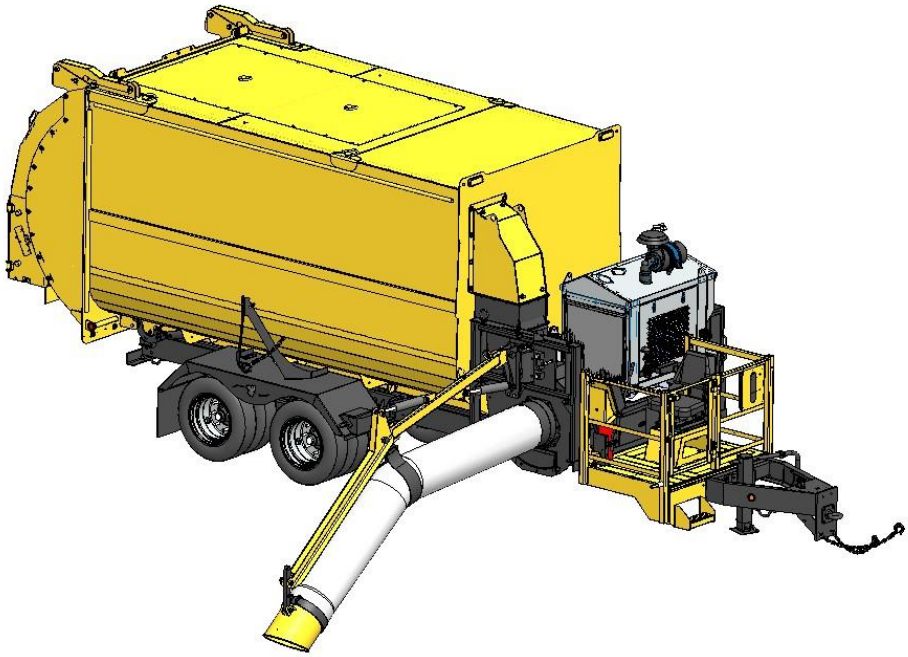
OPERATION & MAINTENANCE MANUAL
FOR MODEL YEARS 2020 & NEWER

Release Date: 12/12/22



WHEN ORDERING PARTS, PLEASE REFER TO THE
VIN NUMBER AND “TYPE OF VEHICLE” OF YOUR LEAF VACUUM.

RECORD THEM FROM THE VIN TAG ON THE
FRONT DRIVER’S SIDE OF THE TRAILER:

OLYMPIAN LEAF VACUUM VIN: _____

TYPE OF TOW VEHICLE: _____

OLYMPIAN ENGINE MODEL NO: _____

OLYMPIAN ENGINE SERIAL NO: _____

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MANUFACTURED AND DISTRIBUTED BY:

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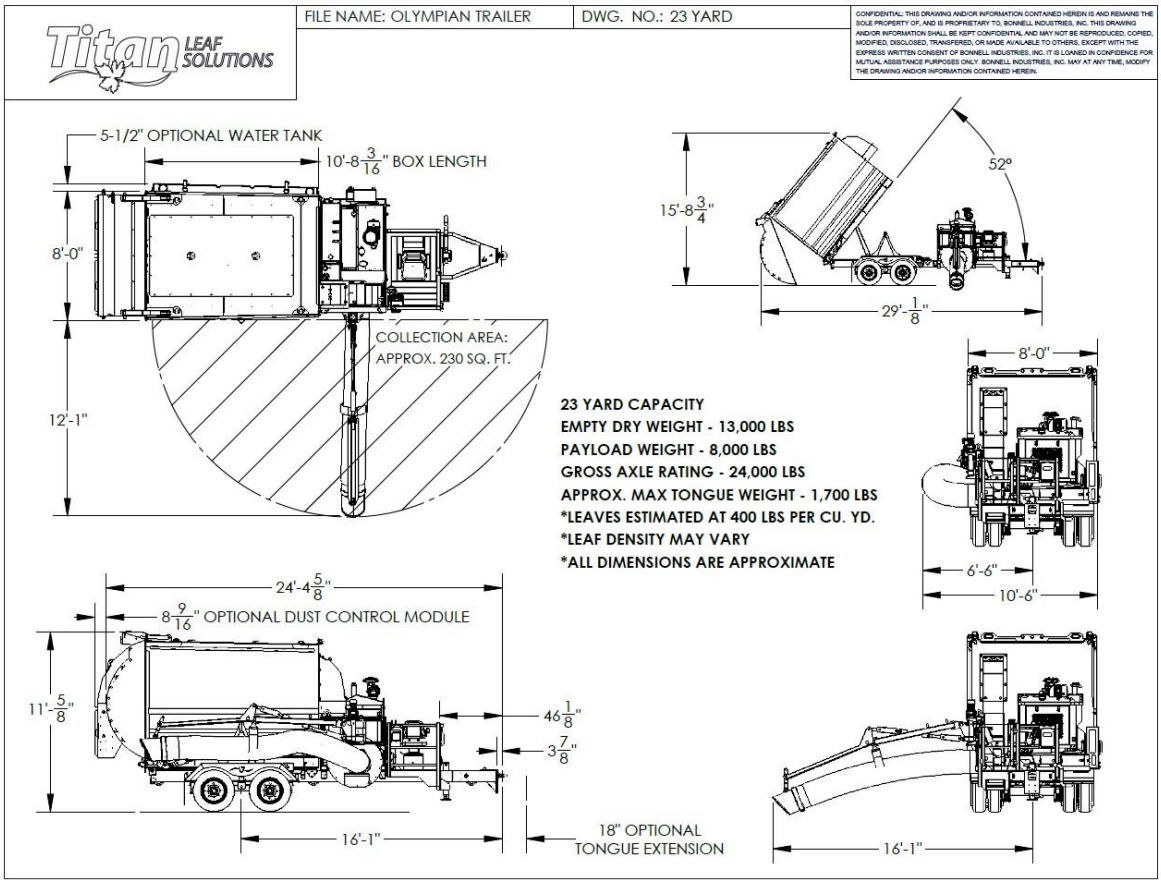
800-851-9664
www.bonnell.com
www.titanleafpro.com

1 DIMENSIONAL DATA

OLYMPIAN DIMENSIONS



SPECIFICATIONS

Collection Box Capacity …….... 23 yd³

Empty Weight ……..…. 13,000 lbs

Payload Weight ..……..…. 8,000 lbs

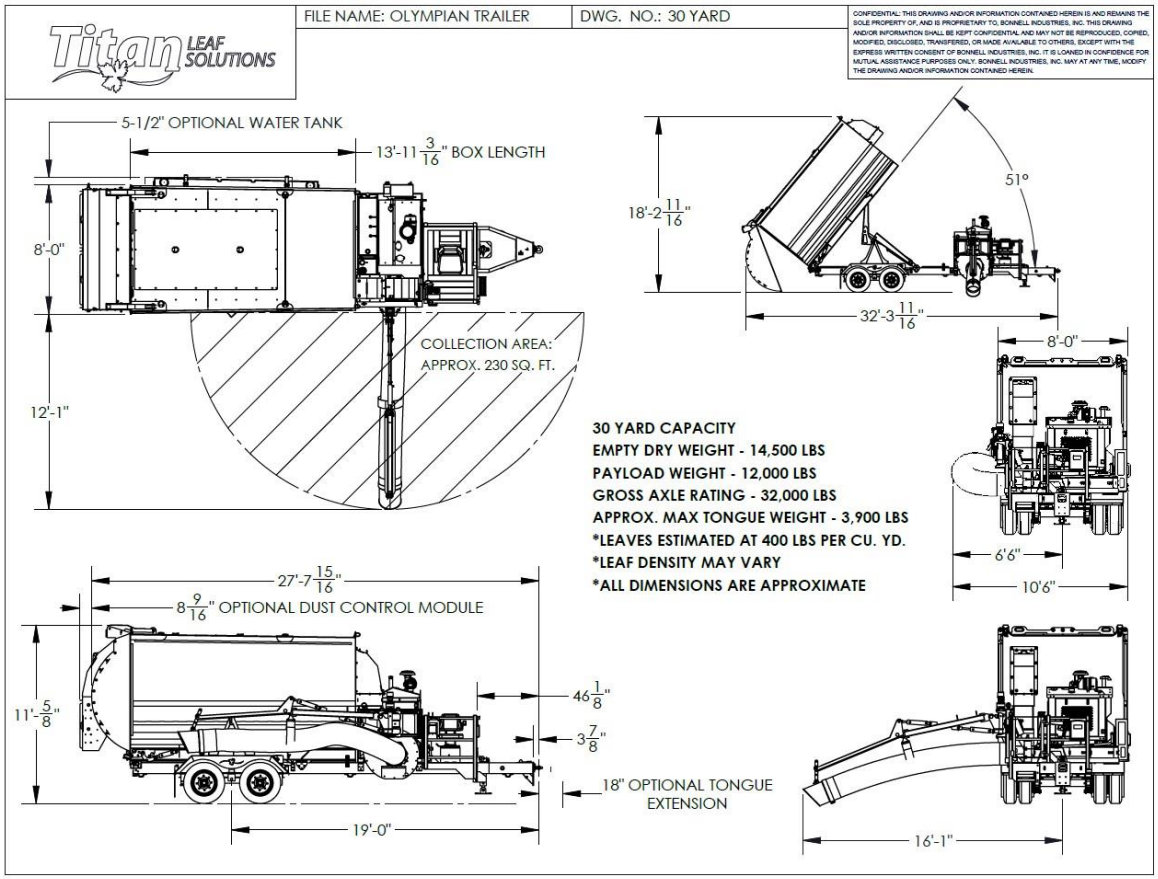
Gross Axle Rating …… 24,000 lbs

Maximum Tongue Load ……..…. 1,700 lbs

Approximate Density of Compacted Leaves ….. 400 lbs/yd³

Density of leaves may vary.

All dimensions are approximat



SPECIFICATIONS

Collection Box Capacity ……... 30 yd³

Empty Weight ……..…. 14,500 lbs

Payload Weight ..…….…. 12,000 lbs

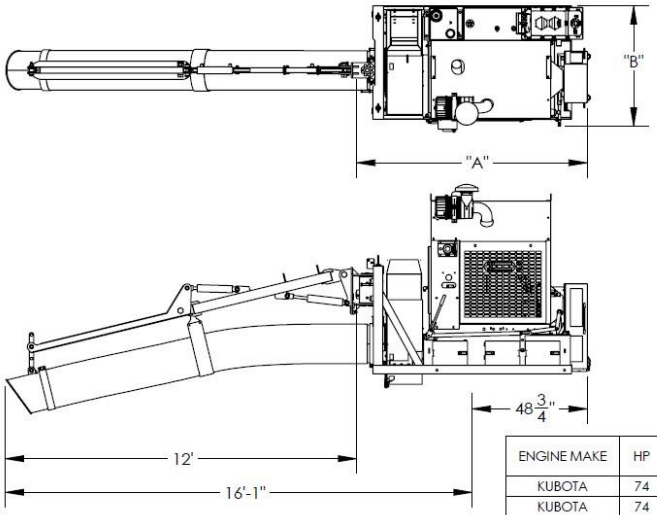
Gross Axle Rating …….. 32,000 lbs

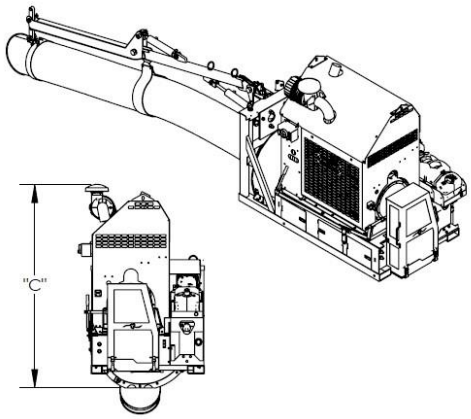
Maximum Tongue Load ……..…. 3,900 lbs

Approximate Density of Compacted Leaves * …. 400 lbs/yd³

Density of leaves may vary.

All dimensions are approximate.





ENGINE MAKE	HP	CLUTCH TYPE	OVERALL DIMENSIONS (IN)			SKID WEIGHT (LBS)	
			"A" WIDTH	"B" DEPTH	"C" HEIGHT	DRY	FULL
KUBOTA	74	MANUAL	98	51-5/8	84-7/16	4129	4721
KUBOTA	74	FLUID COUPLER	98	48-3/4	84-7/16	4127	4719
KUBOTA	87	MANUAL	98	51-5/8	80-1/2	3858	4422
KUBOTA	87	FLUID COUPLER	98	48-3/4	80-1/2	3856	4420
JOHN DEERE	74	MANUAL	98	51-5/8	84	4127	4719
JOHN DEERE	74	FLUID COUPLER	98	48-3/4	84	4125	4717
JOHN DEERE	99	MANUAL	98	51-5/8	92-1/8	4516	5122
JOHN DEERE	99	FLUID COUPLER	98	48-3/4	92-1/8	4517	5123
					OPTIONAL QD SUCTION HOSE	28	

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FILE NAME:
OLYMPIAN Power Unit Skid Dimensions

COMMENTS:

	NAME	DATE
MODELLED	JKG	5/10/21
DETAILED	JKG	5/10/21
ENG APPR.		
MFG APPR.		

FINISH WEIGHT (LBS)	

DIMENSIONS ARE IN INCHES
TOLERANCES UNLESS OTHERWISE NOTED

FRACTIONAL	±1/16
BEND ANGLE	± .5°
SQUARENESS	± .15°
TWO PLACE DECIMAL	±.03
THREE PLACE DECIMAL	±.005

Titan LEAF SOLUTIONS

TITLE: OLYMPIAN POWER SKID DIMENSIONS

DWG. NO.
LV-4309 DIMENSIONS

CAPACITIES & SPECIFICATIONS

Fuel Tank	40 US Gallons
Hydraulic System (if equipped)	23 US Gallons
Hydraulic Tank Only (if equipped)	20 US Gallons
Dust Control System (if equipped)	100 US Gallons
Engine, Kubota 7V3800TI74T4-15035	74 BHP @ 2600 RPM
Engine, Kubota WG3800G	87 BHP @ 2600 RPM
Engine, Deere 4045TFC03	74 BHP @ 2400 RPM
Engine, Deere 4045HFC04	99 BHP @ 2400 RPM
Trans Fluid Coupler (if equipped)	5-6 Quarts
Battery	12 Volt, 1050 AMP, 950 CCA
23 YD Axles	12,000 lb. each with Electric Brakes
30 YD Axles	16,000 lb. each with Electric Brakes
23 YD Tires	ST325 85R16, Load Range G
30 YD Tires	ST215 75R17.5, Load Range H
Fan	30” Diameter

2 GENERAL SAFETY INFORMATION

SAFETY ALERT SYMBOLS AND SIGNAL WORDS

This manual contains information pertaining to both the chassis (trailer portion) of the leaf vacuum, as well as the equipment mounted on the chassis. Throughout this manual, the complete pull behind leaf vacuum will be referred to as a trailer, as this is how it is classified by federal law. *All rules and regulations pertaining to the operation of "regular trailers" also apply to this" leaf vacuum trailer".*

An Owner's Manual that provides general trailer information cannot cover all of the specific details necessary for the proper combination of every trailer, tow vehicle and hitch. Therefore, you must read, understand and follow the instructions given by the tow vehicle and trailer hitch manufacturers, as well as the instructions in this manual.

This trailer is 102" wide, which is within legal towing width for all US interstates and federally designated state highways. When operating on other roadways, consult local and state laws regarding legal towing width.

Trailers are built with components produced by other manufacturers. Some of these components have separate instruction manuals, and many are included in this manual. Call 800-851-9664 for replacement manuals that are available from Bonnell Industries at no charge.

The safety information in this manual is denoted by the safety alert symbol ⚠. The level of risk is indicated by the following signal words:

⚠ DANGER
DANGER – Immediate hazards which WILL result in severe personal injury or death if the warning is ignored.
⚠ WARNING
WARNING – Hazards or unsafe practices which COULD result in severe personal injury or death if the warning is ignored.
⚠ CAUTION
CAUTION – Hazards or unsafe practices which could result in minor or moderate injury if the warning is ignored.
⚠ NOTICE
NOTICE – Practices that could result in damage to the trailer or other property.

PROPOSITION 65 WARNINGS

⚠ WARNING

Operating, servicing and maintaining a passenger vehicle or off-highway motor vehicle can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle in a well-ventilated area and wear gloves or wash your hands frequently when servicing your vehicle. For more information go to www.P65Warnings.ca.gov/passenger-vehicle.

⚠ WARNING

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65warnings.ca.gov/diesel.

⚠ WARNING

Processing wood products can expose you to wood dust, a substance known to the State of California to cause cancer. Avoid inhaling wood dust or leaf debris or use a dust mask or other safeguards for personal protection. For more information go to www.P65Warnings.ca.gov/wood.

MAJOR HAZARDS

Loss of control of the trailer or trailer/tow vehicle combination can result in serious injury or death. The most common causes for loss of control of the trailer are:

IMPROPER SIZING BETWEEN THE TRAILER AND THE TOW VEHICLE.

Trailers that weigh too much for the towing vehicle can cause stability problems, which can lead to serious injury or death. The additional strain put on the engine and drive-train may lead to serious tow vehicle maintenance problems. The maximum towing capacity of your towing vehicle should not be exceeded. The towing capacity of the tow vehicle, in terms of maximum Gross Trailer Weight (GTW) and the maximum Gross Combined Weight Rating (GCWR) can be found in the tow vehicles Owner's Manual.

- Use of a hitch with a load rating less than the load rating of the trailer can result in loss of control and may lead to serious injury or death.
- Use of a tow vehicle with a towing capacity less than the load rating of the trailer can result in loss of control and may lead to serious injury or death.
- Be sure your hitch and tow vehicle are rated for the Gross Vehicle Weight Rating (GVWR) of your trailer.

DRIVING TOO FAST FOR THE CONDITIONS

With ideal road conditions, the maximum recommended speed for safely towing a trailer is 60 mph. If driven too fast, the trailer could sway, increasing the possibility for loss of control. In this situation the tires may overheat, increasing the possibility of a blowout.

- Driving too fast for conditions can result in loss of control and cause serious injury or death.

FAILURE TO PROMOTE SAFE DRIVING BEHAVIOR WHEN TOWING A TRAILER

When towing a trailer, you will have reduced acceleration, increased stopping distance, and increased turning radius. The trailer must make wider turns to keep from hitting curbside obstructions. The trailer will change the handling characteristics of the towing vehicle, making it more sensitive to steering inputs. The trailer is likely to react to windy conditions or when being passed by large vehicles. It will take a longer distance to pass due to slower acceleration and increased trailer length.

- Be alert for slippery conditions. A tow vehicle driver is more likely to be affected by slippery road surfaces when driving a tow vehicle with a trailer, than driving a tow vehicle without a trailer.
- Anticipate the trailer "swaying." Swaying can be caused by excessive steering, wind gusts, irregular roadway edges, or by the trailer reaction to the pressure wave created by passing trucks and buses.
- When encountering trailer sway, take your foot off the gas and steer as little as possible in order to stay on the road. Use small "trim-like" steering adjustments. Do not attempt to steer out of the sway as it may make steering conditions more difficult. Use caution when applying the brakes intermittently to correct trailer swaying. In some cases, applying the trailer brakes alone will tend to straighten out the combination, especially when going downhill.
- Check the rearview mirrors frequently to observe the trailer and traffic.
- Use a lower gear when driving down steep or long grades. Use the engine and transmission as a braking mechanism. Do not ride the brakes as they can overheat and become ineffective. Be aware of your trailer height, especially when approaching bridges, roofed areas and around trees.

IMPROPER COUPLING OF THE TRAILER TO THE TOW VEHICLE HITCH

It is critical that the trailer be securely coupled to the hitch ball, and that the safety chains and emergency breakaway brake cable are correctly attached. Not using these components correctly may result in serious injury or death.

- Proper selection and condition of the coupler and hitch are essential to safely towing the trailer. A loss of coupling may result in serious injury or death.
- Be sure the hitch load rating is equal to or greater than the load rating of the coupler.
- Be sure the hitch size matches the coupler size
- Observe the hitch for wear, corrosion and cracks before coupling. Replace worn, corroded or cracked hitch components before coupling the trailer to the tow vehicle.
- Be sure the hitch components are tight before coupling the trailer to the tow vehicle.

An improperly coupled trailer can result in serious injury or death. Do not move or tow the trailer until:

- The coupler is secured and locked to hitch.
- The safety chains are secured to the tow vehicle.
- The coupler is secured and locked to the hitch.
- The safety chains are secured to the tow vehicle.
- The trailer jack(s) are fully retracted.
- Tires and wheels are checked.
- The trailer brakes are checked.
- The breakaway switch is connected to the tow vehicle.
- The load is secured to the trailer.
- The trailer lights are connected and checked.

IMPROPER USE OF SAFETY CHAINS

If the trailer comes loose from the hitch, there are safety chains provided so that control of the trailer can be maintained.

- If the trailer uncouples from the tow vehicle, improper rigging of the safety chains can result in loss of control of the trailer and tow vehicle, leading to serious injury or death.
- Fasten the safety chains to the frame of the tow vehicle. Do not fasten chains to any part of the hitch unless the hitch has holes or loops specifically for that purpose.
- Cross the safety chains underneath the hitch and coupler with sufficient slack to permit turning and to adequately hold the tongue off the ground should the trailer comes loose.

IMPROPER CONNECTION OF THE BREAKAWAY BRAKE SYSTEM

The trailer is equipped with a breakaway brake system that can apply the brakes to the trailer if the trailer comes loose from the hitch ball. The breakaway brake system, including battery, must be in good condition and properly rigged to be effective.

- An ineffective or inoperative breakaway brake system can result in a runaway trailer, leading to serious injury or death if the coupler or hitch fails.
- The breakaway cable must be connected to the tow vehicle, and NOT to any part of the hitch.

- Before towing the trailer, test the function of the breakaway brake system. If the breakaway brake system is not working, do not tow the trailer. Have the unit serviced or repaired.

WORN TIRES, LOOSE WHEELS AND LUG NUTS

The trailer tires and wheels are important safety items. It is essential to inspect the trailer tires before each tow.

If a tire has a bald spot, bulge, cut, crack, or is showing any cords, replace the tire before towing. If a tire has uneven tread wear, take the trailer to a dealer service center for diagnosis. Uneven tread wear can be caused by tire imbalance, axle misalignment or incorrect inflation.

Tires with too little tread will not provide adequate frictional forces on wet roadways and can result in loss of control, leading to serious injury or death.

Improper tire pressure causes increased tire wear and may reduce trailer stability that can result in a tire blowout or possible loss of control. Before each tow check the tire pressure. The proper tire pressure is listed on the Certification / VIN label, normally mounted on the front left side of the trailer. Tire pressure should be checked when tires are cool. Allow 3 hours for the tires to cool after driving as much as 1 mile at 40 mph before checking tire pressure.

- Improper tire pressure can result in a blowout and loss of control, which can lead to death or serious injury.
- Be sure tires are inflated to pressure indicated on sidewall before towing trailer.

The tightness of the lug nuts is very important in keeping the trailer wheels properly seated to the hub. Before each tow, check to make sure the lug nuts are properly torqued.

- Metal creep between the wheel rim and lug nuts will cause the rim to loosen and could result in a wheel coming off, leading to serious injury or death.
- Torque the lug nuts before each tow.

The proper torque for lug nuts is listed in the Inspection, Service, and Maintenance section of this manual. Use a torque wrench to tighten the lug nuts. Use a crisscross star pattern as shown on page 49. If you do not have a torque wrench, have a service garage or trailer dealer tighten the lug nuts to the proper torque.

- Lug nuts are prone to loosen after the initial installation that can lead to serious injury or death.
- Check the lug nuts for tightness on a new trailer or when wheel(s) have been remounted after the first 10, 25 and 50 miles of driving.
- Improper lug nut torque can cause a wheel to separate from the trailer, leading to serious injury death. Make sure the lug nuts are properly torqued before each tow.

INOPERABLE BRAKES, LIGHTS AND MIRRORS

Be sure that the electric brakes and all of the lights on the trailer are functioning properly before towing the trailer. Electric brakes and lights on a trailer are controlled by a connection to the tow vehicle, usually a multi-pin electrical connector. Check the trailer tail lights by turning on your tow vehicle headlights. Check the trailer brake lights by having an assistant apply the brake pedal while you observe the trailer lights. Use the same procedure to check the turn signal lights.

If the trailer has electric brakes, the tow vehicle will have an electric brake controller that sends power to the trailer brakes. Before towing the trailer on the road, operate the brake controller while trying to pull the trailer in order to confirm that the electric brakes operate. While towing the trailer at less than 5 mph,

manually operate the electric brake controller in the tow vehicle. You should be able to feel the operation of the trailer brakes.

- Improper electrical connection between the tow vehicle and the trailer will result in inoperable lights and electric brakes, and can lead to a collision.
- Before each tow, check that the taillights, brake lights and turn signals are operable.
- Check that the electric brakes work by operating the brake controller inside the tow vehicle.

HAZARDS FROM MODIFYING THE TRAILER

Essential safety items can be damaged by altering the trailer. Before making any alteration to the trailer, contact your dealer or Bonnell Industries and describe the alteration you are contemplating. Alteration of the trailer structure or modification of mechanical, electrical, or other systems on the trailer must be performed only by qualified technicians who are familiar with the system installed on the trailer.

SAFETY WARNING LABELS ON THE TRAILER

Below are illustrations of the safety decals applied to the trailer. Familiarize yourself with their locations & importance. To protect you and others against serious injury or death, all of the labels shown below must be on the trailer and be legible. If any of these labels are missing or illegible, contact Bonnell Industries for free replacement labels.

OLYMPIAN DECALS.smg

DECAL SET 2152

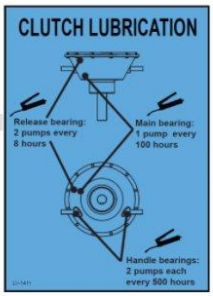
TT13169

DECAL SET 2152

LV-1208

DECAL SET 2152

OLYMPIAN DECALS.smg



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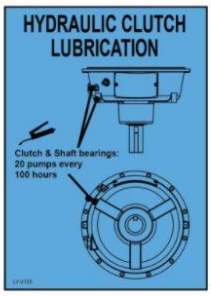
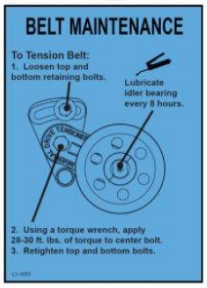


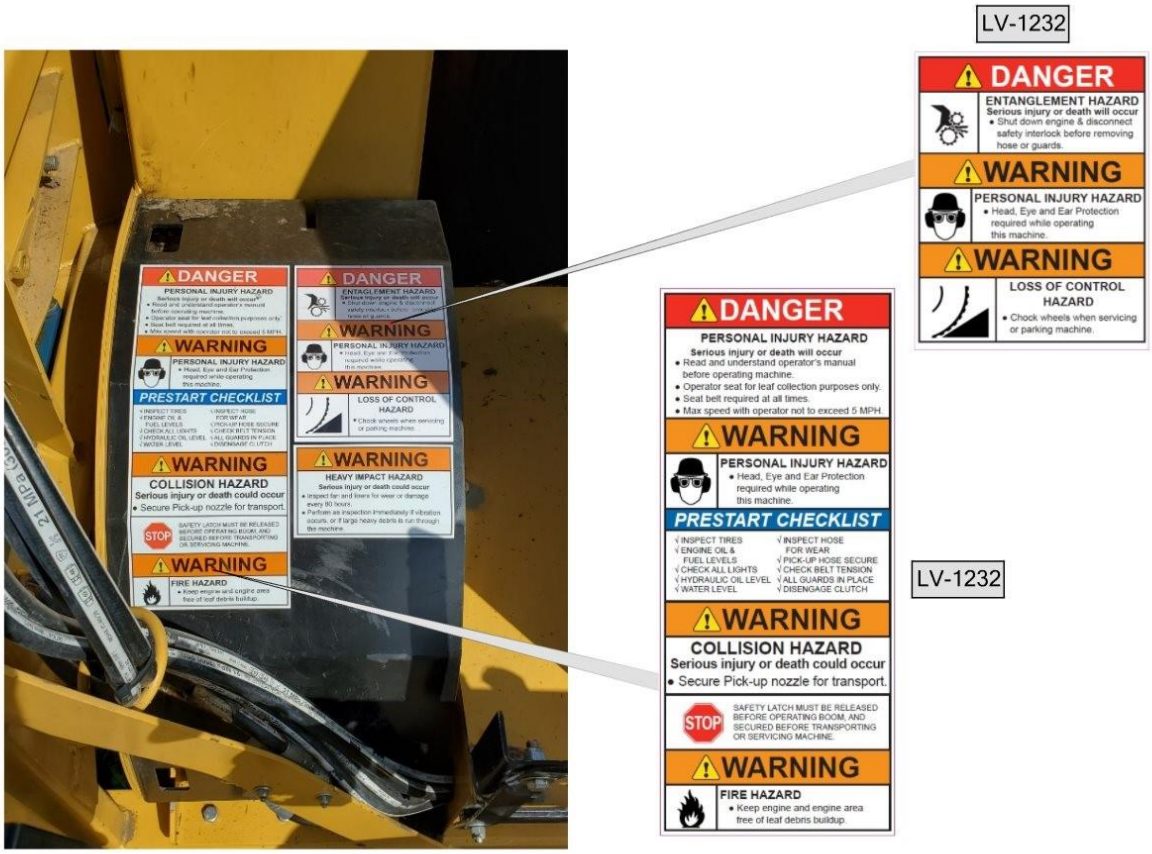
LV-4128



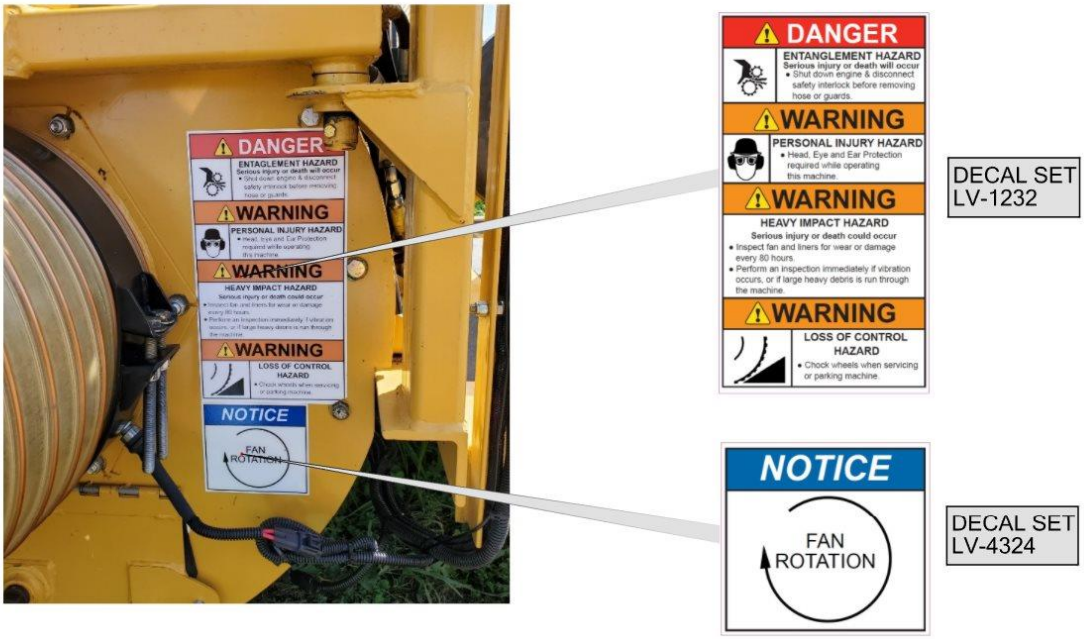
LV-1653

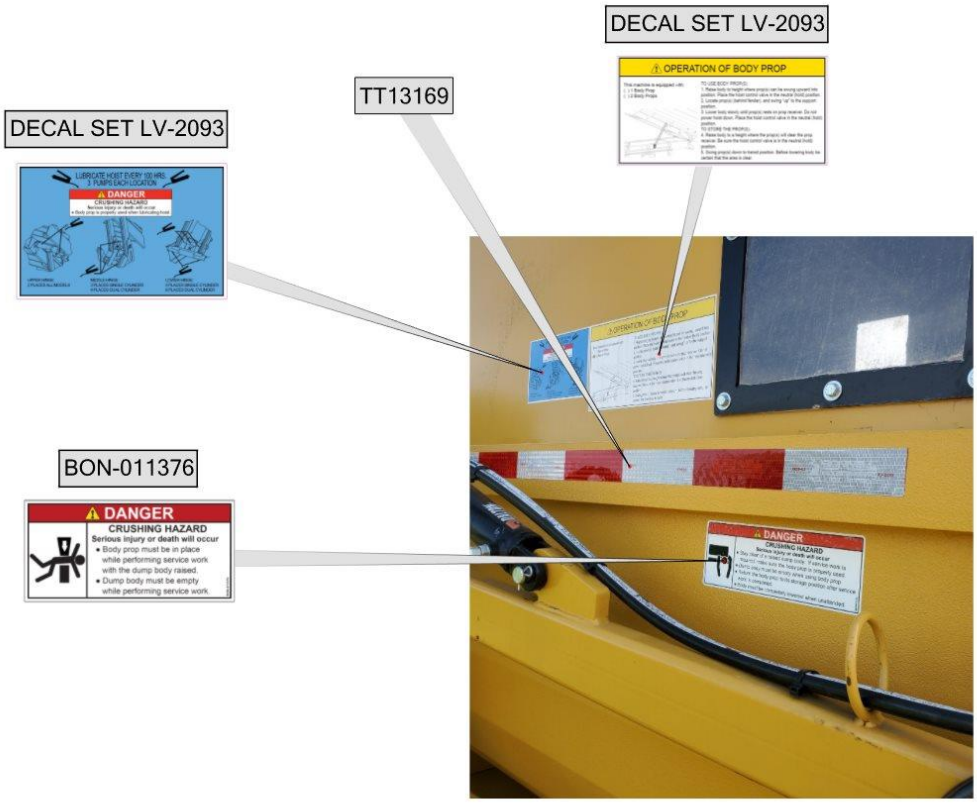
DECAL SET LV-1232


Olympian LEAF PRO+
Boom Control
EMERGENCY ENGINE SHUT-OFF
Flashers ON/OFF
LV-4323
Olympian Controller Set
Rev3, 12/21/2020
Flashers ON/OFF
Programming Port Only
Main Control Harness
Joystick Harness
LV-4323


LV-1232
DANGER
ENTANGLEMENT HAZARD
Serious injury or death will occur
• Shut down engine & disconnect safety interlock before removing hose or guards.
WARNING
PERSONAL INJURY HAZARD
• Head, Eye and Ear Protection required while operating this machine.
WARNING
LOSS OF CONTROL HAZARD
• Chock wheels when servicing or parking machine.
DANGER
PERSONAL INJURY HAZARD
Serious injury or death will occur
• Read and understand operator's manual before operating machine.
• Operator seat for leaf collection purposes only.
• Seat belt required at all times.
• Max speed with operator not to exceed 5 MPH
WARNING
PERSONAL INJURY HAZARD
• Head, Eye and Ear Protection required while operating this machine.
PRESTART CHECKLIST
√ INSPECT TIRES
√ ENGINE OIL & FUEL LEVELS
√ CHECK ALL LIGHTS
√ HYDRAULIC OIL LEVEL
√ WATER LEVEL
√ INSPECT HOSE FOR WEAR
√ PICK-UP HOSE SECURE
√ CHECK BELT TENSION
√ ALL GUARDS IN PLACE
√ DISENGAGE CLUTCH
WARNING
COLLISION HAZARD
Serious injury or death could occur
• Secure Pick-up nozzle for transport.
STOP
SAFETY LATCH MUST BE RELEASED BEFORE OPERATING BOOM, AND SECURED BEFORE TRANSPORTING OR SERVICING MACHINE.
WARNING
FIRE HAZARD
• Keep engine and engine area free of leaf debris buildup.
LV-1232

OLYMPIAN DECALS.smg





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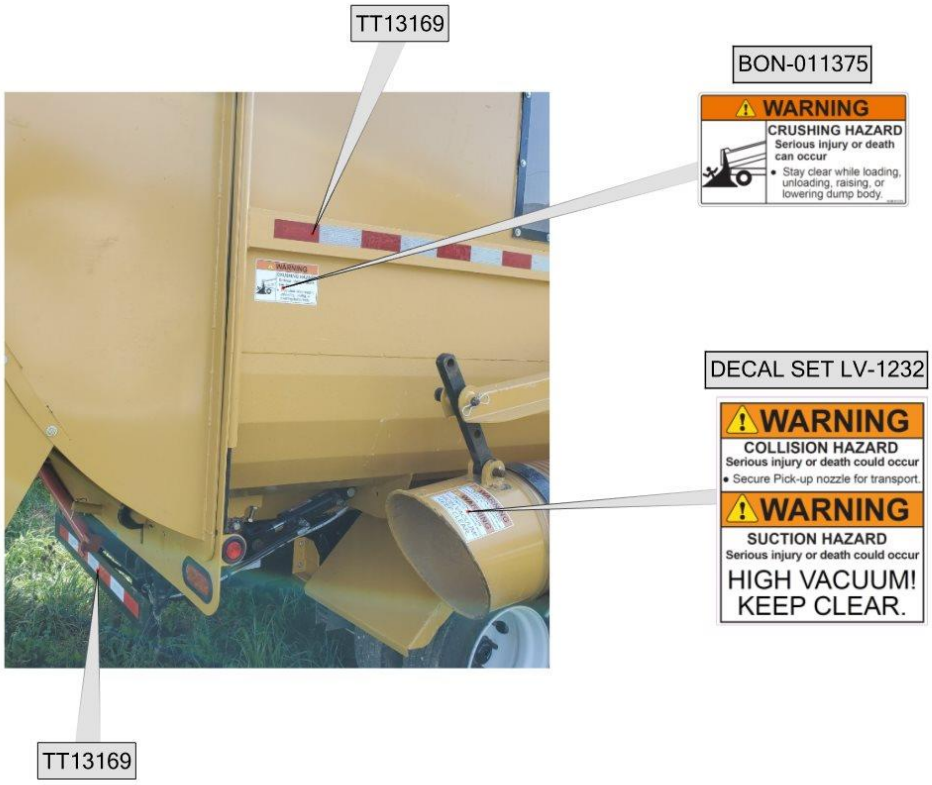


OLYMPIAN DECALS.smg

DECAL SET LV-4324

HYDRAULIC FLUID ONLY. FILL LINE:

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Serious injury or death could occur

- Do not operate engine with ball valve closed.
- Close valve to change hydraulic filter.

⚠ DANGER

EXPLOSION HAZARD

Serious injury or death will occur

- No smoking.
- Keep open flame away.
- Do no weld, cut or burn on or near fuel tank.

ULTRA LOW SULFUR DIESEL FUEL ONLY

DECAL SET LV-4324

EMERGENCY ENGINE SHUT-OFF

DECAL SET LV-2152

DECAL SET LV-4324

NOTICE

TO OPERATE THE CLUTCH:

Make sure that there is free play in the engagement handle prior to operation of the power take-off.

If no free play is evident, see adjustment procedure in manual.

1. Engine should be started and running at low idle speed, 1000 rpm or less.
2. Engage the PTO clutch with one single hand lever movement.

Do not slip the clutch for longer than one or two seconds without completely engaging it or disengaging it and allowing it to cool.

Set engine to idle speed before disengaging clutch.

CLUTCH ADJUSTMENT:

Clutch adjustment should be checked after the first eight hours of operation.

Adjustments should be made at the ten to fifteen hour intervals thereafter until the new plates are worn in.

Refer to clutch manual for proper adjustment procedures.

BON-011377

⚠ CAUTION

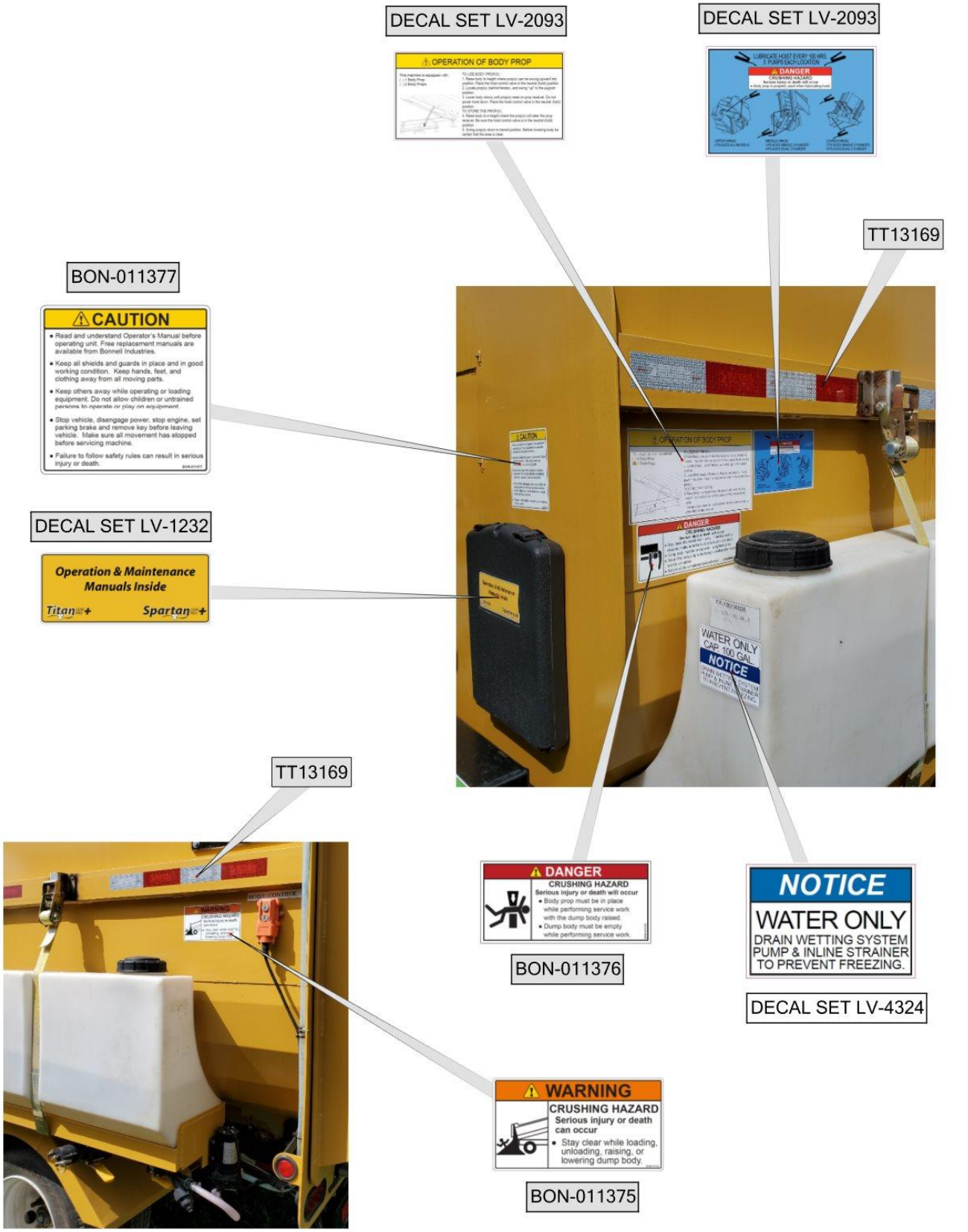
- Read and understand Operator's Manual before operating unit. Free replacement manuals are available from Bonnell Industries.
- Keep all shields and guards in place and in good working condition. Keep hands, feet, and clothing away from all moving parts.
- Keep others away while operating or loading equipment. Do not allow children or untrained persons to operate or play on equipment.
- Stop vehicle, disengage power, stop engine, set parking brake and remove key before leaving vehicle. Make sure all movement has stopped before servicing machine.
- Failure to follow safety rules can result in serious injury or death.

BJV-1660

NOTICE

Bonnell Industries is not an authorized service center for engines, nor do we stock parts for these engines. Please refer to your engine manual, the yellow pages or internet to find your local authorized engine service center.

