

Gandy Orbit-Air® Applicator Operator's Manual



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INTRODUCTION

Our line of Orbit-Air applicators are designed to provide you with years of accurate and dependable performance when used for the purpose for which it was intended.

To make sure your applicator provides you with safe, efficient, and trouble-free operation, all personnel that operate this applicator must read and understand all the information included in this operator's manual. It is the responsibility of the owner(s) of this equipment to ensure that the operator is fully instructed and understands the contents of this manual. If you have any questions about this manual or the equipment, contact your Gandy dealer, or the factory.

ALWAYS use original Gandy service parts as substitute parts could adversely affect equipment performance and warranty.

DEALER

Your authorized dealer is your primary source for parts and service. If you need assistance with the operation or maintenance of this applicator, contact your dealer, or the factory. For future reference, write the dealer's name and phone number below:

Purchase Date: _____

Dealership: _____

Salesperson: _____

Address: _____

City/State/Zip: _____

Phone: _____

Email: _____

Web: _____

LIMITED WARRANTY

The Gandy Company warrants all material and workmanship on equipment delivered to be free of defects for a period of twelve months from date of original purchase. Products used on a commercial, rental, or leased basis are warranted for 90 days. Any part or parts thought to be defective within these warranty periods are to be returned through your servicing dealer or distributor to the Gandy Company's plant. Distributor must receive authorization from Gandy Company to return items under warranty. An authorization number will be issued and must be clearly visible on all packages returned to the factory. If found defective by Gandy Company, replacement parts will be forwarded free of charge, prepaid. No service charge or expense on the equipment will be allowed unless such expense has been previously authorized in writing by the Gandy Company. Serial number and model of the unit involved is required by the Gandy Company on all warranty claims. Gandy Company policy is to improve products whenever it is practical to do so. It reserves the right to make changes or add improvements at any time without incurring any obligation to make such changes on products sold previously. This warranty does not apply to products altered by users after the point of manufacture.

This warranty against defects in material and workmanship is in lieu of all other warranties, expressed or implied, and there are no other warranties of any kind whatsoever including, but not limited to, any implied warranty of merchantability or fitness for any particular purpose. In no event shall the company be liable for any incidental or consequential damages, whether for breach of warranty, for breach or repudiation of any other term or condition hereof, or for negligence, on the basis of strict liability, or for any other reason.

ORBIT-AIR / ZERO-MAX IDENTIFICATION

Orbit-Air Serial Number / Model Number

The Company places a serial number and model number nameplate on the side panel of the Orbit-Air for easy identification. For parts, service, or technical information, always provide your dealer with the model and serial number.



Model: _____

Serial No: _____

Zero-Max Serial Number / Model Number

The Company places a serial number and model number nameplate on the side of the Zero-Max rate controller for easy identification. In addition, a separate decal is placed next to it with information on where to obtain parts, service, or technical information. The Zero-Max cannot be serviced on location, but must be returned to the factory-authorized repair center.



Model: _____

Serial No: _____

Zero-Max parts and service, contact:

Humphries Textile parts, Inc.
3717 West Franklin Blvd.
Gastonia, NC 28052

(704)867-1576

SAFETY INFORMATION

This Operator's Manual provides important safety messages that are posted on Orbit-Air applicators. **ALWAYS** read and obey all safety messages.

Safety Alert Symbol



Not all decals on the Orbit-Air Applicator have the safety alert symbol. This symbol alerts you to hazards that have the potential to kill or hurt you and/or others, or cause damage to equipment or property. Safety messages will be preceded by the safety alert symbol and the word **WARNING**, **CAUTION**, or **IMPORTANT**.

These words mean:

WARNING

Hazards or unsafe practices that COULD result in severe personal injury or death.

CAUTION

Hazards or unsafe practices that COULD result in personal injury, product damage, or property damage.

IMPORTANT

Provides practical information and potential consequences.

NOTE

Provides additional information about a component or process.

Notes will call attention to issues to be kept in mind regarding the applicable situation.

SAFETY DECALS

Keep safety decals clean and legible at all times. Replace decals that are missing or have become illegible. Safety decals are available from the factory.

Safety Decal Installation

- Be sure the installation area is clean and dry.
- Decide on the exact position before removing the backing paper.
- Remove the smallest portion of the backing paper.
- Align the decal over the desired area and press the small portion of the decal into place.
- Remove the remainder of the backing paper and press the entire decal in place.
- Pierce any air pockets and smooth them out.

Familiarize yourself with the location and message of all safety decals.

OPERATOR'S MANUAL REVIEW

ALL OPERATORS must read and understand the Operator's Manual before working with the applicator. Review the Operator's Manual and safety decals of this machine before each season of use. The Safety Alert Symbol is on all pertinent safety decals. When you see the symbol, follow the instructions to avoid injury or death.



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Figure 1. Safety Decal Locations

OPERATOR SAFETY

Applicator owners must give operation instructions to employees or operators before allowing them to operate the applicator, and at least annually thereafter, according to OSHA (Occupational Safety and Health Administration) Regulation 1928.57.

SAFETY GUIDELINES

1. Store a first aid kit in a visible, accessible location, and know how to use it.
2. Keep safety decals clean and legible at all times. Replace missing or damaged decals.
3. Before servicing, adjusting, repairing, or unplugging the applicator, stop the machine, set the parking brake, and wait for all moving parts to come to a complete stop.

4. Ensure that all guards and shields are in place. Replace any that are damaged.
5. Do not allow riders on the applicator.

GRANULAR CHEMICAL SAFETY

1. Read and strictly follow the manufacturer's instructions found on the product container.
2. Wear chemically resistant clothing, gloves, and safety goggles.
3. Avoid contact with skin and eyes.
4. Wear a respirator as directed by the chemical manufacturer.
5. Wash thoroughly after working with chemicals, especially before eating.
6. Wash all clothing contaminated by chemicals.
7. Wash down the applicator prior to any maintenance. Dispose of wash water in accordance with local standards and laws.
8. Know the poison control emergency telephone numbers in your area.

HYDRAULIC SAFETY

1. Keep hydraulic components clean so that leaks can be easily identified.
2. Replace damaged hoses and fittings.
3. Use a piece of cardboard when trying to pinpoint leaks. Wear heavy gloves and a face shield.
4. Have hydraulic components repaired by a qualified repair facility. Makeshift repairs may fail suddenly creating a hazardous condition.
5. If injured by a high pressure stream of hydraulic fluid, seek medical attention immediately. Serious infection can result.

