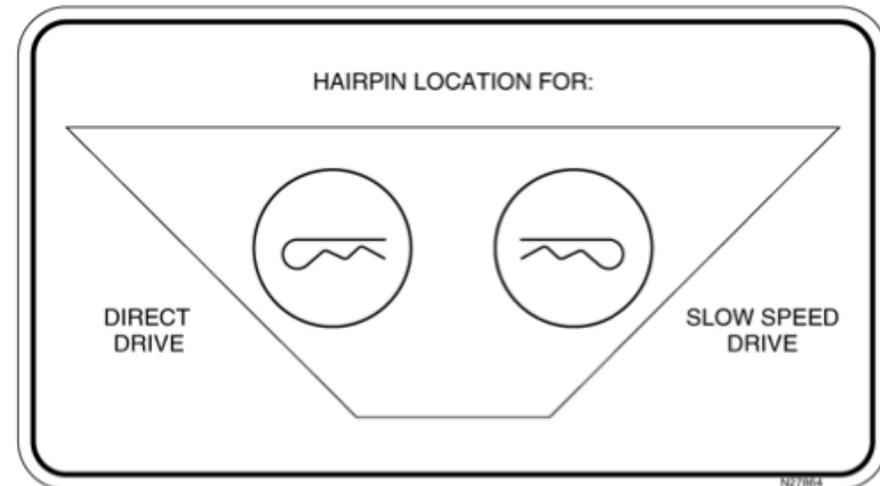
Transmission

- When seeding fine seed such as canola or mustard, the slow speed drive on the transmission must be engaged to ensure the low rates required for these types of product

Notes:



Cover removed for clarity





Metering System – Seed Plates

Fine, Medium, Coarse Seed Plates

- Refer to seed charts for product type
- Make sure tank shut-offs are open
- Install seed plate with hook to the top of the metering body.
- Rotate seed plate towards the metershaft with top part of seed plate hooked to the shaft running through the top of the meter body.



Seed Plate Assembly complete with clips:



Rate Charts

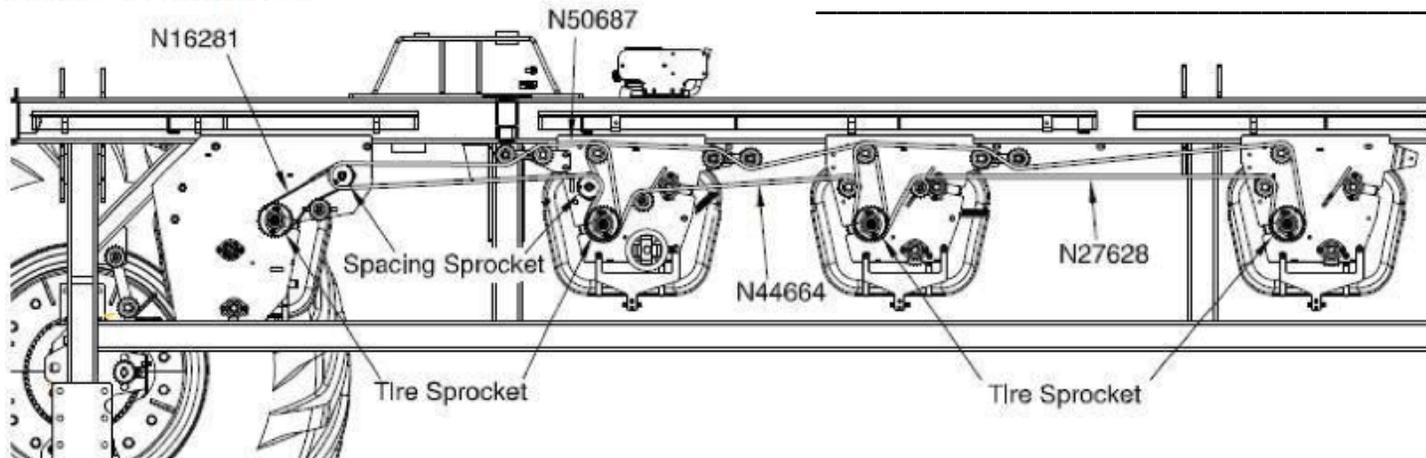
Rate	Metershaft Sprocket Size	Maximum Size of Quick Change Sprocket	Minimum Size of Quick Change Sprocket
Standard	25 Tooth	45 Tooth	12 Tooth
Low Rate (1)	35 Tooth	33 Tooth	12 Tooth
Low Rate (2)	40 Tooth	26 Tooth	12 Tooth
High Rate	15 Tooth	45 Tooth	12 Tooth

Rate change sprocket

- Make sure you have the correct spacing sprocket installed – ref: sec 5-54 Operator’s Manual
- Check tire sprocket – ref: sec 5-56 Operator’s Manual

Notes:

9650 Tow Behind shown



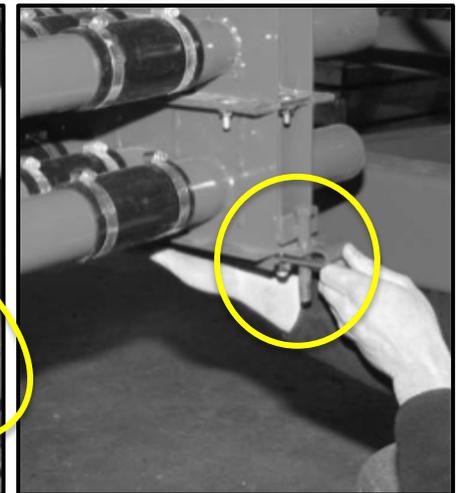
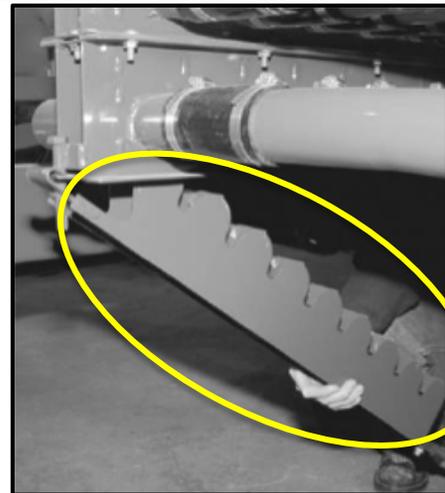


Rate Calibration

Double shoot

- Cycle the double shoot collector valve daily
- Always use the calibration insert when conducting a product calibration
- Ensure flappers move freely and are seated tight at either side to prevent air imbalances within the pipes

Notes:





Rate Calibration

Turning the Crank

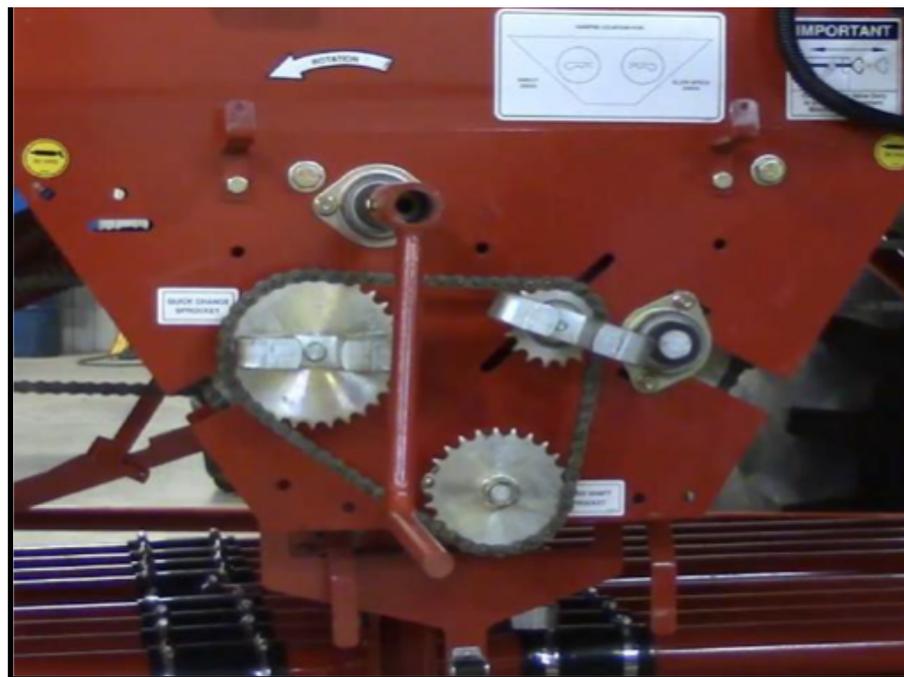
- Refer to the Operator's Manual for # of crank revolutions for the model of air cart and tire size for 1/10 acre
- Always turn crank proper # of revolutions for 1 acre when seeding canola

Example: For a 9450 with 800/65 R32 Tires and a 51ft wide seeding tool (W) width: The measured Tire Circumference (Tc) was 211.6 inches.