OLYMPIAN DECALS.smg



TRAILER TOWING GUIDE

Driving a vehicle with a trailer in tow is vastly different from driving the same vehicle without a trailer in tow. Acceleration, maneuverability and braking are all diminished with a trailer in tow. It takes longer to get up to speed; you need more room to turn and pass, and more distance to stop when towing a trailer. You will need to spend time adjusting to the different feel and maneuverability of the tow vehicle with a loaded trailer. Because of the significant differences in all aspects of maneuverability when towing a trailer, the hazards and risks of injury are also much greater than when driving without a trailer. You are responsible for keeping your vehicle and trailer in control, and for all the damage that is caused if you lose control of your vehicle and trailer.

As you did when learning to drive an automobile, find an open area with little or no traffic for your first practice trailering. Of course, before you start towing the trailer, you must follow all of the instructions for inspection, testing, loading and coupling. Also, before you start towing, adjust the mirrors so you can see the trailer as well as the area to the rear of it.

Drive slowly at first, 5 mph or so, and turn the wheel to get the feel of how the tow vehicle and trailer combination responds. Next, make some right and left hand turns. Watch in your side mirrors to see how the trailer follows the tow vehicle. Turning with a trailer attached requires more room.

Stop the rig a few times from speeds no greater than 10 mph. If your trailer is equipped with brakes, try using different combinations of trailer/electric brake and tow vehicle brake. Note the effect that the trailer brakes have when they are the only brakes used. When properly adjusted, the trailer brakes will come on just before the tow vehicle brakes.

It will take practice to learn how to back up a tow vehicle with a trailer attached. Take it slow. Before backing up, get out of the tow vehicle and look behind the trailer to make sure that there are no obstacles. Some drivers place their hands at the bottom of the steering wheel, and while the tow vehicle is in reverse, “think” of the hands as being on the top of the wheel. When the hands move to the right (counter-clockwise, as you would do to turn the tow vehicle to the left when moving forward), the rear of the trailer moves to the right. Conversely, rotating the steering wheel clockwise with your hands at the bottom of the wheel will move the rear of the trailer to the left, while backing up. If you are towing a bumper hitch rig, be careful not to allow the trailer to turn too much, because it will hit the rear of the tow vehicle. To straighten the rig, either pull forward, or turn the steering wheel in the opposite direction.

REPORTING SAFETY DEFECTS

If you believe that your vehicle has a defect that could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Bonnell Industries.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, or Bonnell Industries.

To contact NHTSA, you may either call the Vehicle Safety Hotline toll-free at 1-888-327-4236 (TTY: 1-800-424-9153), go tohttp://www.safecar.gov; or write to: Administrator, NHTSA, 1200 New Jersey Ave. SE., Washington, DC 20590. You can also obtain other information about motor vehicle safety from http://www.safecar.gov.

Call 1-800-851-9664 to reach Bonnell Industries.

SAFE TRAILER TOWING GUIDELINES

- Before towing, check coupling, safety chain, safety brake, tires, wheels and lights.
- Check the lug nuts or bolts for tightness.
- Check coupler tightness after towing 50 miles.

- Adjust the brake controller to engage the trailer brakes before the tow vehicle brakes. Follow the instructions given with the brake controller manufacturer's literature.
- Use your mirrors to verify that you have room to change lanes or pull into traffic.
- Use your turn signals well in advance.
- Allow plenty of stopping space for your trailer and tow vehicle.
- Do not drive so fast that the trailer begins to sway due to speed. Generally, never drive faster than 60 m.p.h.
- Allow plenty of room for passing. A rule of thumb is that the passing distance with a trailer is 4 times the passing distance without a trailer.
- Shift your automatic transmission into a lower gear for city driving.
- Use lower gears for climbing and descending grades.
- Do not ride the brakes while descending grades, they may get so hot that they stop working. Then you will potentially have a runaway tow vehicle and trailer.
- To conserve fuel, don't use full throttle to climb a hill. Instead, build speed on the approach.
- Slow down for bumps in the road. Take your foot off the brake when crossing the bump.
- Do not brake while in a curve unless absolutely necessary. Instead, slow down before you enter the curve.
- Do not apply the tow vehicle brakes to correct extreme trailer swaying. Instead, lightly apply the trailer brakes with the hand controller.
- Make regular stops, about once each hour. Confirm that:
- The coupler is secure to the hitch and is locked,
- Electrical connectors are made,
- There is appropriate slack in the safety chains,
- There is appropriate slack in the breakaway switch pull pin cable,
- The tires are not visibly low on pressure

GENERAL SAFETY RELATED TO OPERATION OF VACUUM

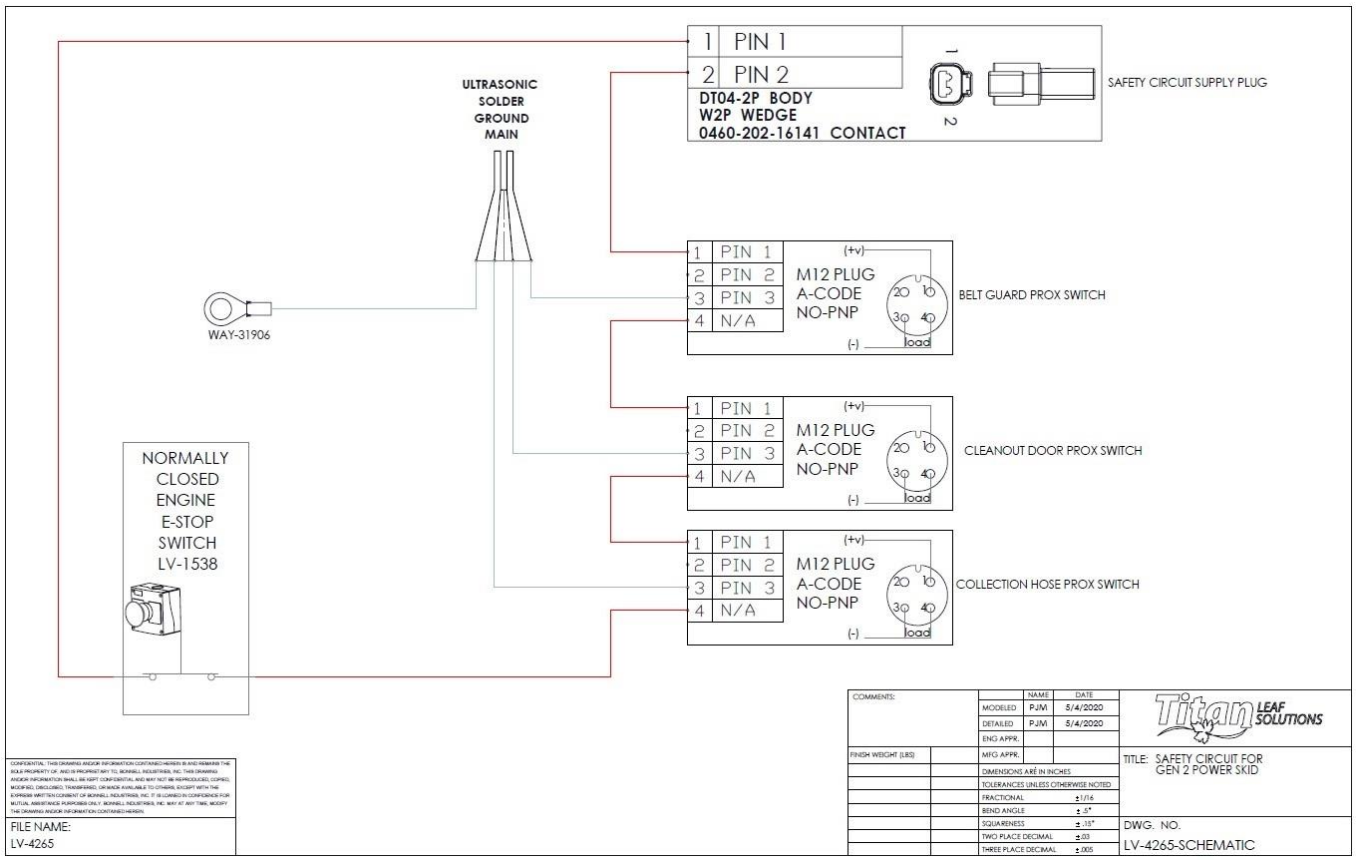
- Review safety items with all relevant personal at regular intervals.
- Ensure all operators are familiar with this manual before operating.
- Ensure your operation is in compliance with all applicable codes and regulations.
- Perform a safety inspection before operating machine. Refer to the pre-start checklist on page 4 for general procedures.
- Make sure all personal protective equipment is in order before leaving for the job site. Recommended equipment includes hard hat, safety goggles or ski mask, and ear protection.
- Have a fire extinguisher on hand at all times.
- Clean leaf debris from machine and engine screen after each load to prevent build-up of flammable material. A leaf blower works well for this. This can be done during truck change-over.
- Inspect work area before operating machine. Inspect for heavy debris, such as bricks, rocks, or glass bottles.
- Ensure all pedestrians and operators are clear of the vacuum area.
- Keep nozzle away from loose objects that may be near the collection area, and may get caught in the nozzle.
- Remove key and chock wheels when leaving machine unattended.
- **DO NOT** operate machine with guard, hose, or housing cover removed. Refer to safety disconnect section below for lock-out procedures.
- Prior to towing, inspect pintle, safety chains, lighting, running gear & trailer brakes.
- Secure pick-up nozzle for transport.
- When rotating hose per maintenance section, inspect fan for uneven wear, cracks, or looseness. Also check housing for large heavy debris & remove.
- With the exception of the operator's seat, no riders are allowed on the machine. Operator's seat is for leaf collection operations only. **Maximum speed with operator not to exceed 5 MPH.**

SAFETY SENSORS & E-STOPS

Your Leaf Machine is equipped with safety sensors & e-stop system which will automatically stop all machine functions and shut down the engine when activated. Safety sensors are located at the hose connection of the blower housing, blower housing cleanout door, and the belt guard. E-stop switches are located on the control panel near the operator's seat and on the engine housing near the belt guard. When performing any repair or maintenance work, remove the key from the ignition, active the e-stop switch, and disconnect the safety sensor for the area being serviced.

The safety sensors, emergency stop switches and wiring must be operable and in their proper locations for the life of the machine. Never operate this machine with broken, incomplete or modified safety components or wiring.

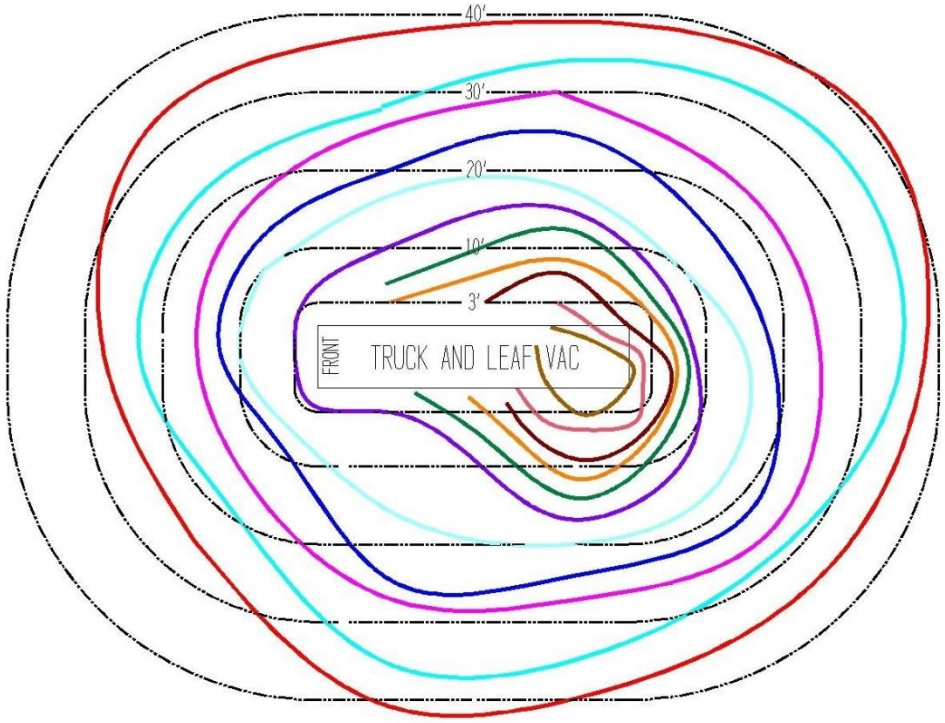
See sections 8.1.4, 8.1.5 & 8.1.6 for additional Safety Circuit information



DECIBEL LEVELS

Below is a decibel level chart showing approximate sound levels at given positions around the machine. The purpose of this chart is to illustrate the approximate sound levels of the machine, and provide a guideline for hearing protection. ***To prevent hearing loss, ear protection is required when working on or around the leaf vacuum during operation.*** The Illustration below shows a Pro Plus leaf vacuum with Kubota 99 HP engine. Decibel levels for the Olympian Pro Series with Kubota or John Deere engines may vary from below.

Decibal Levels at given distances



Continuous dB	Permissible Exposure Time*
85 dB	8 hours
88 dB	4 hours
91 dB	2 hours
94 dB	1 hour
97 dB	30 minutes
100 dB	15 minutes
103 dB	7.5 minutes
106 dB	3.75 min (< 4min)
109 dB	1.875 min (< 2min)
112 dB	.9375 min (~1 min)
115 dB	.46875 min (~30 sec)

100 DB
99 DB
96 DB
94 DB
93 DB
92 DB
90 DB
88 DB
87 DB
86 DB
85 DB

*Permissible Exposure Time is in a 24 hour peroid.
Longer exposure than shown above may result in permanent hearing loss.

3 TIRE SAFETY INFORMATION

This portion of the User's Manual contains tire safety information as required by 49 CFR 575.6.

Section 3.1.1 contains "Steps for Determining Correct Load Limit - Trailer".

Section 4.1 contains "Steps for Determining Correct Load Limit – Tow Vehicle".

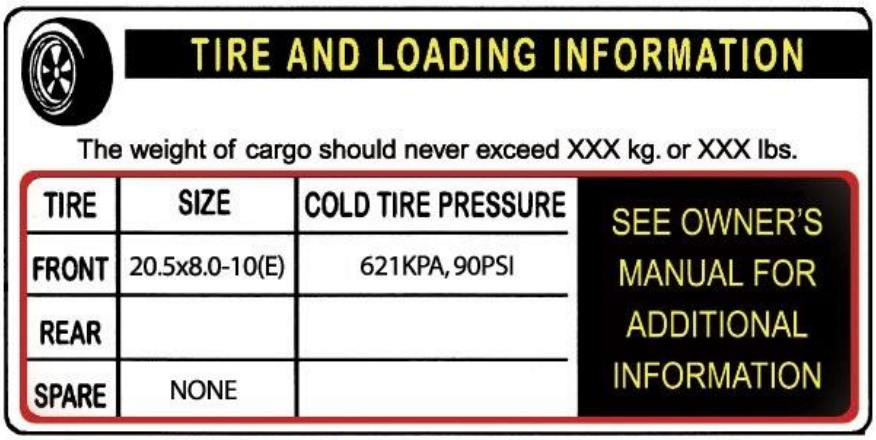
Section 3.1.2 contains a Glossary of Tire Terminology, including "cold inflation pressure", "maximum inflation pressure", "recommended inflation pressure", and other non-technical terms.

Section 3.1.3 contains information from the NHTSA brochure entitled "Tire Safety – Everything Rides On It". This brochure describes the following items;

- Tire labeling, including a description and explanation of each marking on the tires, and information about the DOT Tire Identification Number (TIN).
- Recommended tire inflation pressure, including a description and explanation of:
  A. Cold inflation pressure.
  B. Vehicle Placard and location on the vehicle.
  C. Adverse safety consequences of under inflation (including tire failure).
  D. Measuring and adjusting air pressure for proper inflation.
- Tire Care, including maintenance and safety practices.
- Vehicle load limits, including a description and explanation of the following items:
  Locating and understanding the load limit information, total load capacity, and cargo capacity.
  Calculating total and cargo capacities with varying seating configurations including quantitative examples showing / illustrating how the vehicles cargo and luggage capacity decreases as combined number and size of occupants' increases. This item is also discussed in Section 3.
  Determining compatibility of tire and vehicle load capabilities.
  Adverse safety consequences of overloading on handling and stopping on tires.

STEPS FOR DETERMINING CORRECT LOAD LIMIT – TRAILER

Trailers 10,000 Pounds GVWR or Less:



1. Locate the statement, "The weight of cargo should never exceed XXX kg or XXX lbs.," on your vehicle's placard. See figure 1-1.
2. This figure equals the available amount of cargo and luggage load capacity.
3. Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage load capacity.

The trailer's placard refers to the Tire Information Placard attached adjacent to or near the trailer's VIN (Certification) label at the left front of the trailer.

GLOSSARY OF TIRE TERMINOLOGY

Accessory weight
The combined weight (in excess of those standard items which may be replaced) of automatic transmission, power steering, power brakes, power windows, power seats, radio and heater, to the extent that these items are available as factory-installed equipment (whether installed or not).

Bead: The part of the tire that is made of steel wires, wrapped or reinforced by ply cords and that is shaped to fit the rim.

Bead separation: This is the breakdown of the bond between components in the bead.

Bias ply tire: A pneumatic tire in which the ply cords that extend to the beads are laid at alternate angles substantially less than 90 degrees to the centerline of the tread.

Carcass: The tire structure, except tread and sidewall rubber which, when inflated, bears the load.

Chunking: The breaking away of pieces of the tread or sidewall.

Cold inflation pressure: The pressure in the tire before you drive.

Cord: The strands forming the plies in the tire.

Cord separation: The parting of cords from adjacent rubber compounds.

Cracking: Any parting within the tread, sidewall, or inner liner of the tire extending to cord material.

CT: A pneumatic tire with an inverted flange tire and rim system in which the rim is designed with rim flanges pointed radially inward and the tire is designed to fit on the underside of the rim in a manner that encloses the rim flanges inside the air cavity of the tire.

Curb weight: The weight of a motor vehicle with standard equipment including the maximum capacity of fuel, oil, and coolant, and, if so equipped, air conditioning and additional weight optional engine.

Extra load tire: A tire designed to operate at higher loads and at higher inflation pressures than the corresponding standard tire.

Groove: The space between two adjacent tread ribs.

Inner liner: The layer(s) forming the inside surface of a tubeless tire that contains the inflating medium within the tire.

Inner liner separation: The parting of the inner liner from cord material in the carcass.

Intended outboard sidewall: The sidewall that contains a white-wall, bears white lettering or bears manufacturer, brand, and/or model name molding that is higher or deeper than the same molding on the other sidewall of the tire or the outward facing sidewall of an asymmetrical tire that has a particular side that must always face outward when mounted on a vehicle.

Light truck (LT) tire: A tire designated by its manufacturer as primarily intended for use on lightweight trucks or multipurpose passenger vehicles.

Load rating: The maximum load that a tire is rated to carry for a given inflation pressure.

Maximum load rating: The load rating for a tire at the maximum permissible inflation pressure for that tire.

Maximum permissible inflation pressure: The maximum cold inflation pressure to which a tire may be inflated.

Maximum loaded vehicle weight: The sum of curb weight, accessory weight, vehicle capacity weight, and production options weight.

Measuring rim: The rim on which a tire is fitted for physical dimension requirements.

Non-pneumatic rim: A mechanical device which, when a non-pneumatic tire assembly incorporates a wheel, supports the tire, and attaches, either integrally or separably, to the wheel center member and upon which the tire is attached.

Non-pneumatic spare tire assembly: A non-pneumatic tire assembly intended for temporary use in place of one of the pneumatic tires and rims that are fitted to a passenger car in compliance with the requirements of this standard.

Non-pneumatic tire: A mechanical device which transmits, either directly or through a wheel or wheel center member, the vertical load and tractive forces from the roadway to the vehicle, generates the tractive forces that provide the directional control of the vehicle and does not rely on the containment of any gas or fluid for providing those functions.

Non-pneumatic tire assembly: A non-pneumatic tire, alone or in combination with a wheel or wheel center member, which can be mounted on a vehicle.

Normal occupant weight: This means 68 kilograms (150 lbs.) times the number of occupants specified in the second column of Table I of 49 CFR 571.110.

Occupant distribution: The distribution of occupants in a vehicle as specified in the third column of Table I of 49 CFR 571.110.

Open splice: Any parting at any junction of tread, sidewall, or inner liner that extends to cord material.

Outer diameter: The overall diameter of an inflated new tire.

Overall width: The linear distance between the exteriors of the sidewalls of an inflated tire, including elevations due to labeling, decorations, or protective bands or ribs.

Ply: A layer of rubber-coated parallel cords.

Ply separation: A parting of rubber compound between adjacent plies.

Pneumatic tire: A mechanical device made of rubber, chemicals, fabric and steel or other materials, that, when mounted on an automotive wheel, provides the traction and contains the gas or fluid that sustains the load.

Production options weight: The combined weight of those installed regular production options weighing over 2.3 kilograms (5 lbs.) in excess of those standard items which they replace, not previously considered in curb weight or accessory weight, including heavy duty brakes, ride levelers, roof rack, heavy duty battery, and special trim.

Radial ply tire: A pneumatic tire in which the ply cords that extend to the beads are laid at substantially 90 degrees to the centerline of the tread.

Recommended inflation pressure: This is the inflation pressure provided by the vehicle manufacturer on the Tire Information label and on the Certification / VIN tag.

Reinforced tire: A tire designed to operate at higher loads and at higher inflation pressures than the corresponding standard tire.

Rim: A metal support for a tire or a tire and tube assembly upon which the tire beads are seated.

Rim diameter: This means the nominal diameter of the bead seat.

Rim size designation: This means the rim diameter and width.

Rim type designation: This means the industry of manufacturer's designation for a rim by style or code.

Rim width: This means the nominal distance between rim flanges.

Section width: The linear distance between the exteriors of the sidewalls of an inflated tire, excluding elevations due to labeling, decoration, or protective bands.

Sidewall: That portion of a tire between the tread and bead.

Sidewall separation: The parting of the rubber compound from the cord material in the sidewall.

Special Trailer (ST) tire: The "ST" is an indication the tire is for trailer use only.

Test rim: The rim on which a tire is fitted for testing, and may be any rim listed as appropriate for use with that tire.

Tread: That portion of a tire that comes into contact with the road.

Tread rib: A tread section running circumferentially around a tire.

Tread separation: Pulling away of the tread from the tire carcass.

Tread wear indicators (TWI): The projections within the principal grooves designed to give a visual indication of the degrees of wear of the tread.

Vehicle capacity weight: The rated cargo and luggage load plus 68 kilograms (150 lbs.) times the vehicle's designated seating capacity.

Vehicle maximum load on the tire: The load on an individual tire that is determined by distributing to each axle its share of the maximum loaded vehicle weight and dividing by two.

Vehicle normal load on the tire: The load on an individual tire that is determined by distributing to each axle its share of the curb weight, accessory weight, and normal occupant weight (distributed in accordance with Table I of CRF 49 571.110) and dividing by 2.

Weather side: The surface area of the rim not covered by the inflated tire.

Wheel center member: In the case of a non-pneumatic tire assembly incorporating a wheel, a mechanical device which attaches, either integrally or separably, to the non-pneumatic rim and provides the connection between the non-pneumatic rim and the vehicle; or, in the case of a non-pneumatic tire assembly not incorporating a wheel, a mechanical device which attaches, either integrally or separably, to the non-pneumatic tire and provides the connection between tire and the vehicle.

Wheel-holding fixture: The fixture used to hold the wheel and tire assembly securely during testing.

TIRE SAFETY - EVERYTHING RIDES ON IT

The National Traffic Safety Administration (NHTSA) has published a brochure (DOT HS 809 361) that discusses all aspects of Tire Safety, as required by CFR 575.6. This brochure is reproduced in part below. It can be obtained and downloaded from NHTSA, free of charge, from the following web site:

http://www.nhtsa.dot.gov/cars/rules/TireSafety/ridesonit/tires_index.html

Studies of tire safety show that maintaining proper tire pressure, observing tire and vehicle load limits (not carrying more weight in your vehicle than your tires or vehicle can safely handle), avoiding road hazards, and inspecting tires for cuts, slashes, and other irregularities are the most important things you can do to avoid tire failure, such as tread separation or blowout and flat tires. These actions, along with other care and maintenance activities, can also:

- Improve vehicle handling
- Help protect you and others from avoidable breakdowns and accidents
- Improve fuel economy
- Increase the life of your tires.

This booklet presents a comprehensive overview of tire safety, including information on the following topics:
- Basic tire maintenance
- Uniform Tire Quality Grading System
- Fundamental characteristics of tires
- Tire safety tips.

Use this information to make tire safety a regular part of your vehicle maintenance routine. Recognize that the time you spend is minimal compared with the inconvenience and safety consequences of a flat tire or other tire failure.

SAFETY FIRST–BASIC TIRE MAINTENANCE

Properly maintained tires improve the steering, stopping, traction, and load-carrying capability of your vehicle. Underinflated tires and overloaded vehicles are a major cause of tire failure. Therefore, as mentioned above, to avoid flat tires and other types of tire failure, you should maintain proper tire pressure, observe tire and vehicle load limits, avoid road hazards, and regularly inspect your tires.

FINDING YOUR VEHICLE'S RECOMMENDED TIRE PRESSURE AND LOAD LIMITS

Tire information placards and vehicle certification labels contain information on tires and load limits. These labels indicate the vehicle manufacturer's information including:

- Recommended tire size
- Recommended tire inflation pressure
- Vehicle capacity weight (VCW–the maximum occupant and cargo weight a vehicle is designed to carry)
- Front and rear gross axle weight ratings (GAWR– the maximum weight the axle systems are designed to carry).

Both placards and certification labels are permanently attached to the trailer near the left front.

UNDERSTANDING TIRE PRESSURE AND LOAD LIMITS

Tire inflation pressure is the level of air in the tire that provides it with load-carrying capacity and affects the overall performance of the vehicle. The tire inflation pressure is a number that indicates the amount of air pressure– measured in pounds per square inch (psi)–a tire requires to be properly inflated. (You will also find this number on the vehicle information placard expressed in kilopascals (kPa), which is the metric measure used internationally.)
Manufacturers of passenger vehicles and light trucks determine this number based on the vehicle's design load limit, that is, the greatest amount of weight a vehicle can safely carry and the vehicle's tire size. The proper tire pressure for your vehicle is referred to as the "recommended cold inflation pressure." (As you will read below, it is difficult to obtain the recommended tire pressure if your tires are not cold.)
Because tires are designed to be used on more than one type of vehicle, tire manufacturers list the "maximum permissible inflation pressure" on the tire sidewall. This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

CHECKING TIRE PRESSURE

It is important to check your vehicle's tire pressure at least once a month for the following reasons:

- Most tires may naturally lose air over time.
- Tires can lose air suddenly if you drive over a pothole or other object or if you strike the curb when parking.
- With radial tires, it is usually not possible to determine under inflation by visual inspection.

For convenience, purchase a tire pressure gauge to keep in your vehicle. Gauges can be purchased at tire dealerships, auto supply stores, and other retail outlets.
The recommended tire inflation pressure that vehicle manufacturers provide reflects the proper psi when a tire is cold. The term cold does not relate to the outside temperature. Rather, a cold tire is one that has not been driven on for at least three hours. When you drive, your tires get warmer, causing the air pressure within them to increase. Therefore, to get an accurate tire pressure reading, you must measure tire pressure when the tires are cold or compensate for the extra pressure in warm tires.

STEPS FOR MAINTAINING PROPER TIRE PRESSURE

- Step 1: Locate the recommended tire pressure on the vehicle's tire information placard, certification label, or in the owner's manual.
- Step 2: Record the tire pressure of all tires.
- Step 3: If the tire pressure is too high in any of the tires, slowly release air by gently pressing on the tire valve stem with the edge of your tire gauge until you get to the correct pressure.
- Step 4: If the tire pressure is too low, note the difference between the measured tire pressure and the correct tire pressure. These "missing" pounds of pressure are what you will need to add.
- Step 5: At a service station, add the missing pounds of air pressure to each tire that is underinflated.
- Step 6: Check all the tires to make sure they have the same air pressure (except in cases in which the front and rear tires are supposed to have different amounts of pressure).

If you have been driving your vehicle and think that a tire is underinflated, fill it to the recommended cold inflation pressure indicated on your vehicle's tire information placard or certification label. While your tire may still be slightly underinflated due to the extra pounds of pressure in the warm tire, it is safer to drive with air pressure that is slightly lower than the vehicle manufacturer's recommended cold inflation pressure than to drive with a significantly underinflated tire. Since this is a temporary fix, don't forget to recheck and adjust the tire's pressure when you can obtain a cold reading.

TIRE SIZE

To maintain tire safety, purchase new tires that are the same size as the vehicle's original tires or another size recommended by the manufacturer. Look at the tire information placard, the owner's manual, or the sidewall of the tire you are replacing to find this information. If you have any doubt about the correct size to choose, consult with the tire dealer.

TIRE TREAD

The tire tread provides the gripping action and traction that prevent your vehicle from slipping or sliding, especially when the road is wet or icy. In general, tires are not safe and should be replaced when the tread is worn down to 1/16 of an inch. Tires have built-in tread wear indicators that let you know when it is time to replace your tires. These indicators are raised sections spaced intermittently in the bottom of the tread grooves. When they appear "even" with the outside of the tread, it is time to replace your tires. Another method for checking tread depth is to place a penny in the tread with Lincoln's head upside down and facing you. If you can see the top of Lincoln's head, you are ready for new tires.

TIRE BALANCE AND WHEEL ALIGNMENT

To avoid vibration or shaking of the vehicle when a tire rotates, the tire must be properly balanced. This balance is achieved by positioning weights on the wheel to counterbalance heavy spots on the wheel-and-tire assembly. A wheel alignment adjusts the angles of the wheels so that they are positioned correctly relative to the vehicle's frame. This adjustment maximizes the life of your tires. These adjustments require special equipment and should be performed by a qualified technician.

TIRE REPAIR

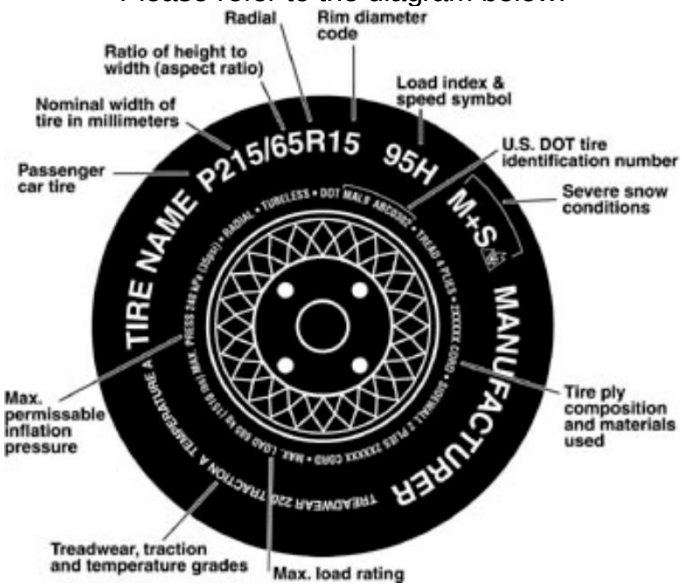
The proper repair of a punctured tire requires a plug for the hole and a patch for the area inside the tire that surrounds the puncture hole. Punctures through the tread can be repaired if they are not too large, but punctures to the sidewall should not be repaired. Tires must be removed from the rim to be properly inspected before being plugged and patched.

TIRE FUNDAMENTALS

Federal law requires tire manufacturers to place standardized information on the sidewall of all tires. This information identifies and describes the fundamental characteristics of the tire and also provides a tire identification number for safety standard certification and in case of a recall.

3.1.1.1 Information on Passenger Vehicle Tires

Please refer to the diagram below.



P
The "P" indicates the tire is for passenger vehicles.

Next number
This three-digit number gives the width in millimeters of the tire from sidewall edge to sidewall edge. In general, the larger the number, the wider the tire.

Next number
This two-digit number, known as the aspect ratio, gives the tire's ratio of height to width. Numbers of 70 or lower indicate a short sidewall for improved steering response and better overall handling on dry pavement.

R
The "R" stands for radial. Radial ply construction of tires has been the industry standard for the past 20 years.

Next number
This two-digit number is the wheel or rim diameter in inches. If you change your wheel size, you will have to purchase new tires to match the new wheel diameter.

Next number
This two- or three-digit number is the tire's load index. It is a measurement of how much weight each tire can support. You may find this information in your owner's manual. If not, contact a local tire dealer. Note: You may not find this information on all tires because it is not required by law.

M+S
The "M+S" or "M/S" indicates that the tire has some mud and snow capability. Most radial tires have these markings; hence, they have some mud and snow capability.

U.S. DOT Tire Identification Number
This begins with the letters "DOT" and indicates that the tire meets all federal standards. The next two numbers or letters are the plant code where it was manufactured, and the last four numbers represent the week and year the tire was built. For example, the numbers 3197 means the 31st week of 1997. The other numbers are marketing codes used at the manufacturer's discretion. This information is used to contact consumers if a tire defect requires a recall.

Tire Ply Composition and Materials Used
The number of plies indicates the number of layers of rubber-coated fabric in the tire. In general, the greater the number of plies, the more weight a tire can support. Tire manufacturers also must indicate the materials in the tire, which include steel, nylon, polyester, and others.

Maximum Load Rating
This number indicates the maximum load in kilograms and pounds that can be carried by the tire.

Maximum Permissible Inflation Pressure
This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

3.1.1.2 UTQGS Information

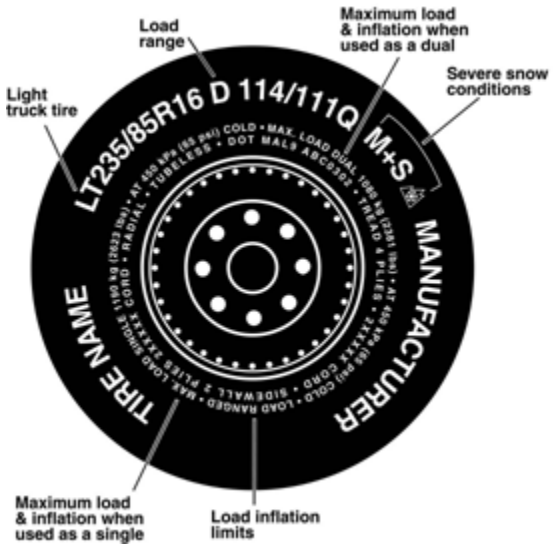
Tread wear Number
This number indicates the tire's wear rate. The higher the tread wear number is, the longer it should take for the tread to wear down. For example, a tire graded 400 should last twice as long as a tire graded 200.

Traction Letter
This letter indicates a tire's ability to stop on wet pavement. A higher graded tire should allow you to stop your car on wet roads in a shorter distance than a tire with a lower grade. Traction is graded from highest to lowest as "AA","A", "B", and "C".

Temperature Letter
This letter indicates a tire's resistance to heat. The temperature grade is for a tire that is inflated properly and not overloaded. Excessive speed, under inflation or excessive loading, either separately or in combination, can cause heat build-up and possible tire failure. From highest to lowest, a tire's resistance to heat is graded as "A", "B", or "C".

3.1.1.3 Additional Information on Light Truck Tires

Please refer to the following diagram.



Tires for light trucks have other markings besides those found on the sidewalls of passenger tires.

LT
The "LT" indicates the tire is for light trucks or trailers.

ST
An "ST" is an indication the tire is for trailer use only.

Max. Load Dual kg (lbs.) at kPa (psi) Cold
This information indicates the maximum load and tire pressure when the tire is used as a dual, that is, when four tires are put on each rear axle (a total of six or more tires on the vehicle).

Max. Load Single kg (lbs.) at kPa (psi) Cold
This information indicates the maximum load and tire pressure when the tire is used as a single.

Load Range
This information identifies the tire's load-carrying capabilities and its inflation limits.

TIRE SAFETY TIPS

Preventing T**ire Damage**

- Slow down if you have to go over a pothole or other object in the road.
- Do not run over curbs or other foreign objects in the roadway, and try not to strike the curb when parking.

Tire Safety Checklist

- Check tire pressure regularly (at least once a month), including the spare.
- Inspect tires for uneven wear patterns on the tread, cracks, foreign objects, or other signs of wear or trauma.
- Remove bits of glass and foreign objects wedged in the tread.
- Make sure your tire valves have valve caps.
- Check tire pressure before going on a long trip.
- Do not overload your vehicle. Check the Tire Information and Loading Placard or User's Manual for the maximum recommended load for the vehicle.

TIRE REGISTRATION

TIRE REGISTRATION

In accordance with Title 49 CFR 574.1, the following tire registration information must be filled out and returned to Bonnell Industries:

Company Name:_____

Contact: _____

Address: _____

City: _____

State: _____ Zip: _____

Model Number:_____

Serial Number: _____

TIN: DOT _____

SPARE TIN: _____

Date of Purchase:_____

The Tire Identification Number (TIN) can be found on the side wall of the tire. The number begins with “DOT”, and ends with a four-number date code.

Please Complete Form and fax to:

815-284-8815

4 COUPLING TO THE TOW VEHICLE

Follow all of the safety precautions and instructions in this manual to ensure safety of persons, cargo, and satisfactory life of the trailer.

USE AN ADEQUATE TOW VEHICLE AND HITCH

If the vehicle or hitch is not properly selected and matched to the Gross Vehicle Weight Rating (GVWR) of your trailer, you can cause an accident that could lead to death or serious injury. If you already have a tow vehicle, know your vehicle tow rating, and Gross Combination Weight Rating (GCWR) and make certain the trailer's rated capacity is less than or equal to the tow vehicle's rated towing capacity. If you already have (or plan to buy) a trailer, make certain that the tow rating of the tow vehicle is equal to or greater than the GVWR of the trailer, and that the GCWR will be within limits.

Use of a hitch with a load rating less than the load rating of the trailer can result in loss of control and may lead to death or serious injury.

Use of a tow vehicle with a towing capacity less than the load rating of the trailer can result in loss of control, and may lead to death or serious injury.

Be sure your hitch and tow vehicle are rated for the Gross Vehicle Weight Rating (GVWR) of your trailer.

CERTIFICATION / VIN TAG

The VIN tag is located on the driver's side, near the front of the trailer. The VIN Tag contains the following critical safety information for the use of your trailer:

MANUFACTURER: Name of trailer manufacturer

DATE OF MANUFACTURE: Month and year the trailer was manufactured.

GVWR: The Gross Vehicle Weight Rating is the maximum allowable gross weight of the trailer and its contents. The gross weight of the trailer includes the weight of the trailer and all of the items within it (such as cargo, water, food and other supplies).

GAWR: The Gross Axle Weight Rating is the maximum gross weight that an axle can support. It is the lowest of axle, wheel, or tire rating. Sometimes the tire or wheel rating is lower than the axle manufacturers rating, and will then determine GAWR.

The sum total of the GAWR for all trailer axles may be less than the GVWR for the trailer, because some of the trailer load is carried by the tow vehicle, rather than by the trailer axle(s). The total weight of the cargo and trailer must not exceed the GVWR, and the load on an axle must not exceed its GAWR.

TIRE SIZE: The tire size recommended for your trailer and load range.

PSIC: The "pounds per square inch- cold" is the tire pressure (Kilopascals / Pounds per Square Inch) measured when Cold.

CERTIFICATION STATEMENT: "This trailer meets all the Federal Motor Vehicle Safety Standards in effect on the date of manufacture shown above".

VIN: The Vehicle Identification Number.

VEHICLE TYPE: Generally, the word “trailer” is used. However, after this you may put a Model #, or additional descriptor.

COUPLING AND UNCOUPLING THE TRAILER

A secure coupling (or fastening) of the trailer to the tow vehicle is essential. A loss of coupling may result in death or serious injury. Therefore, you must understand and follow all of the instructions for coupling.

The following parts are involved in making a secure coupling between the trailer and tow vehicle:

Coupling: That part of the trailer connecting mechanism by which the connection is actually made to the trailer hitch. This does not include any structural member, extension of the trailer frame, or brake controller.

Hitch: That part of the connecting mechanism including the ball support platform and ball and those components that extend and are attached to the towing vehicle, including bumpers intended to serve as hitches.)

Weight Distributing Hitch (or Equalizing Hitch): A mechanical device that connects the trailer to the towing vehicle and by means of leverage applied on both the trailer and towing vehicle structures, when properly adjusted, distributes the imposed vertical load at the hitch and coupling connection between structures of the towing vehicle and trailer.

Weight Carrying Hitch: A mechanical and/or structural device that connects the trailer to the towing vehicle and that does not employ features designed to redistribute the load imposed at the hitch and carrying connection.

Safety chains or cables: Chains or cables permanently attached to the trailer such that if the coupler connection comes loose, the safety chains or cables can keep the trailer attached to the tow vehicle. With properly rigged safety chains or cables, it is possible to keep the tongue of the trailer from digging into the road pavement, even if the coupler-to-hitch connection comes apart. Some states do not allow safety cables, e.g. Pennsylvania; therefore, it may be wise to check with the State Police to see if your state has any restrictions on the use of safety cables, if your trailer is so equipped.

Trailer lighting (and braking) connector: A device that connects electrical power from the tow vehicle to the trailer. Electricity is used to turn on brake lights, running lights, and turn signals as required. In addition, if your trailer has a separate braking system, the electrical connector will also supply power to the trailer brakes from the tow vehicle.

Breakaway switch: If the trailer becomes de-coupled from the towing vehicle, the breakaway switch lanyard, attached independently to the tow vehicle hitch, will pull a pin in the emergency electrical break-away switch on the trailer. The breakaway switch is activated by a separate battery supply in the trailer such as to energize the trailer brakes independently of the towing vehicle. It is important to check the state of charge of the emergency break-away battery before each trip. Simply pull the pin out of the switch by hand and then try to pull the trailer. If you feel a significant drag force the brakes are activated. Be sure to re-insert the pin in the break-away switch. Also be sure to allow enough slack in the break-away brake lanyard such that the switch will only activate (pin pulls out) if the coupler connection comes loose. For additional details refer to Section 0

Jack: A device on the trailer that is used to raise and lower the trailer tongue. On larger trailers the jack is sometimes called the “landing gear.”

An improperly coupled trailer can result in death or serious injury. Do not move the trailer until:

- The coupler is secured and locked to hitch;
- The safety chains are secured to the tow vehicle; and
- The trailer jack(s) are fully retracted.

Do not tow the trailer on the road until:

- Tires and wheels are checked;
- The trailer brakes are checked;
- The breakaway switch is connected to the tow vehicle;
- The load is secured to the trailer; and
- The trailer lights are connected and checked.

VARIOUS COUPLER DESIGNS

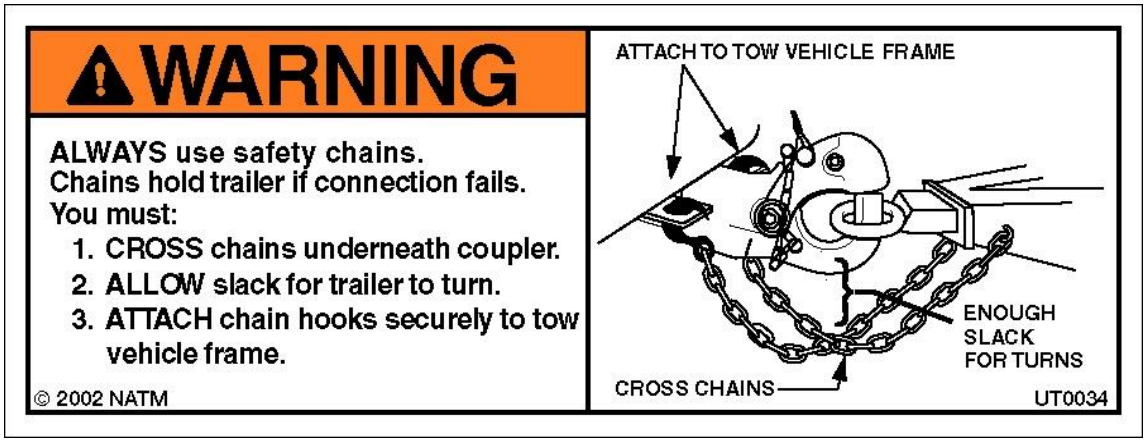
Trailers are produced with a variety of coupler devices. One of the sections below will pertain to your trailer. If the coupler on your trailer does not resemble one of the couplers shown in the figures, see the separate coupler instructions. If you do not have separate coupler instructions, call Bonnell Industries at 800-851-9664 for a free copy.