TRANSPORT SAFETY

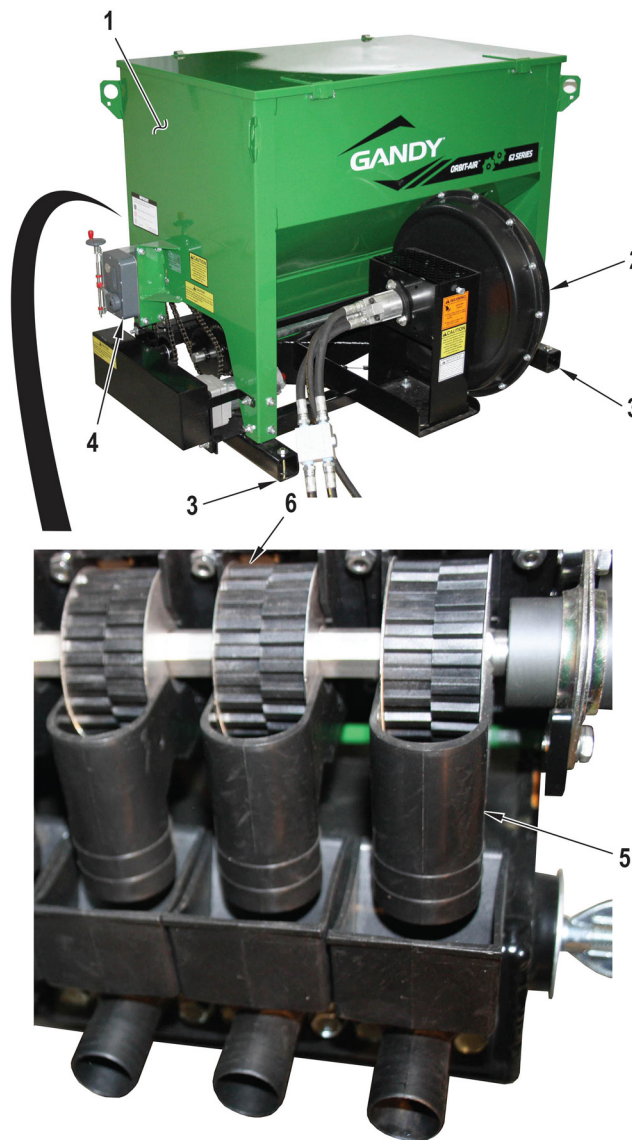
1. Be sure that a Slow Moving Vehicle (SMV) sign and all reflectors and lights required by local authorities are clean, functional, and in their proper place.
2. Do not exceed the maximum speed rating for the machine being operated.
3. Ensure that the booms and implement wings are folded and latched in place.
4. Disengage the metering drive. Failure to do so may result in the metering of seed or chemicals onto roadways.

STORAGE SAFETY

1. Store the applicator on a firm, level surface.
2. Thoroughly clean the applicator before storing to avoid contaminating the surrounding area with chemical or seed residue. Dispose of the wash water in accordance with local standards and laws.

ORBIT-AIR APPLICATOR

The Orbit-Air applicator is designed to efficiently broadcast seeds and granular chemicals. This machine operates by using a hydraulically powered fan to blow product through an air delivery system.



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Figure 2. Orbit-Air Applicator

1. Hopper	4. Zero-Max Controller
2. Hydraulic Fan	5. Metering Chambers
3. Mounting Base	6. Metering Wheels

The Orbit-Air applicator is designed to save time and operating costs by efficiently handling the following three different field jobs:

- Economically band, broadcast, or place in-furrow dry materials
- Apply material across the full tillage width
- Meter seed, grains, cover crops, and granular chemicals

The Orbit-Air applicator can be anchored by the mounting base to combines, high-clearance units, vertical tillage tools, field cultivators, chisel plows, planters, row cultivators, and much more.

NOTE

When mounting on vertical tillage equipment or any other implement, be sure to mount and place unit as close to center on parent implement for even weight distribution.

Product is fed from the hopper via metering wheels into individual metering chambers where the air stream moves it through hoses to all delivery attachments. Precise rate control is achieved by maintaining a steady field speed and through the Zero-Max controller that sets the rotating speed of the metering wheels. The available color-coded metering wheels are:

Black - Granular chemicals and small seeds, such as alfalfa and canola

Red - Fertilizer and small grains at high rates, such as oats, wheat and barley

Yellow - Fertilizer at high rates

White - Large seeds, such as field peas and soybeans

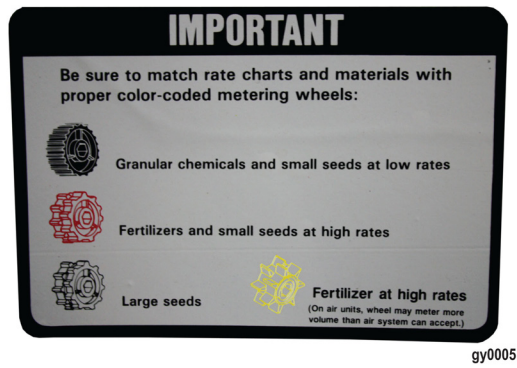


Figure 3. Metering Wheel Decal

An **IMPORTANT** metering wheel decal is located on the side of the Orbit-Air applicator for quick reference.

CONTROL UNIT

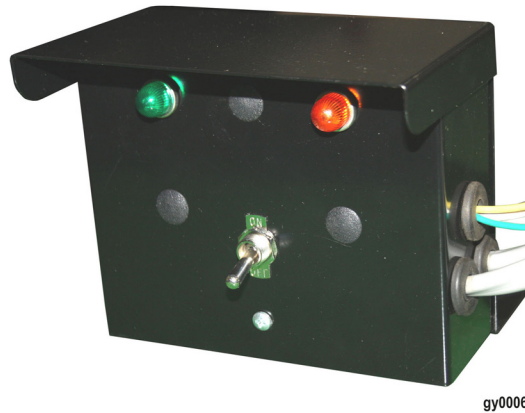


Figure 4. Control Unit (Non-Clutch Application)

SWITCH / LIGHTS

The cab-mounted Control Unit provides easy ON/OFF and visual monitoring of the Orbit-Air applicator.

SET UP / OPERATION

HOPPER INSTALLATION

NOTE

The Orbit-Air applicator mounting base dimensions vary by model. Use the table below to find your specific model's mounting base spacing dimensions.

Mounting Base Dimensions	
10 cu. ft models	40 9/16 x 27 1/2 in.
21.9 and 30 cu. ft models	60 x 50 7/8 in.
1018 model (10 cu. ft)	82 17/64 x 27 1/2 in.

With implement in the transport position, check the measurement of planned location to assure proper clearance. Determine if additional support tubing is necessary for convenient and level installation. When mounting to combine head, applicator tubing should face rear of machine. Make sure applicator does not restrict operator's line-of-sight.

HOPPER COVER

Depending how the applicator is mounted, the cover is hinged to allow opening from either the front or rear of the applicator. Place the cover with spillguards in the desired direction. Using the clevis pins, secure them with the cotter pins. Place snap latches on opposite side and secure each latch in place with a cotter pin.