For 32" Rim

$$\begin{aligned} \text{Crank Rotations (R)} &= (82328.4/W)/Tc \\ &= (82328.4/51)/211.6 \\ &= \mathbf{7.63} \end{aligned}$$

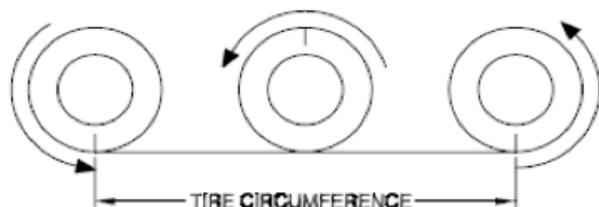
Notes:





Rate Calibration - Using Rotation Value Formula

- Ensure tires are at correct pressure.
- Determine Tire Circumference (Tc) as follows:
 - Check under normal field conditions with tanks half full.
 - Mark tire and starting point.
 - Drive air cart 10 revolutions of tire in a straight line.
 - Mark ending point.
 - Measure distance from starting point to ending point and divide by 10 to get the rolling circumference of the tire (Tc).



- Calculate the number of rotations (R) of the calibration crank for 1/10 Acre. Record value below for future reference.
 Note: For reference nominal (R) values are listed in Section 12 of the manual.
- Calculate required tire sprocket size (Ts) and to ensure correct sprockets are installed on the Air Cart. Record value below for future reference.

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

- Calculate the monitor PP400 setting. Record value below for future reference. Change monitor to new PP400 value as outlined under "Changing Monitor Settings" under Monitor Section.

Example:

For a 9450 with 800/65 R32 Tires and a 51ft wide seeding tool (W) with:

The measured Tire Circumference (Tc) was 211.6 inches.

For 32" Rim

$$\begin{aligned} \text{Crank Rotations (R)} &= (82328.4/W)/Tc \\ &= (82328.4/51)/211.6 \\ &= 7.63 \end{aligned}$$

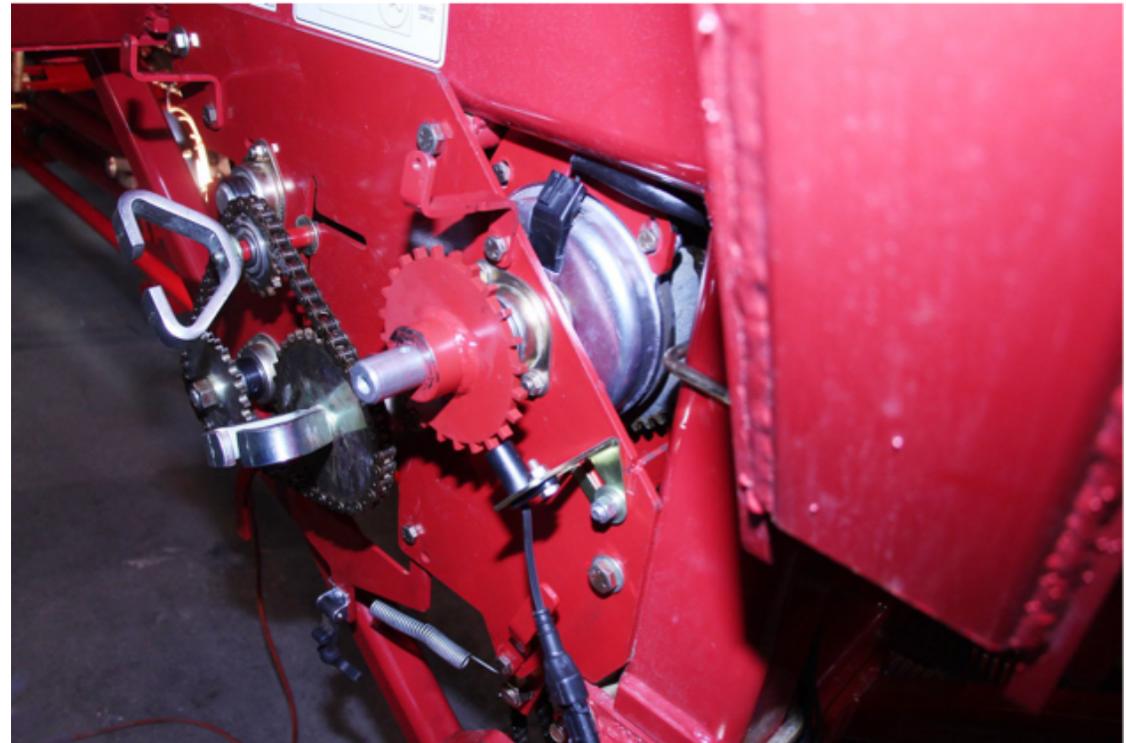
$$\begin{aligned} \text{Monitor PP400} &= 80640/Tc \\ &= 80640/211.6 \\ &= 381 \end{aligned}$$

Calibration Formulas - Imperial	
Rotations of Crank for 1/10 Acre:	
For 32" Rim = (82328.4/W)/Tc	
For 38" Rim = (82328.4/W)/Tc	R = _____
Tire Sprocket Size:	
For 32" Rim = 5992/Tc	
For 38" Rim = 5992/Tc	Ts = _____
Monitor PP400 Setting:	
For 32" Rim = 80640/Tc	
For 38" Rim = 80640/Tc	PP400 = _____
Tc = Tire Circumference measured in inches	
W = Working Width measured in feet	
Optional Acre Tally Factor:	
F = 56/R	F = _____



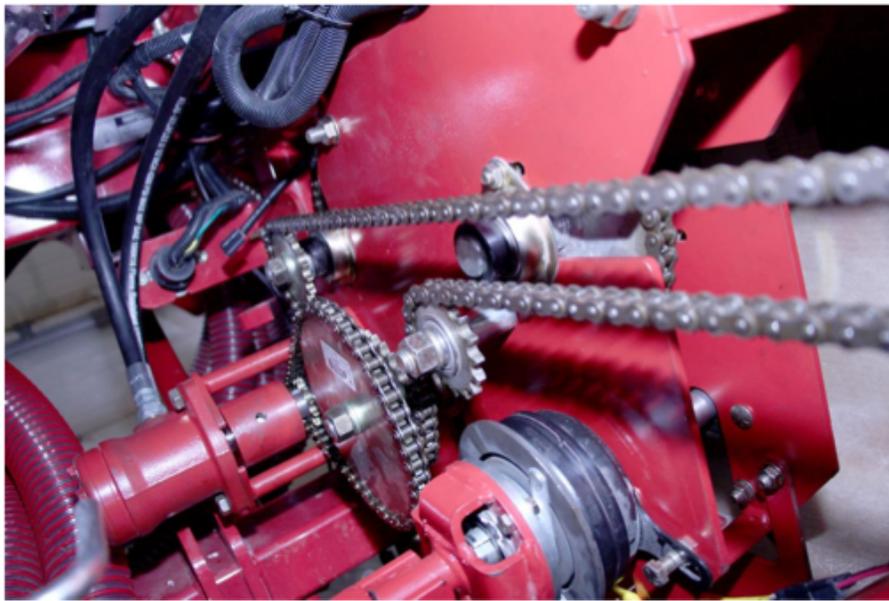
Hydraulic Calibration Option

- New hydraulic calibration option available for standard drive model carts.
- Allows for a faster and more simplified calibration process, removing unnecessary physical demand.