RIG THE SAFETY CHAINS

Visually inspect the safety chains and hooks for wear or damage. Replace worn or damaged safety chains and hooks before towing.

Rig the safety chains so that they:

- Criss-cross underneath the coupler so if the trailer uncouples, the safety chains can hold the tongue up above the road.
- Loop around a frame member of the tow vehicle or to holes provided in the hitch system (but, do **not** attach them to an interchangeable part of the hitch assembly)
- Attach hooks up from underneath the hole (do not just drop into hole); and
- Provide enough slack to permit tight turns, but not be close to the road surface to drag.

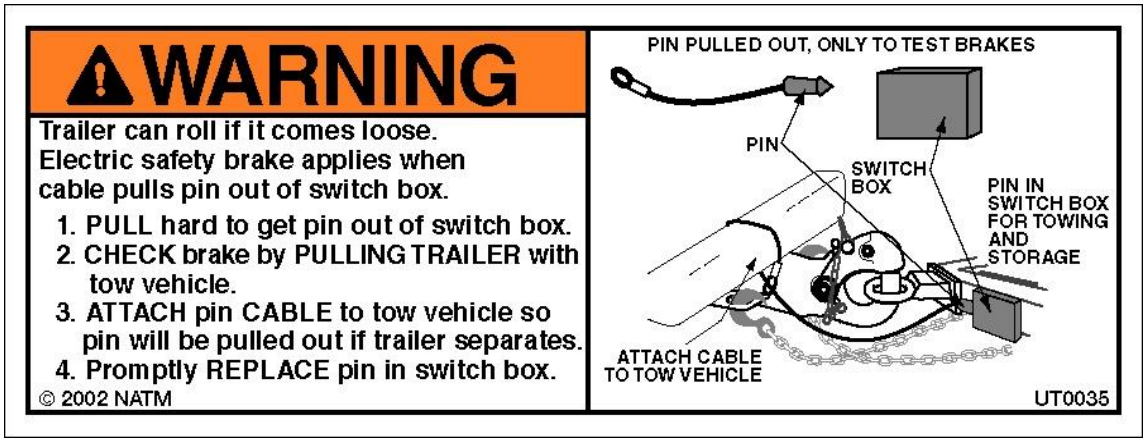


ATTACH AND TEST ELECTRIC BREAKAWAY BRAKE SYSTEM

If the coupler or hitch fails, a properly connected and working breakaway brake system will apply electric brakes on the trailer. The safety chains will keep the tow vehicle attached and as the brakes are applied at the trailer's axles, the trailer/tow vehicle combination will come to a controlled stop.

The breakaway brake system includes a battery, a switch with a pull-pin, and a lanyard. Read and follow the instructions here as well as the instructions that have been prepared by the breakaway brake manufacturer.

The breakaway brake system may be fitted with a "charging" capability that draws power from the tow vehicle. If the electrical system on your tow vehicle does not provide power to the breakaway brake battery, you must periodically charge the battery to keep the breakaway brake system in working order.



Connect the pull pin lanyard to the tow vehicle so that the pull pin will be pulled out before all of the slack in the safety chains is taken up (see Breakaway Brake System figure). Do **not** connect the pull pin cable to a safety chain or to the hitch ball or hitch ball assembly. This would keep the breakaway brake system from operating when it is needed.

To test the break-away brake battery, remove the pull pin from the switch and attempt to pull the trailer forward. You should feel the trailer resisting being towed, but the wheels will not necessarily be locked. If the brakes do not function, do not tow the trailer until brakes, or battery, are repaired.

Immediately replace the pull pin. The breakaway brake system battery discharges rapidly when the pull pin is removed.

An ineffective breakaway brake system can result in a runaway trailer, leading to death or serious injury if the coupler or ball hitch fails.

Connect the breakaway cable to the tow vehicle; and NOT to the hitch, ball or support.

Before towing the trailer, test the function of the breakaway brake system. If the breakaway brake system is not working, do not tow the trailer. Have it serviced or repaired.

Do **not** tow the trailer with the breakaway brake system ON because the brakes will overheat which can result in permanent brake failure.

Failure to replace the pull pin will prevent brakes from working, leading to loss of control, serious injury or death.

If you do not use your trailer for three or more months, or during winter months:

Store the battery indoors; and

- Charge the battery every three months.
- Replace the breakaway brake battery according to the intervals specified by battery manufacturer.
- Connect the electrical cables
- Connect the trailer lights to the tow vehicle's electrical system using the electrical connectors.
- Check all lights for proper operation.
    - Clearance and Running Lights (Turn on tow vehicle headlights).
    - Brake Lights (Step on tow vehicle brake pedal).
    - Turn Signals (Operate tow vehicle directional signal lever).

Check the electric brakes for proper operation using brake controller mounted in the tow vehicle.

Your tow vehicle will have an electric brake controller that sends power to the trailer brakes. Before towing the trailer on the road, you must operate the brake controller while trying to pull the trailer in order to confirm that the electric brakes operate. While towing the trailer at less than 5 M.P.H., manually operate the electric brake controller in the tow vehicle cab. You should feel the operation of the trailer brakes.

Improper electrical connection between the tow vehicle and the trailer will result in inoperable lights and electric brakes, and can lead to a collision.

Before each tow, check that the taillights, brake lights and turn signals work.

Check that the electric brakes work by operating the brake controller inside the tow vehicle.

Uncoupling the Ball Hitch Trailer with Tongue Jack

Follow these steps to uncouple your ball hitch trailer from the tow vehicle:

- Block trailer tires to prevent the trailer from rolling, before jacking the trailer up.
- Disconnect the electrical connector.
- Disconnect the breakaway brake switch lanyard.
- Disconnect the safety chains from the tow vehicle.
- Unlock the coupler and open it.
- Before extending jack, make certain the ground surface below the jack pad will support the tongue load.
- Rotate the jack handle (or crank) clockwise. This will slowly extend the jack and transfer the weight of the trailer tongue to the jack.

5 CHECKING THE TRAILER BEFORE AND DURING EACH TOW

PRE-TOW CHECKLIST

Before towing, double-check all of these items: See section 0, “Inspection, Service & Maintenance Summary Charts,” for more information.

Tires, wheels and lug nuts (see the Major Hazards section starting on page 11 of this manual)

- Tire Pressure. Inflate tire on trailer and tow vehicle to the pressure stated on the VIN / Certification label.
- Coupler secured and locked (see the “Coupling and Uncoupling the Trailer” section starting on page 38 of this manual)
- Safety chains properly rigged to tow vehicle, not to hitch or ball (see the “Coupling to the Tow Vehicle” chapter starting at Page 37 of this manual)
- Test of lights: Tail, Stop, and Turn Lights
- Test trailer brakes.
- Safety breakaway switch cable fastened to tow vehicle, not to safety chains (see the “Coupling to the Tow Vehicle” chapter starting at Page 37 of this manual)
- Fire extinguisher
- Flares and reflectors

MAKE REGULAR STOPS

After each 50 miles, or one hour of towing, stop and check the following items:

- Coupler secured
- Safety chains are fastened and not dragging

6 BREAKING-IN A NEW TRAILER

RETIGHTEN LUG NUTS AT FIRST 10, 25 & 50 MILES

Wheel lugs can shift and settle quickly after being first assembled, and must be checked after the **first** 10, 25 and 50 miles of driving. Failure to perform this check may result in a wheel coming loose from the trailer, causing a crash leading to death or serious injury.

Lug nuts are prone to loosen after initial installation, which can lead to death or serious injury.

Check lug nuts for tightness on a new trailer or when wheel(s) have been remounted after the first 10, 25 and 50 miles of driving.

See Section 7.1.1.8 page 47 on Proper Torquing Technique.

ADJUST BRAKE SHOES AT FIRST 200 MILES

Brake shoes and drums experience a rapid initial wear. The brakes must be adjusted after the first 200 miles of use, and each 3,000 miles thereafter. Some axles are fitted with a mechanism that will automatically adjust the brake shoes when the trailer is “hard braked” from a rearward direction. Read your axle and brake manual to see if your brakes adjust automatically. If you do not have the axle and brake manual, call Bonnell Industries at 800-851-9664 for a free copy.

A hard stop is used to:
Confirm that the brakes work;
Confirm that the trailer brakes are properly synchronized with the tow vehicle brakes using the brake controller in the tow vehicle
Adjust the brake shoes as necessary.
For surge brakes check the Master cylinder reservoir for fluid.

If your trailer is not fitted with automatically adjusting brakes, the brakes will need to be manually adjusted. See section 7.1.1.5, “Manually Adjusting Brake Shoes,” for instructions.

SYNCHRONIZING THE BRAKE SYSTEMS

Trailer brakes are designed to work in synchronization with the brakes on the tow vehicle. When the tow vehicle and trailer braking systems are synchronized, both braking systems contribute to slowing, and the tongue of the trailer will neither dive nor rise sharply.

⚠ WARNING

If trailer and tow vehicle brakes do not work properly together, death or serious injury can occur.

Road test the brakes in a safe area at no more than 30 m.p.h. before each tow

To ensure safe brake performance and synchronization, read and follow the axle/brake and the brake controller manufacturers’ instructions. If you do not have these instructions, call Bonnell Industries at 800-851-9664 for a free copy.

TIRE PRESSURE
Check tire pressures on both the trailer and tow vehicle. Inflate to the maximum shown on the VIN / Certification Label.

7 INSPECTION, SERVICE & MAINTENANCE

INSPECTION, SERVICE & MAINTENANCE SUMMARY CHARTS

7.1.1.1.1.1.1.1.1 **You must inspect, maintain and service your trailer regularly to insure safe and reliable operation. If you cannot or are unsure how to perform the items listed here, have your dealer do them. Note: In addition to this manual, also check the relevant component manufacturer's manual. Inspection and Service before Each Use**

Item	Inspection / Service	Manual Section Reference
Breakaway Brakes > Electric	Check operation	Section 7.1.1.6
Breakaway Battery	Fully charged, connections clean	Section 7.1.1.6.1.1
Brakes, all types	Check operation	Section 0
Shoes and Drums	Adjust	Section 7.1.1.5
Safety Chain(s) & Hooks	Check for wear and damage	Sections 0
Tires	Check tire pressure when cold. Inflate as needed.	Sections 0 & 0
Wheels - Lug Nuts (Bolts) & Hub	Check for tightness Tighten. For new and remounted wheels, check torque after first 10, 25 & 50 miles of driving and after any impact	Section 0 Sections 0 & 7.1.1.8

INSPECTION AND SERVICE EACH 6 MONTHS OR 6,000 MILES		
Item	**Inspection / Service**	**Manual Section Reference**
Tires	Rotate @ 5,000 miles	Section 0
Brakes, electric > Magnets > Controller (in tow vehicle)	 Check wear and current draw Check power output (amperage) and modulation	 Section 7.1.1.6.3 Section 7.1.1.6.2 See Controller Mfr's Manual
Tires	Inspect tread and sidewalls thoroughly. Replace tire when treads are worn, when sidewall has a bulge, or sidewall is worn	Section 0 Section 0

INSPECTION AND SERVICE EACH YEAR OR 12,000 MILES		
Item	**Inspection / Service**	**Manual Section Reference**
Brakes, all types > Shoes and drums	Check for scoring and wear. Replace per manufacturer's specifications	Section 7.1.1.4 See Brake Mfr's Manual
Jack, Drop-leg	Grease gears at top	See Jack Mfr's Manual
Structure > Frame members > Welds	Inspect all frame members, bolts & rivets. Repair or replace damaged, worn or broken parts. Inspect all welds. Repair as needed	Section 0 Section 7.1.1.3
Wheels > Sealed Bearings (Hubs) > UNSEALED Bearings (Hubs) > Rims	Check and confirm free running. Replace if not (sealed bearings are not serviceable) Disassemble / inspect / assemble and repack. Replace promptly if immersed in water Inspect for cracks & dents. Replace as needed.	Section 0 Section 7.1.1.7 See Axle Mfr's Manual Section 0
Structure > Axle Attachment Bolts	 Check BY DEALER	 Section 0

INSPECTION AND SERVICE INSTRUCTIONS

AXLE BOLTS, FRAME, SUSPENSION, & STRUCTURE

Worn or broken suspension parts can cause loss of control and injury may result.

Have trailer professionally inspected annually and after any impact.

To perform many of the inspection and maintenance activities, you must jack up the trailer. When jacking and using jack stands, place them so as to clear wiring, brake lines, and suspension parts (springs, torsion bars, etc.). Place jacks and jack stands directly under the side tube members of the trailer frame.

Refer to the axle manual for service information. Bonnell Industries does not service axles. Refer to your local axle dealer for service requirements.

Never crawl under your trailer unless it is on firm and level ground and resting on properly placed and secured jack stands.

TRAILER STRUCTURE

Because the trailer floor receives the most abuse, it will most likely corrode before any other part of the structure.

7.1.1.2 Fasteners and Frame Members

Inspect all of the fasteners and structural frame members for bending and other damage, cracks, or failure. Repair or replace any damaged fastener and repair the frame member. If you have any questions about the condition or method of repair of fasteners or frame members, get the recommendation of, or have the repair done by, your dealer.

Worn or broken suspension parts can cause loss of control and injury may result.

Have trailer professionally inspected annually and after any impact.

7.1.1.3 Welds

All welds can crack or fail when subjected to heavy loads or movement of cargo that was not properly tied to prevent movement. Any time that you know or suspect that the trailer has been subjected to heavy loads or movement of cargo, immediately inspect the welds and fasteners for damage. To prevent severe damage to your trailer, inspect all of the welds for cracks or failure at least once a year.

Improper weld repair will lead to early failure of the trailer structure and can cause serious injury or death.

Do not repair cracked or broken welds unless you have the skills and equipment to make a proper repair. If not, have the welds repaired by your dealer.

TRAILER BRAKES

7.1.1.4 Brake Shoes and Drums

Properly functioning brake shoes and drums are essential to ensure safety. You must have your dealer inspect these components at least once per year, or each 12,000 miles.

The brake shoes must be adjusted after the first 200 miles of use, and each 3,000 miles thereafter. Most axles are fitted with a brake mechanism that will automatically adjust the brake shoes when the trailer is “hard braked” from a rearward direction. Read your axle and brake manual to see how to adjust your brakes. If you do not have this manual, call Bonnell Industries at 800-851-9664 for a free copy.

7.1.1.5 Manually Adjusting Brake Shoes

Most braking systems are not automatically adjusted by hard stopping. These brakes require manual adjustment. The following steps apply to adjust most manually adjustable brakes. Read your axle and brake manual to see how to adjust your brakes. If you do not have this manual, call Bonnell Industries at 800-851-9664 for a free copy.

Jack up the trailer and secure it on adequate capacity jack stands.
Be sure the wheel and brake drum rotate freely.
Remove the adjusting-hole cover from the adjusting slot on the bottom of the brake backing plate.

With a screwdriver or standard adjusting tool, rotate the star wheel of the adjuster assembly to expand the brake shoes. Adjust the brake shoes out until the pressure of the linings against the drum makes the wheel very difficult to turn. Note: Your trailer maybe equipped with drop spindle axles. See axle manual for your axle type. You will need a modified adjusting tool for adjusting the brakes in these axles. With drop spindle axles, a modified adjusting tool with about an 80-degree angle should be used.
Rotate the star wheel in the opposite direction until the wheel turns freely with a slight drag.
Replace the adjusting-hole cover.
Repeat the above procedure on all brakes.
Lower the trailer to the ground.

7.1.1.6 Brakes, Electric

Two different types of electric brakes may be present on the trailer: an emergency electric breakaway system, which acts only if the trailer comes loose from the hitch and the breakaway pin is pulled. The other brake is an electric braking system that acts whenever the brakes of the tow vehicle are applied.

7.1.1.6.1 Breakaway Brake

7.1.1.6.1.1 Breakaway Battery

This battery supplies the power to operate the trailer brakes if the trailer uncouples from the tow vehicle. Be sure to check, maintain and replace the battery according to the battery manufacturer' instructions.

> Extreme cold weather can degrade battery performance and cause brakes to not operate properly.
> Always check battery charge level before towing.

7.1.1.6.1.2 Breakaway Switch

This switch causes the breakaway battery to operate the electric brakes if the trailer uncouples from the tow vehicle.

The pull cable for the pull pin is connected to the tow vehicle, and the switch is connected to the trailer. To check for proper functioning of the switch, battery and brakes, you must pull the pin from the switch and confirm that the brakes apply to each wheel. You can do this by trying to pull the trailer with the tow vehicle, after pulling the pin. The trailer brakes may not lock, but you will notice that a greater force is needed to pull the trailer.

> If electric breakaway brakes do not operate when trailer is uncoupled from the tow vehicle, death or serious injury can occur.
> Check emergency breakaway brake system BEFORE each tow.

7.1.1.6.2 Tow Vehicle Operated Electric Brakes

The electric brakes that operate in conjunction with the tow vehicle brakes must be "synchronized" so that braking is properly distributed to the tow vehicle brakes and the trailer brakes. For proper operation and synchronization, read and follow the axle/brake and the brake controller manufacturers' instructions. If you do not have these instructions, Bonnell Industries at 800-851-9664 for a free copy.

7.1.1.6.3 Magnets for all Electric Brakes

To make certain an electrically-operated braking system will function properly, you must have your dealer inspect the magnets at least once a year, or each 12,000 miles. See the brake manual for wear and current inspection instructions.

Trailer Connection to Tow Vehicle

Inspect the towing pintle and safety chains periodically for wear, damage, cracks or missing parts. Replace as necessary.

TRAILER JACK

HYDRAULIC:
The optional hydraulic trailer jack is equipped with a pilot operated check valve to eliminate bleed down of the hydraulic cylinder. NOTE: FOR ELECTRIC OVER HYDRAULIC SYSTEMS, THE ENGINE NEEDS TO BE RUNNING TO RAISE THE JACK.

MANUAL:
If a grease fitting is present, you must use a grease gun to lubricate the jack mechanism. Grease the gears in the top of hand-cranked jacks once a year, by removing the top of the jack and pumping or hand packing grease into the gears.

LIGHTS AND SIGNALS

Before each tow, check the trailer taillights, stoplights, turn signals and any clearance lights for proper operation.

Improper operating taillights, stoplights and turn signals can cause collisions.

Check all lights before each tow.

TIRES

Trailer tires may be worn out even though they still have plenty of tread left. This is because trailer tires have to carry a lot of weight all the time, even when not in use. It is actually better for the tire to be rolling down the road than to be idle. During use, the tire releases lubricants that are beneficial to tire life. Using the trailer tires often also helps prevent flat spots from developing.

The main cause of tire failure is improper inflation. Check the cold tire inflation pressures at least once a week for proper inflation levels. “Cold” means that the tires are at the same temperature as the surrounding air, such as when the vehicle has been parked overnight. Wheel and tire manufacturers recommend adjusting the air pressure to the trailer manufacturer’s recommended cold inflation pressure, in pounds per square inch (PSI) stated on the vehicle’s Federal Certification Label or Tire Placard when the trailer is loaded to its gross vehicle weight rating (GVWR). If the tires are inflated to less than the recommended inflation level or the GVWR of the trailer is exceeded, the load carrying capacity of the tire could be dramatically affected. If the tires are inflated more than the recommended inflation level, handling characteristics of the tow vehicle/trailer combination could be affected. Refer to the owner’s manual or talk to your dealer or vehicle manufacturer if you have any questions regarding proper inflation practices.

Tires can lose air over a period of time. In fact, tires can lose 1 to 3 PSI per month. This is because molecules of air, under pressure, weave their way from the inside of the tire, through the rubber, to the outside. A drop in tire pressure could cause the tire to become overloaded, leading to excessive heat buildup. If a trailer tire is under-inflated, even for a short period of time, the tire could suffer internal damage.

High speed towing in hot conditions degrades trailer tires significantly. As heat builds up during driving, the tire’s internal structure starts to breakdown, compromising the strength of the tire. It is recommended to drive at moderate speeds.

Statistics indicate the average life of a trailer tire is about five years under normal use and maintenance conditions. After three years, replacing the trailer tires with new ones should be considered, even if the tires have adequate tread depth. Some experts claim that after five years, trailer tires are considered worn out and should be replaced, even if they have had minimal or no use. This is such a general statement that it may not apply in all cases. It is best to have your tires inspected by a tire supplier to determine if your tires need to be replaced.

If you are storing your trailer for an extended period, make sure the tires are fully inflated to the maximum rated pressure and that you store them in a cool, dry place, such as a garage. Use tire covers to protect the trailer tires from the harsh effects of the sun.

Worn, damaged or under-inflated tires can cause loss of control, resulting in damage, serious injury and possibly death.

Inspect tires before each tow.

WHEEL RIMS

If the trailer has been struck, or impacted, on or near the wheels, or if the trailer has struck a curb, inspect the rims for damage (i.e. being out of round); and replace any damaged wheel. Inspect the wheels for damage every year, even if no obvious impact has occurred.

WHEELS, BEARINGS AND LUG NUTS

A loose, worn or damaged wheel bearing is the most common cause of brakes that grab.

To check your bearings, jack trailer and check wheels for side-to-side looseness. If the wheels are loose, or spin with a wobble, the bearings must be serviced or replaced.

Most trailer axles are built with sealed bearings that are not serviceable. Sealed bearings must be replaced as complete units.

7.1.1.7 Unsealed Bearings (Hubs)

If your trailer has unsealed axle bearings, they must be inspected and lubricated once a year or 12,000 miles to insure safe operation of your trailer.

If a trailer wheel bearing is immersed in water, it must be replaced.

If your trailer has not been used for an extended amount of time, have the bearings inspected and packed more frequently, at least every six months and prior to use.

Follow the steps below to disassemble and service the UNSEALED wheel bearings.

After removing the grease cap, cotter pin, spindle nut and spindle washer (items 7-10 in “Exploded Wheel Bearing” figure), remove the hub and drum to inspect the bearings for wear and damage.
Replace bearings that have flat spots on rollers, broken roller cages, rust or pitting. Always replace bearings and cups in sets. The inner and outer bearings are to be replaced at the same time.
Replace seals that have nicks, tears or wear.
Lubricate the bearings with a high-quality EP-2 automotive wheel bearing grease.

Every time the wheel hub is removed and the bearings are reassembled, follow the steps below to check the wheel bearings for free running and adjust.

Turn the hub slowly, by hand, while tightening the spindle nut, until you can no longer turn the hub by hand.
Loosen the spindle nut just until you are able to turn it (the spindle nut) by hand. Do not turn the hub while the spindle nut is loose.
Put a new cotter pin through the spindle nut and axle.
Check the adjustments. Both the hub and the spindle nut should be able to move freely (the spindle nut motion will be limited by the cotter pin).

7.1.1.8 Lug Nuts (Bolts)

Being sure wheel mounting nuts (lug nuts) on trailer wheels are tight and properly torqued is an important responsibility that trailer owners and users need to be familiar with and practice. Inadequate and/or inappropriate wheel nut torque (tightness) is a major reason that lug nuts loosen in service. Loose lug nuts can rapidly lead to a wheel separation with potentially serious safety consequences.

Lug nuts are prone to loosen right after a wheel is mounted to a hub. When driving on a new or remounted wheel, check the lug nut tightness often during the first few hundred miles of the trailer's use, especially after the first 10, 25 and 50 miles of driving, before each tow, and at least twice per year thereafter.

Lug nuts are prone to loosen after initial installation that can lead to serious injury or death.

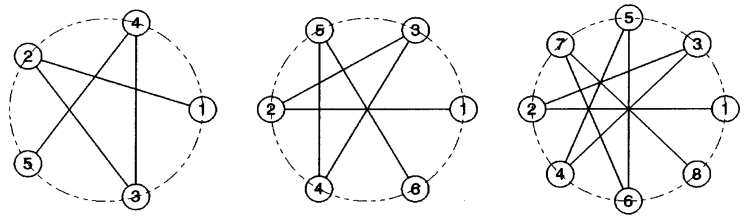
Check lug nuts for tightness on a new trailer or when wheel(s) have been remounted after the first 10, 25 and 50 miles of driving.

Metal creep between the wheel rim and lug nuts will cause rim to loosen and could result in a wheel coming off, leading to death or serious injury.

Tighten lug nuts before each tow.

Tighten the lug nuts to the proper torque for the axle size on your trailer to prevent wheels from coming loose. Use a torque wrench to tighten the fasteners. The only way to be certain you have checked the torque or torqued the lug nuts to the proper torque is with a torque wrench. Four-way wrenches, ratchets, and similar tools can be useful for short-term emergency repairs, but are not appropriate tools for adequately checking lug nut torque. You must use a torque wrench to adequately indicate the torque that you are applying to the lug nut. If you do not have a torque wrench, tighten the fasteners with a lug wrench as much as you can, then have a service garage or dealer tighten the lug nuts to the proper torque. Over-tightening will result in breaking the studs or permanently deforming the mounting stud holes in the wheels.

Figure 7-1 Lug nut sequence of tightening



Keep a record of the date and approximate mileage when you check the lug nut torque. Note any lug nut that has lost torque. Investigate the reason(s) if the lug nut torque is not maintained after more than one re-torque application, because this indicates there is something wrong with the lug nuts, nut studs, wheels and/or hubs and should be corrected.

Contact your dealer or vehicle manufacturer immediately if you experience any persistent lug nut loosening or any other lug, wheel or axle problems.

In the event of a wheel separation incident, notify the vehicle manufacturer and dealer. Seek prompt professional assistance in assessing the trailer and its gear, and retain, but don't re-use involved lugs, wheels and studs. Don't repair or service the trailer yourself. Call a trained technician.

Torque lug nuts per axle owner's manual.

LEAF VAC MAINTENANCE

INITIAL SERVICING & BREAK-IN

The leaf vacuum machine has been initially serviced at the factory and is ready to operate. Review engine manual for break-in procedures. Belt tension should be adjusted after first hour of operation. See fan belt section for instructions.

Your leaf machine is designed to pull approximately level. Adjust the pintle eye up or down as required to match the pull vehicle.

LIST OF SUPPLEMENTAL MANUALS

Your manual packet includes supplemental manuals for some or all of the following components. Refer to these manuals for service & operation of these items:

ENGINE SERVICE AND SERVICE PARTS LIST

Refer to the engine manual for service information. Bonnell Industries does not service engines. Refer to your local engine dealer for service requirements.

Common engine service parts

Below is a list of common engine service parts that may be necessary for engine maintenance on your machine.

Kubota V3800 74HP Tier 4 Engine:

Fuel Filter:	1K947-43172
Fuel Separator filter:	1J430-43060
Oil Filter:	HH1CO-32430
Inner Air Filter:	55231-26150
Outer Air Filter:	59700-26112

CLUTCH OR FLUID COUPLER SERVICE

NACD Clutch: Refer to the clutch manual for detailed service & lubrication information. Bonnell Industries does not service clutches.

Hydraulic Clutch: Self-adjusting design does not require adjustment. Replace inline hydraulic filter element annually. Refer to the clutch manufacturer's manual for detailed service & lubrication information. Bonnell Industries does not service clutches.

TransFluid Coupler: The transfluid coupler is filled from the factory with ISO 32 Oil. When put under extreme load, the oil in the coupler will heat up, and in some cases, the safety relief plug will melt, letting out the oil, and therefore stopping power transfer. **In this case, always replace plug with P/N 7018C**. **DO NOT USE STANDARD ALLEN HEAD PLUG.** Unit could overheat, and cause severe damage to engine, belts, or coupler.

When refilling oil (with coupler installed on engine), rotate inner housing until stamped "X" aligns in top vertical slot of outer housing. Fill inner housing with 5-6 quarts, until oil runs out of plug opening. Replace plug. FOR ADDITIONAL INFORMATION, SEE PAGE **94**

LUBRICATION

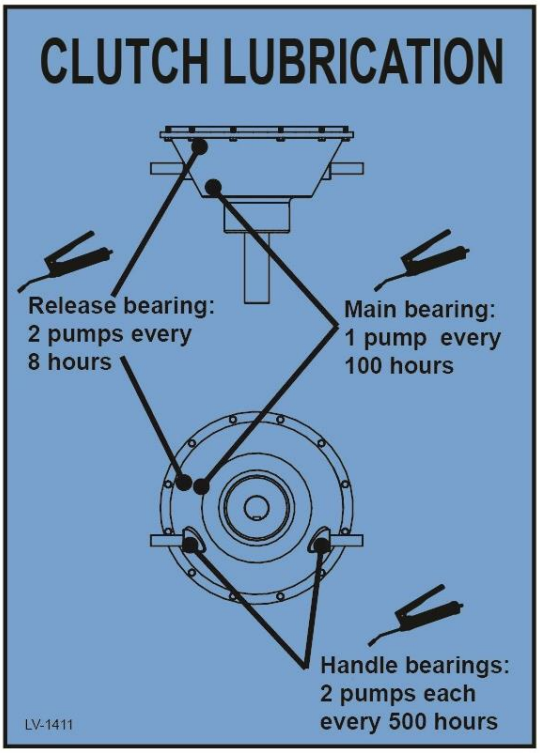
Type of grease: It is recommended that lithium complex grease with a thickness rating of NLGI 2 and operating temperature of -20 – 200 deg. F. be used.

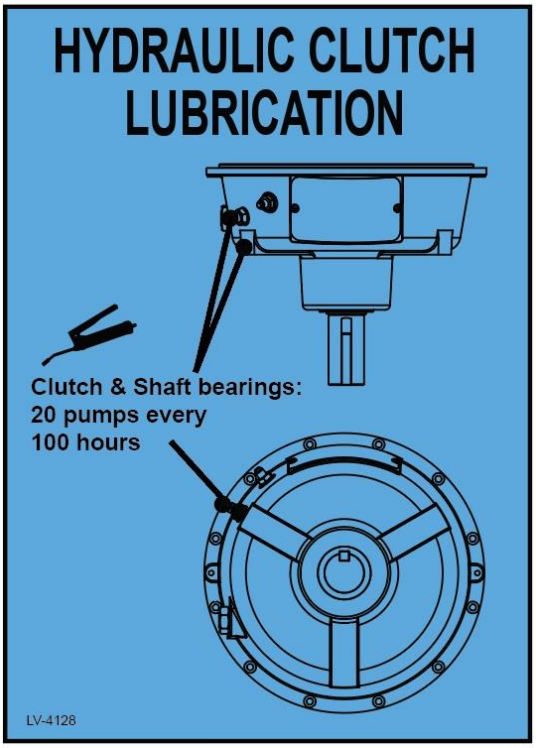
Daily:
- NACD clutch Hose arm pivot, 2 pumps each fitting (4 places)
- NACD clutch release bearing, 2 pumps

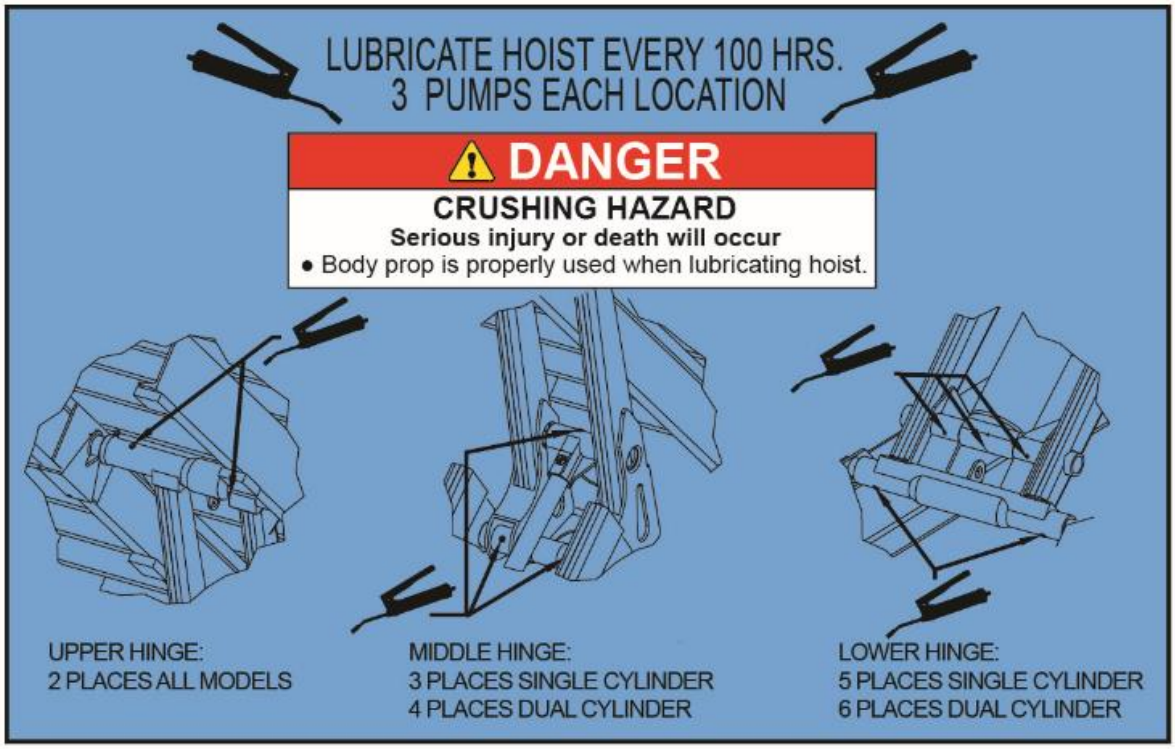
Weekly:
- Transfluid coupler output shaft bearing (if equipped), 2 pumps
- Hoist hinges, 2

Every 100 hours:
- NACD clutch main bearing (if equipped), 1 pump
- Hydraulic clutch bearings, 1 oz (20 pumps)
- Hydraulic clutch shaft bearings, 1 oz (20 pumps)
- Hoist pivots, 3 pumps each location
- Hubs, 1 pump

Every 500 hours:
- NACD clutch handle bearing (if equipped), 2 pumps each


CLUTCH LUBRICATION
Release bearing:
2 pumps every
8 hours
Main bearing:
1 pump every
100 hours
Handle bearings:
2 pumps each
every 500 hours
LV-1411


HYDRAULIC CLUTCH
LUBRICATION
Clutch & Shaft bearings:
20 pumps every
100 hours
LV-4128


LUBRICATE HOIST EVERY 100 HRS.
3 PUMPS EACH LOCATION
DANGER
CRUSHING HAZARD
Serious injury or death will occur
• Body prop is properly used when lubricating hoist.
UPPER HINGE:
2 PLACES ALL MODELS
MIDDLE HINGE:
3 PLACES SINGLE CYLINDER
4 PLACES DUAL CYLINDER
LOWER HINGE:
5 PLACES SINGLE CYLINDER
6 PLACES DUAL CYLINDER

RADIATOR SCREEN

Your leaf machine is equipped with an auxiliary magnetic radiator screen. This screen assists in keeping the engine radiator clean and the engine cool during operation. This screen needs to be checked regularly for debris buildup. **Remove screen and clean after each hour of operation!**

ENGINE COMPARTMENT

The engine cooling fan may cause chaff or debris to build up inside the engine compartment. Regular inspection and cleanout of the engine compartment is necessary to prevent an engine fire.

FAN

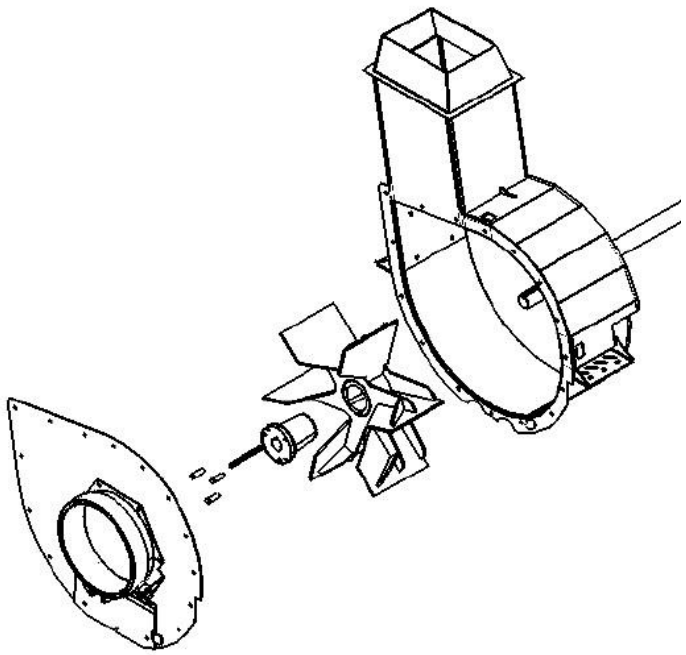
Your leaf machine is equipped with a 30" diameter balanced fan with AR400 impeller blades, mounted to the shaft with a split taper bushing. Inspect the fan regularly for cracks, deformations, and uneven wear. DO NOT OPERATE THE MACHINE IF THE FAN IS OUT OF BALANCE.

REMOVAL:

- Disconnect safety interlock
- Remove suction hose
- Remove fan cover face plate on inlet side
- Loosen & remove the three bolts on the split taper bushing that hold the fan in place.
- Reinsert the screws into the two tapped holes on the bushing and tighten. This will free the fan from the bushing, and the bushing will slide out.
- Slide fan off of shaft.

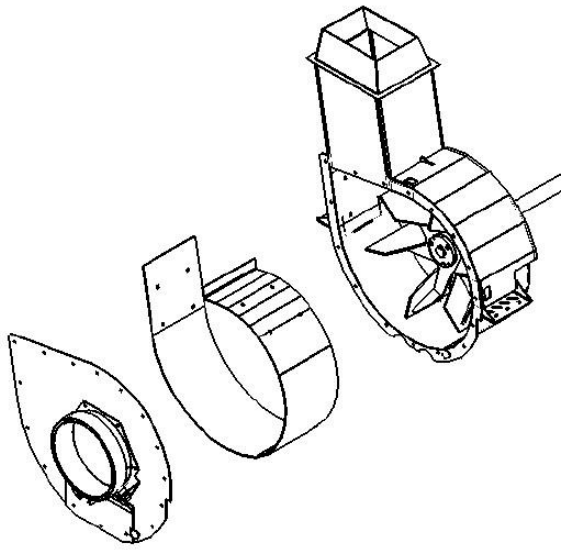
INSTALLATION:

- Clean tapered cone surfaces of taper bushing & fan.
- **NOTE: DO NOT USE ANTISIEZE LUBRICANT ON TAPERED CONE SURFACES OR BOLT THREADS.**
- Slide fan onto shaft, with tapped hole side of fan bushing facing out. Install impeller on shaft as far as possible, with approx..3/8" clearance to back wall.
- Slide split taper bushing onto shaft, insert key, position.
- Install 1/2x2-1/4 grade 8 bolts with alloy lock washers into tapped holes in coupler.
- Use blue Loctite on bolts.
- Tighten in circular pattern to **82 ft-lbs**. for ½" bolts
- Tap collet firmly or use air hammer in between bolts after each tightening.
- Do at least three circular tightening patterns until there is no rotation of the bolts at **82 ft-lbs**. for ½" bolts
- Start machine and run fan for several minutes at full RPM.
- <u>Repeat torque procedure after shutting off machine.</u>



BLOWER HOUSING LINER REMOVAL

To remove the liner from the housing for service or replacement:



- Disconnect safety interlock
- Remove suction hose
- Remove fan cover face plate on inlet side
- Loosen & remove the eight bolts that hold the liner in place.
- Puller liner out.

SUCTION HOSE

To increase the life of the suction hose, the hose should be loosened, removed, and rotated ¼ turn every 40 hours of operation. Inspect liner plate & fan for wear at this time.

HYDRAULIC SYSTEM (IF EQUIPPED)

FILTER: The hydraulic filter is equipped with an indicator gauge. Change filter accordingly.
OIL: The hydraulic oil should be changed annually. System capacity is approximately 20 gallons.

DUST CONTROL SYSTEM (IF EQUIPPED)

The dust control system is equipped with an 80-mesh strainer screen. Check the screen every 40 hours or as necessary, and clean as needed.

When the machine will be stored or parked in freezing temperatures, the pump and strainer need to be drained. To drain, shut off tank valve, and disconnect right hand pump fitting. Operate pump until line is empty. Shut off pump, and empty strainer canister.

OPERATING REAR DOOR PROP

Always use door prop when accessing body.

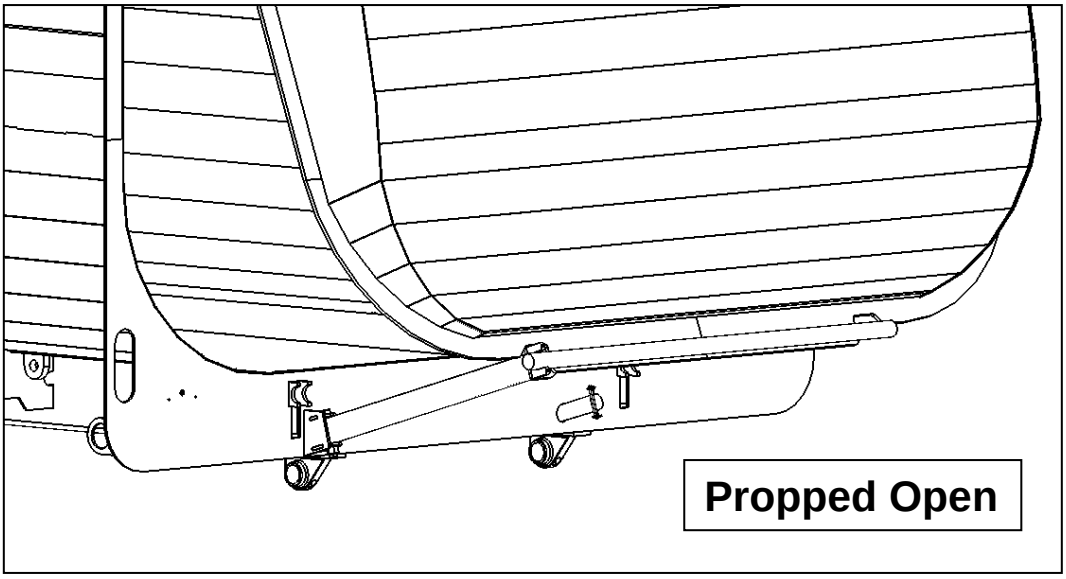
⚠ Caution

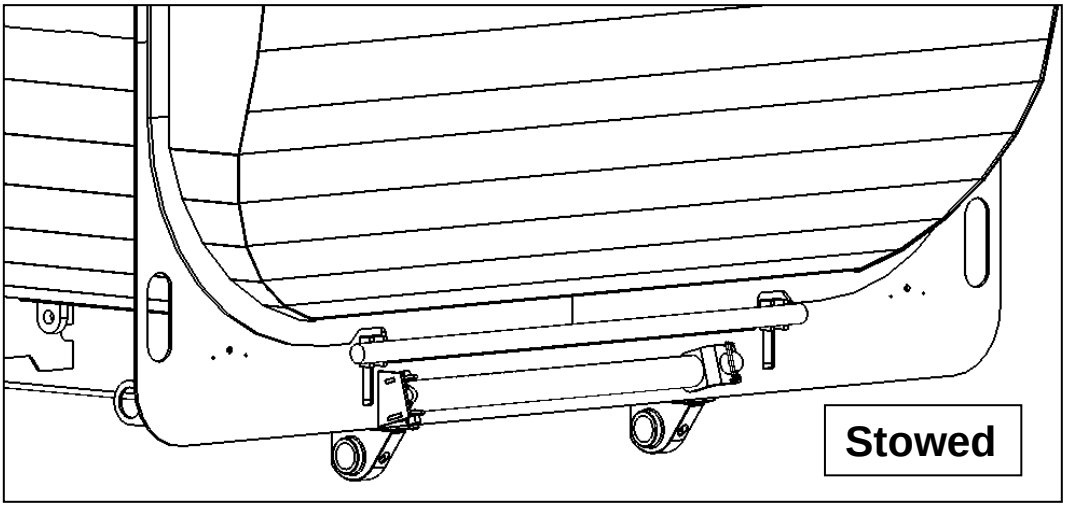
TO USE DOOR PROP:

- Raise body to height where rear door swings open on its own.
- Unpin the prop, swing it out, and insert into door cutout as shown.

TO STOW THE PROP:

- Push door open and remove prop from door cutout.
- Swing prop in and re-insert pin to keep the prop in place.