OUTLETS

If all outlets are not required, close equal number of individual closure slides on each side of the applicator. Blank plates are furnished to block off metering door and air chamber. Replace unused metering cup with blank plate. Remove mixing chambers on outlets not used and replace with blank plates and supplied rubber gaskets.

OPTIONAL DEFLECTORS

Determine optimal spacing of deflectors. Deflectors should be spaced evenly. Use the most number of outlets possible for the implement width while keeping them spaced an equal distance apart. There should be at least 1 ft of tubing going straight into the deflector. Ends of all tubing should be cut at right angles and be free of burrs.

Recommended height of deflectors:

24 in. row spacing – 14 to 18 in. above soil

30 in. row spacing – minimum of 18 in. above soil

CONTROL UNIT WIRING CONNECTIONS

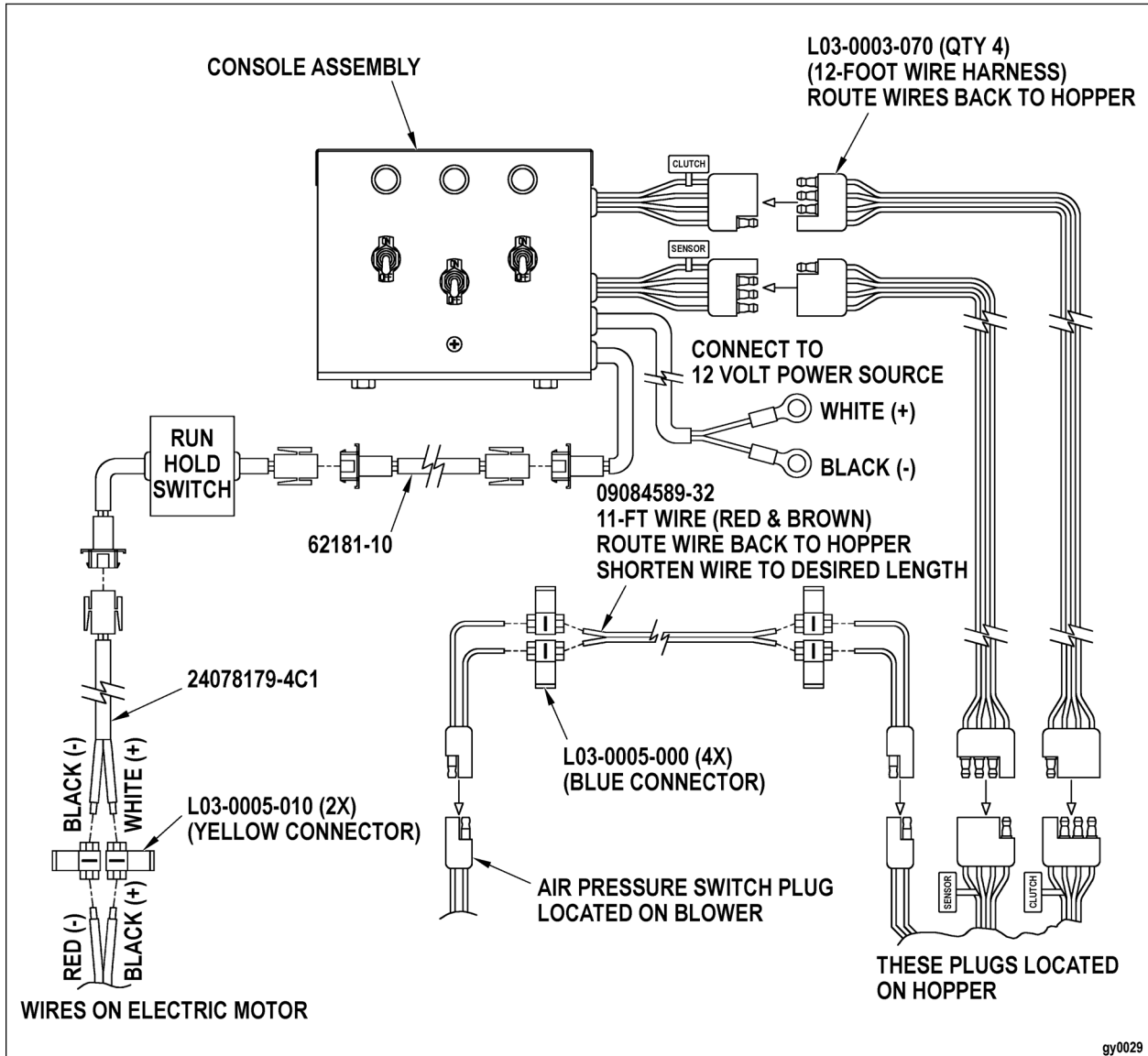
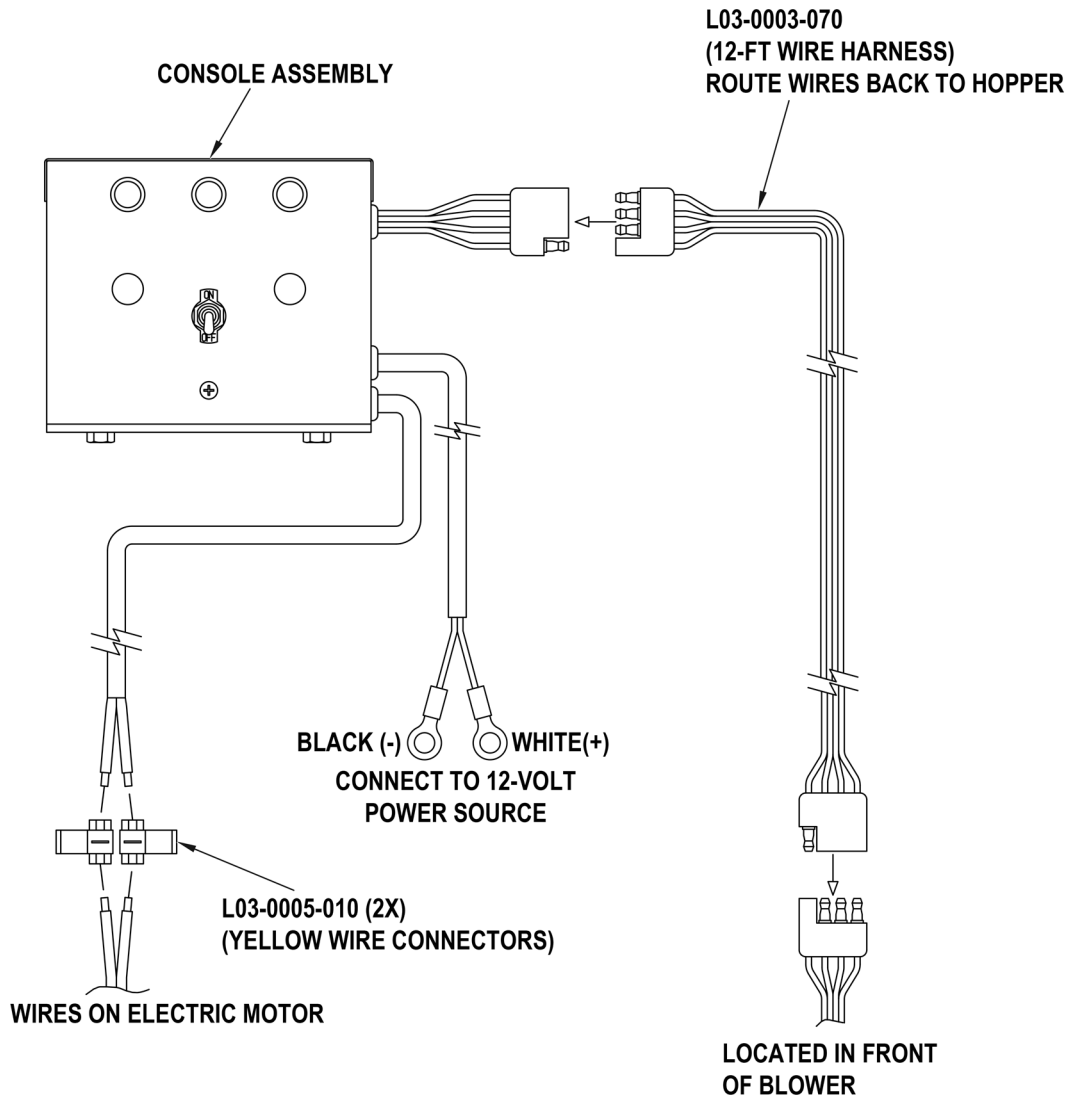
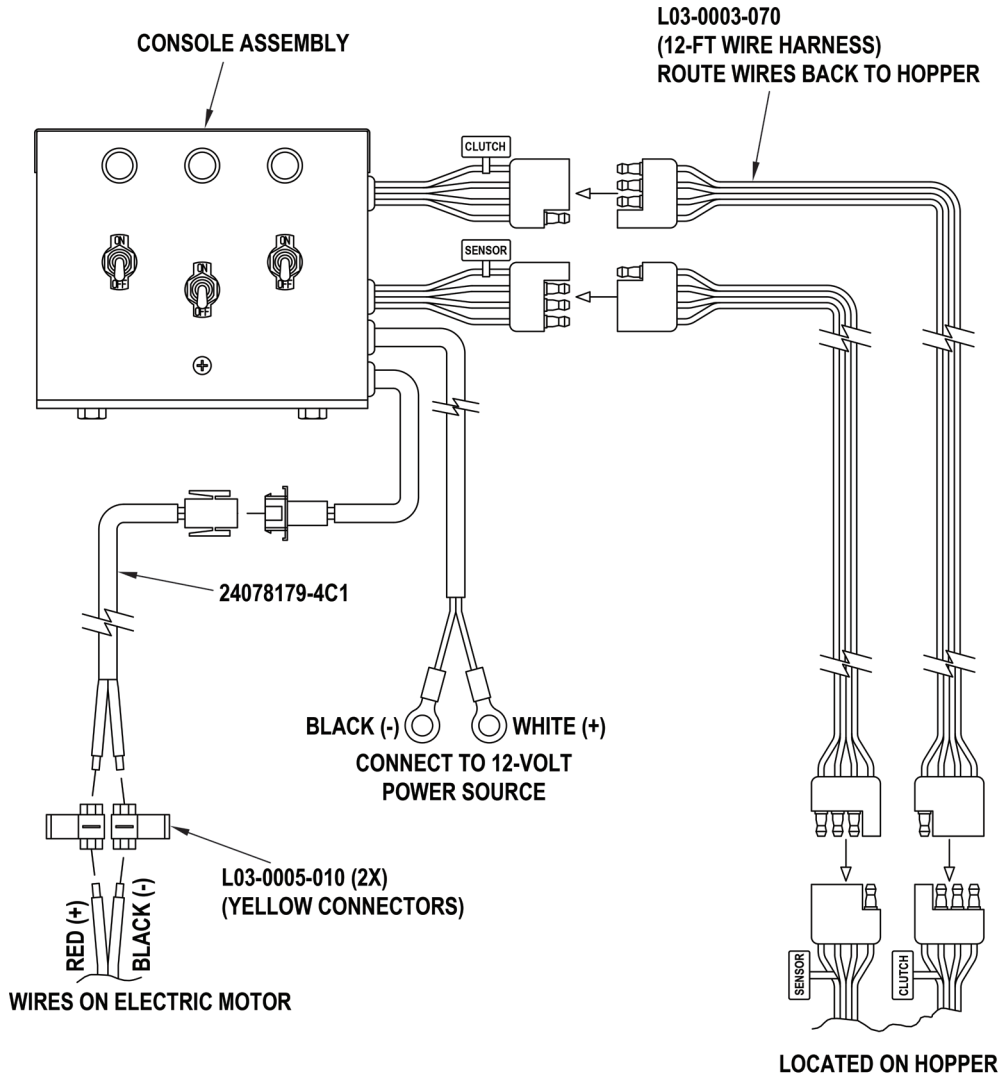