Hydraulic Calibration Option



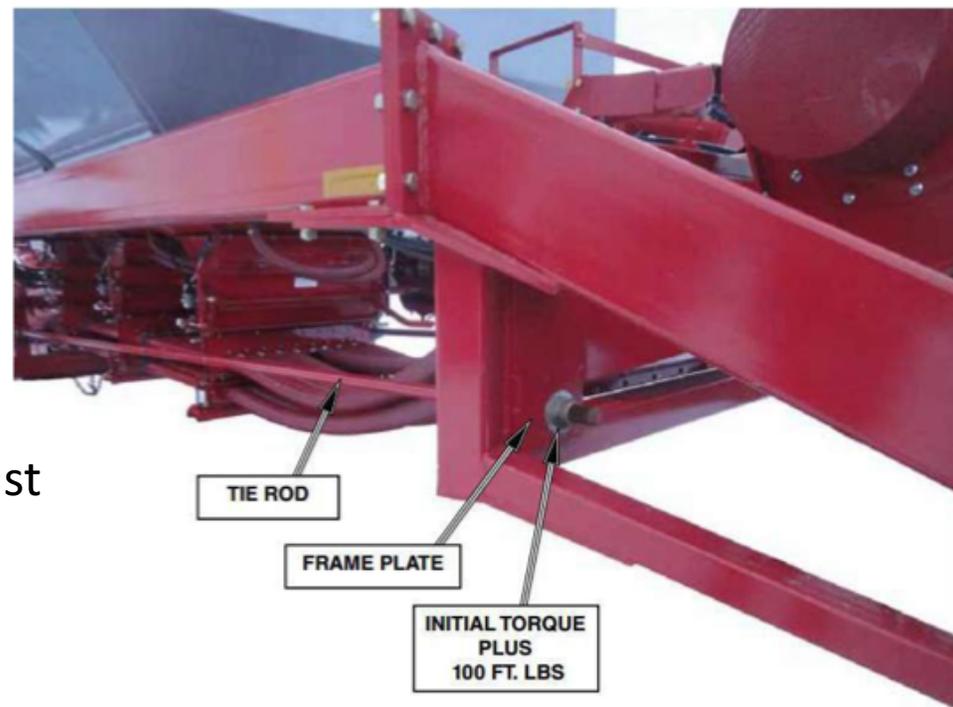


Tie-Rod Torquing

On the 9365 and 9450 Tow-Between Carts the Tie Rod torque procedure has changed as follows:

1. Tighten the nut up to the frame plate.
2. Record the torque just before contacting the plate. (Initial Torque)
3. Add 100 ft-lbs to the recorded torque and tighten the nut against the plate at this torque.

Check at 10 and 50 hours and periodically afterwards.





Filling Tanks



2,3 or 4 Tanks

- Always screen your product for foreign material - tank screens are standard on 9 Series Air Carts
- Tank lids should be adjusted to between 25-30lbs, which is recommended for opening/closing them.
- When storing reduce the amount of torque to preserve tank seals

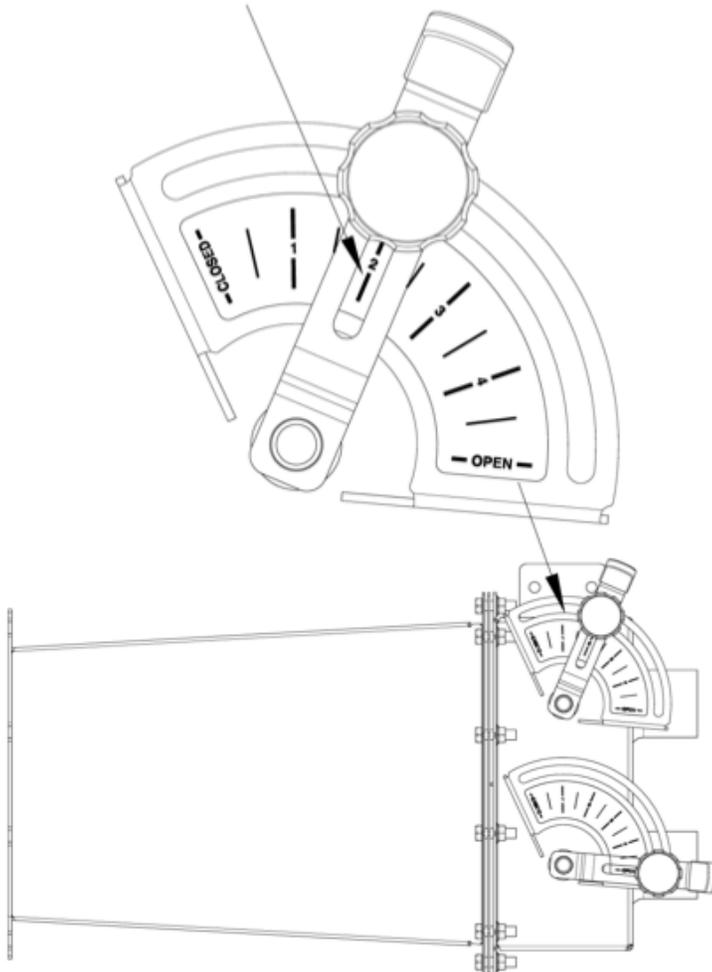
Important: Before Filling Tank

- Correct seed plate is installed
- Clean out doors are fully sealed
- Run auger before placing downspout into the tank - this will ensure auger is free of debris

Notes:



Plenum Settings



Plenum Damper Settings

- Set plenum damper so that setting is in the middle of slot.
- This damper is set at the 2 position.

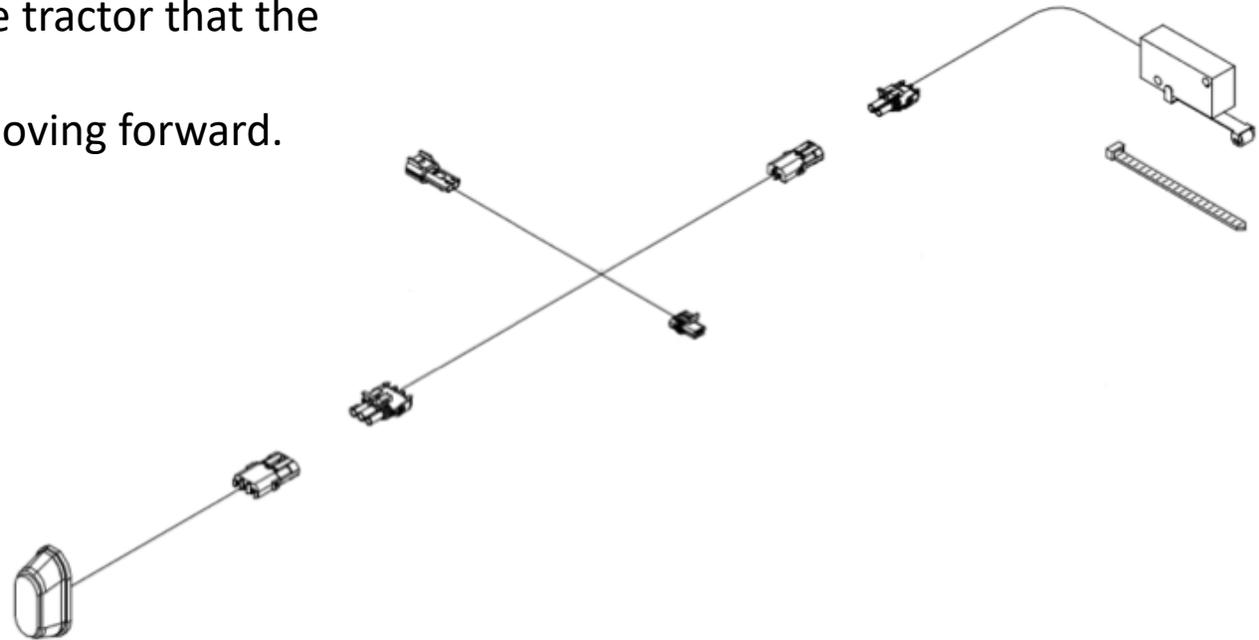
Suggested Plenum Settings				
Product	Seed		Fertilizer	
	Rate lb/acre	Damper Setting	Rate lb/acre	Damper Setting
Fine Seeds	All Rates	1	All Rates	Open
Coarse Grains	90 lb (100 kg/ha)	Open	50 lb (56 kg/ha)	2
	90 lb (100 kg/ha)	4	100 lb (112 kg/lb)	Open
	90 lb (100 kg/ha)	3	150 + lb (168 kg/ha)	Open
Large Seeds	180 lb (200 kg/ha)	Open	40 lb (45 kg/ha)	2
Single Shoot	Lower Pipes - Top Damper Closed - Bottom Damper Open			
	Upper Pipes - Top Damper Open - Bottom Damper Closed			



Operator Convenience

Ladder Down Light

- Strobe light that sits at the front end of the cart, connected to cart harness.
- Notifies operator in the tractor that the ladder is down.
- Standard on all carts moving forward.