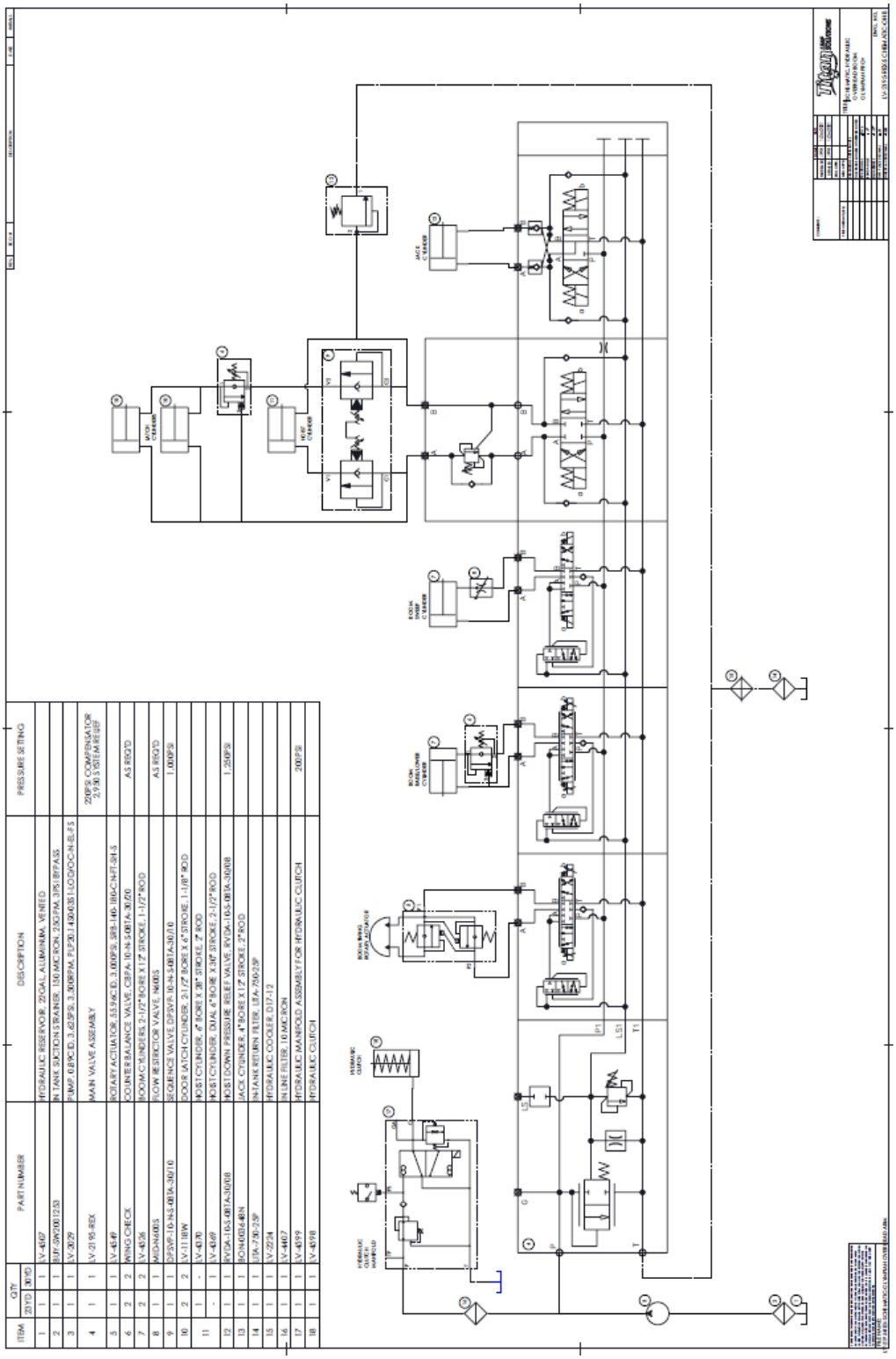




HYDRAULIC SCHEMATICS

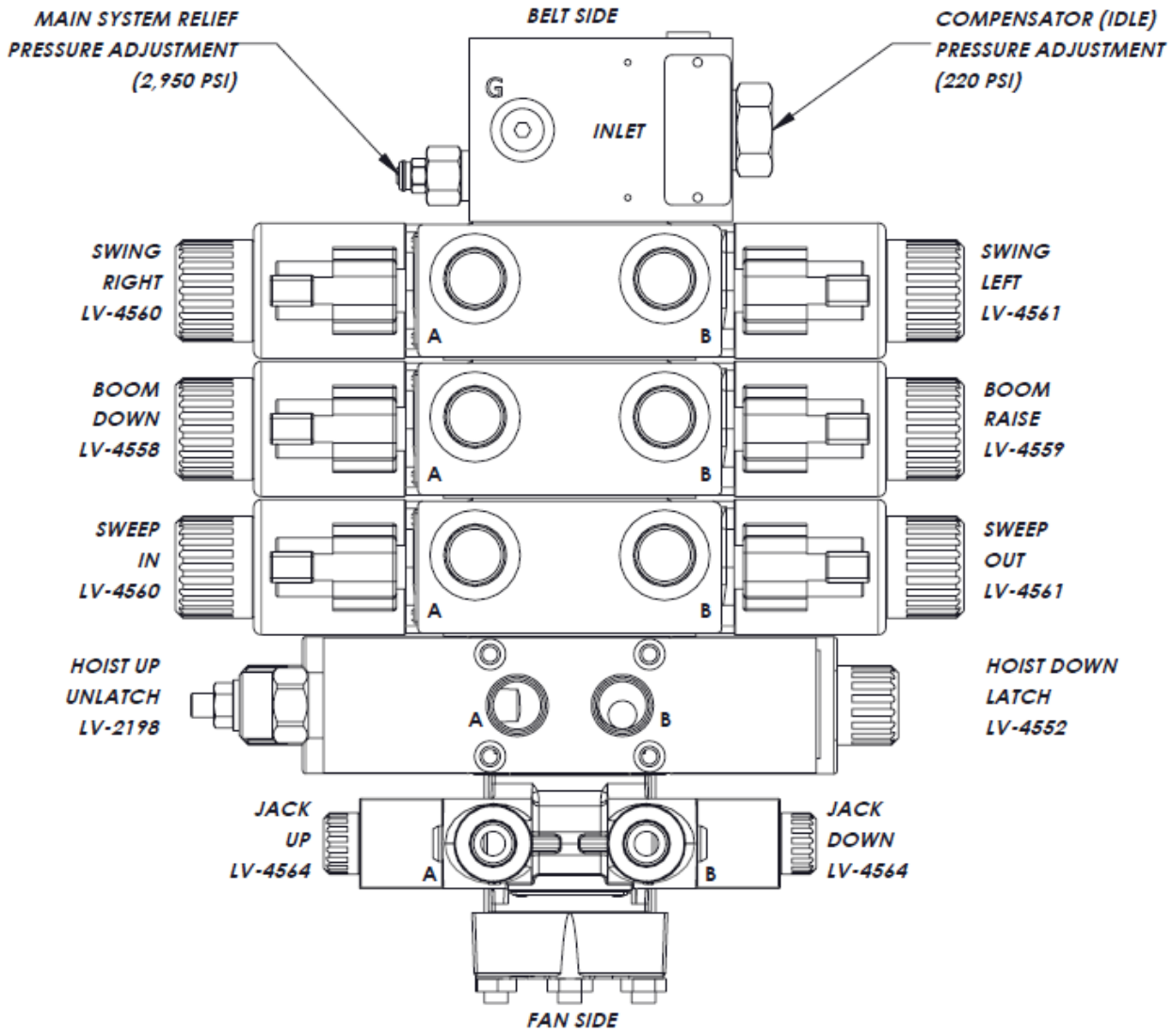
The following pages show a complete system hydraulic schematic. Following the complete schematic, diagrams with part numbers illustrate how the leaf vacuum hydraulic system is broken down into individual plumbing layouts

MAIN HYDRAULIC SCHEMATIC



MAIN VALVE LAYOUT

FILE NAME	Main Valve Layout - Olympian
DWG NAME	MAIN VALVE



VIEWED FROM THE BOTTOM LOOKING UP

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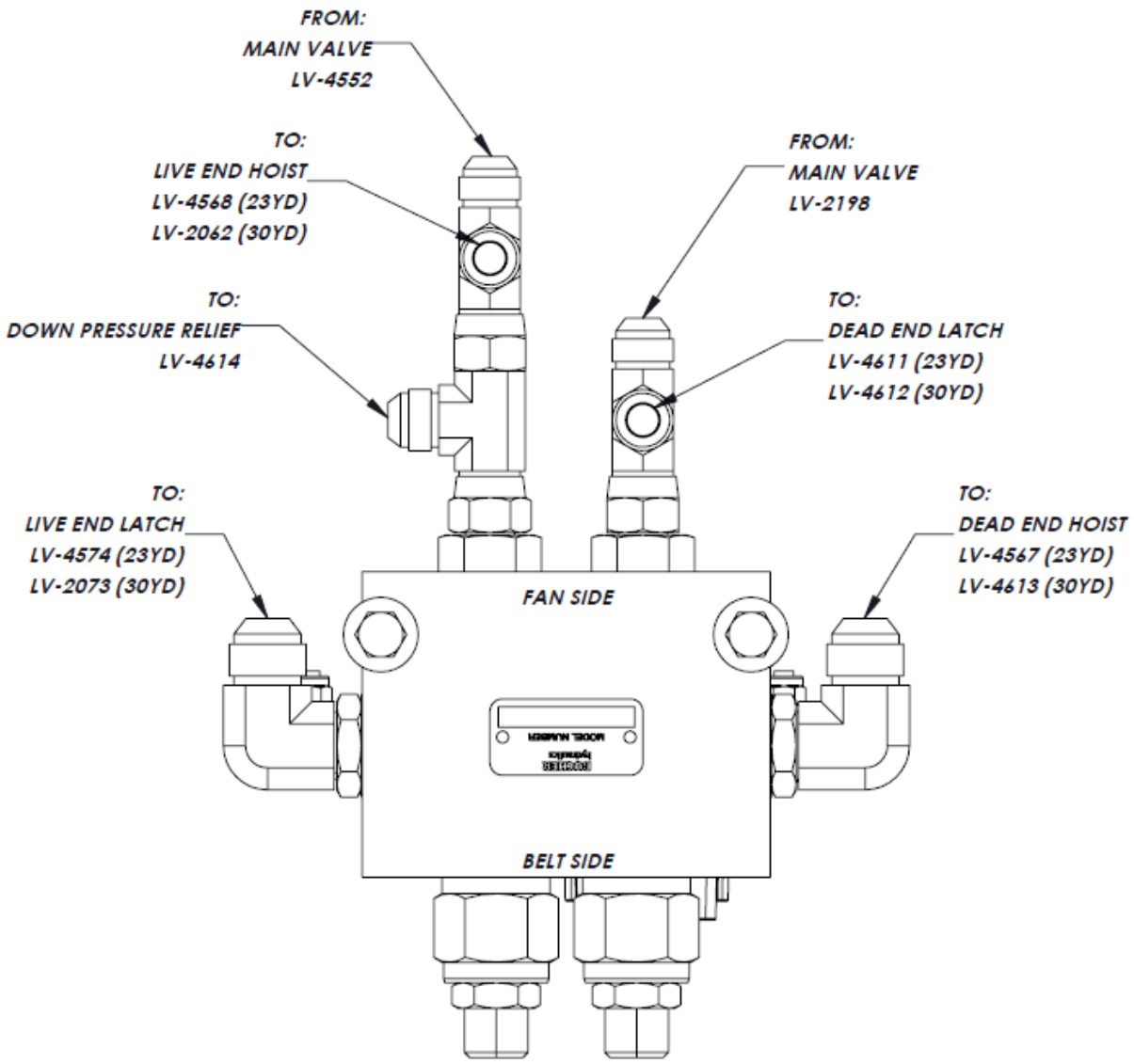
SEQUENCE VALVE LAYOUT

FILE NAME	Main Valve Layout - Olympian
DWG NAME	SEQUENCE VALVE



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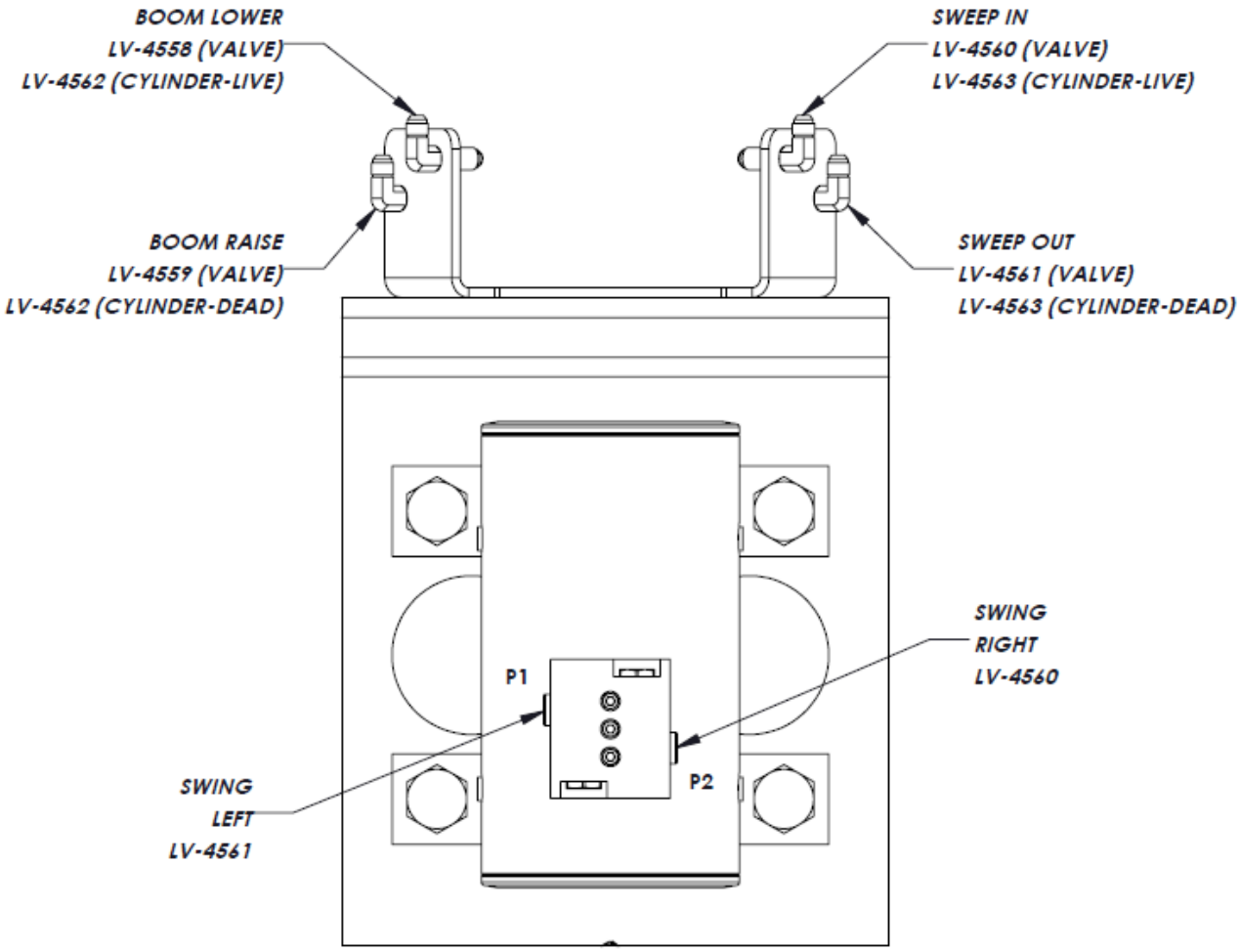
CONTROL ARM INTERFACE LAYOUT

FILE NAME	Main Valve Layout - Olympian
DWG NAME	CONTROL ARM INTERFACE



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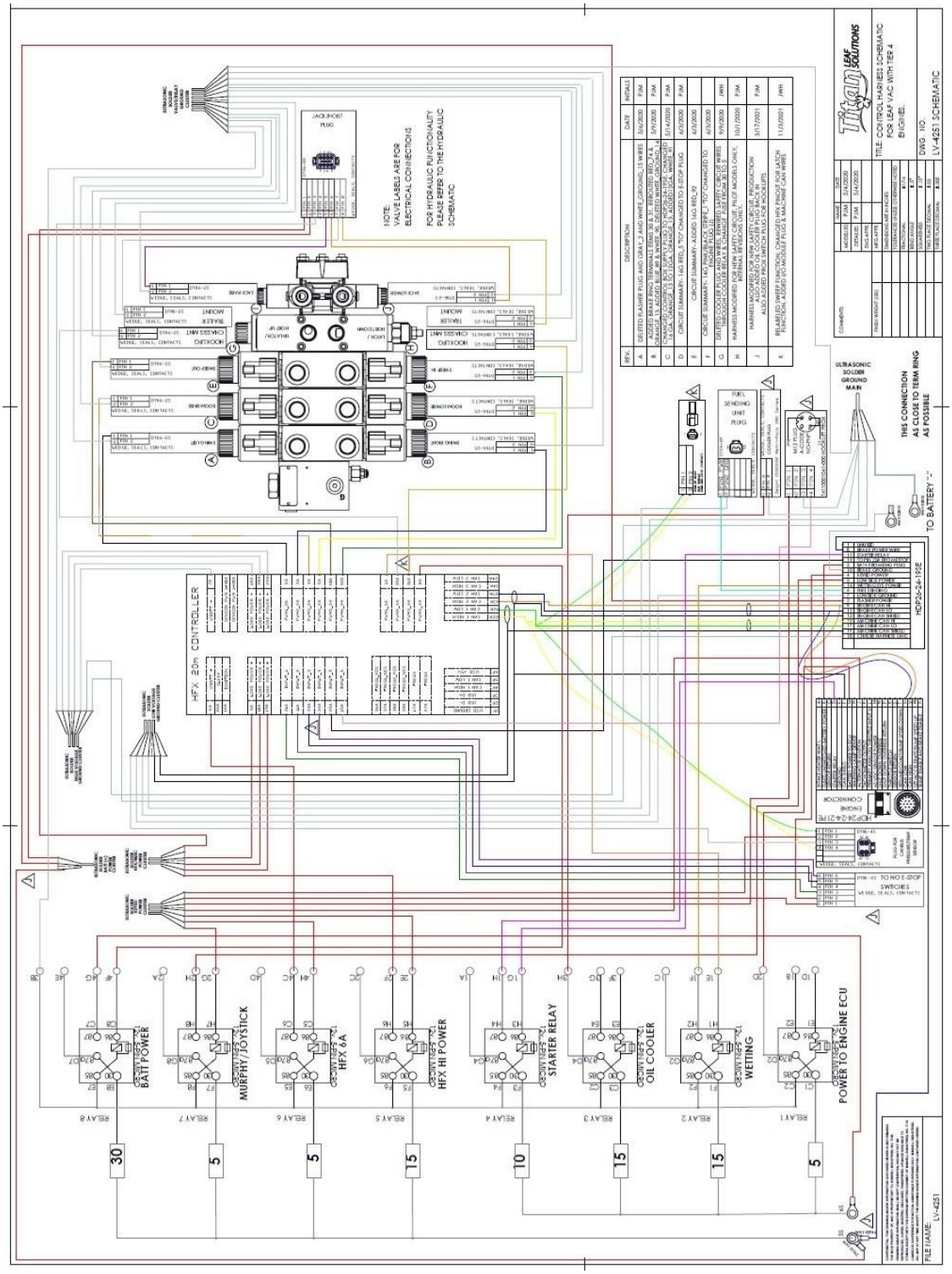
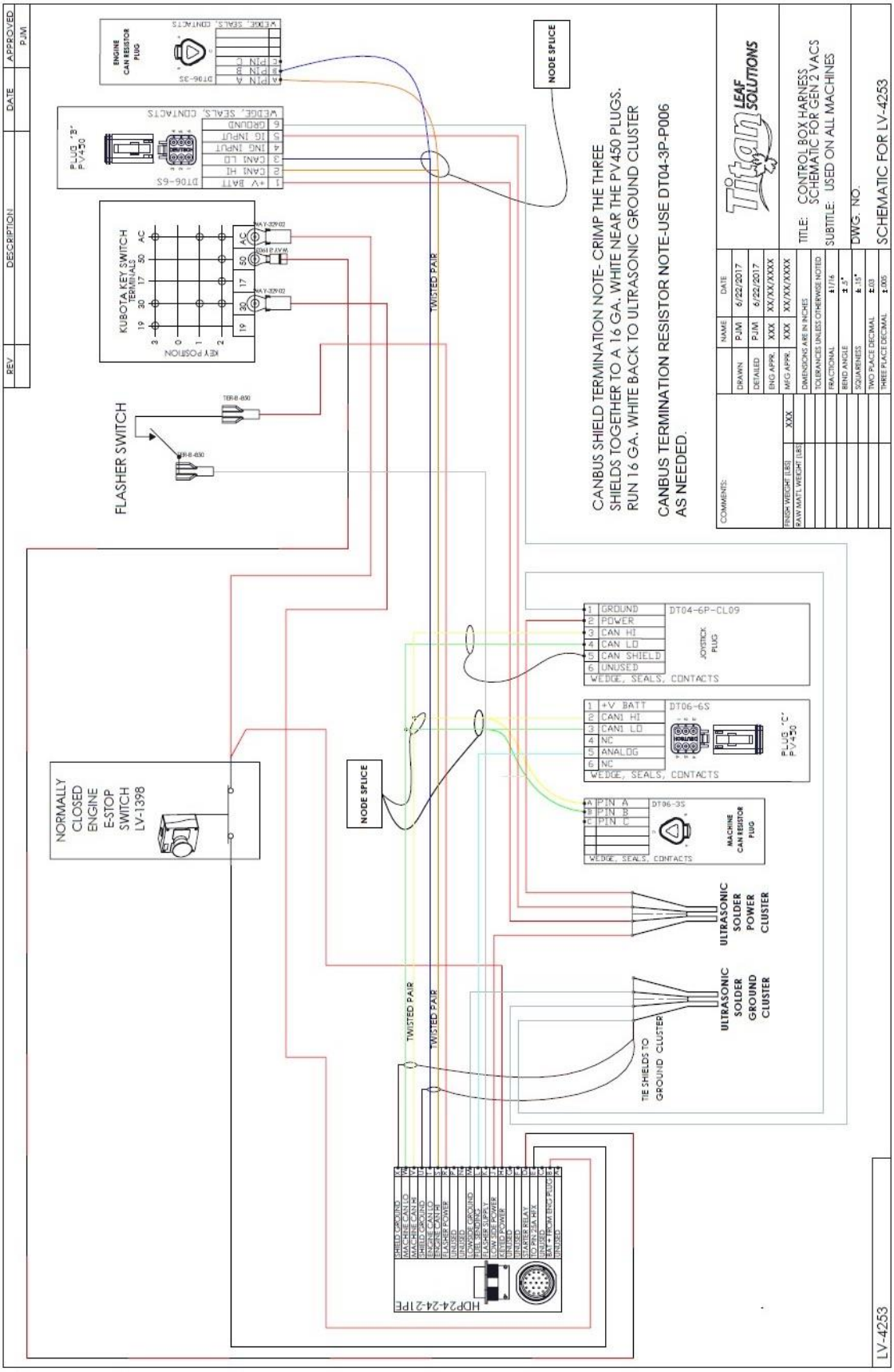
ELECTRICAL SCHEMATICS

The following pages show a complete system electrical schematic. Following the complete schematic, diagrams with part numbers illustrate how the leaf vacuum electrical system is broken down into individual harness assemblies. Use this as a reference when ordering replacement harnesses.

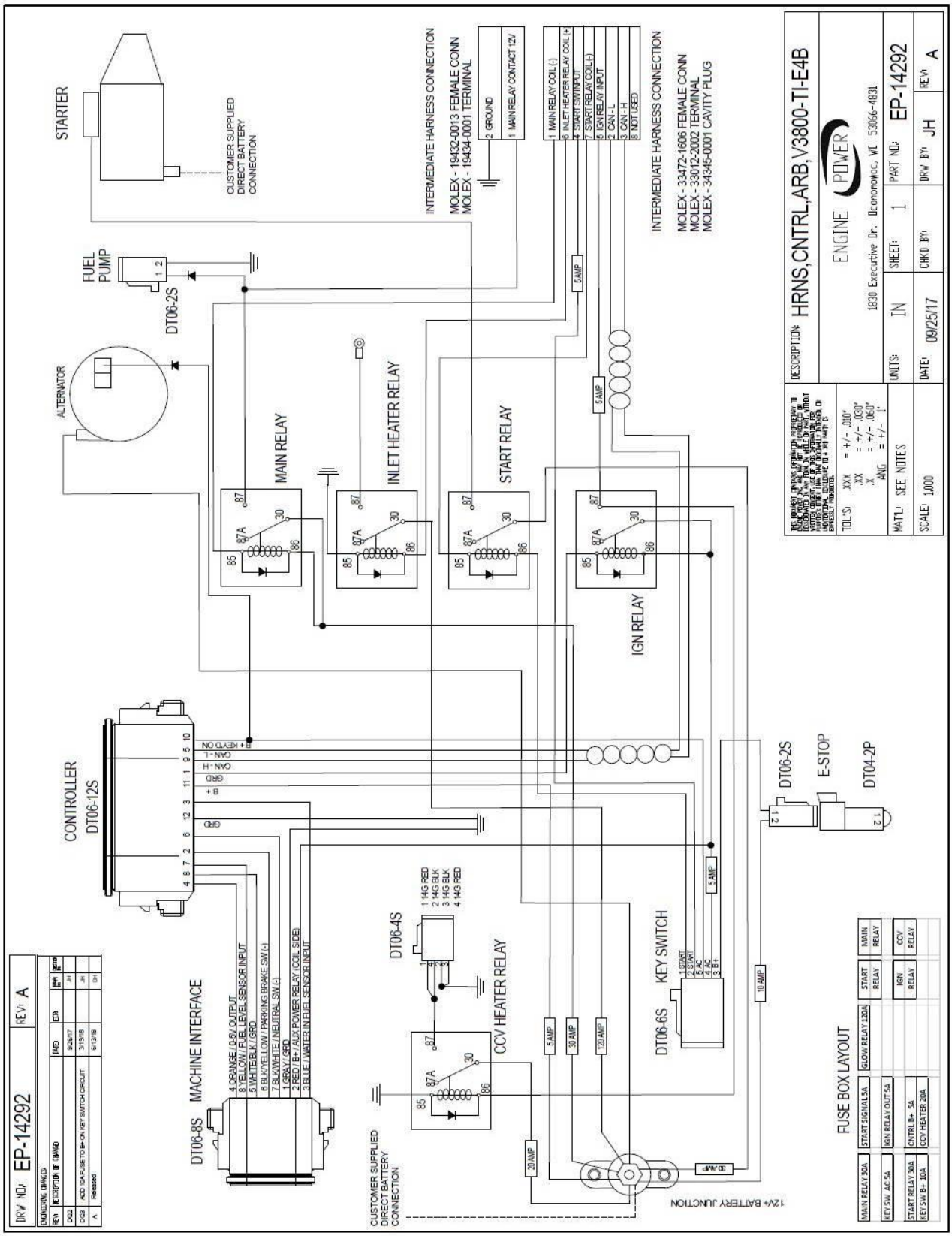
PROPORTIONAL VALVE CONTROL HARNESS SCHEMATIC TIER 4



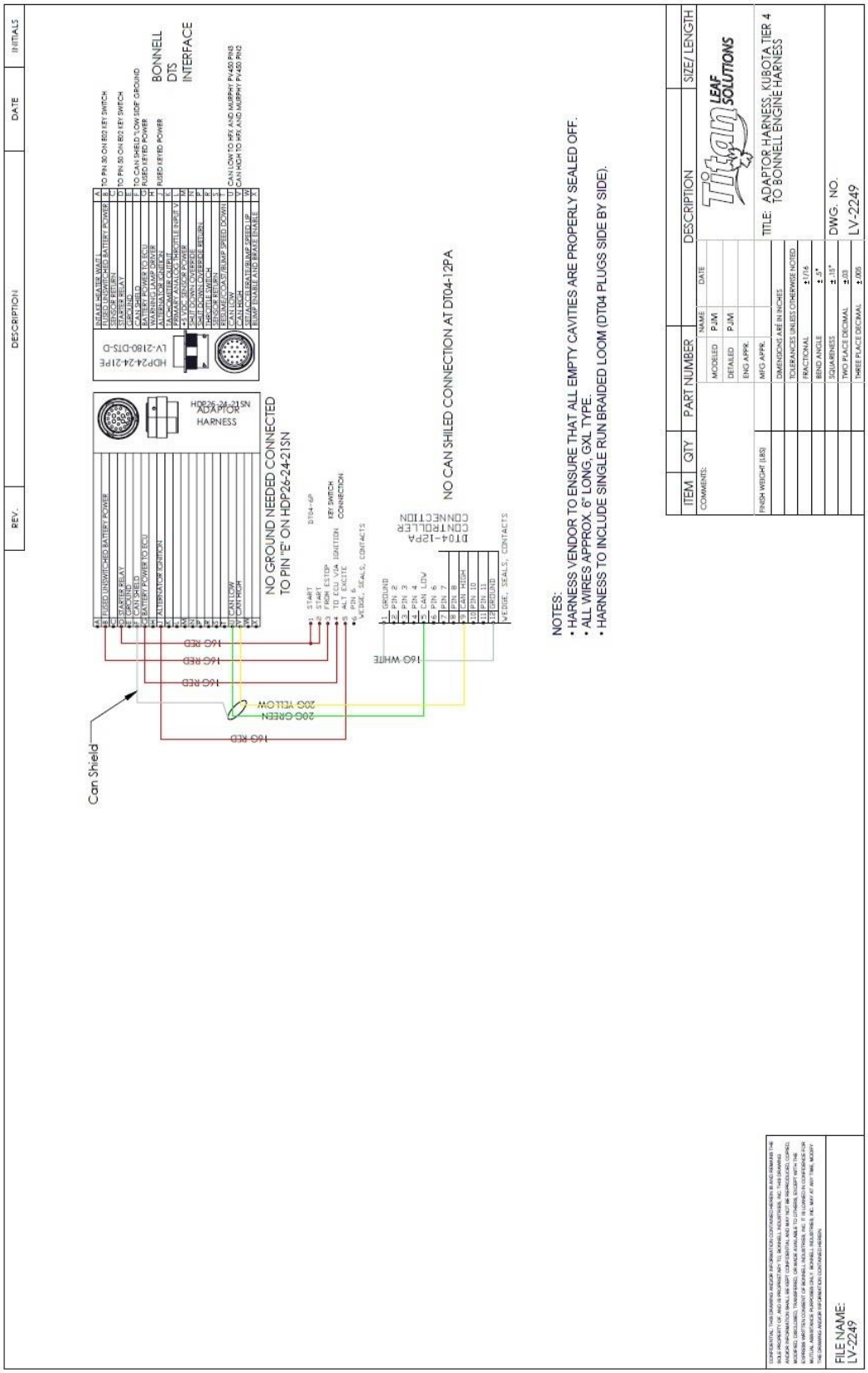
EXTERNAL CONTROL HARNESS SCHEMATIC TIER 4



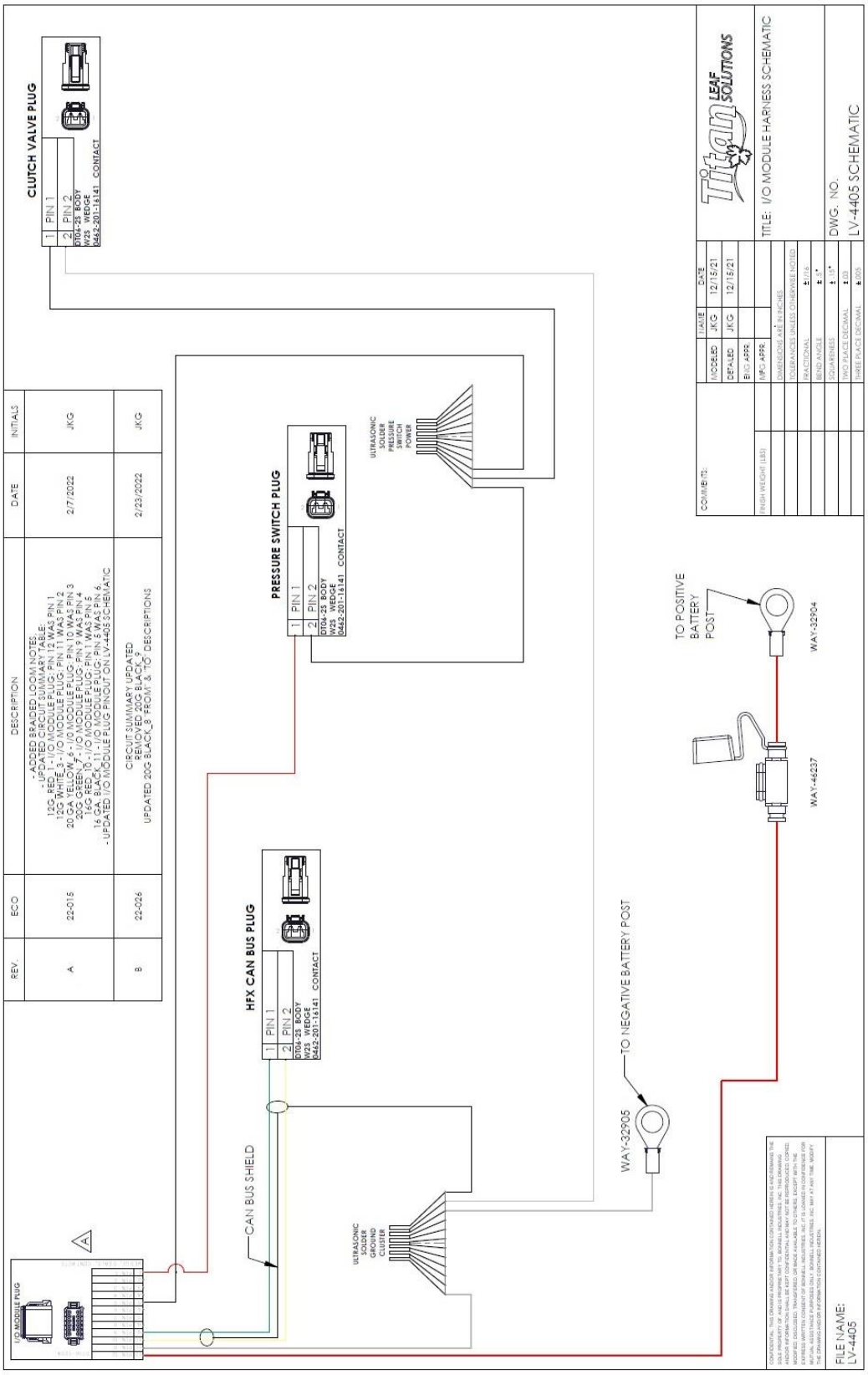
74 HP KUBOTA TIER 4 ENGINE SCHEMATIC



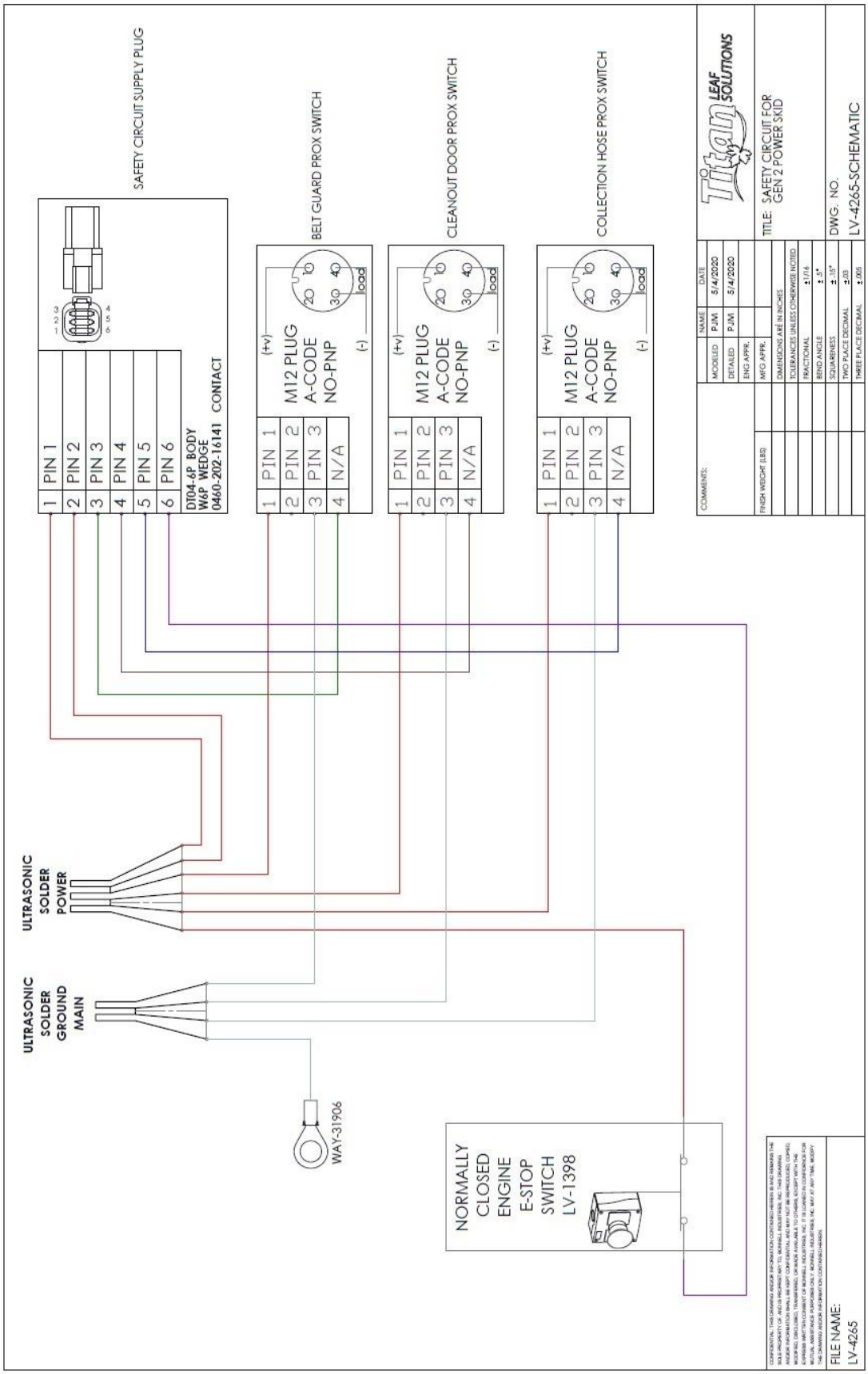
KUBOTA ENGINE ADAPTER HARNESS



I/O EXPANSION MODULE HARNESS

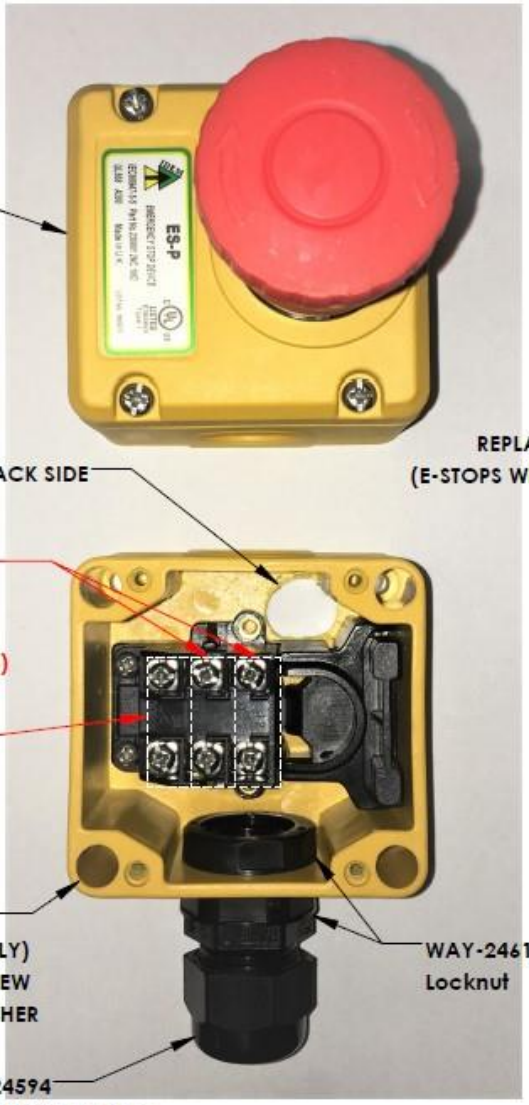


E-STOP SAFETY CIRCUIT SCHEMATIC



E-STOP WIRING ASSEMBLY

FILE NAME	LV-1398 WIRING ASSY	REV.	DESCRIPTION	DATE	INITIALS
DWG NAME	LV-1398 WIRING ASSY	-	ORIGINAL	11/30/2020	LAJ



REPLACE ONLY E-STOPS WITH GREY BASES
(E-STOPS WITH BLACK BASES DO NOT NEED REPLACED)

EXAMPLE ONLY: TERMINAL BLOCK 3
NORMALLY OPEN
-TITAN (ALL MODELS)
-SPARTAN (ALL MODELS)
(USE BLOCK 1 OR 2 FOR OLYMPIAN)

E-STOP INSTALLATION INSTRUCTIONS:

If wiring from the back:
- Drill1/2 hole as shown.

If wiring from side:
- Use knockout and install fittings as shown.

Fastening E-Stop to mounting surface:
- Transfer hole pattern (Opposite corners only)
- If field install - use one existing hole if possible.
- Drill 3/16" holes.
- Mount with 6-32 x 1" machine screws & nuts with star washers.