Figure 5. Electrical Diagram (1018 Model)



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Figure 6. Electrical Diagram (Single Shaft Models)



gy0039

Figure 7. Electrical Diagram (Split Shaft Two-Clutch Models)

Connect wire harnesses for battery, shaft, air pressure, Run/Hold switch and bin level sensors as indicated. Refer to **Console Wiring Diagram and Wiring Schematics** in the Illustrated Parts & Packing List that came with your unit, for additional information.

Wiring Instructions:

1. After mounting Orbit-Air applicator in desired location, mount console in a convenient location for operator.
2. Locate wire components from parts carton and hardware bag.

3. Connect the ring terminals to a 12-volt power source. White Wire (+) Black Wire (-).
4. Connect two 12-ft wire harnesses (L03-0003-010) to connectors on console and route to connectors on hopper. Install one piece of black flex guard to each wire harness.
5. Locate the two red/brown 8 in.-long molded connectors (L03-0003-040) and connect one to the hopper and one to the air pressure switch on the blower. Locate the red/brown coiled wire (09084589-3) and route it from the air pressure switch to the hopper. Shorten wire to desired length and connect it to the two molded connectors using four blue connectors. Connect red wire to red wire and brown wire to brown wire.
6. Mount the Run/Hold Switch (select models). The Run/Hold Switch is wired from the factory to be nominally open. The chain must be pulled to release the switch to start the electric motor.

NOTE

The Run/Hold Switch only turns the electric motor on or off. If stopping for long periods of time, shut-off the center master switch to cut all power to motor and clutches. Mount Run/Hold Switch box to parent implement so switch is stationary. Connect chain to part of implement that is being lowered/raised.