Fan Speed Recommendations

Air Delivery System

- Remove inspection doors and check for debris prior to seeding
- Turning your primary hoses (2.5") ¼ turn will help extend the life of the hoses

Check for air leaks prior to and during seeding

- Put off plates between the drill and tank before starting
- Use a soap and water solution in a spray bottle with the fan running
- Tank lids, metering body shaft seals
- Metering bodies to tank seals
- Collector to metering body seals
- Fan to plenum
- Inspection doors
- Collector door seals
- Couplers
- Access doors on Flathead dividers

17 inch Diameter Impeller Suggested Fan RPM 4.5 mph (7.2 kph) on a 71 ft unit for 1 inch (25 mm) Secondary Hose		
For 1 1/8 inch (28.6 mm) Secondary Hose add an additional 500 rpm to values below.		
Combined Application Rate	Fan Speed Setting	
	Single Shoot	Double Shoot
3 - 50 lbs/acre 3 - 56 kg/ha	3250 - 3500 RPM	3000 - 3250 RPM
50 - 100 lbs/acre 56 - 112 kg/ha	3500 - 3750 RPM	3250 - 3500 RPM
100 - 150 lbs/acre 112 - 168 kg/ha	3750 - 4000 RPM	3500 - 3750 RPM
150 - 200 lbs/acre 168 - 224 kg/ha	4000 - 4250 RPM	3750 - 4000 RPM
200 - 250 lbs/acre 224 - 280 kg/ha	4250 - 4500 RPM	4000 - 4250 RPM
250 - 300 lbs/acre 280 - 336 kg/ha	4500 - 4750 RPM	4250 - 4500 RPM
300 - 350 lbs/acre 336 - 392 kg/ha	4750 - 5000 RPM	4500 - 4750 RPM
> 350 lbs/acre > 392 kg/ha	-	4750 - 5000 RPM



Chart is based on a 71 foot machine traveling at 4.5 mph



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. (0-45 kg) spring scale to check the tank lid closing force. With the lid near the closed position, place one end of the scale *on* the tank lid handle. Pull down on the scale and note the maximum force it takes to hold the lid. The force needed to close the lid **must be 25 lbs to 30 lbs (12-14 kg)**.
- Adjust the lid latch adjusting bolts as necessary. This will ensure that the lid is sufficiently tight and prevent any leaks.
- Re-check for leaks. If Lids still leak re-adjust latch bolts. Re-check for leaks.

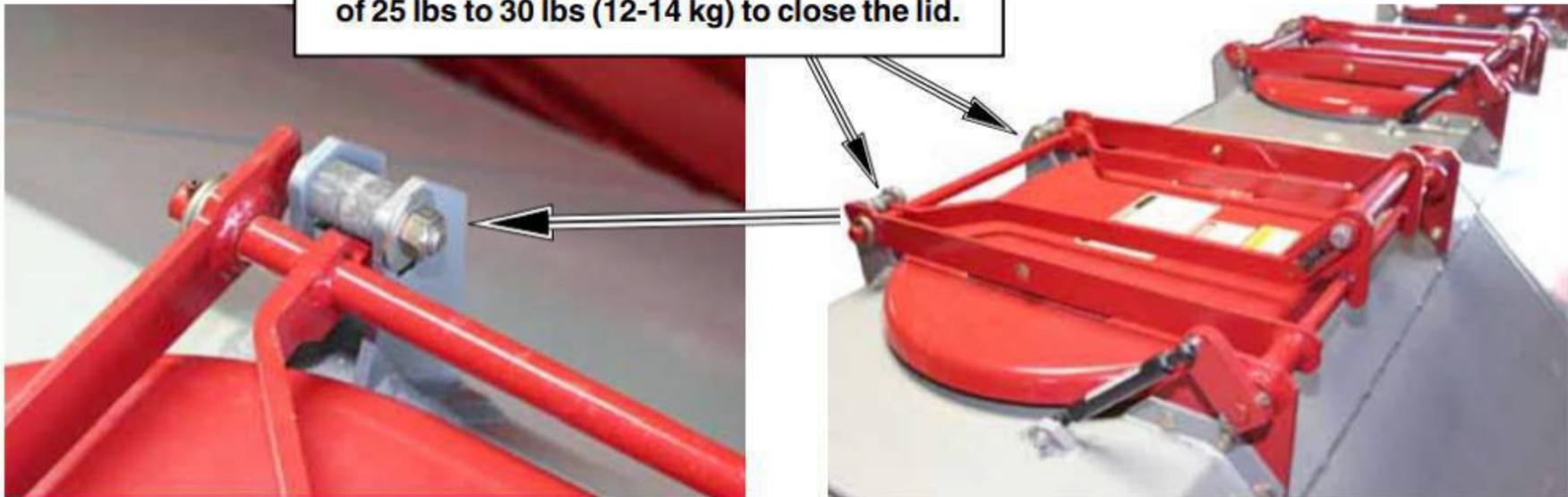
Note: When air cart is not in use, leave lid latches loose to help maintain resilience of the seals.





Tank Lid Adjustment

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

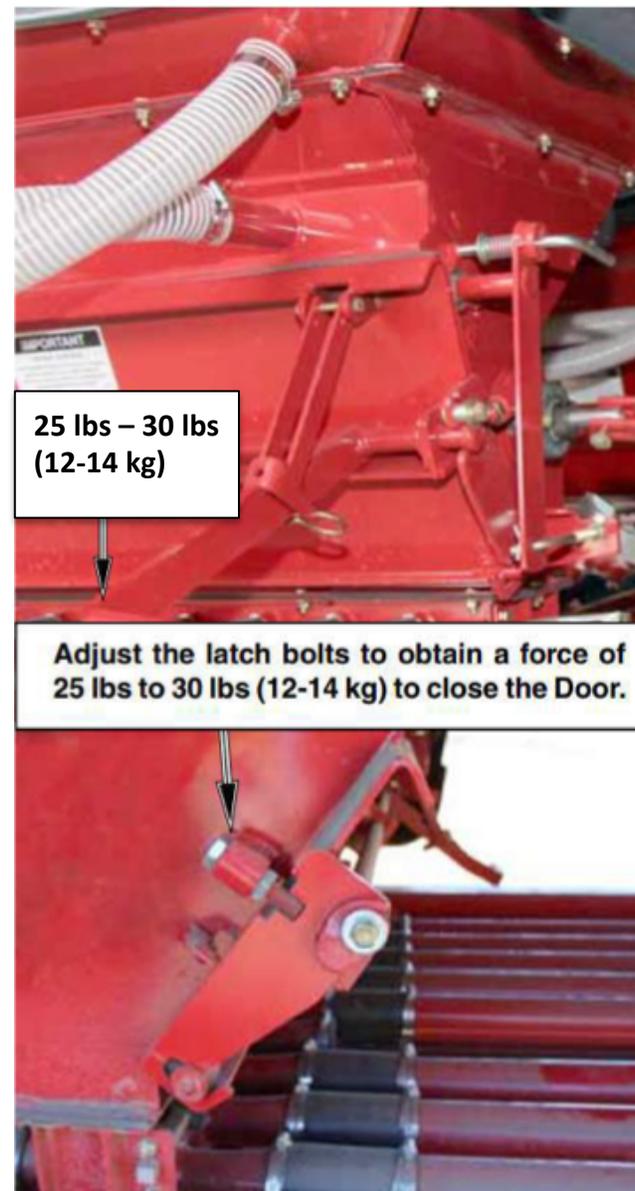




Inspection Door Adjustment

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

- Check for any foreign material embedded into seal. Clean out foreign material from seal surface.
- Check seal for cuts and abrasions. If seal is cut or severely worn, then replace seal.
- Ensure seal is positioned properly on steel rim around tank opening.
- Use a 1-100 lb. (0-45 kg) spring scale to check the tank lid closing force. With the Door near the closed position, place one end of the scale on the Door handle. Pull down on the scale and note the maximum force it takes to latch handle lock. The force needed to latch handle lock must be **25 lbs to 30 lbs (12-14 kg)**.
- Adjust the door latch adjusting bolts as necessary. This will ensure that the lid is sufficiently tight and prevent any leaks.
- Re-check for leaks. If Doors still leak adjust latch bolts one or two more turns. Re-check for leaks.