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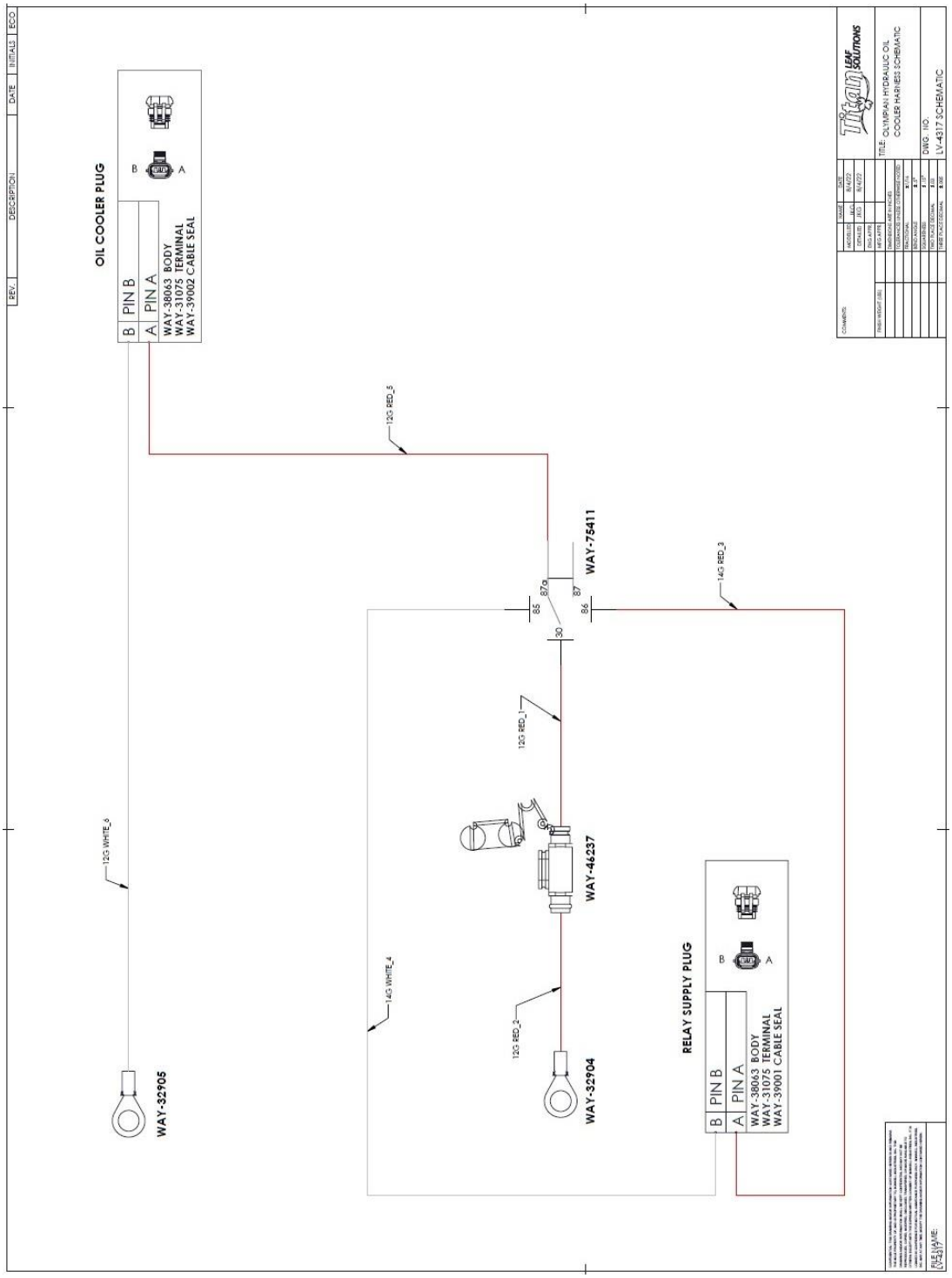
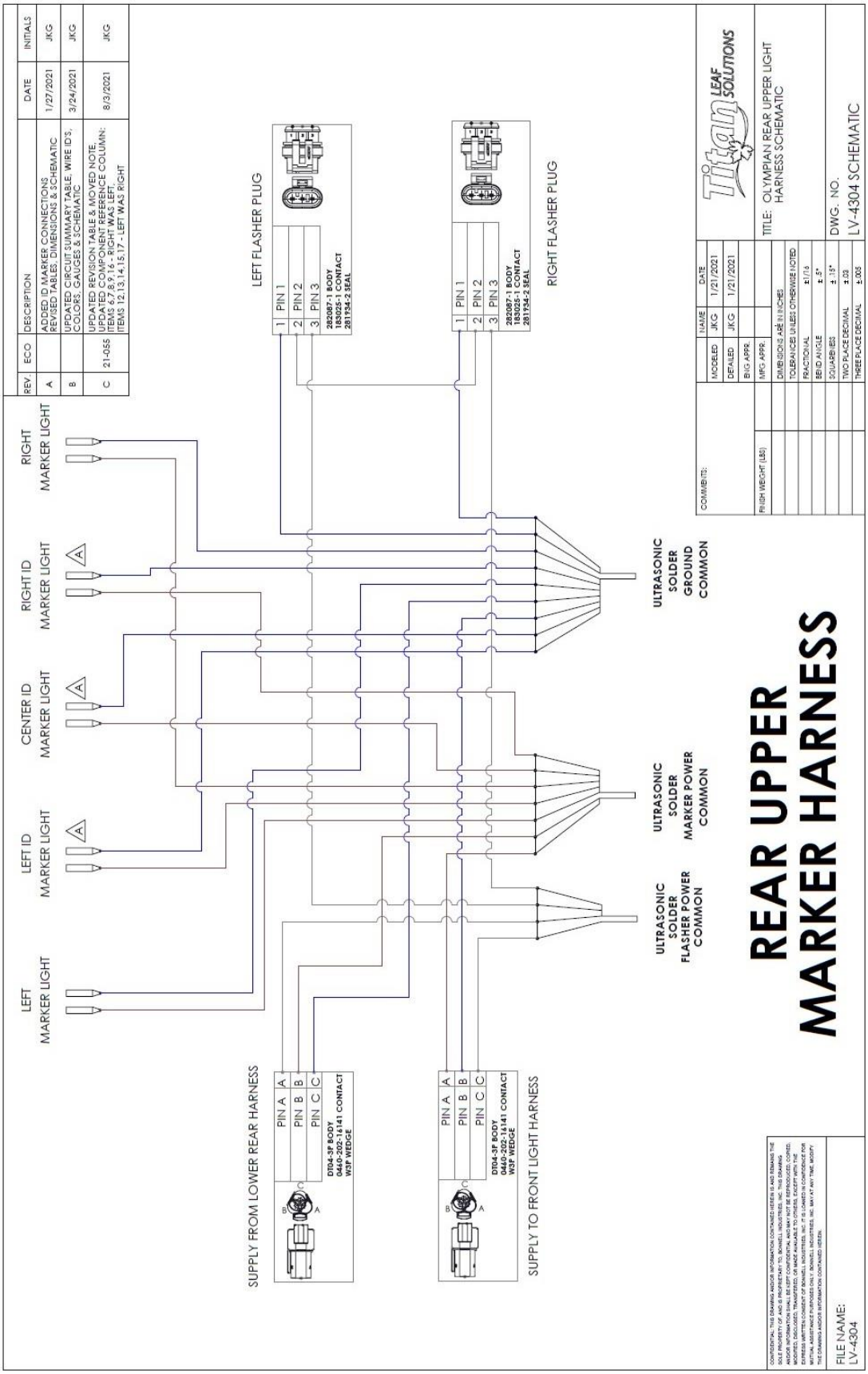
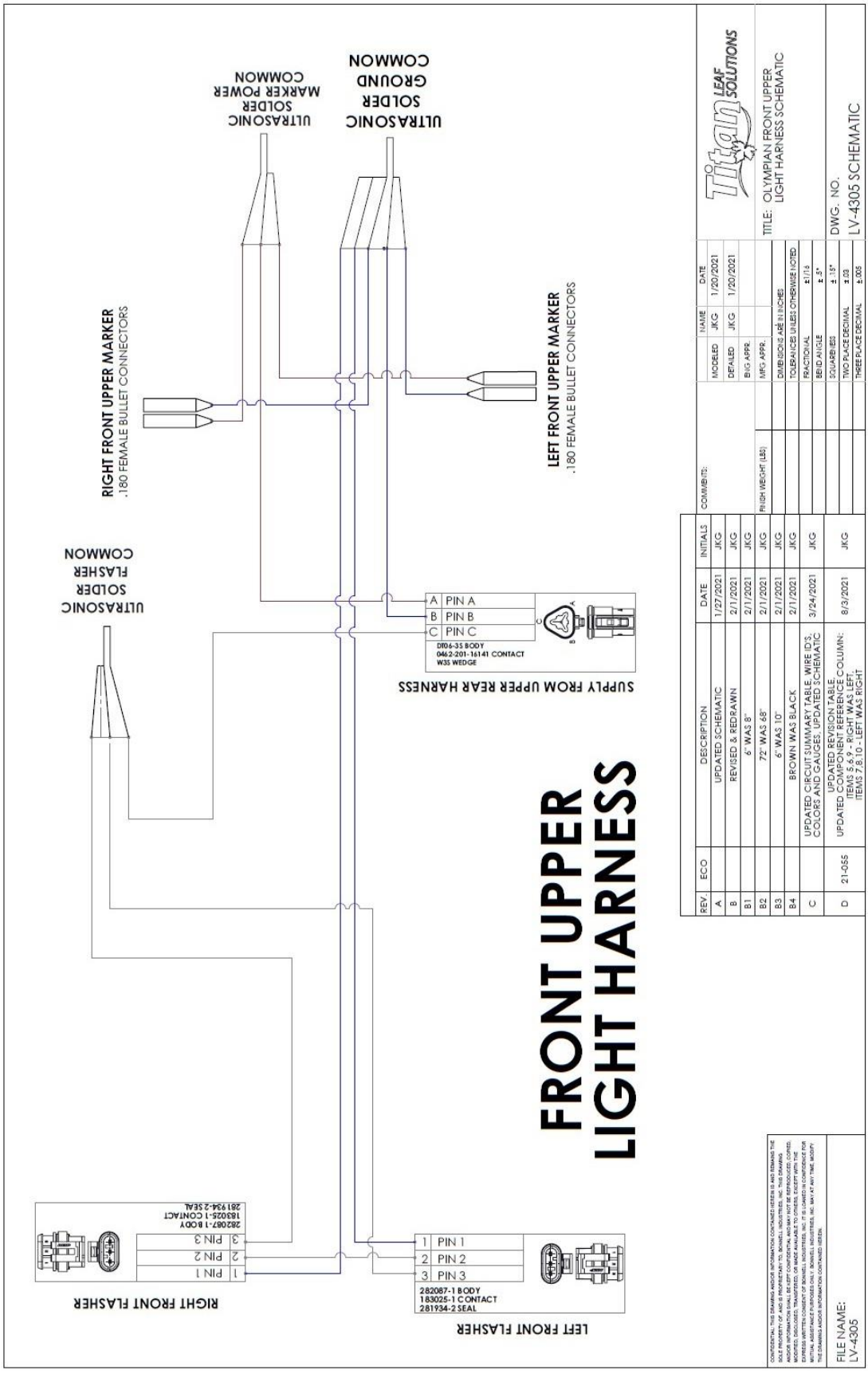
OIL COOLER HARNESS



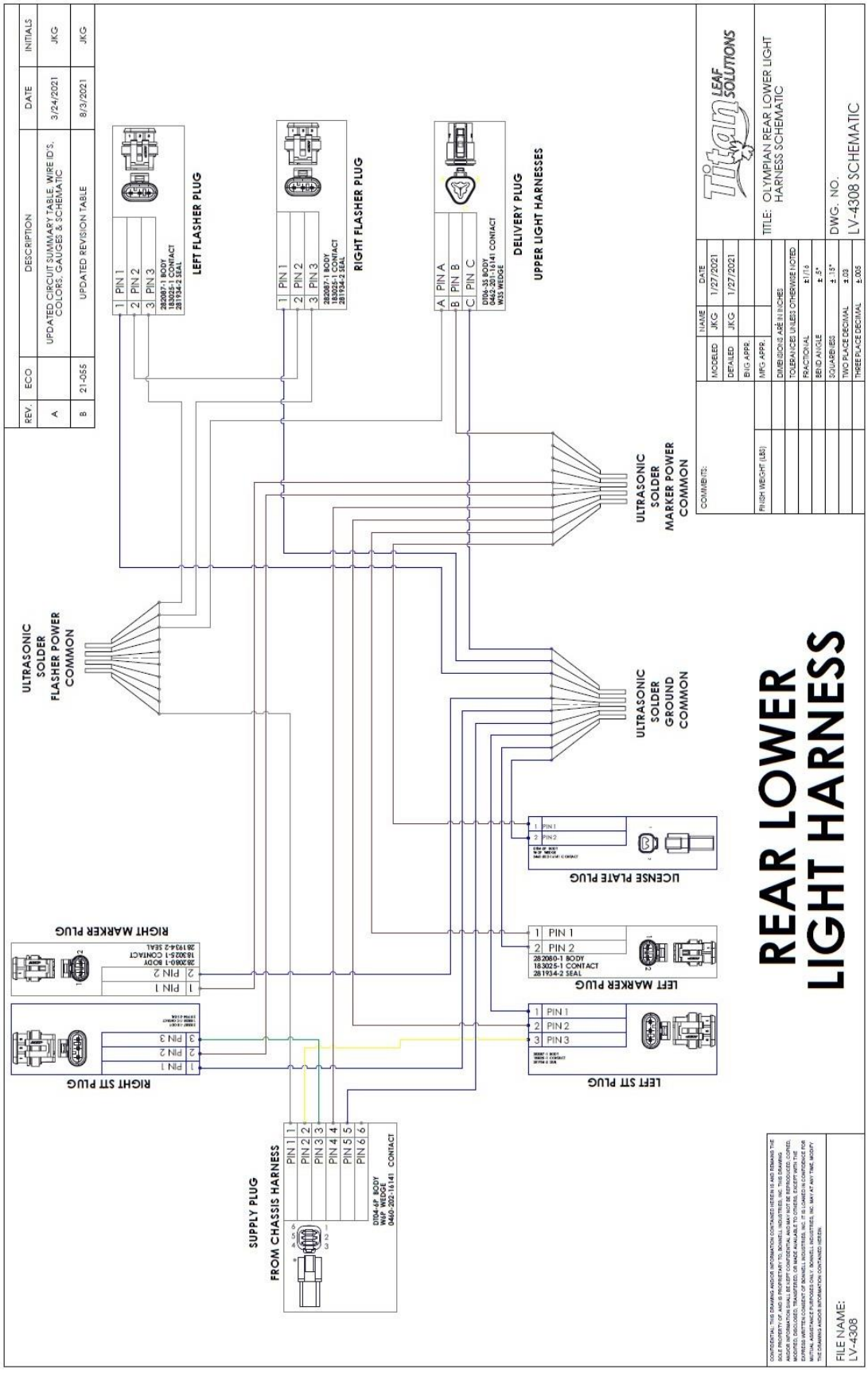
LIGHTING HARNESS, BODY REAR UPPER



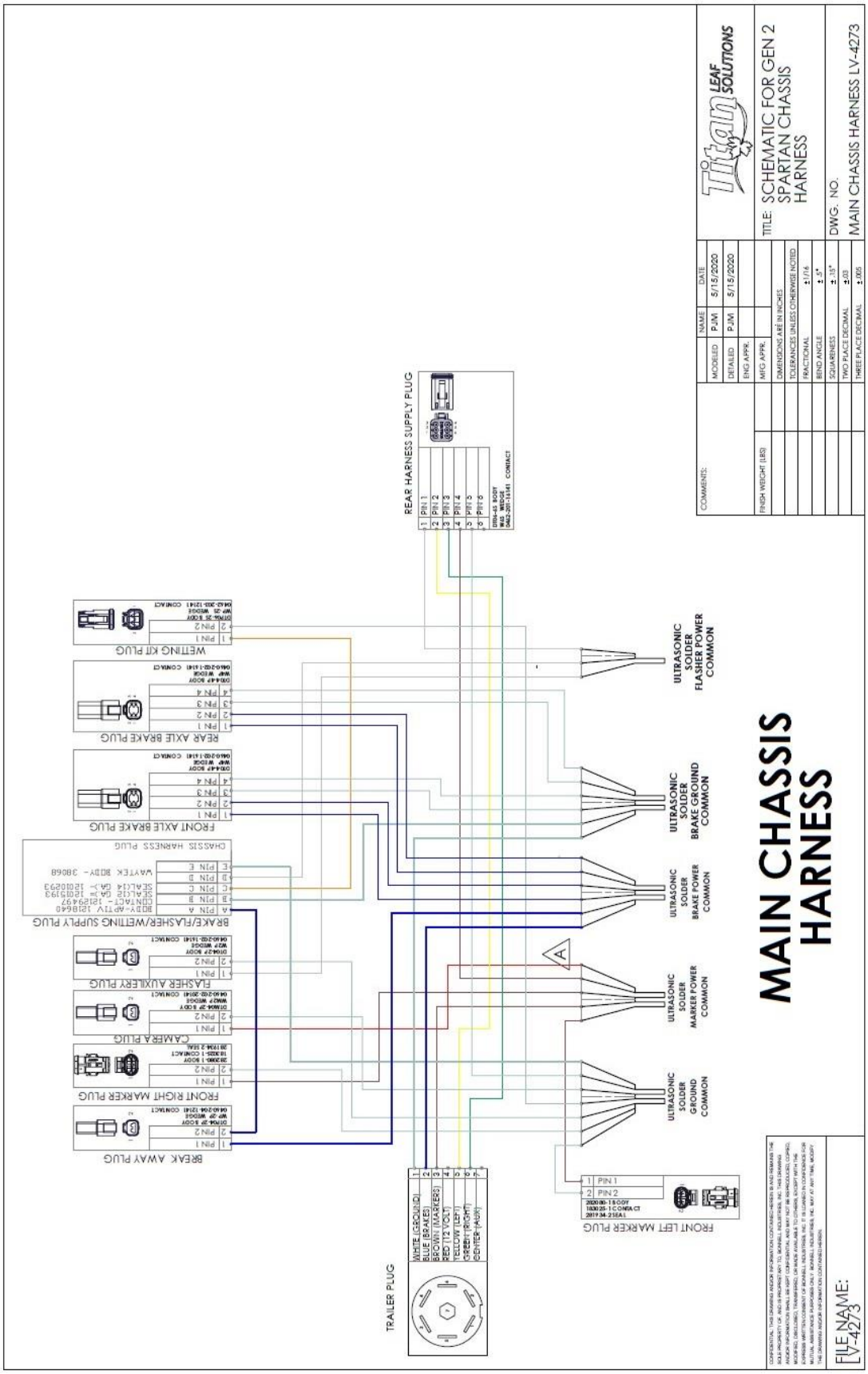
LIGHTING HARNESS, BODY FRONT UPPER



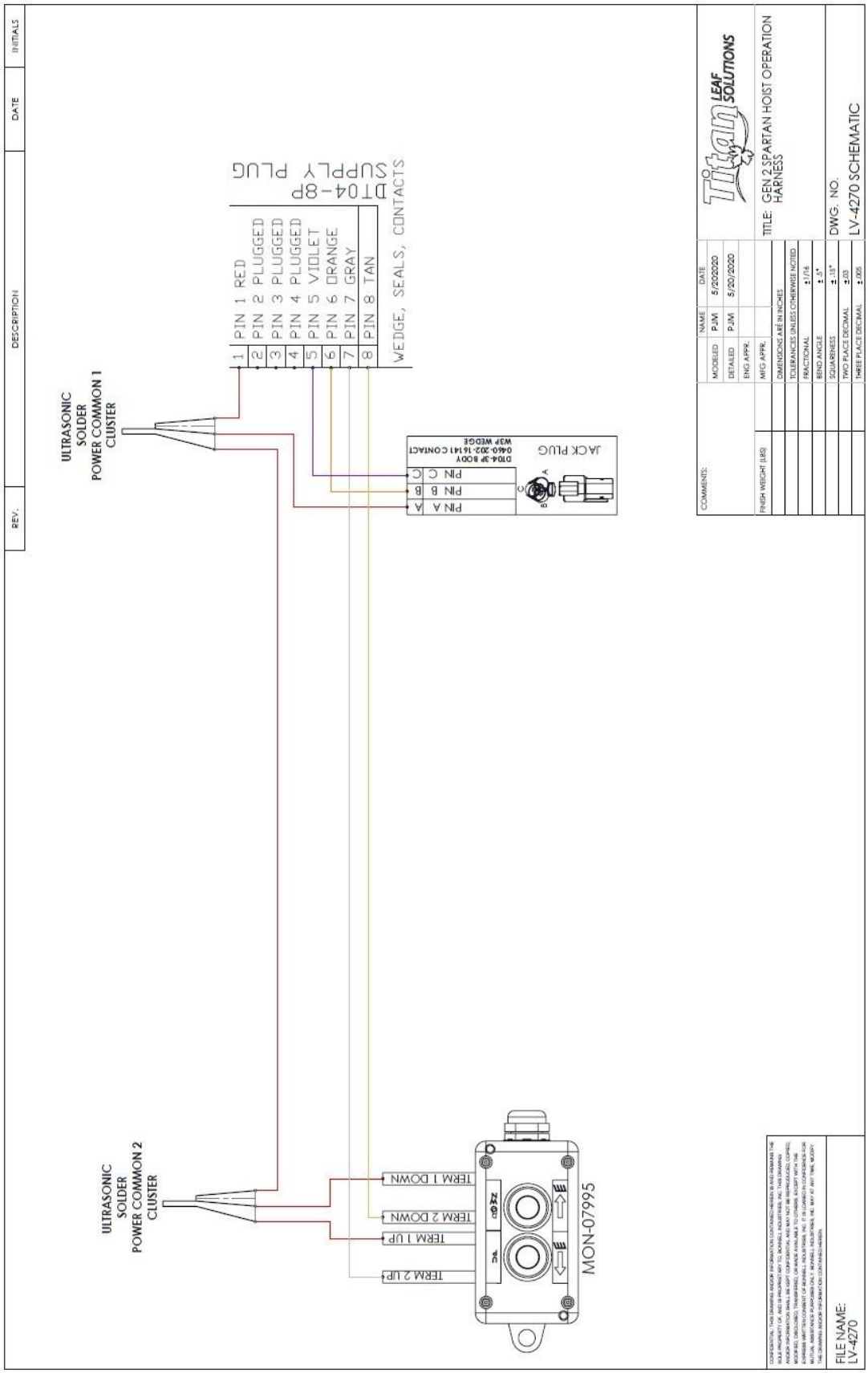
LIGHTING HARNESS, BODY REAR LOWER



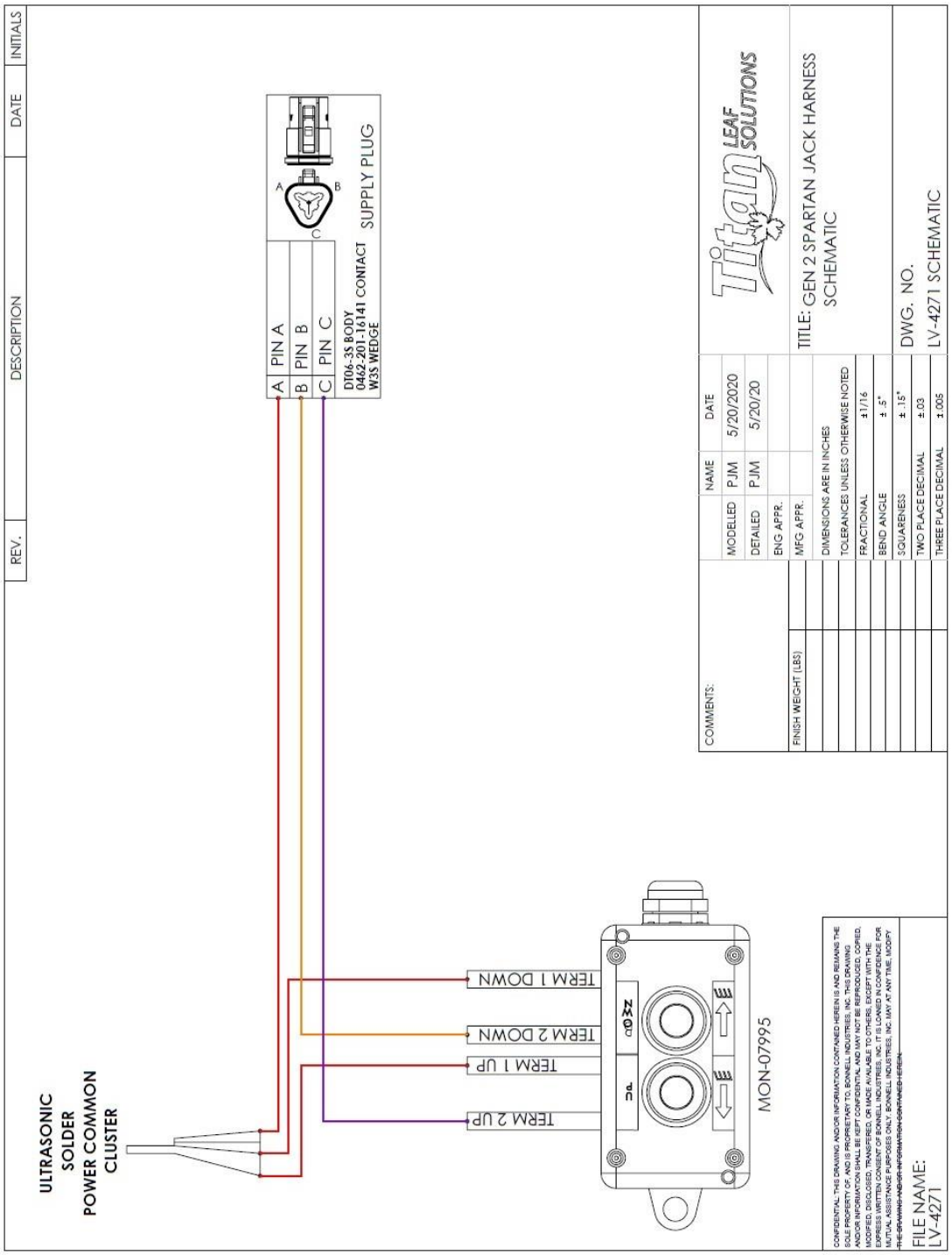
LIGHTING HARNESS, CHASSIS



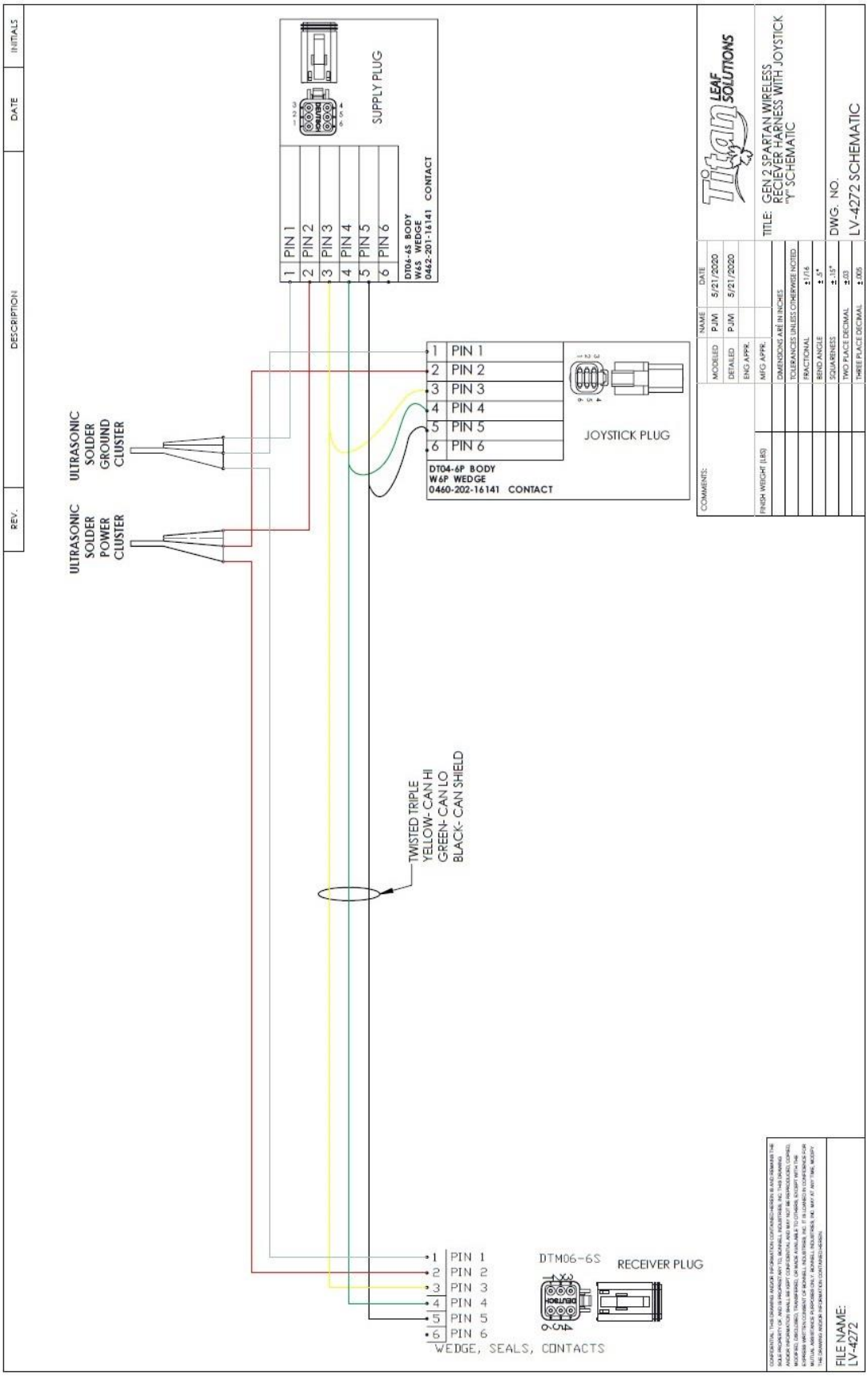
HOIST CONTROL HARNESS



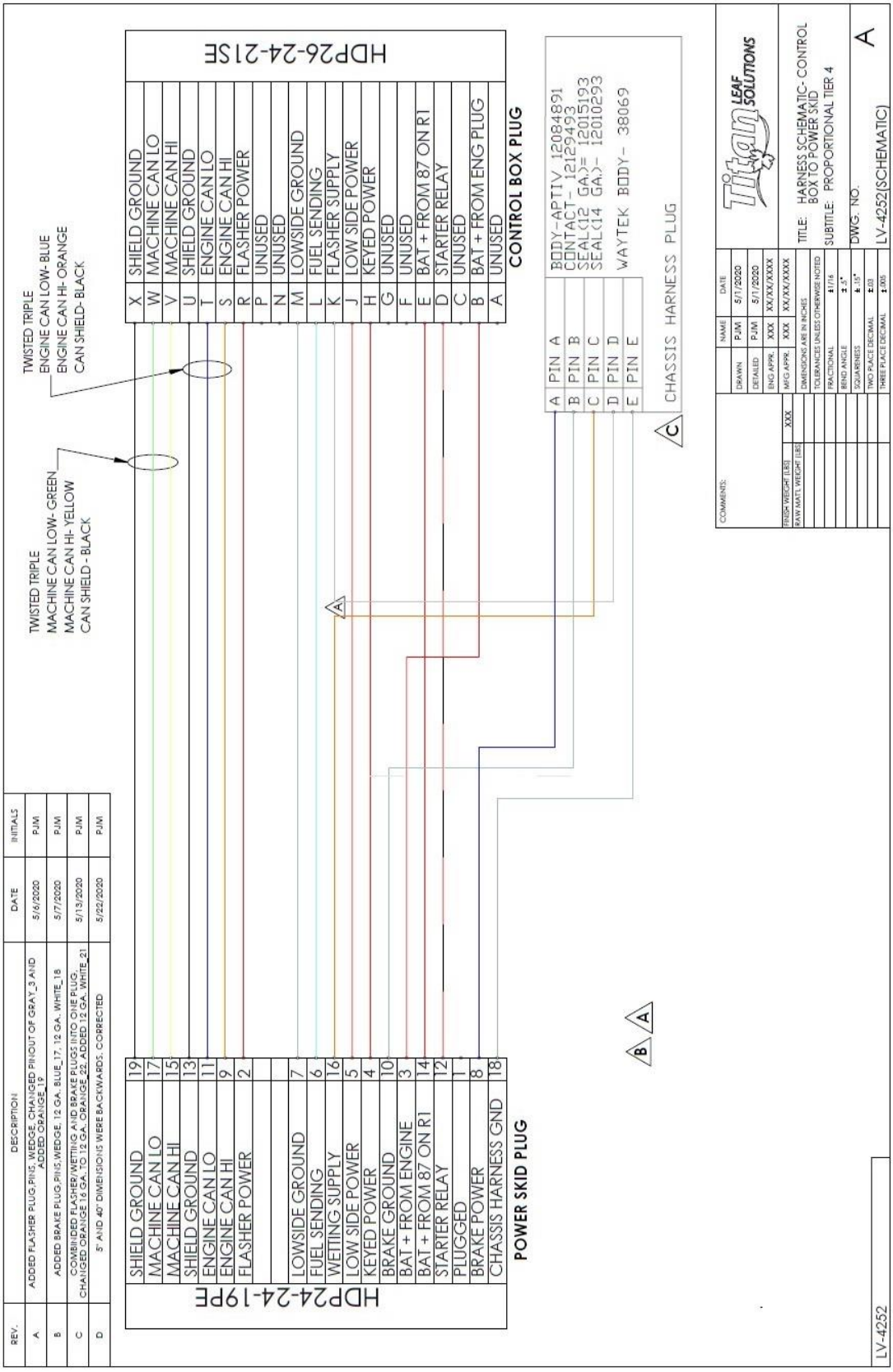
HYDRAULIC JACK HARNESS



WIRELESS CONTROL HARNESS



CONTROL BOX HARNESS



8 GENERAL OPERATING INSTRUCTIONS

SPECIAL NOTE: **this section of the manual is intended as a supplement to your specific municipal or business guidelines in leaf collection, and is not intended to be a *"complete leaf collection guide"*. Training is the key to safe and proper operation of this equipment. Ensure your operation is in compliance with all applicable codes and regulations.**

PRESTART CHECKLIST

NACD CLUTCH

HYDRAULIC CLUTCH

Softkeys are provided on the control panel for engaging & disengaging the hydraulic clutch. The engine throttle will automatically be reduced to idle speed when the clutch is engaged or disengaged. After 5 seconds the engine can be manually throttled up to the desired RPM.

Engage Clutch:
Press and hold the clutch engage softkey for one second. The engine throttle will automatically reduce to idle speed. The clutch will engage and the clutch engaged indicator will be displayed.

Disengage Clutch:
Press the clutch disengage softkey. The engine throttle will automatically reduce to idle speed. The clutch will disengage and the clutch disengaged indicator will be displayed.

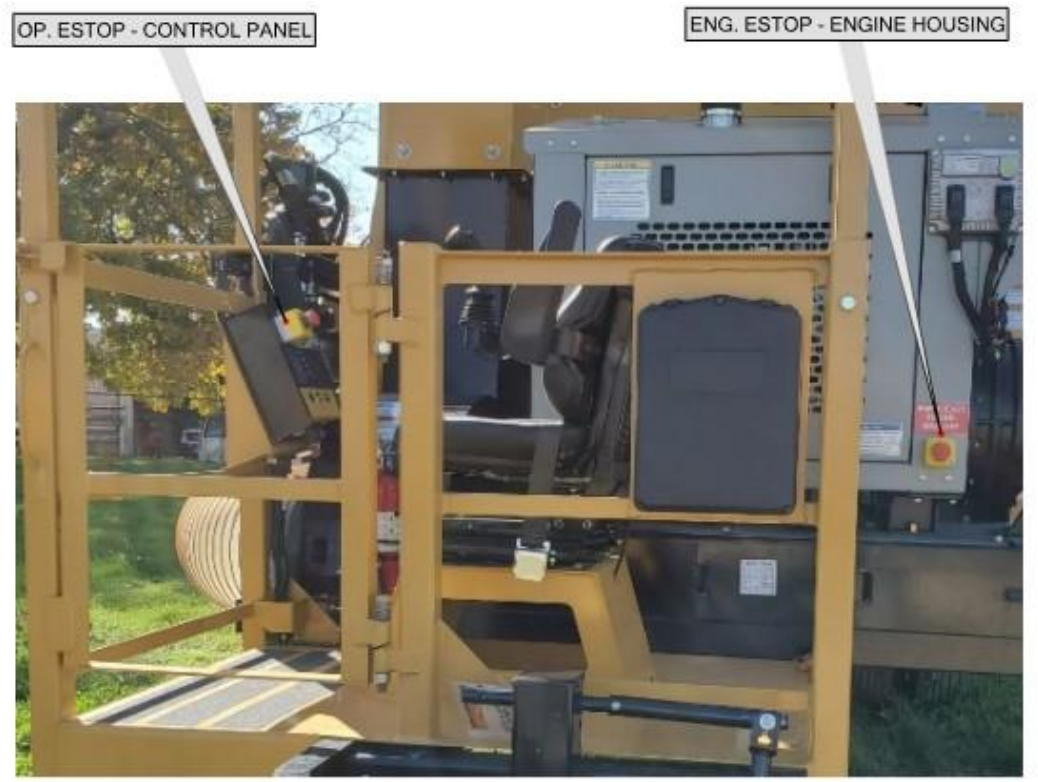
Clutch Adjustment:
The hydraulic clutch is a self-adjusting design which does not require adjustments.

ENGINE RPM

Adjust engine RPM to match working conditions. Generally, lower RPM is better for dryer and dusty conditions. However, engines will have greater vibrations at certain rpms that vary by engine. For example, the vibration of the engine may be higher at 2000 rpm than it is at 2200 rpm.
Never collect leaves while the engine is running in idle.

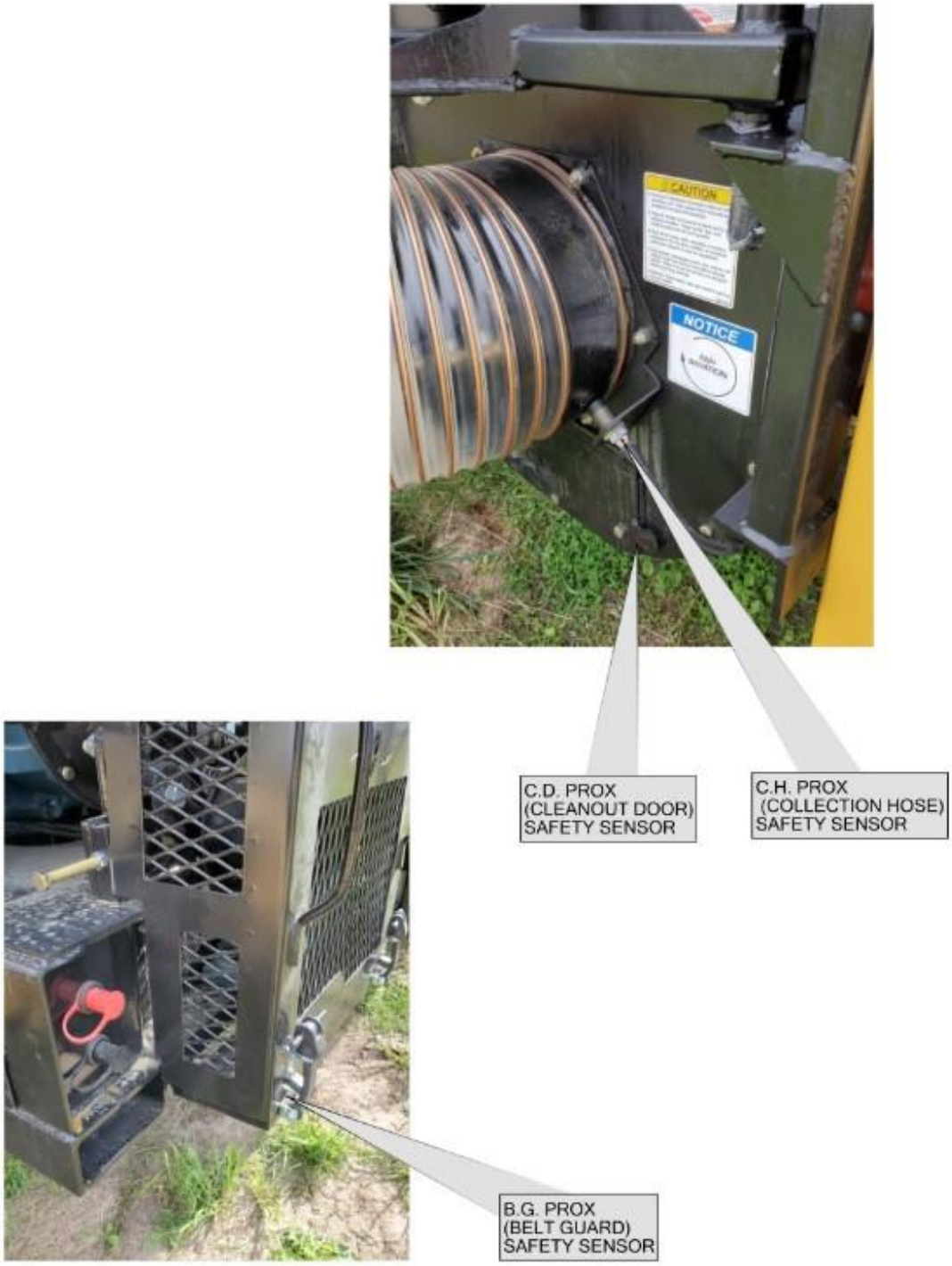
E-STOP SWITCHES

Emergency stop locations are shown below. Press the red button to stop the engine if an emergency situation arises. The emergency stop will kill the engine and disable all hydraulic and joystick functions. To reset the system after an e-stop activation, twist the red button on the e-stop switch until it pops out. Then switch the ignition key off and back on to clear the fault. The engine can now be restarted and operation may continue. If the engine will not start make sure all e-stop switches are reset. See section 8.1.6 for additional safety circuit information.



SAFETY SENSORS

The safety sensor locations are shown below. When activated the sensors will kill the engine and disable all hydraulic and joystick functions. To reset the system after a safety sensor activation, return the guard to its intended operating position. The engine can now be restarted and operation may continue. If the engine will not start, make sure all of the guards & covers are in their proper operating position. See section 8.6 for additional safety circuit information.

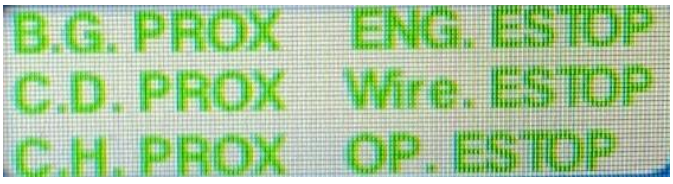


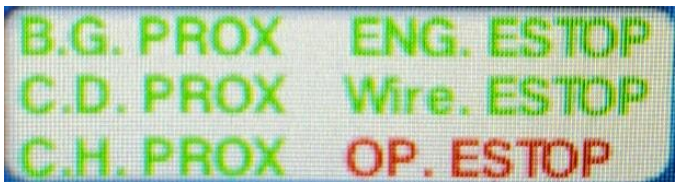
SAFETY CIRCUIT OPERATION

The safety circuit is comprised of safety sensors and emergency stop switches. Whenever a safety sensor or e-stop switch is activated all machine functions will be stopped and the engine will shut down. When a safety condition is encountered the control panel will display the message “SAFETY CIRCUIT FAULT!”.

It can be determined which safety sensor or E-stop has been activated by viewing the diagnostic menu. Press the softkey shown below to access the diagnostics menu.

A list of safety components is shown within the diagnostics menu. The component causing the fault will be displayed in red.





B.G. PROX = Belt guard safety sensor
C.D. PROX = Cleanout door safety sensor
C.H. PROX = Collection hose safety sensor
ENG. ESTOP = Engine E-stop switch
Wire. ESTOP = Wireless controller E-stop
OP. ESTOP = Operator E-stop switch

When a safety circuit fault has occurred the cause of the fault will need to be addressed before the machine can be operated again.

To clear the fault for e-stop activations, the e-stop switch must be reset by twisting the red button until it pops out, and then recycling the control system power by turning the ignition key switch off and back on again.

To clear the fault for safety sensor activations, the associated guard or cover must be returned to its intended operating position. The guard or cover is in the correct position when the base of the safety sensor is lit. The engine can then be restarted and operation may continue.

HYDRAULIC BOOM OPERATION

The collection boom is equipped with two hydraulic cylinders for up & down and sweep angle movements. Boom is supplied with a gearbox for left & right swing operation. These controls will provide the range of motion needed to operate on varying terrain and conditions.

Raise Boom – depress trigger and pull joystick towards the operator
Lower Boom – depress trigger and push joystick away from the operator
Swing Left - depress trigger and move joystick to the operator's left
Swing Right – depress trigger and move joystick to the operator's right
Sweep Angle – depress trigger and move the thumb control left or right

ENGINE THROTTLE CONTROLS

The engine throttle controls are controlled by the joystick buttons.