NOTE

Chain may have to be lengthened to meet desired length. Make sure, if this part of the implement can float, that there is enough tension on spring so Run/Hold Switch will not start and stop the electric motor when traveling.

7. Connect wire (62181-10) from console to Run/Hold Switch. Connect wire (240781798-4C1) to Run/Hold Switch and route it to electric motor on hopper. Connect white (+) wire to black (+) wire on motor using the yellow connector. Connect black (-) wire to red (-) wire on motor using the yellow connector.
8. If Run/Hold Switch is not needed, connect wires 62181-10 and 24078179-4C1 together and manually turn on and off from console.

HYDRAULICS

The supplied hydraulic hoses require male adaptors of the same brand as the female connectors found on the tractor, combine, etc. To obtain optimum hydraulic function, some additional adjustments or equipment may be necessary. Consult your owner's manual for operation of hydraulic system. In some instances, especially on high-gallonage tractors, installation of a hydraulic motor return line that bypasses the valve bank will eliminate

heating and excessive back-pressure. Use of adaptors or other than like-brand connectors may cause excessive back-pressure, resulting in seal failure on the hydraulic motor. If your tractor, combine, etc., has a remote outlet that is piped directly to the oil cooler, use it for the return hose. If the blower's hydraulic motor is equipped with a case drain return, it is highly recommended that this be used to reduce back-pressure and heating. If more than one hydraulic motor is used in the operating system, they must be connected in parallel, not series, or back-pressure may damage the seals. Check the operator's manual of your machine to determine if you have an open or closed hydraulic system.

NOTE

If you own a late model tractor and cannot regulate hydraulic flow from the cab, contact the factory to order a hydraulic bypass block with needle valve (No. 6296) to manually adjust hydraulic pressure.

SAFE OPERATION

Efficient and safe operation of the Orbit-Air applicator requires that each operator read and understand the operating procedures and all related safety precautions outlined in this section. A Pre-Operation Checklist is provided. It is important, for both personal safety and to maintain the good mechanical condition of the applicator, that the Pre-Operation Checklist is followed.

Pre-Operation Checklist

Before operating the applicator, and each time thereafter, check off the following areas:

1. Check the implement and applicator hydraulic system. Ensure that the hydraulic reservoir in the tractor is filled to the required specifications.
2. Inspect all hydraulic lines, hoses, fittings, and couplers. Use a clean cloth to wipe any accumulating dirt from the couplers before connection to the tractor's hydraulic system.
3. Inspect all delivery hoses for any wear and restrictions. Repair or replace if necessary.
4. Inspect the hopper for accumulation of any foreign material that could plug the venturi system.
5. Check all the chains and sprockets for proper adjustment and tension. Adjust as required.
6. Check the fan and manifold for any accumulation of debris or dirt. Clean as required. Run the fan at field speed to clear hoses and outlets of foreign material.
7. Check the metering wheels. They must turn easily. Worn metering wheels will alter rates.

8. Ensure all bearings turn freely.
9. Operate the electrical clutches for proper engagement. Refer to Adjustment and Service if clutches do not work properly.
10. Make sure that all guards and shield are in place.
11. Check mounting hardware for hopper to implement. Tighten where necessary.

CONTROL UNIT

The Orbit-Air applicator is equipped with an electrically operated control unit allowing operation of just the left or right metering shafts on models with a split shaft and a master switch to turn off all metering outlets. It also monitors manifold air pressure and metering shafts. The **Green** light flashes as shafts rotate. If shafts stop rotating, the **Green** light(s) stays on continuously. Left and Right Side Selector switches for operation of both metering rollers for half or full width application of product. **Green** lights above indicate which option is selected. Half width is useful when finishing a field or where overlapping may occur.

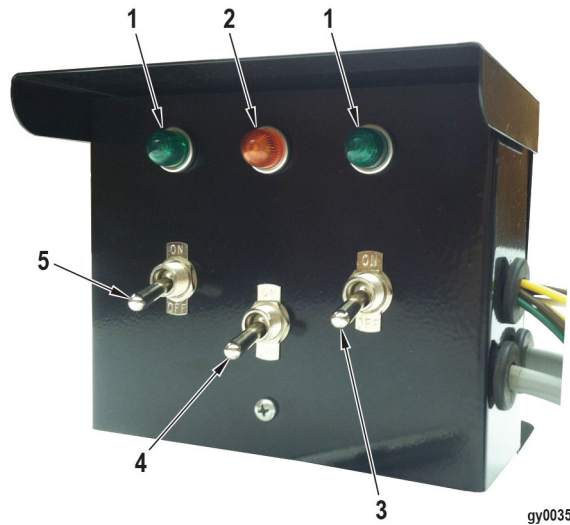


Figure 8. Control Unit

1. Green Light	Left and right shaft monitoring indicators flash when working properly.
2. Amber Light	Air pressure indicator light is always ON when applicator is functioning normally. The light will turn OFF if air pressure is not adequate.
3. Right Side Selector Switch	Used alone when only the right half of application width is desired.

4. Master Power Switch	Push the Master Power Switch to the ON position for operation of control unit. The light above the switch indicates power is ON.
5. Left Side Selector Switch	Used alone when only the left half of application width is desired.

AIR PRESSURE GAUGE



gy0007

Figure 9. Air Pressure Gauge

The manifold air pressure gauge indicates proper fan speed by measuring air pressure in the manifold in ounces/in.2. The gauge is wired to the pressure indicator light on the control unit.

NOTE

The **Amber** air pressure indicator on the Control Unit will go OFF if there is a problem.

For granular chemicals and light seed, the recommended air pressure is between 8-12 oz./in.2.

CLOSURE SLIDES

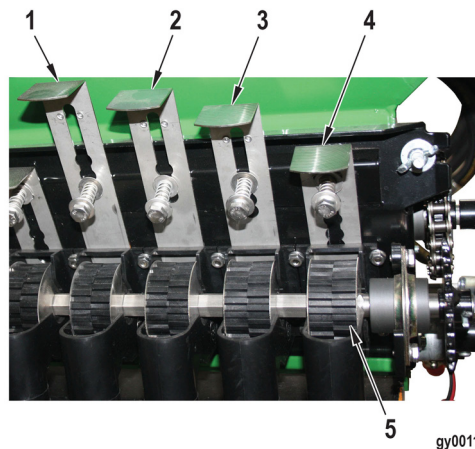


Figure 10. Closure Slides

1. Top Position	4. Closed Position
2. Mid Position	5. Metering Wheels
3. Low Position	

The closure slides are located behind each metering wheel. They should be in the low position for small seed, mid position for granular chemicals, and in the top position for large seeds (refer to rate chart). Do not use the closure slides to regulate product flow. The closure slides can be pushed down to the closed position when removing the metering wheels if product is still in the hopper.