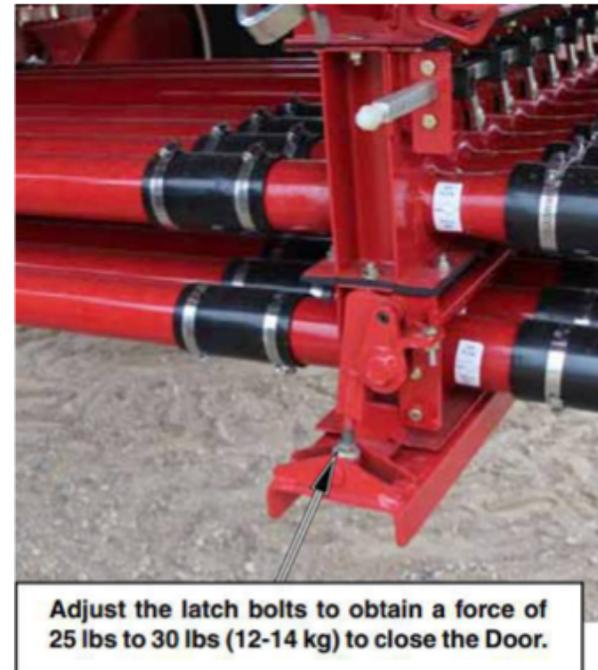
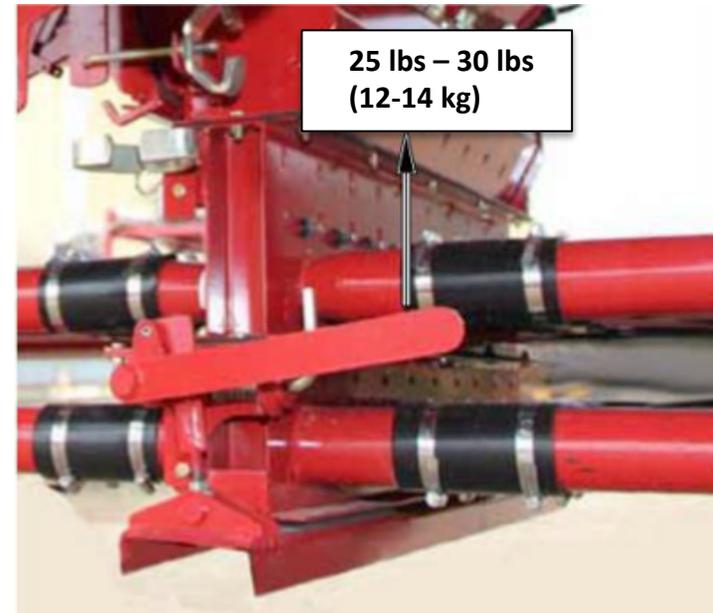




Cleanout Door Adjustment

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

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





Dual Fans - Hydraulics

- For large frame drills (71' and up) and/or very high product rates
- Each fan is dedicated to one product stream
- Each fan will have separate hydraulic remotes
- **21 gpm hydraulic flow required per fan. Extra 6.5 gpm required if VRT Drive**
- If running a dual fan, each product stream is considered to be a single-shoot system



Notes:



Auger/Conveyor Hydraulics

FM Series - Effective working range up to a distance of 60 metres (200 feet).
Narrow Band FM Series - Effective working range up to a distance of 300 metres (1000 feet)

STOP Button switches off the Receiver and the keypad function buttons

RESET Button activates the Receiver and the keypad function buttons

L.E.D. Blinks when Transmitter and Receiver are active.

L.E.D. ON when a Transmitter Button is pressed.

L.E.D. FLASHES when batteries are low an a Button is pressed

4 Release Screws for Battery Compartment at rear.

4 x AAA batteries

Function Buttons

SAFETY FEATURE

The Transmitter automatically transmits a **STOP** signal after 30 minutes; this de-activates the Receiver and the Transmitter keypad.



Auger/Conveyor Hydraulics

To register Transmitters to the Receiver.

Switch OFF or DISCONNECT the power to the Receiver.

Switch ON or Reconnect the power to the Receiver.

This opens a 20 second registration window in the Receiver processor.

If you are looking at the Receiver PCB the Fault LED Flashes.

Immediately PRESS and HOLD the Transmitter Reset Button (Indicated) for 5 seconds during this 20 second window.

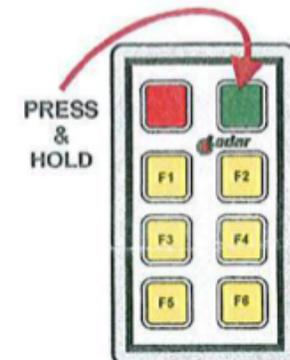
When the Transmitter is Registered the Fault LED lights continuously

IF YOU ARE REGISTERING TWO TRANSMITTERS THEN WITHIN 2 SECONDS

PRESS and then HOLD the second Transmitter Reset Button (indicated) for 5 seconds all during the 20 second window.

When the second Transmitter is Registered the Fault LED goes out and the Set LED comes on.

Both your Transmitters are now operating the Receiver.





Monitoring



Monitor can display the status of the following functions

- Fan speed
- Ground speed
- Shaft speed (up to 4 tanks)
- Bin levels (up to 4 tanks)
- Flow blockage (up to 192 runs)
- Field area
- Total area

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
- Width of the implement
- Imperial or metric units
- English or Russian language





Monitoring – Variable Rate & Input Control Technology



Topcon X30 System

This monitoring system that has a wealth of capabilities for precision ag activities. Full touch-screen navigation built for fast and efficient movement through the system.

Key capabilities include full variable rate monitoring readouts (customizable), **full operation for overlap control**, full field mapping capabilities (prescription), specific job monitoring, implement-specific presets and full interface screen view customization.

This monitor perform many functions, most importantly, it can fully operate the overlap control that will give you a realtime field view of your cost savings.



Monitoring – Variable Rate & Input Control Technology



Topcon X35 System

- 12.1in color touchscreen display
- Topcon Horizon Software embedded
- New Remote Support Tool, allowing technicians to remotely diagnose and fix issues
- Horizon XTend displays any view/window on virtually any mobile device
- Data transfer through Topcon Mobile AG Network cloud-based solution
- GNSS standard when tied with SGR-1/AGI-4 Receivers
- Auto section control (ASC) up to 200 sections via ISOBUS
- Variable rate control (VRC) up to 8 products
- ISOBUS features UT, TC-BAS, TC-GEO and TC-SC
- Up to 6 cameras, directly connected through X35

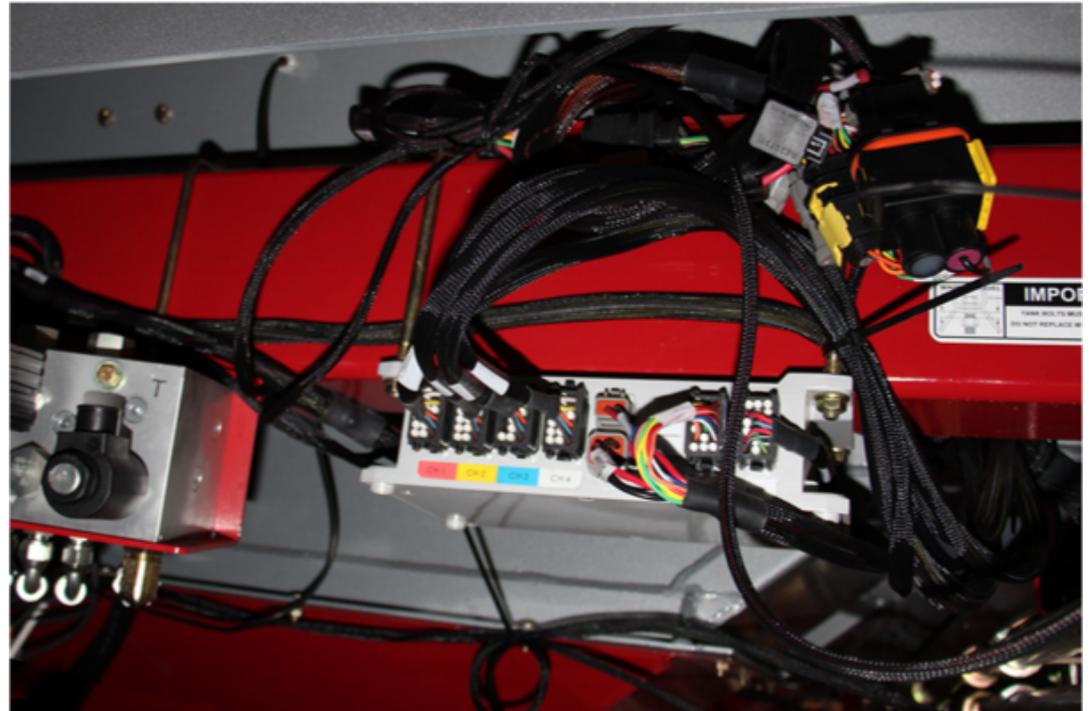
This monitor you can pair a Tablet or Smart Phone to the X35 for remote calibration or use the phone as a hot spot for Morris Service technicians to log into the device remotely for trouble shooting.