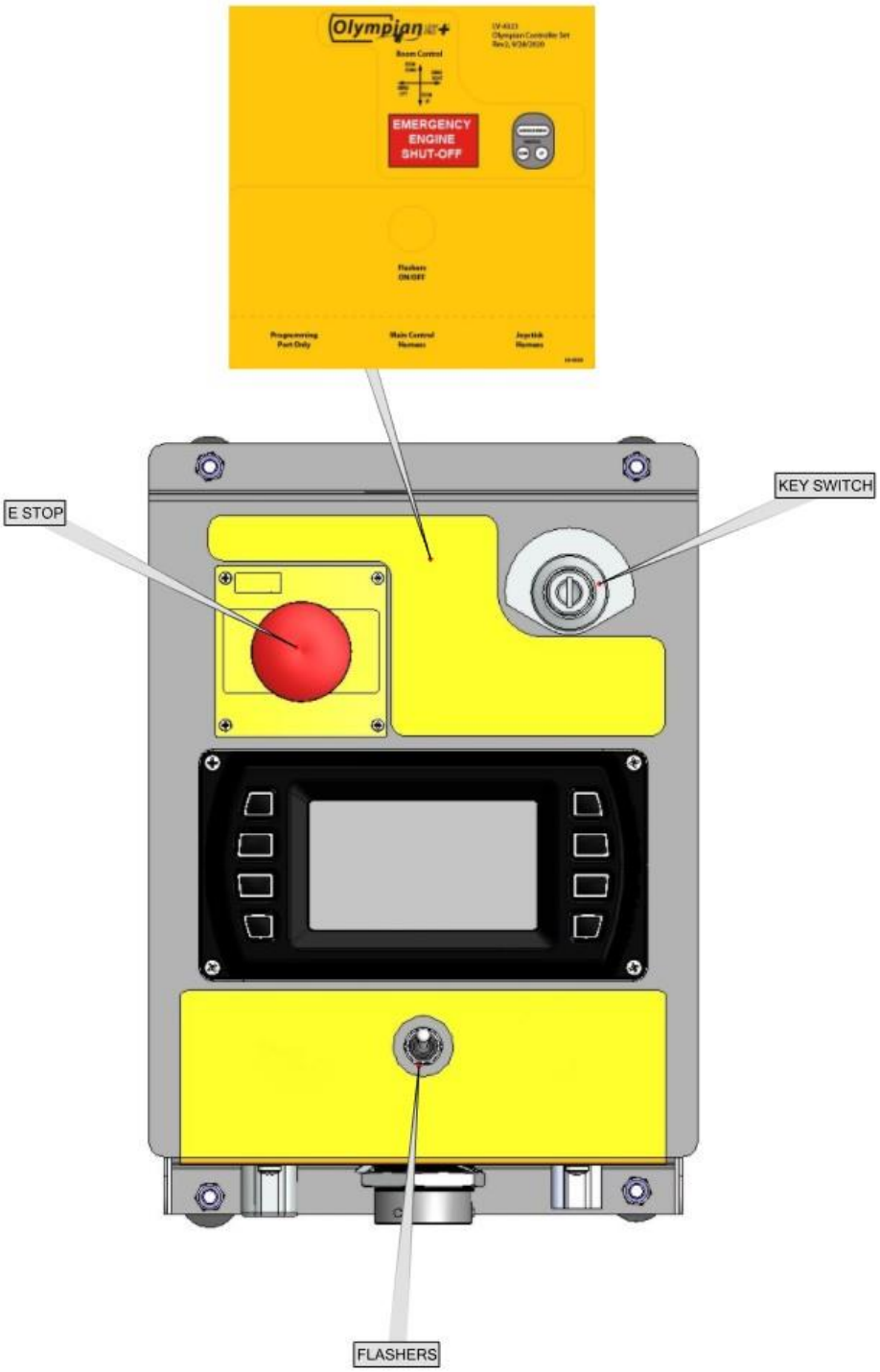
Throttle down – press and hold the throttle down button until desired RPM is achieved
Throttle up – press and hold the throttle up button until the desired RPM is achieved

Note: For machines equipped with a hydraulic clutch, when engaging or disengaging the clutch, the engine throttle will automatically be reduced to idle speed. After 5 seconds the engine can be manually throttled up to the desired RPM.

CONTROL PANEL OPERATION

The control panel assembly contains the PV450 display, key switch and E stop.

1. Turn ignition key to the ON position.
2. Turn ignition key to start the engine.
3. Flip the toggle switch to turn the flashing lights on/off.



PV450 CONTROLLER ADJUSTMENTS

Refer to supplemental controller manual, part number LV-2637. Contact Bonnell Industries to obtain a copy.

HYDRAULIC JACK

The hydraulic jack can be raised or lowered by the control panel located on the hydraulic jack. The engine needs to be running for jack operation.

BODY HOIST OPERATION

The body hoist is operated by the control panel located at the left rear corner of the body**.** This hydraulic function is equipped with a sequence valve. When raising the body, the tailgate latch cylinders will release first prior to the main hoist cylinder. When lowering, the reverse is true. In some cases, the door may touch the ground when dumping. The body is equipped with a double hinge mechanism to prevent damage to the door when this occurs.

⚠ Danger

Crush, pinch, and overhead clearance hazard! Assure that all people and equipment are in the clear when raising the hoist! Also be aware of overhead obstructions such as power-lines. Failure to do so could result in severe injury or death.

⚠ WARNING

Engine must be at idle when dumping. Failure to follow this procedure may cause debris to exit the blower housing, and cause injury.

⚠ WARNING

Do not back up while dumping. Failure to follow this procedure may cause severe damage to the body or tailgate.

⚠ DANGER

DANGER – Immediate hazards which WILL result in severe personal injury or death if the warning is ignored.

⚠ WARNING

WARNING – Engine must be at idle when dumping. Failure to follow this procedure may cause debris to exit the blower housing, and cause injury.

⚠ WARNING

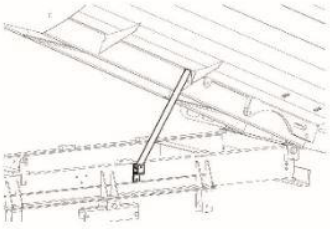
CAUTION – Hazards or unsafe practices which could result in minor or moderate injury if the warning is ignored.

⚠ NOTICE

NOTICE – Practices that could result in damage to the trailer or other property.

⚠ OPERATION OF BODY PROP

This machine is equipped with:
( ) 1 Body Prop
( ) 2 Body Props

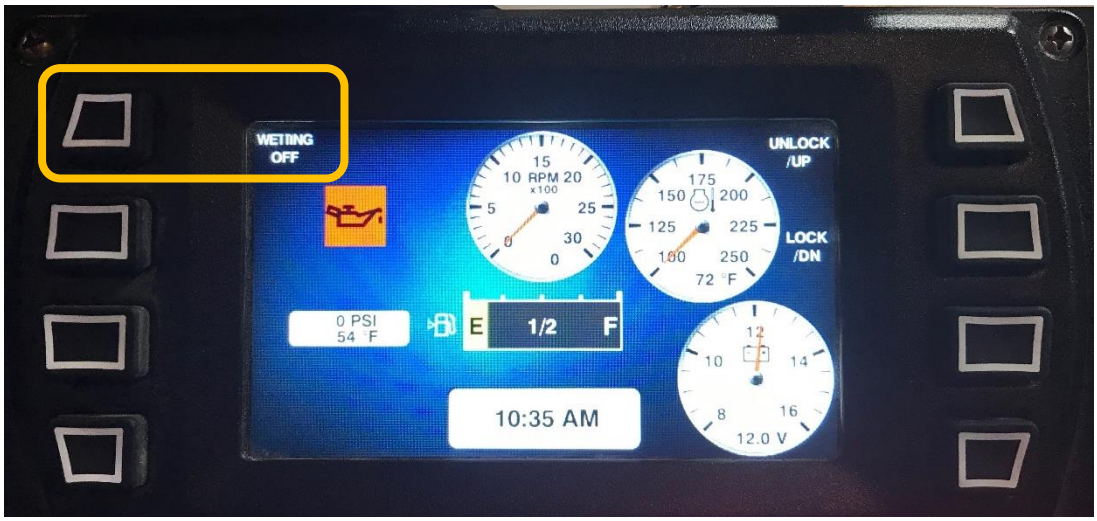


TO USE BODY PROP(S):
1. Raise body to height where prop(s) can be swung upward into position. Place the hoist control valve in the neutral (hold) position.
2. Locate prop(s) (behind fender), and swing "up" to the support position.
3. Lower body slowly until prop(s) rests on prop receiver. Do not power hoist down. Place the hoist control valve in the neutral (hold) position.

TO STORE THE PROP(S):
4. Raise body to a height where the prop(s) will clear the prop receiver. Be sure the hoist control valve is in the neutral (hold) position.
5. Swing prop(s) down to transit position. Before lowering body be certain that the area is clear.

DUST CONTROL SYSTEM

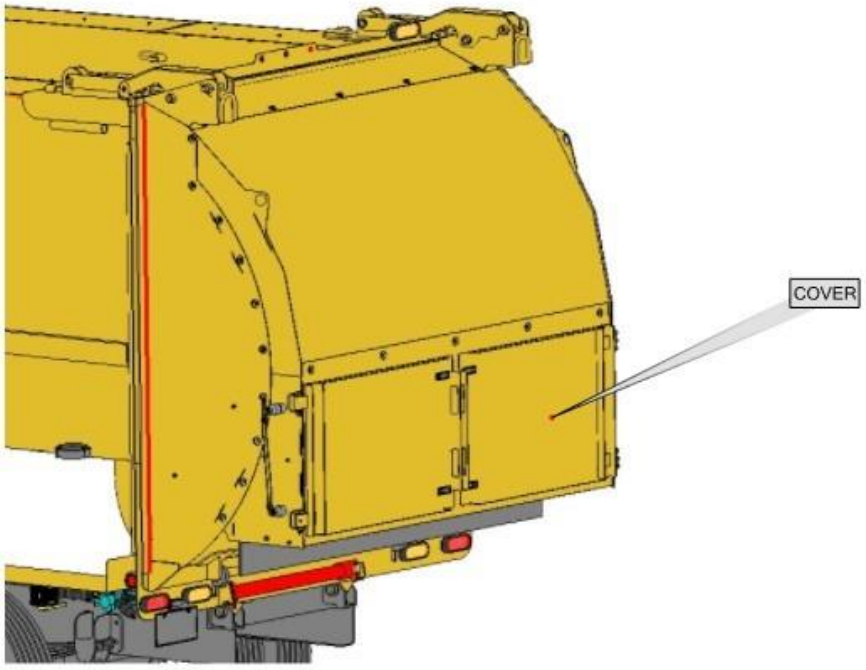
The dust control system is designed to reduce the amount of dust exiting the body. A softkey is provided on the control panel to switch the pump on / off.

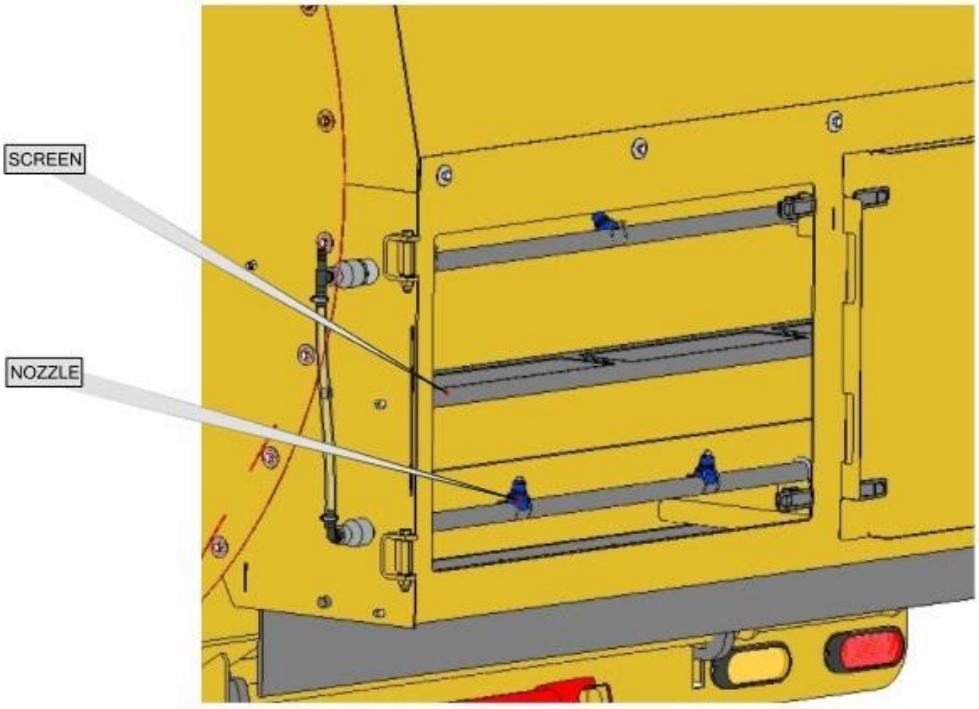


The dust control system consists of:

- 100-gallon water tank
- Electric pump
- Strainer
- 8 spray nozzles located in the discharge chute that apply water to the debris as it passes through.

The dust control screens should be cleaned each time the water tank is refilled. To clean the screens, open both rear covers. Unlatch the screens allowing them to rotate to the vertical position and then hose the debris off the screens. Return the screens to the horizontal position and re-latch. Close both rear covers.


COVER


SCREEN
NOZZLE

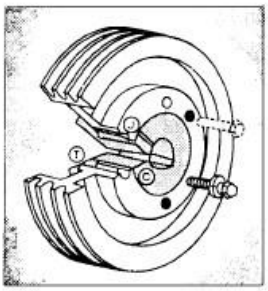
9 SUPPLEMENTAL MANUALS

QD & SPLIT TAPER BUSHINGS

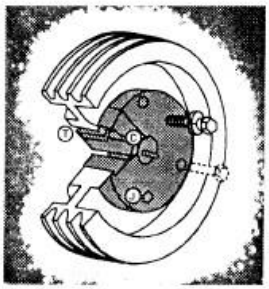
QD Bushing/Sheaves Installation

MASTERDRIVE®
POWER TRANSMISSION PRODUCTS

QD bushing sizes JA through N can be assembled in either of the two positions shown below. Sizes P through S should be assembled in position one. *Position One* is the conventional or standard mounting. *Position Two* (Reverse Mounting) may be necessary in some cases, such as mounting small sheaves with blind holes (not drilled through).



Position 1



Position 2

Bushing Size	Cap Screw Size-Thread	Foot Pounds Wrench Torque*
JA	10-24	3
SH-SDS-SD	1/4-20	6
SK	5/16-18	10
SF	3/8-16	20
E	1/2-13	40
F	9/16-12	50
J	5/8-11	90
M	3/4-10	150
N	7/8-9	200
P	1-8	300
W	1-1/8-7	400
S	1-1/4-7	500

*For Normal Applications. *For Severe* (Rock-crusher type) applications these values can be increased by a maximum of 50%
Caution: Excessive cap-screw torque can cause sheave and/or bushing breakage. The use of lubricants can cause sheave breakage.

Therefore,
DO NOT USE LUBRICANTS IN THIS INSTALLATION!

INSTALLATION:

1. Make sure the tapered-cone surface of the bushing and the mating bore of the sheave are free of all foreign substances, such as dirt, excess paint accumulations, metal chips, lubricants, etc.
2. For position one or two (whichever applies), line up the unthreaded holes (C) with the threaded holes (t) and insert cap screws with lock washers engaging only two or three threads. (*a)
3. With key in shaft keyway, slide the loosely-assembled unit onto shaft and position for good belt alignment. (*b, *c) **Use no lubricants or anti-seize compound on threads or tapered surfaces.**
4. Carefully tighten the capscrews alternately and progressively until the tapers are seated (at approximately half the recommended torque).
5. Check alignment and sheave runout (wobble) and correct as necessary.
6. Continue careful alternate and progressive tightening of the cap screws to the recommended torque values shown in the table. **Maximum torque should be achieved on each individual bolt only two times in the consecutive tightening.**

Note: When properly mounted, there will be a gap between the bushing flange and sheave after the screws are tightened.
Caution: Use of Lubricants and or excessive screw torque can cause breakage

7. Tighten the set screw, when available, to hold the key securely during installation and until cap screws are securely tightened.

REMOVAL

1. Loosen and remove all mounting cap screws.
2. Insert cap screws in all threaded jack screw holes (J).
3. Start with the screws furthest from the bushing saw slot and tighten all jack screws alternately and progressively. Keep turning the screws in small equal amounts until the tapered surfaces disengage.

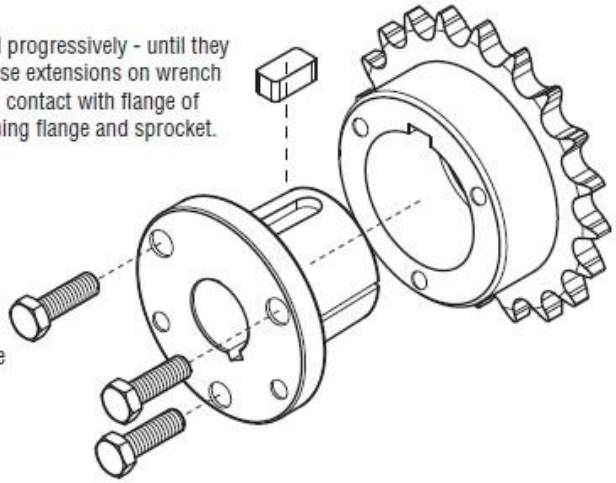
(*a) When mounting a sheave on M through W size bushing, position the threaded jack-apart hole (J) as far from the bushing saw as possible to reduce the possibility of bushing breakage.
(*b) When installing large or heavy parts in *Position One*, it may be easier to mount the key and bushing on the shaft first. Then place the sheave on the bushing and align the holes.
(*c) **Caution**: When mounting on a vertical shaft, provisions must be made, which will positively prevent the sheave and/or bushing from dropping during installation.

MST® Bushings
Instructions & Removal Instruction

The MST® bushings are easy to install and remove. They are split through the barrel and have a taper to provide a true clamp on the shaft. They are keyed to both the shaft and the hub to help during "blind" installations.

INSTALLATION

1. Be sure the tapered cone surfaces of the bushing and the inside of the driven product are clean and fee of anti-seize lubricants.
2. Place bushing in sprocket or other Martin MST® part.
3. Place cap screws loosely in pull-up holes. Bushing remains loose to assure sliding fit on shaft
4. With key on shaft, slide sprocket to desired position on shaft. Be sure heads of cap screws are accessible.
5. Align sprocket. Tighten screws alternately and progressively - until they are pulled up tight (see table below). Do not use extensions on wrench handles. Do not allow sprocket to be drawn in contact with flange of bushing. There should be a gap between bushing flange and sprocket. **CAUTION: THIS GAP MUST NOT BE CLOSED**



REMOVAL

1. Loosen and remove cap screws.
2. Insert cap screws in tapped removal holes.
3. Tighten inserted screws until sprocket is loose on shaft.
4. Remove sprocket from shaft.

WRENCH TORQUE VALUE FOR TIGHTENING BUSHING		
MST® Bushing Size	Size of Cap Screw	Wrench Torque in/lb
G	.25 × .625	95
H	.25 × .75	95
P	.313 × 1	192
Q	.375 × 1.25	348
R	.375 × 1.75	348
S	.5 × 2.25	840
U	.625 × 2.75	1680
W	.75 × 3	3000

CAUTION

WARNING: USE OF ANTI-SEIZE LUBRICANT ON TAPERED CONE SURFACE OR ON BOLT THREADS WHEN MOUNTING MAY RESULT IN DAMAGE TO SHEAVE AND SPROCKETS. THIS VOIDS ALL MANUFACTURER'S WARRANTIES

WARNING: Because of the possible danger to person(s) or property from accidents which may result from the improper use of products, it is important that correct procedures be followed: Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions given above must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. All rotating power transmission products when used in a drive are potentially dangerous and must be guarded by the user as required by applicable laws, regulations, standards, and good safety practice. (Refer to ANSI Standard B15.1.)

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TRANSFLUID COUPLER

TRANSFLUID

TRANSFLUID
trasmissioni industriali

NORME D'INSTALLAZIONE E MANUTENZIONE

PRIMA DI MONTARE E METTERE IN FUNZIONE IL PRODOTTO, LEGGERE ATTENTAMENTE TUTTE LE ISTRUZIONI SULLA SICUREZZA ED IL FUNZIONAMENTO RIPORTATE NEL PRESENTE MANUALE.

SEGUIRE SEMPRE TUTTE LE AVVERTENZE ED ASSICURARSI CHE GLI OPERATORI PRESENTI IN PROSSIMITA' DELL'APPARECCHIATURA INDOSSINO TUTTI I DISPOSITIVI DI PROTEZIONE RICHIESTI PER LA SICUREZZA NELL' AMBIENTE DI LAVORO.

NON UTILIZZARE L'APPARECCHIATURA SE LE PRESENTI ISTRUZIONI NON DOVESSERO RISULTARE CHIARE, E CONTATTARE IMMEDIATAMENTE IL COSTRUTTORE O IL DISTRIBUTORE PER L'ASSISTENZA NECESSARIA.

IL PRODOTTO DEVE ESSERE PROTETTO DA UNA COPERTURA ADEGUATA PER EVITARE DANNI ALLE PERSONE.
LO SCHERMO DEVE SEMPRE PREVEDERE APERTURE ASSIALI E RADIALI PER LA VENTILAZIONE DEL GIUNTO.

SE FOSSE MONTATO IL TAPPO FUSIBILE, LE SUDDETTE APERTURE NON DEVONO ESSERE ORIENTATE VERSO GLI OPERATORI, PARTI CALDE O COLLEGAMENTI ELETTRICI.

INSTALLATION AND MAINTENANCE

BEFORE ASSEMBLING AND OPERATING THE PRODUCT, CAREFULLY READ ALL THE SAFETY AND OPERATING INSTRUCTIONS REPORTED IN THIS MANUAL.

ALWAYS FOLLOW ALL THE INSTRUCTIONS AND ASSURE THAT ALL THE OPERATORS STANDING BY THE MACHINERY ARE WEARING ALL THE PROTECTIVE EQUIPMENT NECESSARY FOR THE JOB TYPE AND APPLICATION BEING PERFORMED.

DO NOT USE THE MACHINERY IF YOU DO NOT UNDERSTAND THESE INSTRUCTIONS, AND IMMEDIATELY REFER TO THE MANUFACTURER OR THE CUSTOMER SERVICE DESK FOR ASSISTANCE.

THE PRODUCT MUST BE PROTECTED BY A CONVENIENT COVER GUARD TO AVOID PERSONAL INJURY TO PEOPLE.
AXIAL AND RADIAL VENTILATION OPENINGS SHOULD BE INCORPORATED IN THE GUARD FOR HEAT EXCHANGE.

IF THE PRODUCT IS FITTED WITH FUSIBLE PLUGS, THE SAID OPENINGS SHOULD NOT BE DIRECTED TOWARDS OPERATORS OR ANY HOT OR ELECTRICAL INSTALLATION.

GIUNTI IDRODINAMICI

FLUID COUPLINGS

13 KFBD

156 I - GB

drive with us

TRANSFLUID trasmissioni industriali	**13 KFBD** **MANUALE INSTALLAZIONE, USO E MANUTENZIONE** ***INSTALLATION, USE AND MAINTENANCE MANUAL***	**TF 6217-A** **Rev. 0**

Questo manuale contiene le istruzioni per l'installazione, l'avviamento, l'uso e la manutenzione del giunto idrodinamico tipo KFBD.
CONSIGLIAMO CHE I RESPONSABILI DELL'USO E DELLA MANUTENZIONE DEL KFBD, VENGANO DOTATI DEL PRESENTE MANUALE. IL NON RISPETTO DELLE REGOLE CITATE IN QUESTO MANUALE, PROVOCA IL DECADERE DELLA GARANZIA.
Ricordiamo che, per ordinare le parti di ricambio, e' importante specificare, oltre al numero di dettaglio e quantita' richiesta, anche:
TIPO - N° di SPECiFICA - N° di SERIE del KFBD, che si trovano stampigliati sulla targhetta di identificazione a bordo macchina.

This manual contains instructions for installation, start up, working, and maintenance of KFBD fluid coupling.
WE SUGGEST THAT ANY PERSON WHO IS RESPONSIBLE FOR USE AND/OR MAINTENANCE, SHOULD BE PROVIDED WITH THIS MANUAL. THE RESPECT OF RULES, CONTAINED IN THIS MANUAL, IS MANDATORY FOR WARRANTY VALIDITY.
We recall that, for spare parts order, it is important to provide, besides detail number and quantity, even:
TYPE - SPECIFICATION Nr. - SERIAL Nr. of KFBD that are stamped on identification metal plate.

DESCRIZIONE

Il KFBD e' un giunto idrodinamico la cui parte esterna, motrice, e' collegata al volano di un motore endotermico mediante un giunto elastico ed il cui albero di uscita e' supportato da un cuscinetto orientabile a rulli, lubrificato ad olio, alloggiati in una campana di supporto flangiata al coprivolano del motore. Un secondo cuscinetto, alloggiato nel volano, sostiene l'albero di uscita dal lato motore. Il KFBD e' adatto per applicazioni con puleggia od i linea.

DESCRIPTION

KFBD is a fluid coupling having the outer driving impeller connected to the internal combustion engine flywheel through an elastic coupling. The output shaft is supported by a spherical roller bearing, oil lubricated, fitted in a cover flanged to the engine flywheel housing. Another bearing, fitted into the flywheel, supports the output shaft at the engine side. The KFBD is suitable for pulley or in line applications.

Prima di iniziare il montaggio del KFBD sul motore, e' bene verificare che il volano rientri nelle tolleranze SAE. Questo e' importante soprattutto per il buon funzionamento del giunto elastico.(Vedere TF6217-B Fig.1)

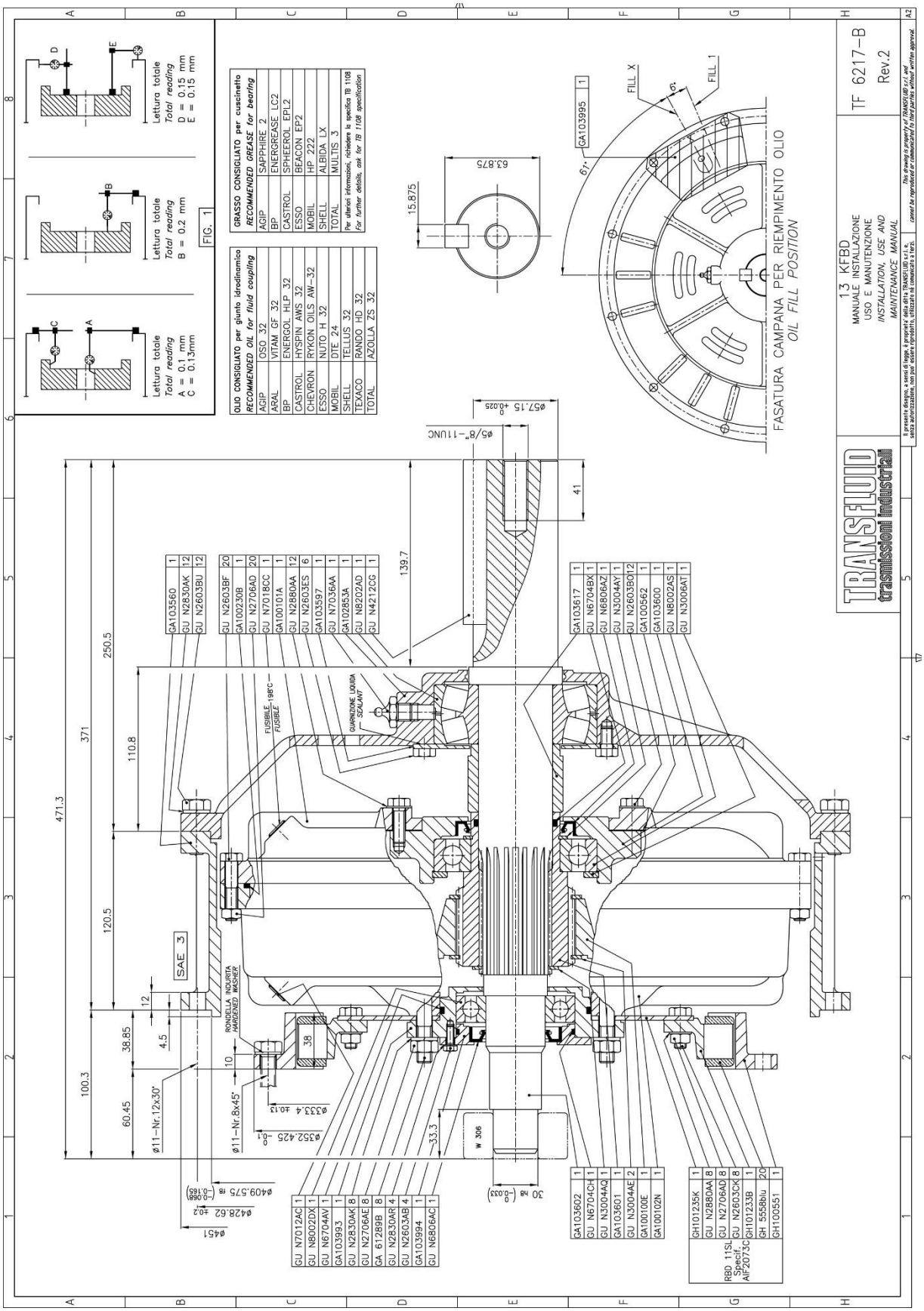
Before KFBD be mounted onto the engine, it is recommended to check that flywheel be within SAE tolerances. This is very important for elastic coupling good working.(see TF6217-B Fig.1)

INSTALLAZIONE (vedere TF6217-B)

1. Montare l'anello di trascinamento del giunto elastico sul volano del motore.
2. Montare il cuscinetto pilota, ingrassato a vita, sull'albero del KFBD.
3. Montare la flangia SAE 3 sul coprivolano.
4. Posizionare il gruppo completo, osservando con cura l'allineamento dell'albero nel cuscinetto pilota e dei blocchetti del giunto elastico con l'anello di trascinamento montato sul volano. La campana esterna deve essere orientata in modo da avere l'apertura per il riempimento dell'olio a circa 60° dalla verticale, in senso orario guardando il volano del motore. Cosi' montato, si avra' l'apertura di drenaggio dell'olio in basso. Infine fissare il gruppo con le apposite viti sulla flangia esterna.
5. Riempimento olio giunto (vedere tabella olii consigliati). Togliere il coperchio che protegge il tappo di carico . Ruotare il giunto sino a portare il tappo in corrispondenza del segno di riferimento X sulla verticale (X-1-2-3-4 dipende dall'applicazione). Togliere il tappo e riempire fino allo sbocco dal foro (13KFBD X=5,2 lt;), quindi chiudere utilizzando del sigillante sul filetto. La coppia di serraggio e' 30 Nm per tappo 3/8". Rimontare il coperchio di protezione.
6. Riempimento grasso (vedere tabella grassi consigliati). Mediante l'apposito ingrasatore,, riempire la camera di lavoro del cuscinetto fino a far fuoriuscire il grasso attorno all'albero
7. Dare alcuni colpi, con un martello non metallico, sull'estremita' dell'albero onde eliminare ogni eventuale tensione sui cuscinetti dovuta alla resistenza offerta dal cuscinetto pilota, quando esso viene montato forzato nella sede del volano.
8. Al primo avviamento, far girare il gruppo innestato, per almeno 10 minuti,con il motore alla meta' dei giri massimi.

INSTALLATION (see sheet.TF6217-B)

1. *Mount elastic coupling driving ring, onto engine flywheel.*
2. *Mount pilot bearing, greased for life, onto KFBD shaft.*
3. *Mount SAE 3 flange onto flywheel housing.*
4. *Install complete group paying attention at alignement between shaft and pilot bearing as well as alignement between rubber blocks and driving ring.*
   External housing must be orientated to get the oil fill opening at about 60° clockwise from vertical line, looking at the flywheel.
   In such a way, the oil drain opening will be downwards. Therefore tighten screws of external flange.
5. *Fluid coupling oil filling (see recommended oil table). Remove cover.*
   Turn fluid coupling untill X mark be on vertical line (X-1-2-3-4 depends on application). Remove plug and fill untill oil overflows (13KFBD fill X=5,2 lt;).
   Therefore fit the plug using sealent on thread.
   Tightening torque is 30 Nm for 3/8" plug .Fit again the cover.
6. *Grease filling (see recommended grease table).*
   Through the grease filler, fill grease untill it comes out around the shaft.
7. *Rap the shaft on the end to relieve any preloading that may result due to the resistance of pilot bearing when being pressed into the flywheel.*
8. *At first start up, run the unit engaged and engine at half of max speed for not less than 10 minutes.*


TRANSFLUID
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13 KFBD
MANUALE INSTALLAZIONE USO E MANUTENZIONE
INSTALLATION, USE AND MAINTENANCE MANUAL
TF 6217-B
Rev.2
FASATURA CAMPANA PER RIEMPIMENTO OLIO
OIL FILL POSITION
FILL X
FILL 1
GA103995 1
63.875
15.875
OLIO CONSIGLIATO per giunto idrodinamico
RECOMMENDED OIL for fluid coupling
ACIP OSO 32
ARAL VITAM GF 32
BP ENERGOL HLP 32
CASTROL HYSPIN AWS 32
CHEVRON RYKON OILS AW-32
ESSO NUTO H 32
MOBIL DTE 24
SHELL TELLUS 32
TEXACO RANDO HD 32
TOTAL AZOLLA ZS 32
GRASSO CONSIGLIATO per cuscinetto
RECOMMENDED GREASE for bearing
AGIP SAPPHIRE 2
BP ENERGREASE LC2
CASTROL SPHEEROL EPL2
ESSO BEACON EP2
MOBIL HP 222
SHELL ALBIDA LX
TOTAL MULTIS 3
Per ulteriori informazioni, richiedere la specifica TB 1108
For further details, ask for TB 1108 specification
FIG. 1
Lettura totale Total reading A = 0.1 mm C = 0.13mm
Lettura totale Total reading B = 0.2 mm
Lettura totale Total reading D = 0.15 mm E = 0.15 mm
Ø57.15 +0.025 0
Ø5/8"-11UNC
41
139.7
250.5
371
471.3
110.8
120.5
100.3
60.45
38.85
4.5
12
10
38
SAE 3
RONDELLA INDURITA HARDENED WASHER
Ø11-Nr.12x30°
Ø11-Nr.8x45°
Ø333.4 +0.13 0
Ø352.425 -0.1 0
Ø409.575 h8 (-0.089 -0.185)
Ø428.62 ±0.2
Ø451
33.3
W 306
30 h8 (0 -0.033)
FUSIBILE 198°C FUSIBLE
GUARNIZIONE LIQUIDA SIGILLANT
GA103560 1
GU N2830AK 12
GU N2603BU 12
GU N2603BF 20
GA100230B 1
GU N2706AD 20
GU N7018CC 1
GA100101A 1
GU N2880AA 12
GU N2603ES 6
GA103597 1
GU N7036AA 1
GA102853A 1
GU N8202AD 1
GU N4212CG 1
GA103617 1
GU N6704BX 1
GU N6806AZ 1
GU N3004AY 1
GU N2603B012
GA100562 1
GA103600 1
GU N8002AS 1
GU N3006AT 1
GU N7012AC 1
GU N8002DX 1
GU N6704AV 1
GA103993 1
GU N2830AK 8
GU N2706AE 8
CA 61289B 8
GU N2830AR 4
GU N2603AB 4
GA103994 1
GU N6806AC 1
GA103602 1
GU N6704CH 1
GU N3004AQ 1
GA103601 1
GU N3004AE 2
GA100100E 1
GA100102N 1
GH101235K 1
GU N2880AA 8
GU N2706AD 8
GU N2603CK 8
GH101233B 1
GH 5558biu 20
GH100551 1
RBD 11SL Specif. AIF2073C
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A2

TRANSFLUID trasmissioni industriali	13 KFBD MANUALE INSTALLAZIONE, USO E MANUTENZIONE *INSTALLATION,USE AND MAINTENANCE MANUAL*	TF 6217-C Rev. 0

MANUTENZIONE

- Controllare, ogni 3 mesi, il livello dell'olio nel giunto. Cambiare l'olio ogni 4000 ore di funzionamento oppure una volta all'anno.
- Ingrassare il cuscinetto dell'albero di uscita ogni settimana.
- Controllare, periodicamente, lo stato dei blocchetti in gomma del giunto elastico.
- E' consigliabile, ogni 4000 ore di funzionamento, cambiare tutti gli anelli di tenuta rotante e controllare lo stato dei cuscinetti.
- Controllare, periodicamente, che la taratura del termostato,se installato, sia uguale al valore originariamente impostato (vedere certificato di collaudo e TF5941-O).
- Pulire periodicamente la sonda del termostato, se installato.

MAINTENANCE

- *Check, every 3 months, the fluid coupling oil level. Change oil every 4000 working hours or once a year, whichever occurs first.*
- *Grease output shaft bearing every week.*
- *Check, periodically, elastic coupling rubber blocks condition.*
- *It is advisable, every 4000 working hours, to change all rotating seals and to check bearings condition.*
- *Check, periodically, that temperature switch whether installed, set value be the same as originally adjusted (see test certificate and TF5941-O).*
- *Clean periodically the temperature switch bulb, whether installed.*

TABELLA INCONVENIENTI

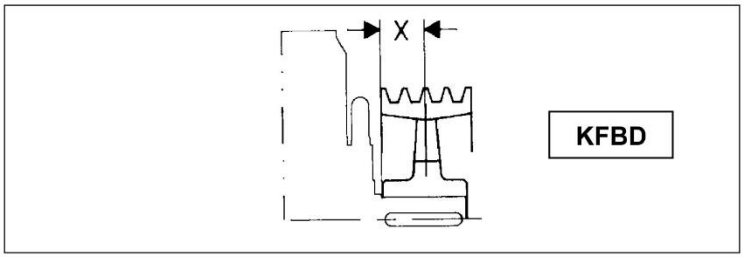
SINTOMO	CAUSA	RIMEDIO
Scarse prestazioni.	Livello olio.	Controllare il livello (olio freddo) ed aggiungere se necessario. Controllare la macchina condotta. Controllare i giri del motore.
	Tipo olio.	Utilizzare olio indicato in tabella.
Surriscaldamento.	Scorrimento eccessivo.	Controllare il livello olio. Verificare l'installazione. Controllare i giri del motore.
	Scarsa ventilazione.	Pulire le aperture per la ventilazione.
	Cuscinetto non lubrificato.	Verificare il livello olio ed eventualmente aggiungere.
	Cuscinetto in uscita danneggiato.	Sostituire.
	Carico radiale eccessivo.	Ridurre la tensione delle cinghie.
Perdita olio lato motore.	Tappo conico.	Rimontare con sigillante per filetti.
	Anello OR.	Sostituire.
	Tenuta rotante.	Sostituire. Controllare l'usura sull'albero.
Perdita olio lato uscita.	Tappo conico.	Rimontare con sigillante per filetti.
	Tappo fusibile se installato.	Sostituire.
	Anelli OR.	Sostituire.
	Tenuta Rotante.	Sostituire. Controllare l'usura sull'albero.
Rumore.	Rottura cuscinetto.	Sostituire.
	Olio con troppa schiuma.	Controllare il livello ed il tipo di olio.
	Usura eccessiva giunto elastico (vibrazioni torsionali?, temperatura eccessiva?, disallineamento?, olio.).	Smontare e sostituire i blocchetti od il giunto elastico completo.
	Usura della dentatura tra albero uscita mozzo, girante interna.	Smontare e sostituire le parti usurate.
Intervento termostato.	Alta temperatura olio.	Vedere "surriscaldamento".
	Errata taratura termostato.	Vedere certificato di collaudo e TF 5941-O.

TROUBLE SHOOTING

SYMPTOM	*CAUSE*	*REMEDY*
Poor performances.	*Oil level.*	*Check level (cold oil) and add as necessary.* *Check driven machine.* *Check engine rpm.*
	Oil type.	*Use recommended oil (see table).*
Overheating.	*High slip.*	*Check oil level.* *Check installation.* *Check engine rpm.*
	Low ventilation.	*Clean ventilation openings.*
	No lubricated bearing.	*Check oil level . Add oil if required .*
	Damaged output bearing.	*Replace.*
	Too high radial load.	*Decrease belt tension.*
Oil leakage at engine side.	*Taper plug.*	*Remount using thread sealent.*
	O-ring.	*Replace.*
	Rotating seal.	*Replace. Check shaft wear.*
Oil leakage at output side.	*Filling plug.*	*Remount using thread sealent.*
	Fusible plug,whether installed.	*Replace.*
	O-ring.	*Replace.*
	Rotating seal.	*Replace. Check shaft wear.*
Noise.	*Bearing failure.*	*Replace.*
	Too much oil foam.	*Check oil level and type.*
	Elastic coupling wear. (Torsional vibration? high temperature? misalignement? oil ?).	*Dismantle and replace rubber blocks or complete elastic coupling.*
	Spline wear between output shafthub, inner impeller.	*Dismantle and replace worn components.*
Temperature switch intervention.	*High oil temperature.*	*See "overheating".*
	Wrong switch setting.	*See test certificate and TF 5941-O.*

TRANSFLUID trasmissioni industriali	KFBD PERMISSIBLE SIDE LOAD (N) AND SUGGESTED PULLEY TRANSMISSION	TF 6093-D Rev. 1

- Calculated bearings life over 10.000 hours.
- Engine speed over those listed, needs approval by Transfluid.
- Pulley diameter is the minimum permissible. (Over 35 m/s, dynamic balancing is recommended).
- Belts nr. is maximum permissible (about belt width: 8V > SPC > 5V).
- Timing belts must be approved by Transfluid.
- "X" distance is according to belts type & number.
- Side load includes 2.5 belt tensioning factor.
- Pilot bearing speed = 5% of max. input speed.



TRANSMITTABLE POWER CRITERIA: slip < 3%
f.c. oil temperature < 50 °C over ambient

13 (pilot brg: dia 30 mm – 33500 N)

Up to kW/rpm	Max "X" (mm) Max load (N)	Max belts nr Type - Min pulley ∅
90 / 2600	65 / 8300	7 x 5V - 200 mm

15 (pilot brg: dia 30 mm – 33500 N)

Up to kW/rpm	Max "X" (mm) Max load (N)	Max belts nr Type - Min pulley ∅
130 / 2400	92 / 13000	10 x 5 V - 200 mm

17-19 (pilot brg: dia 35 mm – 40500 N)

Up to kW/rpm	Max "X" (mm) Max load (N)	Max belts nr Type - Min pulley ∅
200 / 2200	110 / 22000	12 x 5 V - 200 mm 6 x 8V - 315 mm 7 x SPC - 315 mm
280 / 2200	130 / 22000	14 x 5 V - 280 mm 8 x 8V - 315 mm 9 x SPC - 315 mm

21-24 (pilot brg: dia 45 mm – 58500 N)

Up to kW/rpm	Max "X" (mm) Max load (N)	Max belts nr Type - Min pulley ∅
370 / 2000	150 / 28000 170 / 25000	10 x 8V - 315 mm 13 x SPC - 355
500 / 2000	177 / 29800 195 /26500	12 x 8V - 400 mm 15 x SPC - 450 mm

ASK TRANSFLUID FOR ANY APPLICATION DIFFERENT THAN ABOVE.

TRANSFLUID
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GARANZIA BASE, TERMINI E CONDIZIONI
TF 6401-I - rev. 0

1) Premessa
TRANSFLUID garantisce che i propri prodotti, al momento della spedizione, sono conformi alle specifiche pubblicate nei propri cataloghi o documenti tecnici validi al momento della spedizione stessa e che sono esenti da difetti nei materiali e nella fabbricazione. Questi termini di garanzia sostituiscono tutte le altre garanzie, anche legali, espresse o implicite, comprese, a titolo esemplificativo e non esaustivo, le garanzie di commerciabilità e di idoneità ad un uso particolare (e qualsiasi garanzia implicita che sorga nel corso delle prestazioni, nel corso delle trattative o dell'uso commerciale). Fatti salvi i casi di dolo e colpa grave, in nessun caso TRANSFLUID sarà responsabile per danni diretti, indiretti, consequenziali, fortuiti od extracontrattuali basati su una richiesta d'indennizzo da parte del Compratore per violazione di garanzia, violazione di contratto, responsabilità oggettiva. In nessun caso il risarcimento da parte di TRANSFLUID potrà superare l'importo che il Compratore ha pagato per il prodotto fornito da TRANSFLUID.