CALIBRATION

Calibration determines the actual product flow rate of your applicator. Generally, the metering rate of granular products and seed is predictable as long as its properties are consistent. However, metering rate variations are possible and may be caused by:

- Manufacturer’s quality control
- A change in product density due to settling during transport
- Damaged or worn metering components
- Variations in seed size and density due to changes in growing conditions
- Atmospheric conditions

For these reasons, product rate charts are only a guide. Calibration is essential for accurate application. The applicator should be calibrated the first time a new granular product is used and periodically thereafter. For seed, the applicator should be calibrated each time a particular lot of seed is used.

Steps:

1. After filling the hopper, set up a test course using two stakes placed 436 ft apart.
2. Read the label and cautionary statements of the granular chemical or recommended rates for the seed you are using. Determine the rate you need to apply in pounds per acre.

NOTE

Make sure the correct rate chart and the correct metering wheels are used for your application.



Figure 11. Zero-Max

1. Gauge	2. Arrow
----------	----------

3. Look up the rate chart for the material and deflector/tube spacing. Set the speed control on the applicator for your rate according to the chart. Make sure you align the arrow by viewing the gauge at eye level on the Zero-Max. (If no chart is available for your material, estimate a rate control setting based on a similar product in the rate chart.)
4. Place a plastic bag around each deflector tube end, securing it around the plastic tube, leaving one-half of the top open to allow air to escape.

NOTE

Take precaution that bags are not dragged and torn while making the calibration run.

5. Start the blower. Adjust blower speed to produce 8-12 oz./in² when applying granular chemical or light seed. With heavier products, higher air pressure may be required.
6. Travel the 436-ft course at anticipated field working speed.
7. Weigh the total contents of all the bags in pounds.
8. Divide the weight collected in pounds by the width of the implement in feet and multiply by 100 to get pounds per broadcast acre.
9. Adjust the Zero-Max speed control if needed and repeat steps 4-8.

Example

Weight of collected material from 24 outlets on 24 in. row spacing is 6 lbs. Divide pounds by width of implement (48) and multiply by 100.

$$24 \text{ outlets} \times 24 \text{ in.} \div 12 = 48 \text{ ft}$$

Then

$$6 \text{ lbs} \div 48 \times 100 = 12.5 \text{ lbs. per acre}$$

Shortcut Method

If you wish to collect from fewer outlets rather than all the outlets, follow the same procedure as listed above to step 7. Then, use the formula as shown below.

Shortcut Example

Instead of all 24 outlets being used, only three outlets with 24 in. row spacing is used. A total of 0.75 lbs of product is collected. Total width of outlets used in the collection is 6 ft.

$$3 \text{ outlets} \times 24 \text{ in.} \div 12 = 6 \text{ ft}$$

Then,

$$6 \text{ ft of width} \times 436\text{-ft. course} \div 43,560 \text{ ft.}^2 = 0.06 \text{ test acres}$$

$$0.75 \text{ lbs of collected product} \div 0.06 \text{ test acres} = 12.5 \text{ lbs per acre}$$

Again, adjust the Zero-Max speed control if needed and repeat steps 4-7.

MAINTENANCE

This section provides information on daily and periodical maintenance of your applicator. Make sure to service all of these components after any lengthy period of non-use. You are responsible for the safe operation and maintenance of your applicator. Ensure that you and anyone else who is going to operate, maintain, or work on or around the applicator are familiar with the operating and maintenance procedures and related safety information contained in this manual.

ROUTINE MAINTENANCE / INSPECTION

Stop engine before performing any maintenance. Disconnect power source, and wait for all machine movement to stop before servicing, adjusting, cleaning, or unclogging the equipment. If the machine must be running to be properly serviced or maintained, the employer shall instruct employees as to all steps and procedures that are necessary to safely service or maintain equipment. Lock out electrical power before performing maintenance or service. Make sure everyone is clear of machinery before starting engine, engaging power, or operating machine.

HYDRAULIC BLOWER

CAUTION

Failure to provide regular inspection and maintenance may cause equipment failure and unsafe operation.

Inspect blower shaft bearings frequently for loose fasteners and misalignment. Replace and tighten fasteners as needed. After operation in dusty conditions, the air intake screen should be removed and the impeller blades cleaned to prevent accumulation of foreign matter that could interfere with fan operation.

Periodically inspect for excessive wear or cracks and check alignment of impeller shaft with the drive shaft. If the blower must be disassembled for any reason, refer to the Hydraulic Blower Assembly diagram in the Illustrated Parts & Packing List that came with your unit. The impeller is balanced at the factory. If imbalance occurs, replace impeller to prevent unsafe operation.

BEARINGS

Check and clean bearings frequently for accumulation of dust or fine particles. Failure to do so may cause damage to shaft or sprockets. Binding of the shaft could cause a change in application rates.

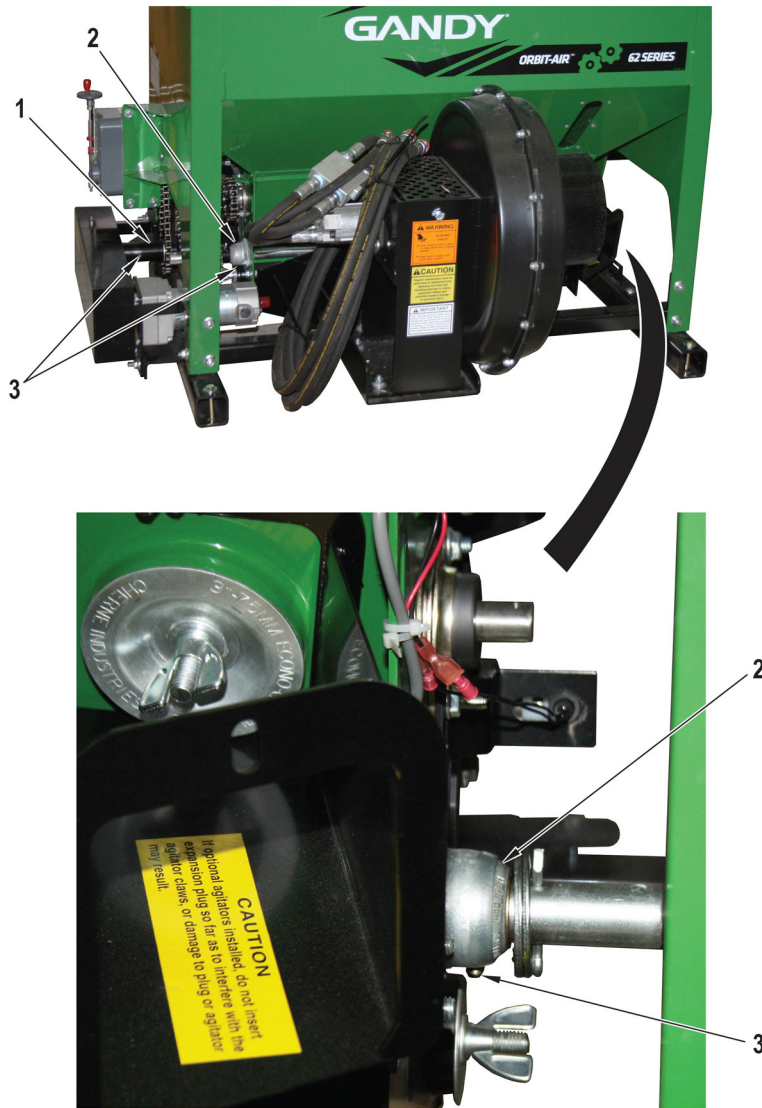
MANIFOLD

 **CAUTION**

Failure to clear accumulation of debris may interfere with air passage and delivery of material.