Topcon Apollo System

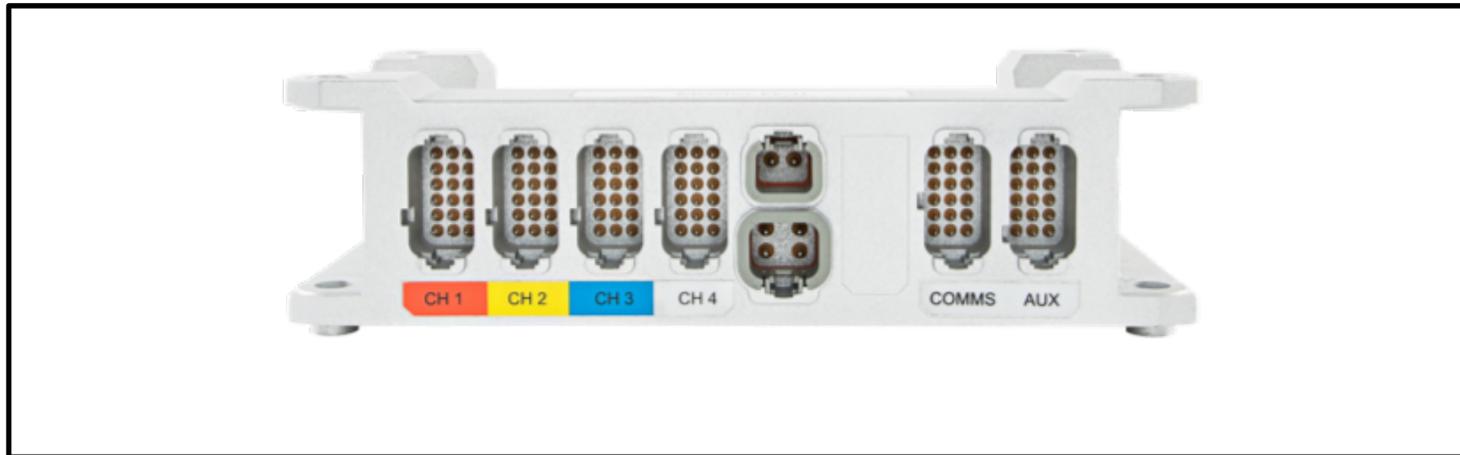


- ISO Compatible with X30 and X35 & OEM Monitors
- Can work with ground drive or variable rate.
- Can run 8 products simultaneously.
- Able to control 10 granular/10 liquid sections.
- Eliminates gray ISO bridge box in tractor cab.
- Pattison Liquid compatible for Morris.
- Simplified wiring/ECU schematics.





Apollo CM-40 Master Module



Features:

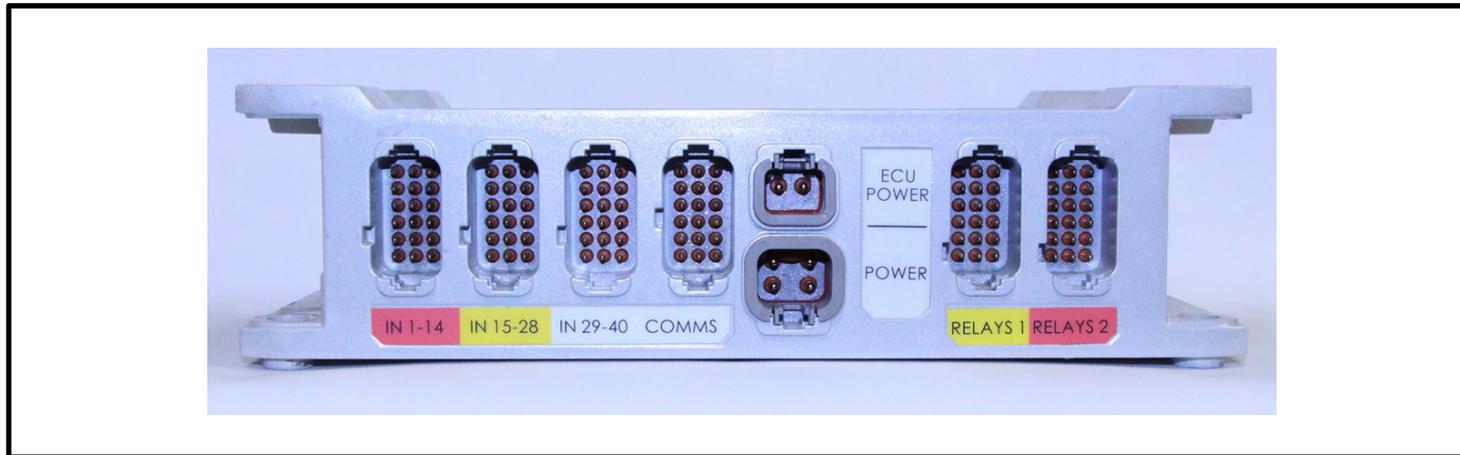
4 Channel Rate Control / PWM Drives

Monitoring of:

- Motor Encoders Feedback Sensors
- Tank Shaft Sensors
- Fan Shaft Speeds Sensors
- Low Bin Levels
- Implement Accumulator Pressure
- Case Drain Pressure



Apollo EM-24 I/O Module

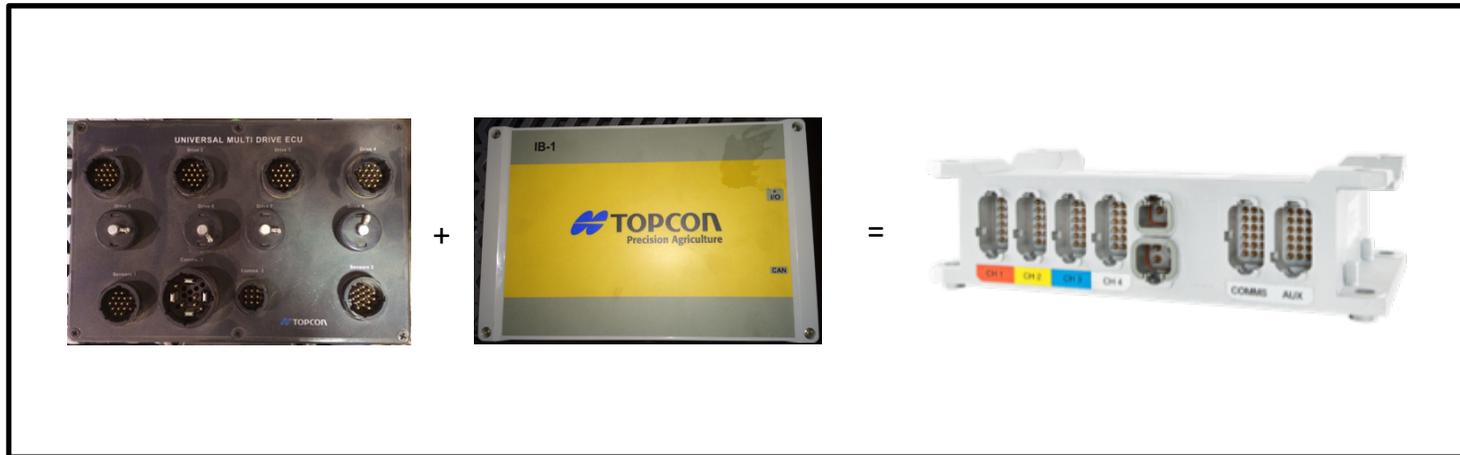


Features:

- ASC Auto section control
- 10 Granular Sections + 10 Liquid Sections Simultaneously
- 40 section sensing inputs
- Blocked Head Monitoring [40 sensors per EM-24 ecu]



Apollo CM-40 Master Module



Apollo CM-40 replaces:

- MD-ECU
- IB-1 [ISO BRIDGE]



Input Accessories



Apollo Chassis mounted Key Pad- Replaces calibration Switch box.

- Key pad is used during calibration procedure, LED lights change color when Tank is On/Off.
- Play/Stop button - Starts/Stop calibration
- Reset – zeros calibration estimated weight
- Buttons 1 - 4 are used to turn tanks off during a multi-tank calibration*
- Calibrations follow the same procedure across all models

Note: Keypad cannot be used to entering actual weights into calibration wizard.

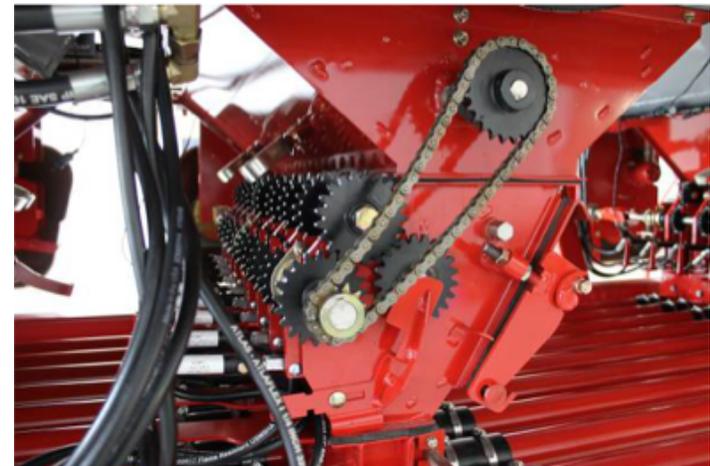


Input Control Technology (Overlap Control)

Electronic, Hydraulic & Mechanical system engineered to eliminate input overlap using a simple method.

Signal from X30 and X35 monitor either engages or disengages the gear drive system for each primary run, starting or stopping the flow of product.