2) Durata e limiti della garanzia

a) La durata della garanzia è pari a diciotto (18) mesi dalla messa in servizio del prodotto fornito da TRANSFLUID e comunque non oltre ventiquattro (24) mesi dalla data di spedizione del prodotto originale dallo stabilimento TRANSFLUID.

b) I prodotti, se inutilizzati e stoccati a lungo termine, devono essere immagazzinati e trattati in accordo alle linee guida redatte da TRANSFLUID per tipologia di prodotto che sono rese disponibili su richiesta.

c) La garanzia per le parti la cui usura o deterioramento è fortemente legata alle condizioni di impiego (tensionamento delle cinghie, condizioni ambientali, urti e sovraccarichi non previsti), alla sensibilità dell'operatore (utilizzo entro i limiti approvati), ad eventi esterni (inceppamenti della macchina condotta), non opera se tali parti sono state utilizzate (non sono nuove), o se non viene chiaramente dimostrato dal Compratore un eventuale difetto di fabbricazione riconducibile a TRANSFLUID.
Tipiche parti soggette ad usura o deteriorabili sono:
- filtri, tenute e guarnizioni
- molle, viti, tappi
- interruttori e fusibili
- materiali e superfici di attrito
- cinghie e catene
- lubrificanti in genere

d) L'installazione e la manutenzione dei prodotti TRANSFLUID deve essere eseguita in conformità a quanto indicato nel manuale di installazione, uso e manutenzione che viene sempre fornito a corredo di ogni prodotto.

e) In caso di fornitura di componenti sfusi/disassemblati, la garanzia copre solo ed esclusivamente eventuali difetti dei componenti stessi, relativamente al materiale o alle lavorazioni meccaniche effettuate da TRANSFLUID.

f) La garanzia decade nei casi in cui:
- il prodotto venga utilizzato oltre i limiti indicati nei cataloghi o manuali di installazione o in applicazioni non approvate da TRANSFLUID;
- la rottura derivi da abuso, negligenza, omessa o inadeguata manutenzione, mancato collegamento o controllo dei dispositivi di protezione o a seguito di incidenti;
- il prodotto venga modificato o disassemblato senza approvazione scritta di TRANSFLUID.

3) Prestazioni incluse/escluse nella garanzia

a) Eventuali prodotti o componenti i cui difetti, ad insindacabile giudizio di TRANSFLUID, sono coperti da garanzia, saranno riparati o sostituiti senza alcun addebito, salvo quanto stabilito ai punti successivi. Le parti sostituite saranno coperte dal residuo periodo della garanzia originale che resta in vigore sul prodotto inizialmente fornito (non decorrerà quindi un nuovo termine di garanzia).

BASIC GUARANTEE, TERMS AND CONDITIONS
TF 6401-GB - rev. 0

1) Preamble
TRANSFLUID guarantees that at the time of dispatch, its products comply with the specifications published in its catalogues or technical documents, which were valid at the time of dispatch, and that the products are free from defects in material and workmanship. These terms of guarantee substitute all other guarantees, including legal, expressed or implicit guarantees, including but not limited to, guarantees of saleability and suitability for a particular use (and any other implicit guarantee arising during the course of the services, negotiations or commercial use). Except in the event of serious negligence and fraud, under no circumstances will TRANSFLUID be held liable for direct, indirect, consequential, fortuitous or extra contractual damage based upon claims for compensation by the Buyer for violation of the guarantee, contract or objective responsibility. Under no circumstances can the compensation by TRANSFLUID exceed the amount paid by the Buyer for the product supplied by TRANSFLUID.

2) Duration and limits of the guarantee

a) The duration of the guarantee is equal to eighteen (18) months from the time the product supplied by TRANSFLUID is commissioned, and nonetheless, no more than twenty-four (24) months from the date of dispatch of the original product from TRANSFLUID's plant.

b) Product that are not used and stored for a long period must be kept and handled in keeping with the guidelines, which are available upon request, drawn up by TRANSFLUID according to product type.

c) The wear or tear of parts, which is particularly due to conditions of use (tension of the belts, environmental conditions, unforeseen knocks and overloading), or to the sensitivity of the operator (use within the approved limits) or to external circumstances (jamming of the machine), is not covered by the guarantee if these parts have been used (are not new), unless the Buyer can clearly prove the manufacturing defect, which is ascribable to TRANSFLUID.
Typical parts subject to wear or tear include:
- filters, seals and gaskets
- springs, screws, plugs
- switches and fuses
- material and friction surfaces
- belts and chains
- lubricants in general

d) Installation and maintenance of TRANSFLUID products must be carried out following the installation, use and maintenance manual, which is always supplied with each product.

e) With regard to the supply of loose/disassembled parts, the guarantee solely and exclusively covers faults of the components themselves, related to the material or mechanical workmanship carried out by TRANSFLUID.

f) The guarantee is no longer valid when:
- the product is used exceeding the limits stated in the catalogues or installation manuals, or in applications that are not approved by TRANSFLUID;
- breakage results from abuse, negligence, omission or inadequate maintenance, failed connection or control of the protection devices or as a result of accidents;
- the product is modified or disassembled without TRANSFLUID'S written approval.

3) Services included/excluded in the guarantee

a) In TRANSFLUID'S final decision, products or components, whose faults are covered by the guarantee, will be repaired or replaced at no extra cost, with the exception of the subsequent points. The replaced parts will be covered from the remaining period of the original guarantee, which stays in force for the product initially supplied (a new guarantee period will therefore not come into effect).

TRANSFLUID
trasmissioni industriali

TF 6401-I - rev. 0

b) Sono esclusi dalla garanzia, e pertanto restano a carico del Compratore, costi derivanti da:
- rimozione del prodotto TRANSFLUID dal macchinario in cui è inserito e relativa rimessa in servizio;
- adeguato imballaggio ed oneri derivanti da trasporti di andata e ritorno del materiale;
- ripristino di lubrificanti in genere, tubazioni, cofanature insonorizzanti, carter, ecc;
- qualsiasi altro costo non espressamente approvato per iscritto da TRANSFLUID.

c) Per le operazioni di smontaggio/reinstallazione/messa in servizio del prodotto, il Compratore potrà richiedere il supporto di un tecnico specializzato inviando un regolare ordine di acquisto. L'intervento sarà fatturato da TRANSFLUID applicando le correnti tariffe ASSIOT (Associazione Italiana costruttori organi di trasmissione, affiliata EUROTRANS).

d) TRANSFLUID non potrà essere ritenuta responsabile per mancati o minori profitti, costi per macchinari sostitutivi, fermi macchina, danni ad apparecchiature o proprietà causati da un eventuale malfunzionamento dei propri prodotti.

4) Modalità di richiesta di prestazioni in garanzia

a) Il Compratore, qualora intenda avvalersi della garanzia, dovrà informare TRANSFLUID per iscritto, entro 7 (sette) giorni dal momento in cui si è evidenziato un difetto, comunicando:
- descrizione del prodotto;
- numero di serie (ove previsto), numero di specifica o codice articolo;
- riferimento alla data ed al documento di acquisto o consegna;
- ragionevole prova che il difetto rientri nelle condizioni di garanzia completata da una descrizione dettagliata dell'anomalia o malfunzionamento ed eventualmente supportata da fotografie.

In caso di malfunzionamento occorso dopo la messa in servizio del prodotto, dovranno essere comunicati inoltre:
- tipo di applicazione;
- potenza e giri del motore (in caso di motore endotermico anche marca e modello);
- diametro, tipo, numero gole e posizione puleggia (se l'applicazione lo prevede);
- ore di funzionamento.

b) In base al prodotto coinvolto, al malfunzionamento segnalato, all'urgenza di intervento, TRANSFLUID indicherà se il prodotto stesso dovrà essere consegnato o spedito in porto franco ad un centro autorizzato o direttamente presso la propria sede.

c) Una volta ricevuto il prodotto, TRANSFLUID o il distributore autorizzato provvederanno ad una approfondita analisi;
se il prodotto sarà ritenuto coperto da garanzia:
- TRANSFLUID riparerà o sostituirà gratuitamente le parti necessarie al ripristino della piena e sicura funzionalità;

se il prodotto NON sarà ritenuto coperto da garanzia, TRANSFLUID:
- invierà un rapporto tecnico motivando la decisione;
- stilerà un preventivo di riparazione;
- solo dopo aver ottenuto l'ordine dal Compratore, procederà con la riparazione.

d) I prodotti riparati saranno restituiti al Compratore in porto assegnato, utilizzando lo stesso mezzo di trasporto con cui sono pervenuti (a meno che non sia diversamente specificato).

e) Qualora il Compratore decida di non accettare il preventivo di riparazione, dovrà comunicare per iscritto la propria decisione chiedendo esplicitamente la rottamazione o la restituzione delle parti che saranno spedite nello stato in cui si trovano.

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b) Excluded from the guarantee and remaining at the Buyer's expense are the costs resulting from:
- removal of the TRANSFLUID product from the machinery onto which it is fitted, and recommissioning;
- suitable packing and charges resulting from the return transport of the material;
- restoration of lubricants in general, piping, sound proof canopies, guards, etc.;
- all other costs not expressly approved in writing by TRANSFLUID.

c) The Buyer can request the support of a specialised technician to disassemble/re-install/recommission the product by sending a standard purchase order. TRANSFLUID will invoice the work, applying the current ASSIOT rates (Italian Association of Gears and Transmission Elements Manufacturers, a member of EUROTRANS).

d) TRANSFLUID cannot be held liable for lost or reduced profit, costs for replaced machinery, still machinery, damage to equipment or property caused by failure of its products.

4) Conditions for requesting services under guarantee

a) If the Buyer intends to take advantage of the guarantee, he must inform TRANSFLUID in writing within 7 (seven) days of discovering a fault, stating:
- product description;
- series number (where foreseen), specification number or article code;
- reference to the date and document of purchase or delivery;
- reasonable proof that the fault falls within the conditions of guarantee, together with a detailed description of the irregularity or failure and where possible, supported by photographs.

In the event of failure after commissioning the product, the following must also be communicated:
- type of application;
- power and engine rpm (stating also the make and model for endothermic engines);
- diameter, type, number of races and position of pulley (if foreseen by the application);
- hours of operation.

b) TRANSFLUID will indicate whether the product must be delivered or sent free port to an authorised centre or directly to its own plant depending on the product concerned, the failure indicated and the urgency of the intervention.

c) On receiving the product, TRANSFLUID or the authorised distributor will carry out a thorough analysis; if the product is deemed to be covered by the guarantee:
- TRANSFLUID will repair or replace the parts needed to restore full and safe working at no cost;

If the product is NOT deemed to be covered by the guarantee, TRANSFLUID:
- will send a technical report explaining its decision;
- will draw up an estimate for the repair;
- will carry out the repair upon receipt of the order from the Buyer.

d) The repaired products will be returned to the Buyer freight collect, by the same means of transport that was used for the arrival (unless stated otherwise).

e) Should the Buyer decide not to accept the estimate for the repair, he must communicate his decision in writing, explicitly asking for the parts to be scrapped or returned; the parts will be sent in their current state.

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0806 - 156 I/GB

NORTH AMERICAN SIGNAL TRAFFIC ASSIST III

LED Traffic Assist™III (12/24VDC)

Installation and operating instructions for:
TA18LPS-A, TA36LP-A, TA36LP-A2
TA42LP-A, TA42LP-A2, TA52LP-A and TA52LP-A2

1. The package should contain the following:
   a. LED Traffic Assist™ III light bar with 25 feet of cable and 12 pin connector taped to end of cable;
   b. Control Head with 8 inches of cable;
   c. 2, 3, or 4 - "L" brackets (depending on model) for optional mounting
   d. Instruction sheet.
2. Attach the LED Traffic Assist Control Head to the dash using the bolts provided. Connect the red/black duplex wire to power (fused for a minimum of 5 Amps) and to a ground.
3. Install the LED Traffic Assist bar horizontally, with the curved side up (product label facing up and cable exiting the passenger side of the vehicle when installed in the rear of the vehicle), in one of the following two ways:
   a. Attach to any vertical surface using the ¼" x 20 - 5/8 inch long stainless steel hex bolts coming out the rear of the bar; or
   b. Mount the two "L" brackets on a horizontal surface and attach the Traffic Assist bar to the "L" brackets.
4. NOTE: For TA18LPS versions, 10' of interconnect cable connects the two 4-segment heads, each half is clearly marked as "LEFT" & "RIGHT" sides. When positioned correctly the power cable runs up the passenger side of the vehicle for rear mount. Unit comes pre-assembled unless otherwise noted.
5. Run the 12 conductor cable from the LED Traffic Assist™ to the control head. Be sure to leave the connector off until cable is completely installed in the vehicle.
6. Plug the individual wire pins into the 12 pin connector taped to the end of the cable according to the color coded diagram shown below and also the diagram shown on the back of the LED Traffic Assist Control Head.

#	COLOR	#	COLOR	#	COLOR	#	COLOR
4	PINK	3	RED	2	BROWN	1	BLACK
8	TAN	7	WHITE	6	GREEN	5	VIOLET
12	YELLOW	11	ORANGE	10	GRAY	9	BLUE

7. Assemble the two connectors together and verify everything is working properly.

OPERATING INSTRUCTIONS

(Use the following diagram for mode operation)

Various functions for either the 7 or 8 segment system.

BUTTON NAME	PRESS ONCE	PRESS TWICE	PRESS THREE TIMES
OFF	Turns system off	N/A	N/A
LEFT ARROW	Lights sequence from right to left until all are on and turn off in the same sequence	Lights sequence from right to left until all are on and then turn off all at once	Lights sequence from right to left until all are on, then the last flashes three times, then all turn off at once
CENTER ARROW	Lights sequence from center out until all are on and the turn off in the same sequence	All lights are quad flashing with the last flash on a delay	Three lights rapidly move from left to right, generating an attention gathering pattern
RIGHT ARROW	Lights sequence from left to right until all are on and turn off in the same sequence	Lights sequence from left to right until all are on and then turn off all at once	Lights sequence from left to right until all are on, then the last flashes three times, then all turn off at once
FAST / SLOW	Fast	Slow	Fast

* Custom Flash Patterns are available upon request. Please inquire at 1-877-246-6274 or sales@nasig.com.

LIMITED WARRANTY

North American Signal Company warrants that the LED Traffic Assist™III will be free of defects in material and workmanship for a period of 5 years from date of manufacture, under normal use and service. This warranty does not cover ordinary wear and tear, abuse, misuse, overloading, altered products, or damage caused by the purchaser connecting the unit to the wrong voltage or polarity. All products in need of repair must be returned to our factory freight prepaid. North American Signal Company reserves the right to determine in its sole discretion, whether to repair or replace a unit found to be defective under this LIMITED WARRANTY, and will then return the unit freight prepaid. THERE IS NO WARRANTY OF MERCHANTABILITY. THERE ARE NO WARRANTIES WHICH EXTEND THE DESCRIPTION HEREIN. THERE ARE NO WARRANTIES EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, EXCEPT AS SET FORTH HEREIN.

In returning product, first try to determine if the controller and / or the Traffic Assist bar is not functioning. If only the bar is having problems, remove the end of the bar where the cable enters the unit and unplug the 12 pin connectors. Then detach the bar from its mounting and return this unit to the factory. If the controller is also not functioning, then detach the controller and bar and send them both to the factory.

North American Signal Company, 605 S. Wheeling Road, Wheeling, IL, 60090
Toll free: 877-246-6274, Fax: 847-537-8895, Email: sales@nasig.com, www.nasig.com

Revision 2.7, 1/1/2018

SHURFLO DUST CONTROL SYSTEM PUMP

SHURflo

2088 INDUSTRIAL SERIES PUMPS

Installation and Operation Manual

SHURflo offers various pumps models for different applications. The information outlined by this manual is general, and not specific to all 2088 series pumps. Be certain the pumps' materials will be compatible with the fluid being pumped. 2088 series pumps are intended for intermittent or continuous duty when the proper operating criteria is met. Product Data Sheets outlining specific thermal limits, load, flow curves, and other technical information for a particular model are available. If unsure of the chemical compatibility with a given elastomer or the motors intended design, please call SHURflo for assistance.

CAUTION: "Intermittent Duty" is defined as; operated and/or frequently started within a period of time that would cause the motor to reach its maximum thermal limits. Once the maximum thermal limit is obtained, the motor must be allowed to return to ambient temperature before resuming operation.

CAUTION: ***DO NOT*** use to pump flammable liquids. Never operate the pump in an explosive environment. Arcing from the motor brushes, switch or excessive heat from an improperly cycled motor may cause an explosion.

CAUTION: ***DO NOT*** assume fluid compatibility. If the fluid is improperly matched to the pumps' elastomers, a leak may occur. Pumps used to transfer hazardous or hot (max. temperature 170°F [76°C] viton only) chemicals must be in a vented area to guard against the possibility of injury due to harmful or explosive liquid/vapors.

CAUTION: ***DO NOT*** operate the pump at pressures which cause the motor to exceed the amperes rating indicated on the name plate. Various pump models are equipped with thermal breakers to interrupt operation due to excessive heat. Once the temperature of the motor is within proper limits it will automatically reset, and the pump ***will start operation without warning.***

CAUTION: To prevent electrical shock, disconnect power before initiating any work. In the case of pump failure, the motor housing and/or the pumped fluid may carry high voltage to components normally considered safe.

PRESSURE SWITCH OPERATION

The pressure switch reacts to outlet pressure, and interrupts power at the preset shut-off pressure indicated on the pump label. When outlet pressure drops below a predetermined limit (typically 15-20 psi.[1-1.4 bar] less than the shut-off pressure), the switch will close and the pump wil operate until the shut-off (high) pressure is achieved. The shut-off pressure is set to factory calibrated standards. See the motor label and Product Data Sheet for specific pump specifications.

CAUTION: Improper adjustment of the pressure switch, may cause severe overload or premature failure. Refer to SHURflo Service Bulletin #1031 for the adjustment procedure. Failures due to improper adjustment of the pressure switch will not be covered under the limited warranty.

If the plumbing is restrictive or the flow rate is very low, the pump may re-pressurize the outlet faster than the fluid is being released causing rapid cycling (ON/OFF within 2 seconds). If the pump is subjected to rapid cycling during normal operation, or for infrequent periods, damage may occur. Applications which exhibit rapid cycling should have restrictions in the outlet minimized. If not feasible considered a SHURflo Accumalator or a SHURflo "bypass" model pump.

BYPASS OPERATION

A bypass pump may be used for applications that normally induce frequent start/stop of the motor, and thereby create a potential for overheating. Models equipped with an internal bypass are designed to pump at high pressure while at low flow rates. Bypass models equipped with a switch may operate for several seconds even though the outlet side has been closed off. Contact SHURflo for information regarding bypass pumps.

MOUNTING

- The 2088 series pumps are self priming. Horizontal and vertical prime vary depending on the fluid viscosity and pump configuration. Refer to the pumps Product Data Sheet.
- The pump should be located in an area that is dry and provides adequate ventilation. If mounted within an enclosure, provisions to cool the motor may be necessary. Heat sinks which attach to the motor are available from SHURflo if increased heat dissipation is necessary.

CAUTION: ***DO NOT*** locate the motor near low temperature plastics or combustible materials. The surface temperature of the motor may exceed 250°F [120°C]. Refer to the pumps Product Data Sheet.

- The pump may be mounted in any position. However, if mounting the pump vertically the pump head should be in the down position so that in the event of a leak, fluid will not enter the motor.
- Secure the rubber feet with #8 hardware. ***DO NOT*** compress the feet, doing so will reduce their ability to isolate vibration/noise.

PLUMBING

- Flexible high pressure tubing compatible with the fluid should be used to connect the inlet/outlet ports. Tubing should be either $^3/_8$" or $^1/_2$" [10 or 13 mm] I.D., and at least 18 in. [46 cm] length is suggested to minimize stress on the fitting/ports and reduce noise. Allow for the shortest possible tubing route and avoid sharp bends that may kink over time.

NOTE: Restrictions on the inlet may cause vacuum levels to reach the fluid vapor pressure, causing cavitation, degassing, vapor lock and a loss in performance. Inlet pressure ***must*** not exceed 30 psi.[2.1 bar] maximum.

- **1/2" Male threaded models:** Are intended to be used with SHURflo Swivel Barb Fittings which seal with an internal taper when ***hand tightened***. Standard 1/2" NPT fittings may be used when tightened to a maximum torque of 3.7 ft\Lb (45 in\Lb) [5 Nm].

NOTE: SHURflo does not recommend the use of metal fittings or rigid pipe to plumb the inlet/outlet ports. Standard plastic male and female threaded fittings can be acquired at commercial plumbing supply stores. SHURflo also distributes Swivel Barb Fittings, and special fitting through it's dealers (Form #07-010-0011).

CAUTION: Sealers and Teflon tape may act as lubricant causing cracked housings or stripped threads due to over-tightening. Care should be used when applying sealers. Sealers may enter the pump inhibiting valve action, causing no prime or no shut-off. ***Failures due to foreign debris is not covered under warranty.***

- Installation of a 50 mesh strainer is recommended to prevent foreign debris from entering the pump.
- If a check valve is installed in the plumbing, it must have a cracking pressure of no more than 2 psi [.14 bar].

ELECTRICAL

CAUTION: Electrical wiring should be performed by a qualified electrician, in accordance with all local electrical codes.

- The pump should be on a dedicated (individual) circuit, controlled with a double pole switch (U.L./C-UL certified) rated at or above the fuse ampere indicated by the pump motor label. Depending on distance of the power source from the pump and ampere load on the circuit, wire may need to be heavier than indicated by the chart.

CAUTION: All 115 VAC and 230 VAC pump motors and systems, ***MUST*** be ground per local and state electrical codes.

- Improper duty cycle and/or rapid start & stop conditons may cause the internal thermal breaker (if equipped) to trip, or can result in premature motor failure due to excessive heat. Refer to the pumps Product Data Sheet.

- For the pump to meet U.L./C-UL requirements the circuit ***MUST be protected with a slow-blow fuse*** (U.L./C-UL certified) or equivalent circuit breaker as indicated on the motor label. Use an approved wire of the size specified or heavier.

VOLTAGE	WIRE LEADS	WIRE SIZE	FUSE RATING
12 DC	RED (positive +) BLACK (negative -)	#14 AWG [2.5 Mm^2] (or heavier)	SEE PUMP MOTOR LABEL
24 DC			
36 DC			
115 AC	BLACK (common) WHITE(neutral) GREEN (ground)	#16 AWG C-UL - TEW / UL 1015 (or heavier) [1 Mm^2]	
230 AC①	BROWN (common) BLUE (neutral) GRN/YELL (ground)		

① VDE requires a fuse (slow blow) or equivalent circuit breaker.

CAUTION: Circuit protection is dependent on the individual application requirements. Failure to provide proper overload / thermal devices may result in a motor failure, which will not be covered under warranty.

TROUBLESHOOTING

PUMP WILL NOT START:
- ✓ Fuse or breaker
- ✓ For correct voltage (±10%) and electrical connections
- ✓ Pressure switch operation and correct voltage at switch or motor wires (as equipped).
- ✓ Rectifier or motor for open or grounded circuit
- ✓ For locked drive assembly

WILL NOT PRIME: (No discharge/Motor runs)
- ✓ Out of product
- ✓ Strainer for debris
- ✓ Inlet tubing/plumbing for severe vacuum leak
- ✓ Inlet/Outlet tubing severely restricted (kinked)
- ✓ Debris in pump inlet/outlet valves
- ✓ Proper voltage with the pump operating (±10%)
- ✓ Pump housing for cracks

LEAKS FROM PUMP HEAD OR SWITCH:
- ✓ For loose screws at switch or pump head.
- ✓ Switch diaphragm ruptured or pinched
- ✓ For punctured diaphragm if fluid is present at bottom drain

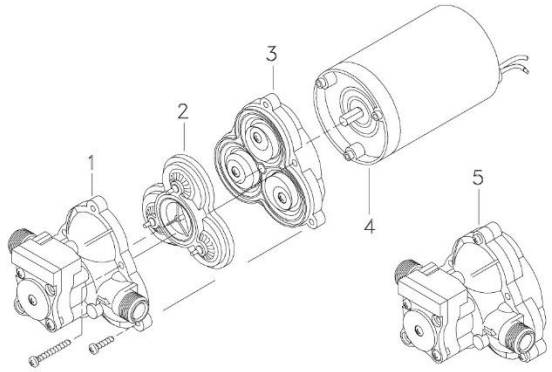
PUMP WILL NOT SHUT-OFF: (Pressure switch equipped)
- ✓ Output line closed and no leaks
- ✓ For air trapped in outlet line or pump head
- ✓ For correct voltage to pump(±10%)
- ✓ Inlet/Outlet valves for debris or swelling
- ✓ For loose drive assembly or pump head screws
- ✓ Pressure switch operation/adjustment incorrect refer to S/B #1031 for differential and pressure adjustment procedure

NOISY / ROUGH OPERATION:
- ✓ Mounting feet that are compressed to tight
- ✓ Does the mounting surface multiply noise (flexible)
- ✓ For loose pump head or drive screws
- ✓ Is the pump plumbed with rigid pipe causing noise to transmit

SERVICE KITS

Kits are readily available to repair standard 2088 series pumps. Repair kits include simple illustrated instructions allowing easy installation. To insure that the correct kit is received the model numbered and all name plate data must be included with the order. Contact a SHURflo distributor or SHURflo directly to order the necessary repair kit.

1	Switch / Check valve and Upper Housing Kit (Replaces all previous switch designs)
2	Valve plate assembly
3	Diaphragm / Drive assembly
4	Motor
5	Complete Pump Head assembly (includes parts # 1,2,3) (Replaces all previous switch designs)



RETURN POLICY

All Industrial pumps/products ***must*** be flushed of ***any*** chemical **(**ref. OSHA Section 1910.1200 (d)(e)(f)(g)(h)**)** and hazardous chemicals ***must*** be labeled/tagged before being *shipped to SHURflo for service or warranty consideration. SHURflo reserves the right to request a Material Safety Data Sheet from the returnee for any pump/product it deems necessary. SHURflo reserves the right to "disposition as scrap" pumps/products returned which contain unknown fluids. SHURflo reserves the right to charge the returnee for any and all costs incurred for chemical testing, and proper disposal of components containing unknown fluids. SHURflo request this in order to protect the environment and personnel from the hazards of handling unknown fluids.

LIMITED WARRANTY PROCEDURE

SHURflo warrants Industrial 2088 series pumps to be free from material and workmanship defects (under normal use and service) for a period of one (1) year from the date of manufacture. or (1) one year use with proof of purchase, not to exceed (2) two years in any event.

The limited warranty will not apply to pumps that were improperly installed, misapplied, or incompatible with fluids or components not manufactured by SHURflo. SHURflo will not warrant any pump which is damaged or modified outside the SHURflo factory.

All Industrial pumps/products ***must*** be flush of ***any*** chemicals before *shipping. All warranty considerations are governed by SHURflo's written Return Policy.

Returns are to be shipped postage prepaid to either service center; SHURflo Garden Grove, CA or Elkhart, IN. SHURflo shall not be liable for freight damage incurred during shipping. Package returns carefully.

Upon receiving a pump, it will be tested per SHURflo's test criteria. SHURflo's obligation under this warranty policy is limited to the repair or replacement of the unit. Pumps found not defective (under the terms of this limited warranty) are subject to charges to be paid by the returnee for the testing and packaging of "tested good" units.

No credit or labor allowances will be given to the returnee for pumps returned as defective. Warranty replacements will be shipped on a freight allowed basis. SHURflo reserves the right to choose the method of transportation.

This limited warranty is in lieu of all other warranties, expressed or implied, and no other person is authorized to give any other warranty or assume obligation or liability on SHURflo's behalf. SHURflo shall not be liable for any labor, damage or other expense, nor shall SHURflo be liable for any indirect, incidental or consequential damages of any kind incurred by the reason of the use or sale of any defective product or part. This limited warranty covers pumps distributed within the United States of America. Other world market areas should consult with the distributor for any deviation from this document.

* Carriers, including U.S.P.S., airlines, UPS, ground freight, etc., require specific identification of any hazardous materials being shipped. Check with your shipping company for specific instructions. Failure to do so may result in a substantial penalties.

★ ISO Certified Facility

SHURflo® a WICOR Company

NSF COMPONENT

SHURflo reserves the right to update specifications, prices, or make substitutions.

SHURflo ★
12650 Westminster Ave.
Santa Ana, CA 92706-2100
(800) 854-3218 (714) 554-7709
FAX (714) 554-4721
Shipping/UPS: 12650 Westminster Ave.
Garden Grove, CA 92843

SHURflo East
52748 Park Six Court
Elkhart, IN 46514-5427
((800) 762-8094
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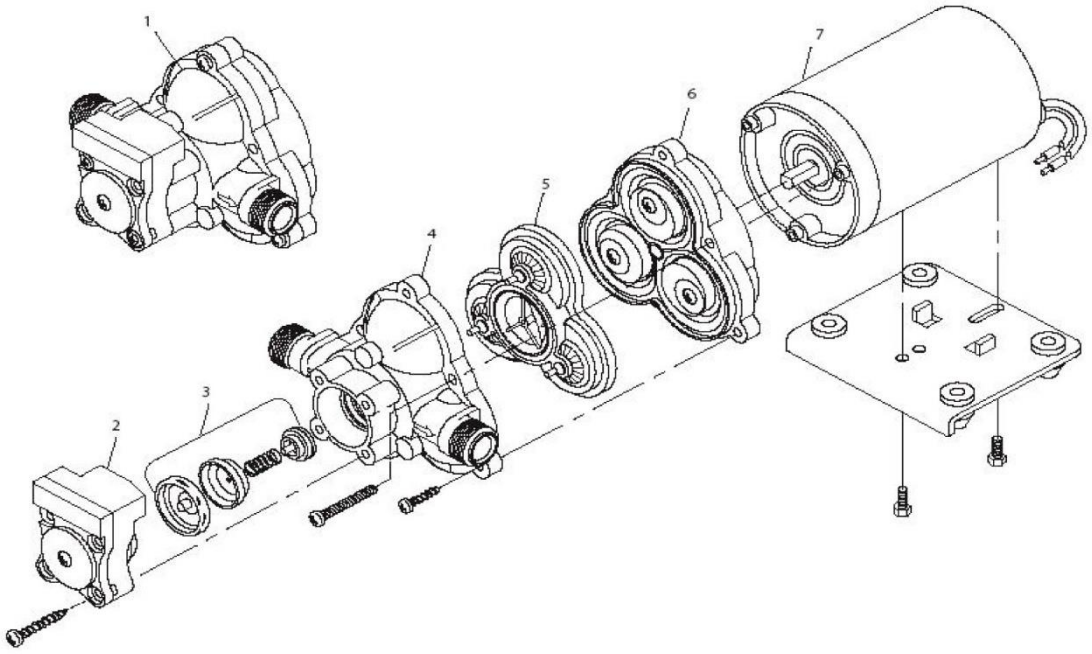
SHURflo Ltd.
Unit 5 Sterling Park
Gatwick Road, Crawley
West Sussex, RH10 2QT
United Kingdom
+44 1293 424000
FAX +44 1293 421880

2088 Replacement Kits



Model Number	1 Complete Pumphead Assembly	2 Switch Assembly	3 Check Valve Assembly	4 Upper Housing	5 Bypass/ Non Bypass Valve Assembly	6 Drive/Impeller Diaphragm Assembly	7 Motor
2088-514-500	N/A	N/A	N/A	94-238-00	94-232-00	94-238-03	11-226-07

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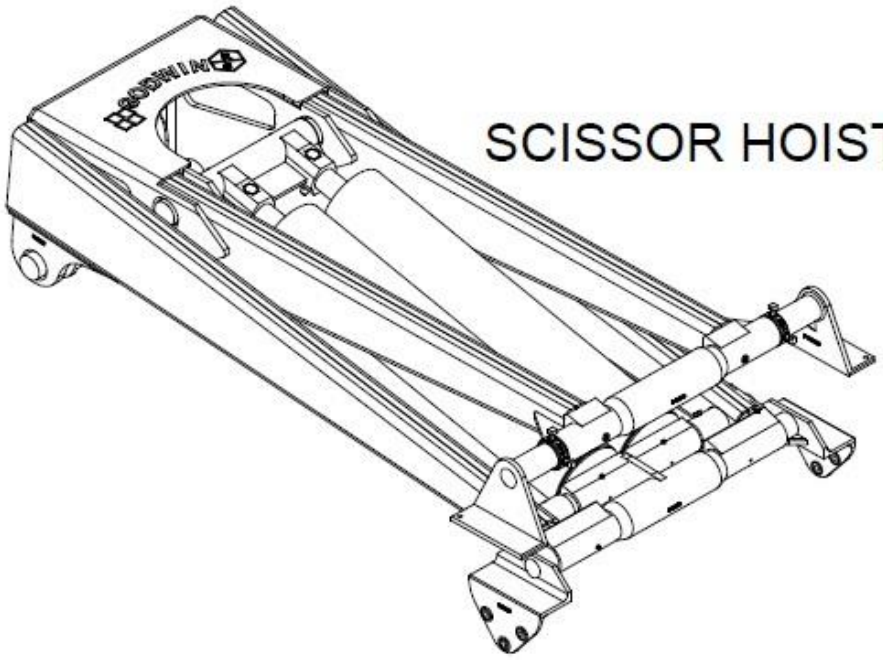
CHAMPION HOIST

CHAMPION
Hoist and Equipment

AN AFFILIATE OF
The Godwin Group

200 CHAMPION DRIVE
DUNN, NC. 28334
(910) 897-4995 FAX: (910) 897-7306



SCISSOR HOIST

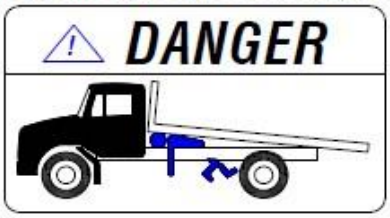
Operation & Installation Manual

OPERATIONS AND SERVICE INFORMATION

Do not operate this equipment without fully reading and understanding this manual.

Do not allow unauthorized personnel to operate this equipment.

Do not go underneath a loaded raised bed under ANY circumstances.



Be sure to.....

* Follow all Federal, State, Local regulations pertaining to this equipment.
* Keep unit properly maintained and serviced.
* Understand and follow all safety decals and keep them in good condition.
* Check hydraulic oil level each time truck is serviced.
* Add correct hydraulic oil to reservoir as needed.

ELECTRIC PUMP APPLICATIONS

CAUTION

USE DEXTRON ATF OIL ONLY!

(DEXTRON AUTOMATIC TRANSMISSION FLUID)

ELECTRIC PUMP APPLICATIONS ONLY!!!

PTO PUMP APPLICATIONS

CAUTION

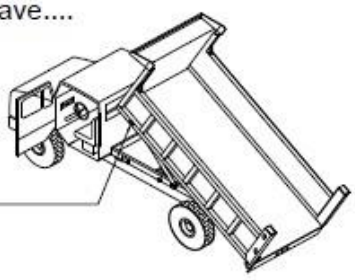
USE HYDRAULIC OIL ONLY!

TEXACO RANDO HD 32
EXXON NUTO HD 32
SHELL TELLUS HD 32
OR COMPARABLE

When calling for Parts/Service Be Sure To Have....

Body: model number
serial number

Serial Plate Location



Hoist: model number
serial number

Serial Plate Location

To Operate the Hoist:

(1) With engine running at idle speed, transmission in neutral, and the park brake set.

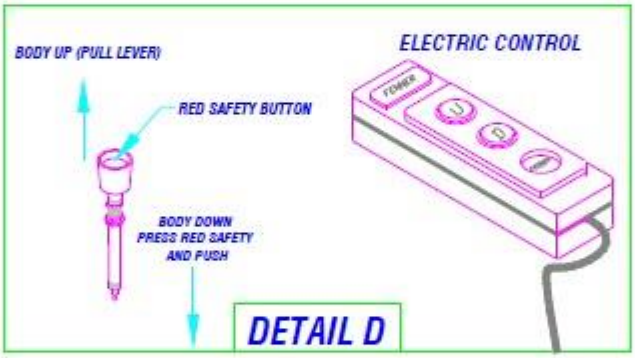
(2) Depress clutch pedal.

(3) Pull PTO control out until the red PTO light illuminates. Note: if light does not illuminate, and PTO does not engage, Slowly release the clutch pedal while pulling on the PTO control.

(4) Once the PTO is engaged, release the clutch pedal to supply power to the pump.

(5) The pump/hoist control should be in the neutral or "hold" position.

(6) Depress the saftey button and pull the pump/hoist control to raise the bed. See Detail D below.



(7) When bed raises to desired height push the pump/hoist controls to the center neutral or "hold" position this will stop bed movement up or down.

(8) To lower bed depress the saftey button and push pump/hoist control .

(9) Depress clutch pedal, and push PTO control to disengage.

FOR ELECTRIC PUMP APPLICATION

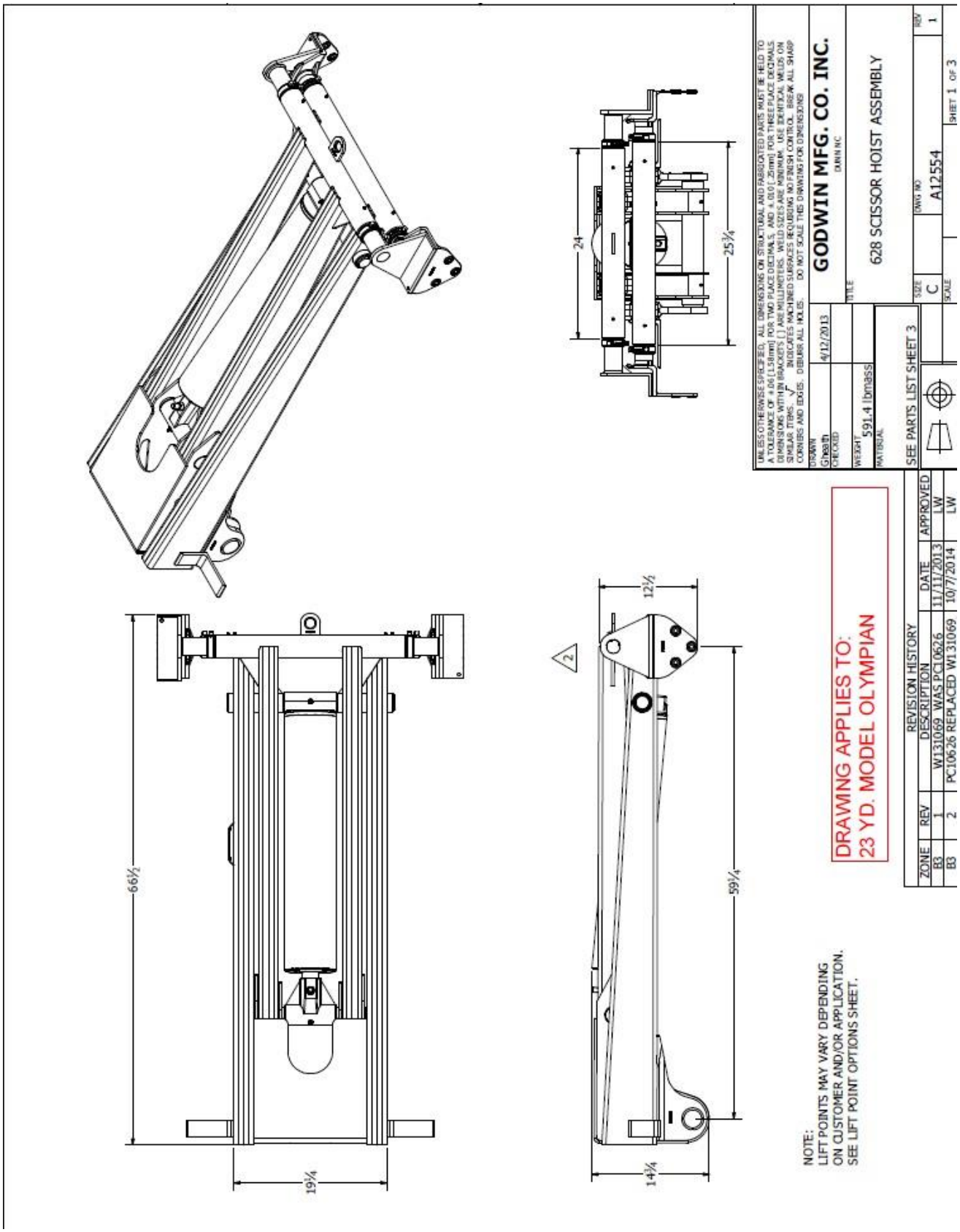
To Operate the push button Hoist:

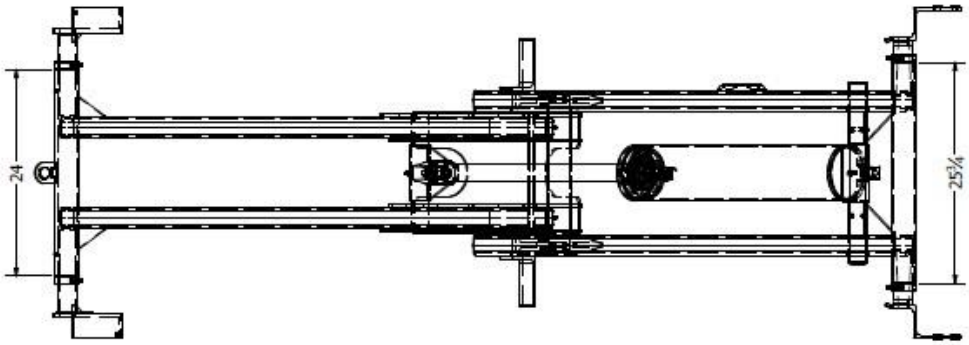
Press and hold approate button.

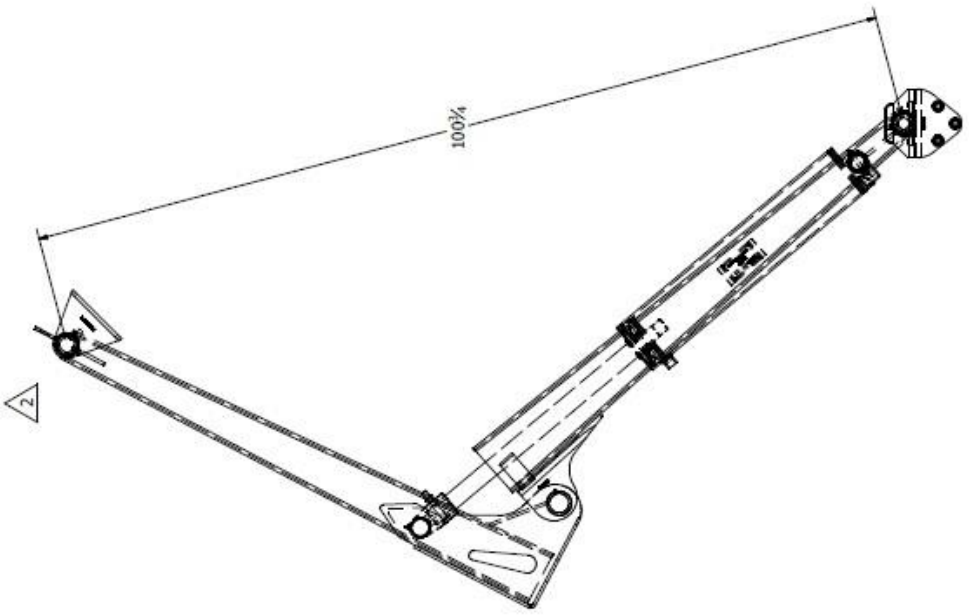
NOTE: Pump will stop when button is released.