Make sure to clear manifold of collected dust or debris by daily removing expansion plugs in the manifold and blow out/remove dust and debris.

LUBRICATION



gy0009

Figure 12. Grease Points (Single shaft model shown)

1. Drive Shaft Housing	3. Grease Fitting
2. Bearing	

NOTE

Split shaft models have five grease points (two more for the additional shaft).

Grease all fittings daily during use to assure best operation and prevent undue wear of moving parts and drive shafts.

SAFETY

1. Refer to the Operator’s Manual for your machine. Follow all operating, maintenance, and safety information in the manual.
2. Place the implement on a firm, level surface. Lower all sections of the implement.
3. Exercise extreme caution when working around or with hydraulic systems. Depressurize the system when connecting or disconnecting the hose couplings.
4. Wear heavy gloves and a face shield for eye protection when searching for suspected hydraulic leaks. A high-pressure concentrated stream of hydraulic fluid can pierce the skin. If such happens, seek immediate medical attention, as infection and toxic reaction could develop.
5. Do not attempt any adjustments or maintenance to any system of the applicator when the implement is in motion.
6. Make sure all guards and shields are in place when the applicator is being operated.
7. Never wear ill-fitting, baggy or frayed clothing when working on any drive system components.
8. Store and transfer gasoline, solvents, cleaners, or any flammable liquids only in Safety Standard-approved containers.

CLUTCHES (MODELS 62DS1018, 62EN24C, 6230EN24C, 6245RDS24S)

Components

An electric clutch consists of three primary components:

1.	Coil Assembly	The clutch’s “power” source contains the coil which generates magnetic force and requires a 12-volt DC coil.
2.	Rotor Assembly	Generally, the input of the clutch includes a keyed hub that mates with the keyway in the drive shaft. The rotor transmits torque from the drive shaft to the output or armature assembly.
3.	Armature Assembly	The output of the clutch also contains the mechanical brake in a clutch/brake assembly. The armature transmits torque from the rotor to the driven load. The sleeve is a secondary component serving as a spacer between the rotor and field assembly and also as a support for the field assembly bearing.

Troubleshooting

1. Clutch Symptom: Clutch will not engage

Problem	Possible Causes
Low voltage supply	Defective battery
	Faulty charging system
	Bad wiring or connectors
Zero voltage	Broken lead wire
	Open clutch coil, check coil resistance
	Faulty switch
	Blown fuse

2. Clutch Symptom: Clutch slippage

Problem	Possible Causes
Low voltage supply	Defective battery
	Faulty charging system
	Bad wiring or connectors
Overloaded clutch	*Contamination on clutch
Contaminated friction surfaces	Loose mounting bolts

**Clean clutch surfaces with emery cloth, steel wool or a wire brush to clean surfaces.*

NOTE

Clutches should release when electrical power is shut off. If the metering shaft continues to turn, inspect clutches for improper assembly, corrosion, damage, or failure.

Evaluating Clutch (Bearing mounted field clutches)

NOTE

Clutch to be at room temperature 70°F (21°C) to complete the following test.

1. Turn engine and all other components off.
2. Disconnect clutch wire connection.
3. Select meter to check ohms.
4. Connect meter lead wires to the wires in the clutch connector.

5. If meter reads below 2.40 ohms or above 2.90 ohms, then the clutch has failed and needs to be replaced. If the meter reads between 2.40 ohms and 2.90 ohms, the problem is in the electrical system leading to the clutch (battery, relay, switch, wiring, etc.).

BLOWER / HOUSING

1. Refer to **Hydraulic Blower Assembly** section in the Illustrated Parts & Packing List. Attach two self-aligning flangettes and a bearing to inside of blower mount on blower side with three 5/16 x 1 in. carriage bolts, lock washers, and nuts. Do not tighten.
2. Attach back half of blower with backup plate to blower mount using four carriage bolts and locknuts. Do not tighten. Fully insert impeller keyed to shaft through back housing bearing and flangettes, slide on locking collar, and position it against flangettes. Shaft should insert easily (see following **CAUTION**).

CAUTION

Impeller was balanced on shaft at factory. Retaining compound was used when impeller was secured to shaft. When inserting shaft, do not strike or force shaft into position or damage to blower may result.

3. Attach front housing to back half using silicone sealant on the seam. Secure with 13 hex bolts, a wrought washer on each side of lip, and tighten with nylon locknut. Fasten screen on outer lip of air intake with three Phillips head sheet metal screws.
4. Thread hydraulic hose onto hydraulic motor. If using optional hydraulic valve block, note the intake and outlet direction arrows on flow-control block. Threads are matched to prevent interchanging error.
5. Install blower and mount on air chamber with four hex bolts, wrought washer on each side of base, and secure with lock washers and nuts. Place a generous bead of silicone sealant around junction of blower outlet and air chamber intake.

METERING DOOR ASSEMBLY

Air Chamber

Attach air chamber to bottom of hopper, placing air chamber flanges to inside of hopper flanges. Secure in place on each side with 3/8 x 3/4 in. hex bolt, lock washer, and hex nut. Next, attach manifold support angle to lowest hole hopper leg using two 3/8 x 1-1/4 in. hex bolts. Secure with lock washers and hex nuts. Attach air chamber to support angle with 3/8 x 2 in. hex bolt, wrought washer, lock washer, and nut.

Attach gasket and mixing chambers over openings in manifold using 5/16 x 1 in. hex head thread cutting screws. Attach rubber plug mounting plate to right end of manifold with four hex head tapping screws, Insert rubber plug. Attach blank plate to other end of manifold using four hex head tapping screws.

Secure tubing angle clamp to outside of hopper leg on mixing chamber side using holes nearest hopper base. Use 3/8 x 1-1/4 in. hex bolt, lock washer, and nut in each end. Attach tubing bar clamp to angle clamp using four 5/16 x 2-1/4 in. hex bolts and nylon nuts.