Simple sprocket driven system that is intuitive to understand and incredibly accurate to provide maximum cost savings.





RAZR



Precision

Parallel Linkage

- Each opener is completely independent resulting in superior ground following.
- Compact linkage arms tuck away nicely in transport.
- Non-greased composite linkage bushings
- 16" of operating travel (8" up and down)
- Allows for constant down force with a cylinder on each opener



Opener Design

Gauge Wheels

- 4.5" width spoked wheel that regulates seeding depth and eliminates mud-build up and plugging
- A 3" wide spoked wheel is available for growers wanting to seed between stubble rows and minimize stubble knockdown.
- Steel hub holds bearing
- Mudsmith tire (right) used on U.S. machines. Otico tire used in other markets.



Gauge Wheels

Shims allow for adjustment of the gauge wheel lip pressure to the blade; this pressure can be “light” or “just contacting” in most cases, but the gauge wheel tire lip can be shimmed tighter against the coulter blade in wet or sticky mud conditions in order to prevent soil build up on the outside of the disc blade.



Opener Design

Disc Blades

- 20.4" diameter for long wear life
- Simple blade angle of 5 degrees for consistent seed furrow formation.
- Reduced blade angle results in less furrow smearing compared to other disc drills
- Ingersoll Boron-treated blade



Opener Design

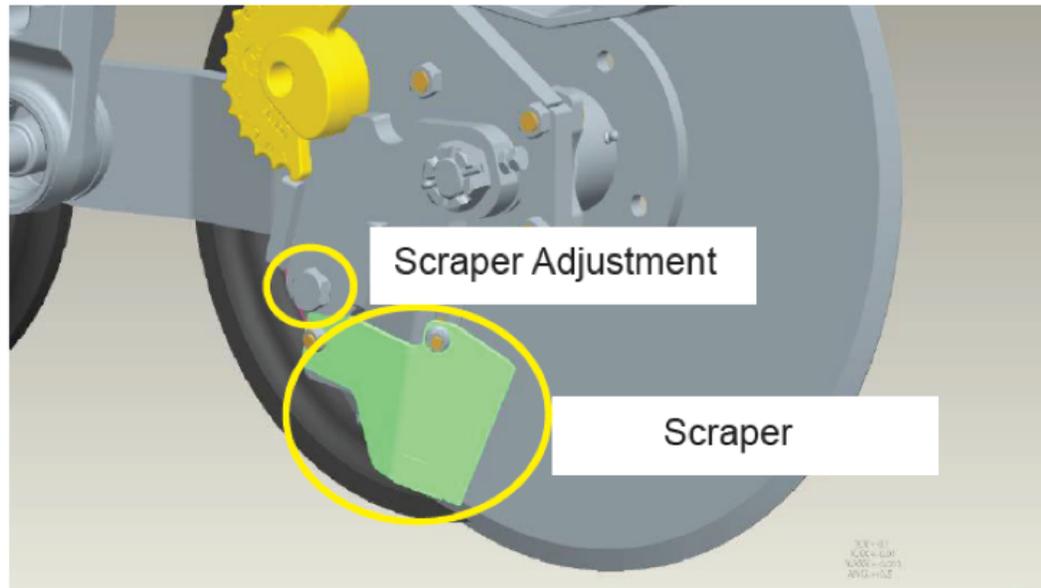
New Disc Scraper

- Improved seed placement and disc cleaning performance.
- Integrated hose holder eliminates the need for hose clamps.



Disc Scraper Settings

- Scraper plate should be aligned with the edge of the bevel on the coulter blade.
- Scraper pressure is set very light from the factory but may be adjusted until the spring is fully compressed for seeding in wet conditions.
- If a solid scraper is more desirable, the spring can be removed and replaced by C18052 spacer bushing (15/16" OD x .627" ID x 15/16" LG) plus a single 5/8" lockwasher to provide a near solid mount that allows only enough movement to account for disc/coulter blade flex.



Opener Design

Disc Scrapers

- Forward angled seed tube design and improved air relief reduces seed bounce for more consistent seeding depth accuracy
- New scraper rides fully in the disc blade shadow, preventing secondary shelves from being cut in the furrow, overall reducing draft and penetration forces
- Much smaller surface that contacts the disc blade with an inner carbide to prevent premature wear on the inside face.
- New scraper mount designed for a both single and dual shoot configurations and requires no hose clamps.

Opener Design



Depth Adjustment

- Single cam, pin adjustment using $\frac{1}{4}$ " increments up to $2\frac{3}{4}$ " deep

Opener Design

Packing System

- Dual-rib closing wheel closes furrow and firms the soil over the seed
- Wheel can be moved to a 2nd bolt location to change the closing angle. This changes from standard 5° angle to a compound 5° + 5° degree angle
- Wheel is reversible for wear longevity.



Hydraulic System

Work Switch

- A pressure activated work switch is now used on C2 Contour and RAZR drills.
- The work switch controls the air cart metering system by sensing changes in the hydraulic pressure on the openers. When the openers are raised the switch opens at a pre-set pressure turning off the air cart metering and when lowered, the switch closes at the pre-set pressure to turn on the metering.
- The work switch is pre-set at the Factory and will meet most operating conditions but can be adjusted if needed.



Hydraulic System

Requirements

- 20 gallons/min recommended for raising and lowering the openers
- Tractors with lower pump capacities will still lift and lower the openers but cycle times will get longer accordingly
- Openers require on average 4.5hp at 6mph*
- ***Note that hp per opener is affected by speed, depth and soil conditions**

Accumulator Operating Range		
Nitrogen Pre-charge Pressure	Display Pressure	
	Minimum	Maximum
350 psi (2413 kPa)	450 psi (3102 kPa)	1200 psi (8274 kPa)

* Maximum system hydraulic pressure is 1200 psi or 4 times the pre-charge pressure, whichever is the lower number.



Hydraulic System

Packing Force

- The Packing force is approximately 1/3 of the opener down force
- Opener force bias while operating in the ground will be approximately 2/3 on disc, 1/3 on packer tire

In-Cab Pressure Display (PSI)	Force at Opener (lbs)
400 (2758 kPa)	350 (158.8 kg)
600 (4137 kPa)	440 (199.6 kg)
800 (5516 kPa)	510 (231.3 kg)
1000 (6895 kPa)	600 (272.2 kg)
1200 (8274 kPa)	690 (313 kg)

Hydraulic System

Pressure Control

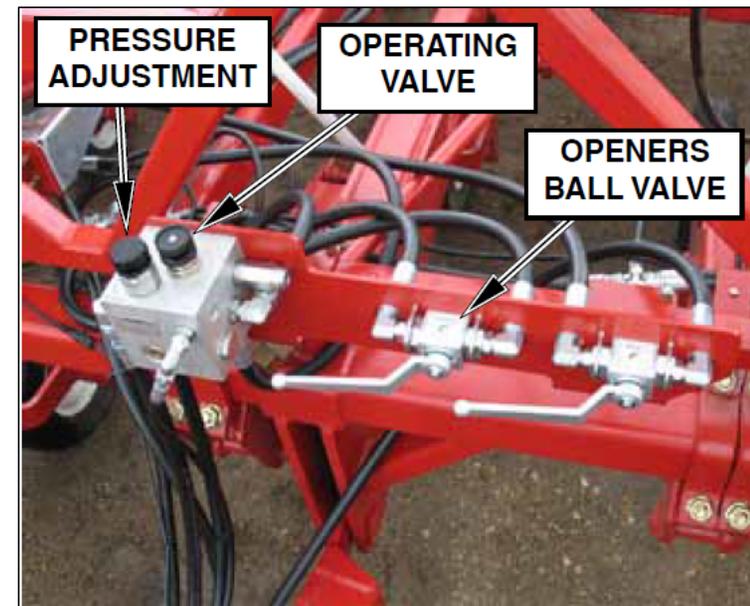
- Once set, operators can adjust accumulator pressure (down force) from their tractor cab for any changes in soil conditions



Hydraulic System

Valve Block/Bleed Off

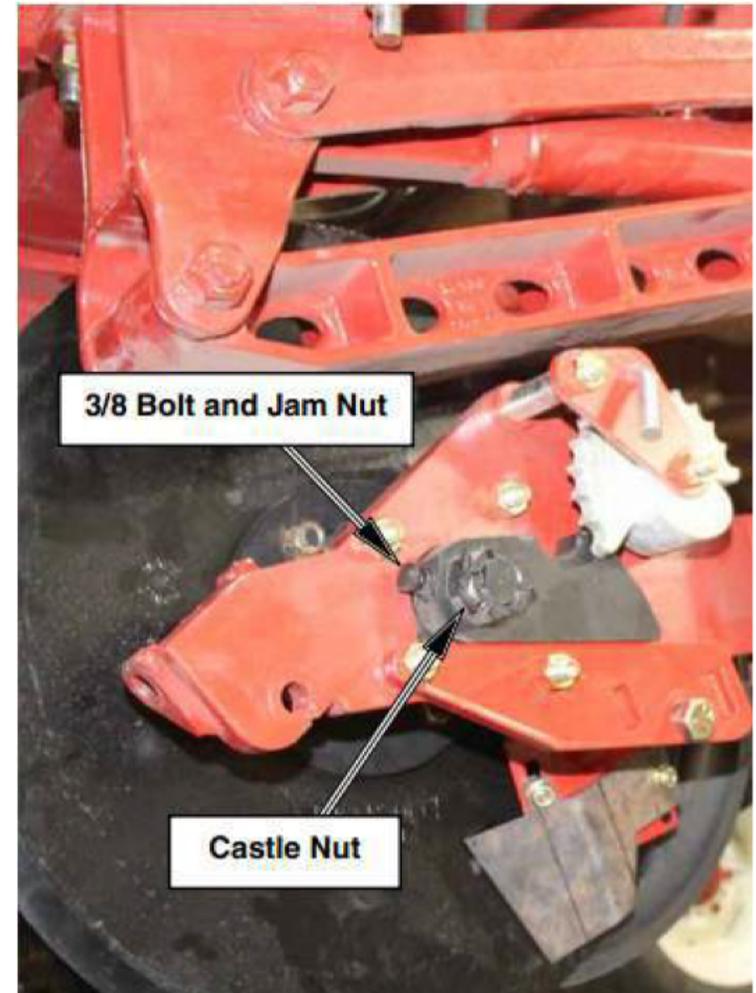
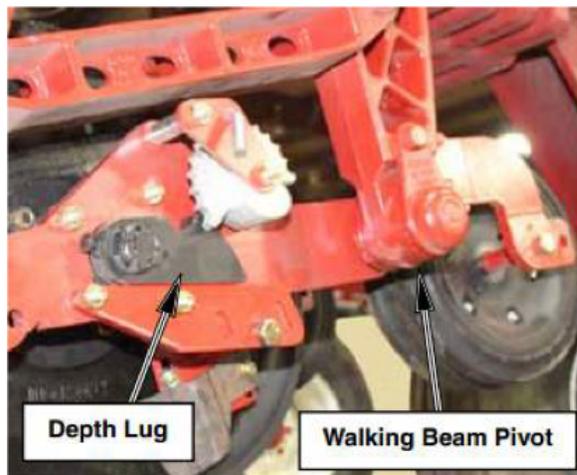
- Easy access at front bar of the drill
- Provides all down pressure and packing force adjustments
- Design reduces lifting and lowering times for disc openers by locking the accumulator pressure (avoids recharging the accumulator with oil when lifting and lowering).
- Easy bleed out system allows for smooth maintenance and relief of pressure with openers in operating position



Disc Hub Maintenance

After first 25 hours of machine operation, grease hubs and walking beam pivot until grease escapes through grass wrap guards. Check for any play in disc hub bearings or walking pivots

- Grease walking beam pivot seasonally or every 200 hours afterwards
- Grease disc hubs every 100 hours afterwards unless seeding conditions are extremely wet or extremely dusty; then grease at 25 hour intervals



Disc Hub Maintenance

If play exists in disc blade/disc hub follow the procedure below to correct:

- Loosen the 3/8" bolt and jam nut on depth lug.
- Remove cotter pin from castle nut.
- Torque castle nut down to 35 lb-ft while rotating blade slowly.
- Back off nut to nearest cotter pin alignment position and reinstall cotter pin.
- Tighten depth lug 3/8" locking bolt down to 30 lb-ft and tighten jam nut.

If play exists in walking beam pivot follow the procedure below to correct:

- Remove the 5/8" locking bolt from cast dust cap.
- Remove dust cap and inspect hub bearings and grease.
- Remove cotter pin from castle nut.
- Torque castle nut to 35 lb-ft and then back castle nut off to nearest cotter pin hole.
- Re-install cotter pin and cast dust cap.
- Tighten 5/8" dust cap lock bolt until dust cap is secure.

If play cannot be taken up with above procedures, disassemble hubs for inspection of bearings, seals, cups etc. and repair or replace components as necessary

Important:

**In extreme wet, or extreme dry conditions;
grease Disc Hubs every 25 hours.**



MORRIS

We hear you.

PRE-SEASON INSPECTION

Air Drills

CUSTOMER

AIR DRILL INFORMATION

Name: _____ Acres Covered: _____
 Address: _____ Serial Number: _____
 City and Prov: _____ Warranty End Date: _____
 Phone: _____

Safety (to be done at pickup)	CONDITION		Repair / Replacement Specification	COMMENTS
	OK	Repair / Replace		
Tires			Check for worn, damaged tires	
Check Tire Inflation			See OM	
Wheel Bolt Torque			See OM	
Condition of Hydraulic Hoses			No leaks, fittings tight, hoses worn	
Hose Supports				
Check Operation of Lights				
Transport Lock Valves			In transport position	
Hydraulic Cylinders			Inspect for leaks	
Inspect Hitch pin for wear				
Inspect wing pivot pins/cylinder pins			Check for wear	
Air Distribution	CONDITION		Repair / Replacement Specification	COMMENTS
	OK	Repair / Replace		
Primary Hoses			Check for cracks and proper installation	
Secondary Hoses			Check for cracks and proper installation	
Manifolds			Check to see if plugged or if lids are seized	
Drill	CONDITION		Repair / Replacement Specification	COMMENTS
	OK	Repair / Replace		
Seed Boots			Check condition of wear & for obstructed airways	
Shanks			Check condition	
Packers			Check for wear & damage	
Packer Bearings			Check for smooth operation	
Packer Arm Assembly			Check for excessive play	
Truss Rods			Inspect condition & check that they are tight. If not, retorque to OM specs.	
Transport Lock Valves			Check with partially raised wings, engage lock, then put tractor hydraulics into float position	
Jack-On Hitch			Check for smooth operation	

	CONDITION		Repair / Replacement Specification	COMMENTS
	OK	Repair / Replace		
Metering Body		Repair / Replace	Repair / Replacement Specification	COMMENTS
Half - tank shutoffs			Check for free movement	
Check for Proper Metering Wheels			Condition & proper size for dividers	
Meter Body Housing			Check condition of coating	
Double Shoot Collector			Check for free operation of flappers	
Variable Rate Transmissions			<i>Run for proper rotation & Inspect for oil leaks</i>	
Air Delivery System				
	CONDITION		Repair / Replacement Specification	COMMENTS
	OK	Repair / Replace		
Hydraulic Fan Motor			Inspect for leakage & grease bearing	
Hydraulic Fan Operation			Verify operation & connections to tractor	
Double Shoot Plenum			Check for free operation of dampener	
Perform Manifold - Tank Pressure Differential Test				
Conveyor System (if equipped)				
	CONDITION		Repair / Replacement Specification	COMMENTS
	OK	Repair / Replace		
Conveyor Hydraulic Components & Check Valve			No leaks, fittings are tight, check for worn hoses	
Conveyor Operation			Beltting is tracking properly & has proper tension adjustment. Check lacing is in good shape	
Air Cart Electrical System				
	CONDITION		Repair / Replacement Specification	COMMENTS
	OK	Repair / Replace		
7 Pin Trailer Lighting & Accessory Outlet			Inspect tractor, seeding tool & Air Cart that connections are clean and make proper contact	
Monitor Cable Connections			Inspect connections & wire placement	
Blockage Sensors (if equipped)			Clean prior to each season & verify installation direction of sensor is correct -- See OM	
Product Tank				
	CONDITION		Repair / Replacement Specification	COMMENTS
	OK	Repair / Replace		
Tank Free of Debris				
Tank Lid Seal			Check for damage to seals	
Tank Lid Adjustment			See OM	
Dead Head at Drill Connection / Run Fan			To check for air leaks	
Tank Level Sensors			Check for free operation & correct placement	

Morris 360 Service™

“I can’t afford down-time.”



Surrounding you with 360 support.

When you have an emergency during seeding you need help immediately. That’s why we created Morris 360 Service SM. To provide troubleshooting from our Technical Support Specialists during seeding.

Your first “trouble” call should always be to your dealer. But if they are assisting another customer, Morris 360 Service will provide immediate support. Together, we’ll ensure your problems are resolved quickly and efficiently.

Morris 360 Service includes:

- April 1 to June 15 service coverage
- Emergency access to problem diagnoses and parts
- All Morris seeding and tillage products
- Service 7am to 11pm everyday
- Your choice of delivery arrangements



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