Interchanging Metering Wheels

Each unit is furnished with one set of metering wheels as ordered. However, additional sets may be ordered to apply other products. They may be interchanged following this procedure:

1. Loosen the two hex bolts on the flangette bearing at each end.
2. Lift out shaft and wheel assembly (on ganged cup models, slide shaft assembly out the side after removing sprocket and bearing on drive end).
3. Remove metering wheels from shaft.
4. Slide on new set of metering wheels, aligning them in metering cups.
5. Replace flangettes and locking collar on outside of mounting plate tab.
6. Tighten hex bolts on each flangette bearing, then lock.

NOTE

If your operation demands metering wheels be interchanged often, additional wheels sets and shafts can be ordered, or complete metering wheels and mounting plate assemblies can be ordered for quick interchange.

DEFLECTOR / TUBE DISCHARGE

For applications involving broadcast applications:

1. Deflectors should be spaced evenly at 24, 27, or 30 in., center-to-center, using the most number of outlets possible for the implement width while keeping them spaced an equal distance. When all openings are not required to reach implement width, use 24-in. spacing. To empty the hopper evenly, an equal number of outlets should be used on each half of the implement.

2. If not all openings are required, close equal number of individual slide shutoffs on each side of the hopper (hopper to be empty). Using the supplied blank plates, remove mixing chambers on outlets not being used and replace with blank plates using the existing rubber gaskets or silicone around the plate for airtight seal.
3. The angle bars are made to hold four or five deflectors at 24, 27, or 30 in. spacing. Choose the combination of bars that matches the center span wings of your implement. (If 12 in. spacing is desired for broadcasting high rates of product, additional mounting holes will need to be drilled into the angle bars.
4. Using the hanger strap, bar clamp, and bolts provided, install the angle bar-deflector assembly on front, middle, or rear of implement based upon desired depth of incorporation. Leading edge of each deflector should be the same height above the ground when the implement is at working depth between 14 and 18 in. above the soil when deflectors are spaced 24 in. apart; a minimum of 18 in. above the soil when deflectors are spaced 27 or 30 in. apart.

NOTE

When applying high rates of product, such as 50 lbs. per acre or more, mount the deflectors at least 18 in. above the soil.

5. Install deflector-angle bar assemblies on wings using remaining parts. Cut off any excess length of angle bar.
6. Slip plastic tubing from coil over mixing chamber outlet so tube is against rim of chamber. Ends of all tube cuts, especially at deflector end, should be cut at right angles and be free of burrs. If temperatures are cold, tubing may need to be heated with hot water for sliding over mixing chamber outlets.
7. Route tubing to any deflector on same side of implement with sufficient radius to avoid kinking and to avoid tube damage when folding the implement.

NOTE

Have at least a foot of tubing going straight into the deflector. On spit shaft models, make sure tubing is routed to the same side of implement for each half of shaft.

8. Repeat steps 6-7 for remaining outlets.
9. Cut tubing to desired length and insert into deflector tube flush with end of metal tube. Secure tubing to deflector tube with supplied Phillips tapping screws. A tube inserted too far or not far enough, or not cut square or left with burrs, can adversely affect the distribution pattern.
10. Place the tube bar clamp padded with sponge rubber over the plastic tubes on each side and secure with bolts and lock nuts. Secure firmly, but do not crush the tube.
11. Fold implement to check tube routing. Use tie-wraps to secure tubes to implement frame, allowing for tube movement while folding and unfolding. Do not permit tubes to kink.

Tube Discharge Into Opener

While some openers have designs that allow air to escape, other models do not. To eliminate blowback so product drops through the opener, follow this procedure:

1. Start by drilling four 5/16 in. holes – two on each side of the opener about 1 in. apart. Holes should be above ground level and below the plastic delivery tube.
2. Test outlet to determine if an additional air outlet hole should be drilled.

NOTE

If two tubes are combined into one opener, the release of twice as much air will be needed.

POST-SEASON MAINTENANCE

Before storing the applicator, check the following areas:

1. Remove the metering wheels and clean them.
2. Clean the inside of the hopper, especially the bottom corners.
3. Purge the delivery system by running the fan at operating speed.
4. Lubricate all roller chains with grease.

5. Remove the manifold pressure gauge. Store it in a clean, dry place. Plug the port.
6. Touch up any paint scratches.
7. Store in a shed or cover with a waterproof tarp.

PRE-SEASON MAINTENANCE

Before starting the season's work, check the following areas:

Bearings

- Inspect the fan bearing and couplers for signs of damage caused by heat.
- Turn the metering system by hand. If there is any binding or dragging, replace the worn bearing(s).

Delivery System

- Inspect the applicator for accumulation of debris. Clean if necessary.
- Install the manifold pressure gauge. Run the fan to ensure it is working properly.
- Run the fan at operating speed and check the air flow in each outlet.

Metering System

- Disassemble the electric clutches and buff the internal surfaces with emery cloth, steel wool, or a wire brush.
- Inspect individual metering wheels for wear.
- Check sprockets for any damage to teeth.
- Examine chains for tension and alignment.
- Inspect Zero-Max Controller for signs of leakage.

TROUBLESHOOTING

Application Rates

Condition	Solution
Individual shutoff slides in incorrect position	Position properly (open, closed, and two intermediate positions)
Mathematical error made during field calibration	Recheck calculations
Catch sample not weighed accurately	Weigh sample again
Actual acreage less or more than calculated	Check area covered
Incorrect setting	Check control setting or meter calibration
Sprockets or chains slipping	Check tightness
Sprockets are incorrect size or ratio	Check sprocket assembly
Density of material differs from rate chart	Field calibrate
Binding of metering shaft	Check and clean bearings
Zero-Max turning in non-preferred direction	Since Zero-Max turns faster in non-preferred direction (marked by an arrow), compensate and lower the setting by checking application rate through calibration

Stripping of Sprocket Teeth

Condition	Solution
Binding of metering shaft	Check and clean bearings

Product not Metering

Condition	Solution
Individual shutoff slides closed	Open to correct position
Tube is kinked	Check tube routing
Blockage at metering wheel	Check and clean
Material has bridged in hopper or mixing chamber	Loosen and agitate
Tube end is blocked and material is blowing back out of mixing chamber	Clear blockage. Check for tube kinking
Manifold opening is blocked	Check and clean manifold by removing expansion plugs
Air pressure too low	Check blower, increase rpm if gauge indicates

Condition	Solution
Metering wheels not turning	Check electric drive

Product Caking in Hopper, Tubes, Metering Wheels or on Deflectors

Condition	Solution
High humidity	Clean and check periodically
Water in hopper bottom	Drain. Remove plug and thoroughly dry hopper
Water in manifold	Clear mixing chambers, remove plug from manifold; run blower until system dries

Chattering Noise Coming from Fan

Condition	Solution
Bearing dry or worn	Replace
Impeller out of balance	Check and replace
Impeller blades striking housing	Shut down blower. Readjust or replace

Hydraulic Motor

Condition	Solution
Leaking	Replace seal. Check for oil contaminants
Hydraulic fan surges	Oil flow from machine is too low or too high

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