CHAMPION HOIST RATINGS

Hoist	NTEA Class	System Pressure	Capacity (TONS) - Truck Bed Length (FT) - 18 inches Overhang							
			10	12	14	16	18	20	22	24
GS 415		3,000	5.9	4.6						
GS 515	C	3,000	9.2	7.2						
GS 615	C	3,000	13.2	10.3						
GS 615 HD	C	3,000	13.9	10.8						
GS 615 LS	C	3,000	12.2	9.5						
GS 620 HD	D	3,000		14.4	11.8	10.0				
GS 6615	E	3,000		21.8	17.8					
GS 628	G	3,000		19.5	16.0	13.5				
GS 5530	G	3,000					14.2	12.6	11.3	
GS 6620	G	3,000			18.6	15.9				
GS 6630	H	3,000					20.4	18.1	16.3	14.8


24
25¾
66½
19¾
12½
59¼
14¾
2
DRAWING APPLIES TO:
23 YD. MODEL OLYMPIAN
NOTE:
LIFT POINTS MAY VARY DEPENDING
ON CUSTOMER AND/OR APPLICATION.
SEE LIFT POINT OPTIONS SHEET.
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ON STRUCTURAL AND FABRICATED PARTS MUST BE HELD TO A TOLERANCE OF ±.06 [1.58mm] FOR TWO PLACE DECIMALS, AND ±.010 [.25mm] FOR THREE PLACE DECIMALS. DIMENSIONS WITHIN BRACKETS [ ] ARE MILLIMETERS. WELD SIZES ARE MINIMUM. USE IDENTICAL WELDS ON SIMILAR ITEMS. ▽ INDICATES MACHINED SURFACES REQUIRING NO FINISH CONTROL. BREAK ALL SHARP CORNERS AND EDGES. DEBURR ALL HOLES. DO NOT SCALE THIS DRAWING FOR DIMENSIONS
DRAWN Ghealth 4/12/2013
CHECKED
WEIGHT 591.4 lbmass
MATERIAL
SEE PARTS LIST SHEET 3
GODWIN MFG. CO. INC.
DIXON INC
TITLE
628 SCISSOR HOIST ASSEMBLY
SIZE C
DWG NO A12554
REV 1
SCALE
SHEET 1 OF 3
ZONE REV DESCRIPTION DATE APPROVED
B3 1 W1310669 WAS PC10626 11/11/2013 LW
B3 2 PC10626 REPLACED W1310669 10/7/2014 LW





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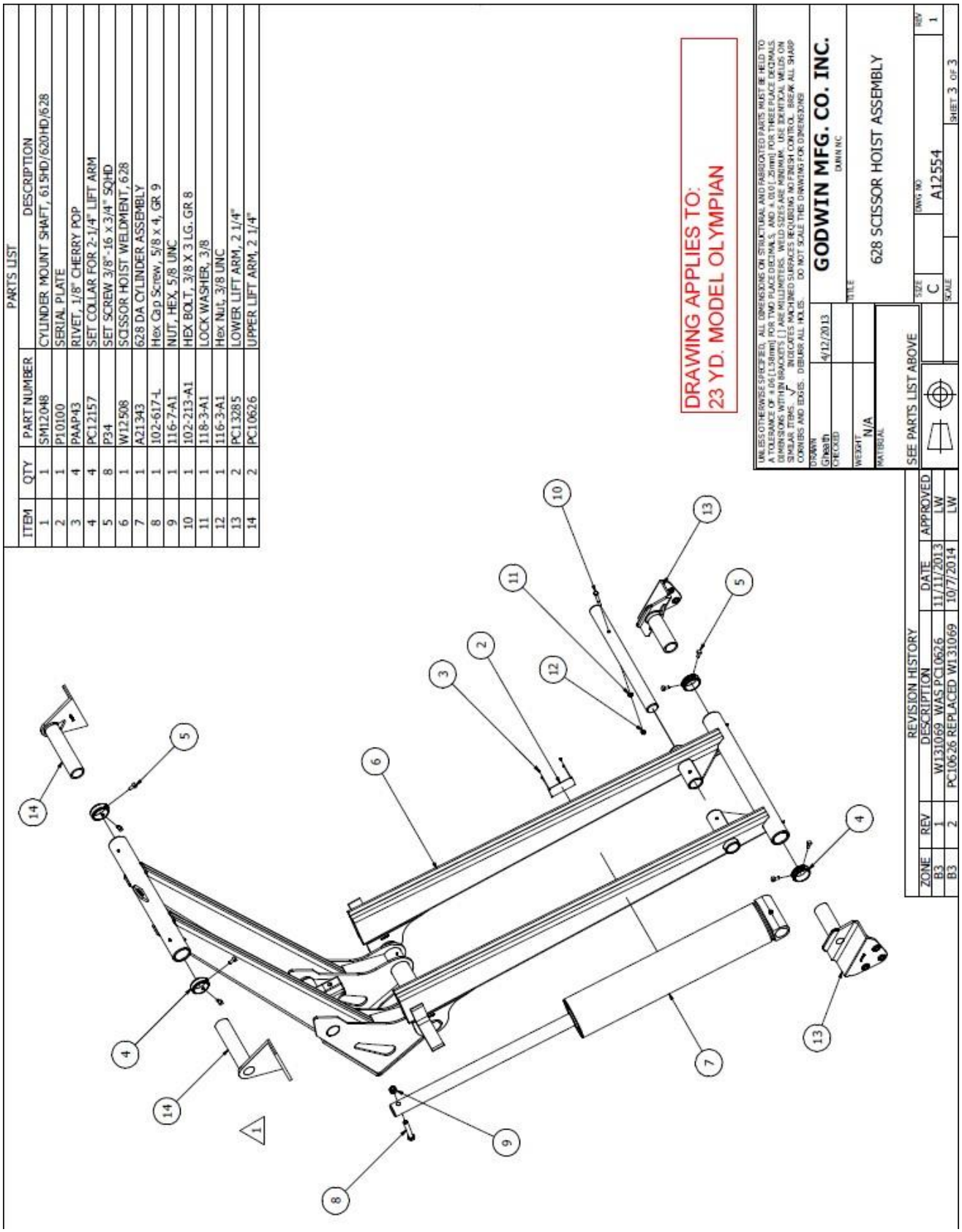
DRAWN	4/12/2013	GODWIN MFG. CO. INC.
Gheen		DUNN NC
CHECKED		TITLE
WEIGHT		628 SCISSOR HOIST ASSEMBLY
N/A		
MATERIAL		SIZE C
SEE PARTS LIST SHEET 3		DWG NO A12554 REV 1
		SCALE SHEET 2 OF 3

DRAWING APPLIES TO:
23 YD. MODEL OLYMPIAN

REVISION HISTORY				
ZONE	REV	DESCRIPTION	DATE	APPROVED
B3	1	W1310669 WAS PC10626	11/11/2013	LW
B3	2	PC10626 REPLACED W1310669	10/7/2014	LW



PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	SM12048	CYLINDER MOUNT SHAFT, 615HD/620HD/628
2	1	P10100	SERIAL PLATE
3	4	PAAP-43	RIVET, 1/8" CHERRY POP
4	4	PC12157	SET COLLAR FOR 2-1/4" LIFT ARM
5	8	P34	SET SCREW 3/8"-16 x 3/4" SQHD
6	1	W12508	SCISSOR HOIST WELDMENT, 628
7	1	A21343	628 DA CYLINDER ASSEMBLY
8	1	102-617-L	Hex Cap Screw, 5/8 x 4, GR 9
9	1	116-7-A1	NUT, HEX, 5/8 UNC
10	1	102-213-A1	HEX BOLT, 3/8 X 3 LG, GR 8
11	1	118-3-A1	LOCK WASHER, 3/8
12	1	116-3-A1	Hex Nut, 3/8 UNC
13	2	PC13285	LOWER LIFT ARM, 2 1/4"
14	2	PC10626	UPPER LIFT ARM, 2 1/4"

DRAWING APPLIES TO:
23 YD. MODEL OLYMPIAN

ZONE	REV	DESCRIPTION	DATE	APPROVED
B3	1	W131069 WAS PC10626	11/11/2013	LW
B3	2	PC10626 REPLACED WI 31069	10/7/2014	LW

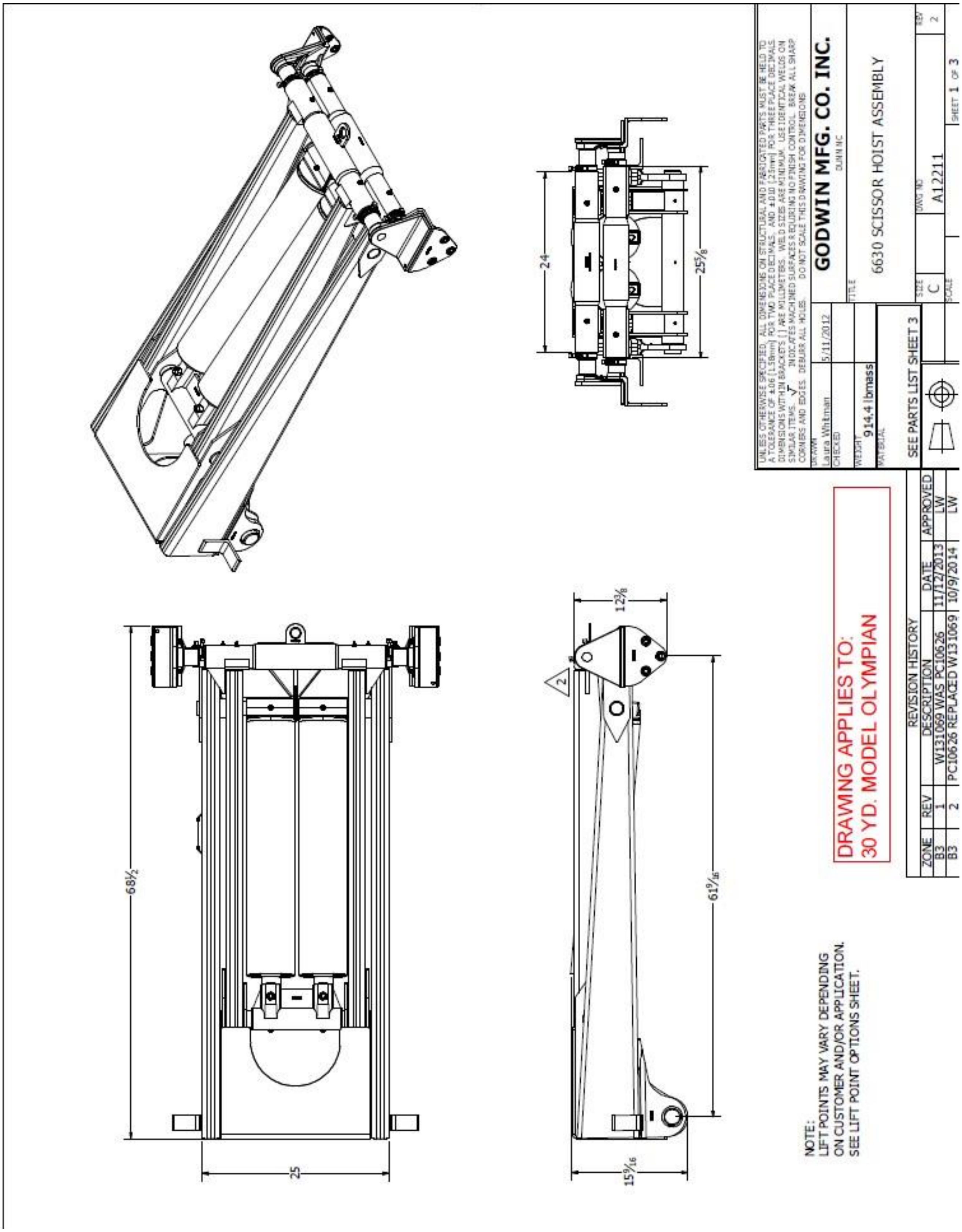
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ON STRUCTURAL AND FABRICATED PARTS MUST BE HELD TO A TOLERANCE OF ± .06 [1.58mm] FOR TWO PLACE DECIMALS, AND ± .010 [.25mm] FOR THREE PLACE DECIMALS. DIMENSIONS WITHIN BRACKETS [ ] ARE MILLIMETERS. WELD SIZES ARE MINIMUM. USE IDENTICAL WELDS ON SIMILAR ITEMS. √ INDICATES MACHINED SURFACES REQUIRING NO FINISH CONTROL. BREAK ALL SHARP CORNERS AND EDGES. DEBURR ALL HOLES. DO NOT SCALE THIS DRAWING FOR DIMENSIONS

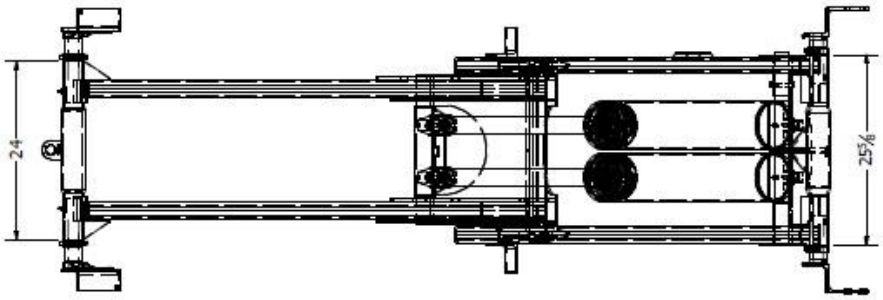
DRAWN: Gheath 4/12/2013
CHECKED:
WEIGHT: N/A
MATERIAL: SEE PARTS LIST ABOVE

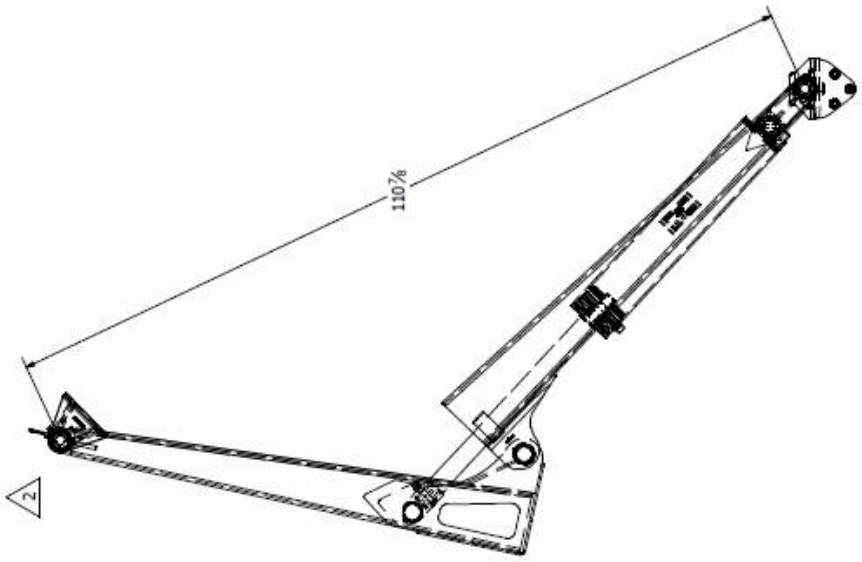
GODWIN MFG. CO. INC.
DIXON NC

TITLE: 628 SCISSOR HOIST ASSEMBLY

SIZE: C
DWG NO: A12554
REV: 1
SCALE:
SHEET 3 OF 3


GODWIN MFG. CO. INC.
DUNN NC
6630 SCISSOR HOIST ASSEMBLY
DRAWN Laura Whitman 5/11/2012
CHECKED
WEIGHT 914.4 lbmass
MATERIAL
SEE PARTS LIST SHEET 3
SIZE C
DWG NO A12211
REV 2
SCALE
SHEET 1 OF 3
REVISION HISTORY
ZONE REV DESCRIPTION DATE APPROVED
B3 1 W131069 WAS PC10626 11/12/2013 LW
B3 2 PC10626 REPLACED W131069 10/9/2014 LW
DRAWING APPLIES TO:
30 YD. MODEL OLYMPIAN
NOTE:
LIFT POINTS MAY VARY DEPENDING
ON CUSTOMER AND/OR APPLICATION.
SEE LIFT POINT OPTIONS SHEET.
24
25⅝
12⅜
68½
61⁹⁄₁₆
15⁹⁄₁₆
25
2





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DRAWN	Laura Whitman
CHECKED	
WEIGHT	N/A
MATERIAL	SEE PARTS LIST SHEET 3

GODWIN MFG. CO. INC.
DUNN NC

5/11/2012

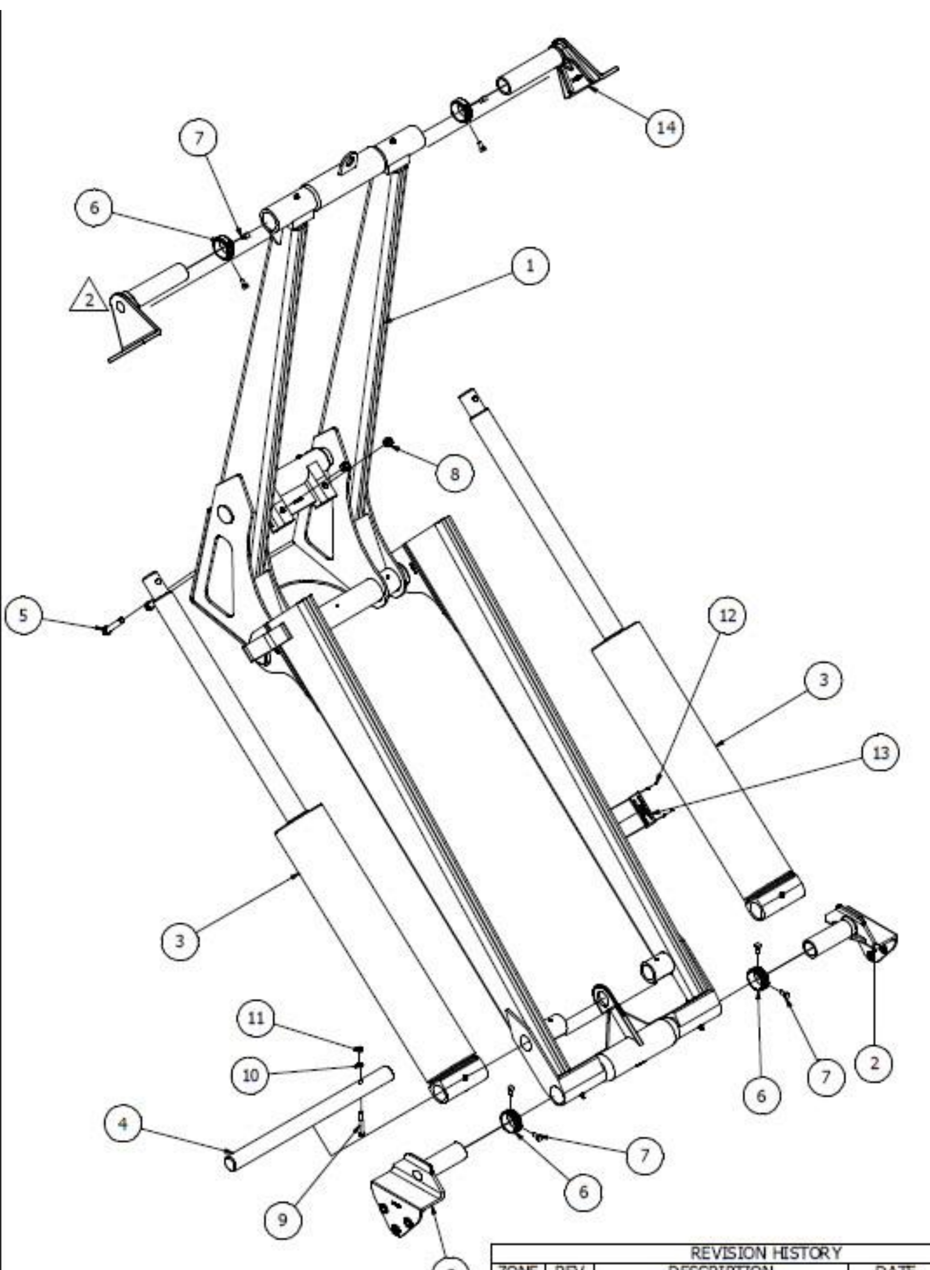
TITLE
6630 SCISSOR HOIST ASSEMBLY

SIZE	DWG NO	REV
C	A12211	2
SCALE		SHEET 2 OF 3

DRAWING APPLIES TO:
30 YD. MODEL OLYMPIAN

REVISION HISTORY

ZONE	REV	DESCRIPTION	DATE	APPROVED
B3	1	W131069 WAS PC10626	11/12/2013	LW
B3	2	PC10626 REPLACED W131069	10/9/2014	LW



PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	W12507	SCISSOR HOIST WELDMENT, 5530/6630
2	2	PC13285	LOWER LIFT ARM, 2 1/4"
3	2	A21356	630 DA CYLINDER ASSEMBLY
4	1	SM12058	CYLINDER MOUNT SHAFT, 6615/6620/5530/6630/5520T/6620T
5	2	102-615-L	5/8 x 3 1/2 L9 Hex Cap Screw
6	4	PC12157	SET COLLAR FOR 2-1/4" LIFT ARM
7	8	P34	SET SCREW 3/8"-16 x 3/4" SQHD
8	2	116-7-A1	HEX NUT, 5/8" UNC
9	1	102-213-A1	HEX BOLT, 3/8 X 3 LG. GR 8
10	1	118-3-A1	Lock Washer, 3/8
11	1	116-3-A1	Hex Nut, 3/8 UNC
12	4	PAAP43	RIVET, 1/8" CHERRY POP
13	1	P10100	SERIAL PLATE
14	2	PC10626	2-1/4" UPPER LIFT ARM

DRAWING APPLIES TO:
30 YD. MODEL OLYMPIAN

REVISION HISTORY

ZONE	REV	DESCRIPTION	DATE	APPROVED
B3	1	W131069 WAS PC10626	11/12/2013	LW
B3	2	PC10626 REPLACED W131069	10/9/2014	LW

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DRAWN Laura Whitman	5/11/2012	GODWIN MFG. CO. INC. DUNN NC	
CHECKED		TITLE 6630 SCISSOR HOIST ASSEMBLY	
WEIGHT N/A			
MATERIAL SEE PARTS LIST ABOVE			
SIZE C	DWG NO A12211	REV 2	
SCALE		SHEET 3 OF 3	

PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	PC10583	REAR HINGE BLOCK, 1-3/4"
2	1	PC10636	HINGE FLIPPER, 1-3/4"
3	1	PC10816	1-3/4" REAR HINGE PIN, SHORT VERSION
4	1	102-214	Hex Cap Screw, 3/8 X 3 1/4
5	1	118-3-A1	Lock Washer, 3/8
6	1	116-3-A1	Hex Nut, 3/8 UNC
7	1	P800	1/8" PIPE THREAD GREASE FITTING

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ON STRUCTURAL AND FABRICATED PARTS MUST BE HELD TO A TOLERANCE OF ±.06 [1.58mm] FOR TWO PLACE DECIMALS, AND ±.010 [.25mm] FOR THREE PLACE DECIMALS. DIMENSIONS WITHIN BRACKETS [ ] ARE MILLIMETERS. WELD SIZES ARE MINIMUM. USE IDENTICAL WELDS ON SIMILAR ITEMS. √ INDICATES MACHINED SURFACES REQUIRING NO FINISH CONTROL. BREAK ALL SHARP CORNERS AND EDGES. DEBURR ALL HOLES. DO NOT SCALE THIS DRAWING FOR DIMENSIONS

DRAWN: Gheath 8/2/2012
CHECKED:

WEIGHT: 15.8 lbmass

MATERIAL: SEE PARTS LIST ABOVE

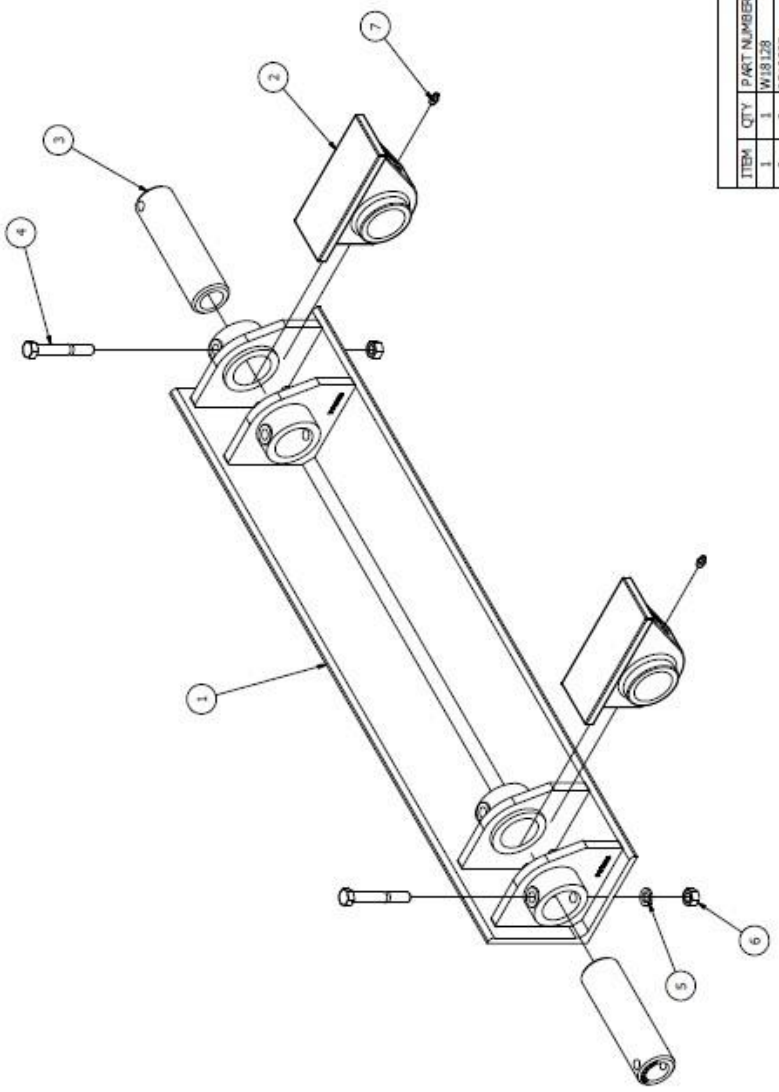
GODWIN MFG. CO. INC.
DIXON NC

TITLE: TRAILER HOIST REAR HINGE ASSEMBLY

SIZE: C | DWG NO: A13926 | REV:

SCALE: | SHEET 1 OF 1

DRAWING APPLIES TO:
23 YD. MODEL OLYMPIAN



PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	W18128	REAR HINGE WELDMENT, 2" NEW
2	2	PC10335	2" REAR HINGE BLOCK, CASTING LG. CONTRACTOR BODY
3	2	PC10523	REAR HINGE PIN 2"
4	2	102-415-A1	Hex Bolt, 1/2-13 UNC x 3 1/2 GR.C8
5	2	118-5-A1	Lock Washer, 1/2
6	2	116-5-A1	HEX NUT, 1/2-13 UNC
7	2	P800	1/8" GREESE FITTING, PIPE THREAD

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ON STRUCTURAL AND FABRICATED PARTS MUST BE HELD TO A TOLERANCE OF ±.06 [1.58mm] FOR TWO PLACE DECIMALS, AND ±.010 [.25mm] FOR THREE PLACE DECIMALS. DIMENSIONS WITHIN BRACKETS [ ] ARE MILLIMETERS. WELD SIZES ARE NOMINAL. USE IDENTICAL WELDS ON SIMILAR PARTS. INTERPRET SURFACE FINISH SYMBOLS PER ANSI Y14.36M. REMOVE ALL SHARP CORNERS AND EDGES. DEBURR ALL HOLES. DO NOT SCALE THIS DRAWING FOR DIMENSIONS

DRAWN: Chip Lowvorn 3/26/2012
CHECKED:
WEIGHT: 96.6 lbmass
MATERIAL:

GODWIN MFG. CO. INC.
DUNN INC

TITLE: ASSY., REAR HINGE, 2"

SIZE: C | DWG NO: A18207 | REV:

SCALE: | SHEET 1 OF 2

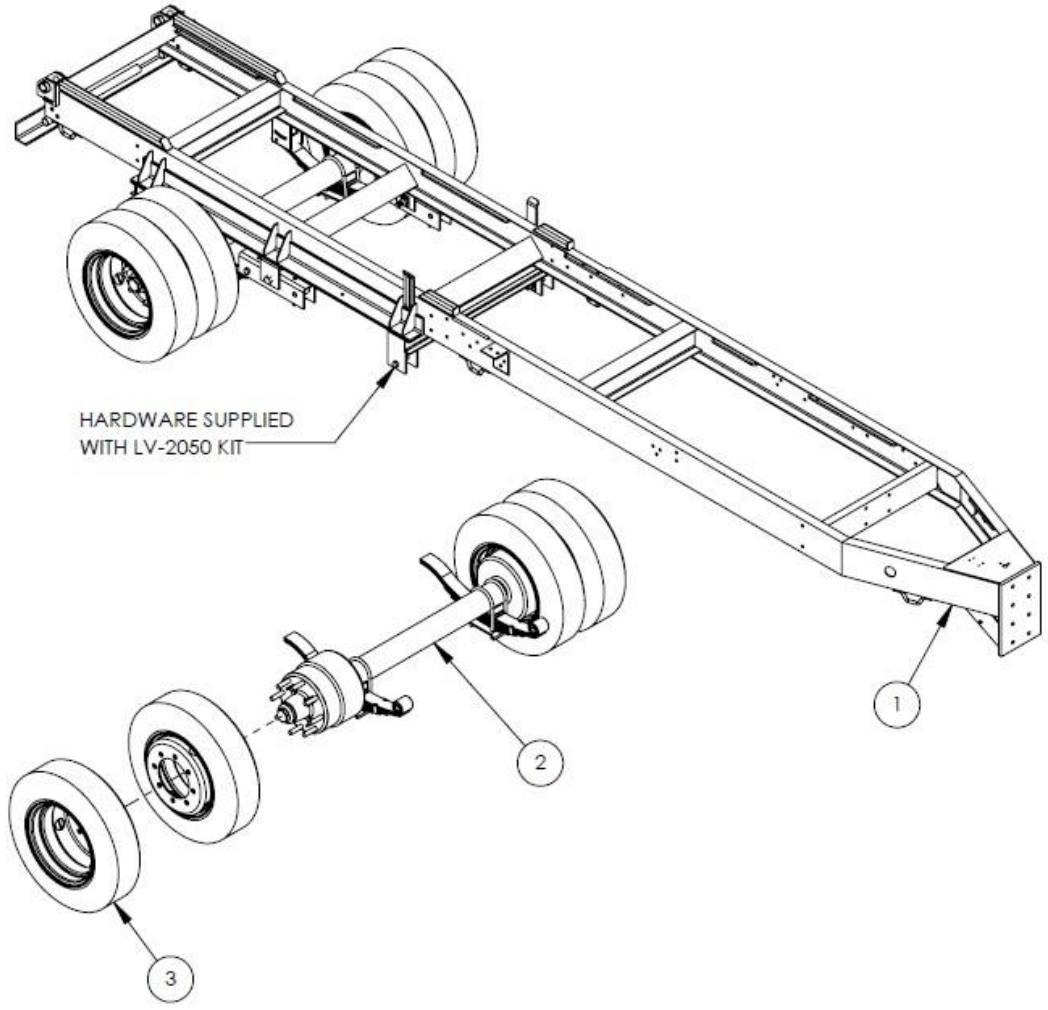
DRAWING APPLIES TO:
30 YD. MODEL OLYMPIAN

10 PART BREAKDOWNS

FRAME AND RUNNING GEAR

FILE NAME	LV-4417
DWG NAME	LV-4417 PG1

OLYMPIAN CHASSIS & RUNNING GEAR



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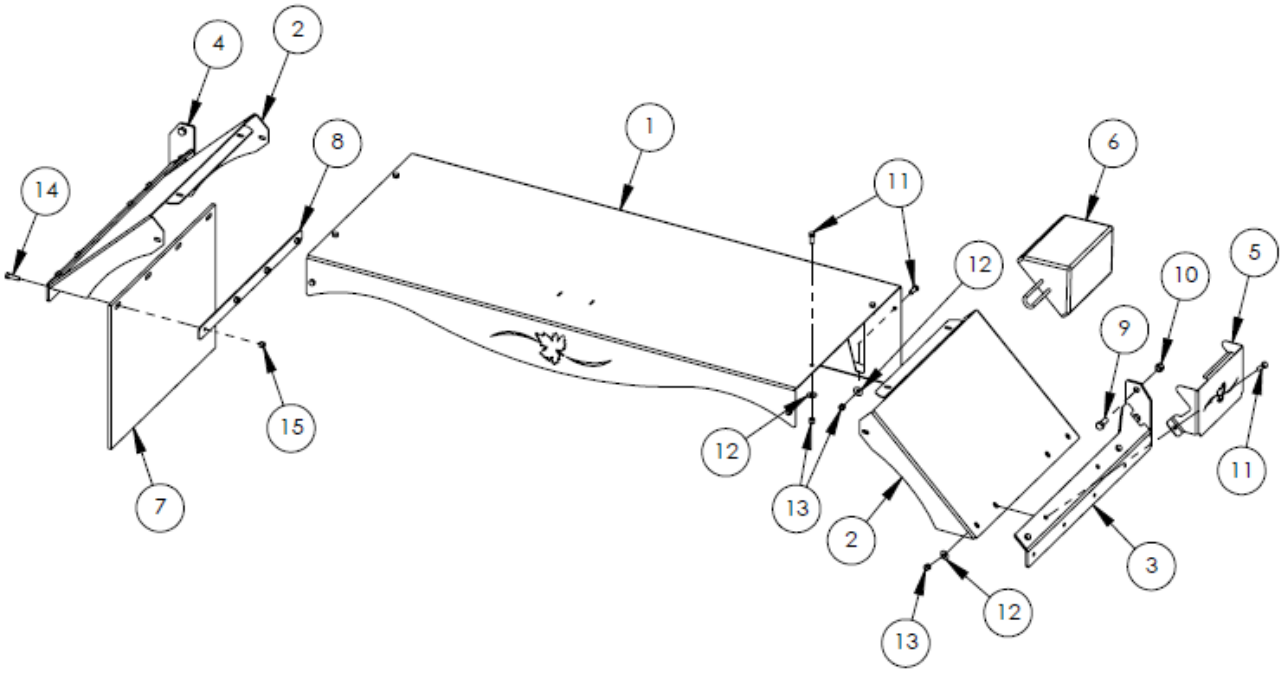
ITEM	QTY	PART NUMBER	DESCRIPTION
3	8	LV-4521	TIRE ST215/75 R17 FOR 16K AXLE
		LV-2051	TIRE ST235/85 R16 FOR 12K AXLE
2	2	LV-4520	16K AXLE FOR 30 YD
		LV-2049	12K AXLE FOR 23 YD
1	1	LV-4430	30 YD CHASSIS WELDMENT
		LV-4420	23 YD CHASSIS WELDMENT

Titan LEAF SOLUTIONS

DIXON, ILLINOIS
PHONE: 800-851-9664

FENDERS AND WHEEL CHOCKS

FILE NAME	M1477	REV.	DESCRIPTION	DATE	INITIALS
DWG NAME	M1477	-	ORIGINAL	1/16/2023	JWH



ITEM	PART NUMBER	QTY	DESCRIPTION
15	BON-000320	4	5/16"-18 LOCK NUT, NYLON
14	BON-000031	4	5/16"-18 X 1-1/4" HHCS
13	BON-000319	16	3/8"-16 LOCK NUT, NYLON
12	BON-000338	16	3/8" FLAT WASHER
11	BON-000058	16	3/8"-16 X 1-1/4" HHCS
10	BON-000321	4	1/2"-13 LOCK NUT, NYLON
9	BON-000107	4	1/2"-13 X 1-1/2" HHCS
8	BON-008755SS	1	MOUNTING BRACKET, MUDFLAP
7	LV-2267	1	MUDFLAP, TITAN LEAF SOLUTIONS
6	BUY-WC1085H	1	WHEEL CHOCK
5	LV-4478	1	WHEEL CHOCK HOLDER
4	LV-4477L	1	MOUNTING BRACKET, FENDER LEFT
3	LV-4477R	1	MOUNTING BRACKET, FENDER RIGHT
2	LV-4476	2	FENDER, SIDE
1	LV-4475	1	FENDER, TOP

NOTE:
QUANTITIES ARE FOR ONE FENDER

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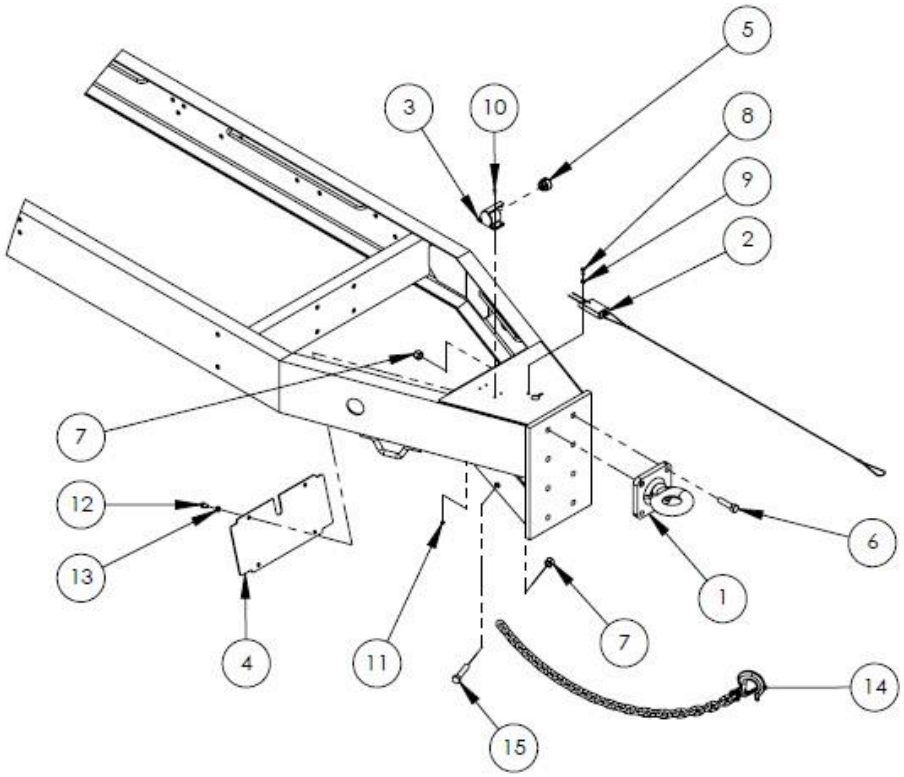
TRAILER CONNECTION

FILE NAME	LV-4417
DWG NAME	LV-4417 PG3

OLYMPIAN HITCH & TRAILER CONNECTION



ITEM	QTY	PART NUMBER	DESCRIPTION
15	2	BON-000157	BOLT, 5/8-11 X 3 HEX ZP
14	2	LV-2047	SAFETY CHAIN, 7/16 X 37" WITH FORGED SLIP HOOK
13	4	BON-000352	LOCKWASHER, 3/8 ZP
12	4	BON-000055	BOLT, 3/8-16 X 3/4 HEX ZP
11	4	*10-24 NUT W/STAR WASHER	#10-24 HEX NUT W/ STAR WASHER ZP
10	4	*10-24X1/2 MACHINE SCREW	#10-24X1/2 MS ZP
9	1	BON-000318.5	LOCKNUT, 1/4-20 NYLON ZP
8	1	BON-000003	BOLT, 1/4-20 X 3/4 HE ZP
7	6	BON-000322	LOCKNUT, 5/8-11 NYLON ZP
6	4	BON-000155	BOLT, 5/8-11 X 2-1/2 HEX ZP
5	1	WAY-37677	TRAILER CONNECTOR FLAT MALE 7 PIN
4	1	LV-4429	BREAKWAY BOX ACCESS PLATE
3	1	LV-1644	TRAILER PLUG COVER
2	1	LV-1404	BREAK AWAY SWITCH AND CABLE ONLY
1	1	HOL-DB-1250-15	LUNETTE DRAW BAR, PINTLE EYE

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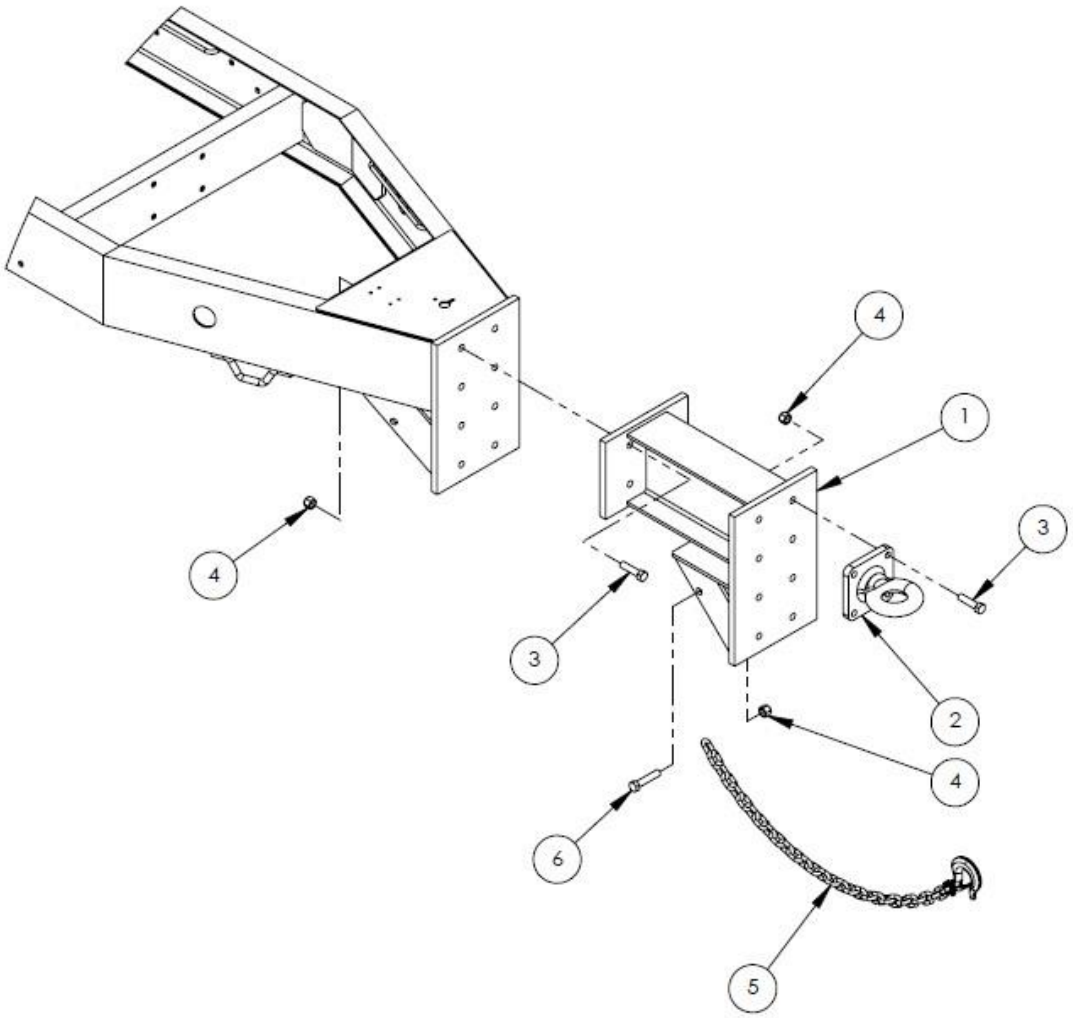
TONGUE EXTENSION

FILE NAME	LV-4417
DWG NAME	LV-4417 PG4

OLYMPIAN TONGUE EXTENSION



ITEM	QTY	PART NUMBER	DESCRIPTION
6	2	BON-000157	BOLT, 5/8-11 X 3 HEX ZP
5	2	LV-2047	SAFETY CHAIN, 7/16 X 37" WITH FORGED SLIP HOOK
4	10	BON-000322	LOCKNUT, 5/8-11 NYLON ZP
3	8	BON-000155	BOLT, 5/8-11 X 2-1/2 HEX ZP
2	1	HOL-DB-1250-15	LUNETTE DRAW BAR, PINTLE EYE
1	1	LV-4421	TONGUE EXTENSION

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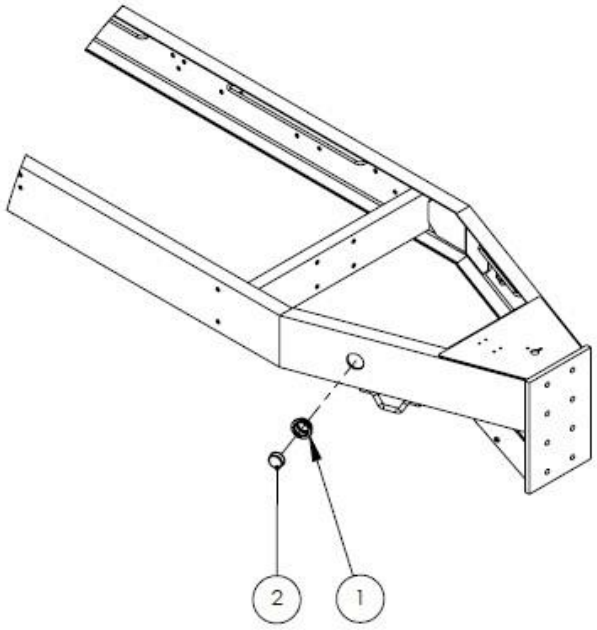
CHASSIS LIGHTS

FILE NAME	LV-4417
DWG NAME	LV-4417 PG5

OLYMPIAN CHASSIS LIGHTS



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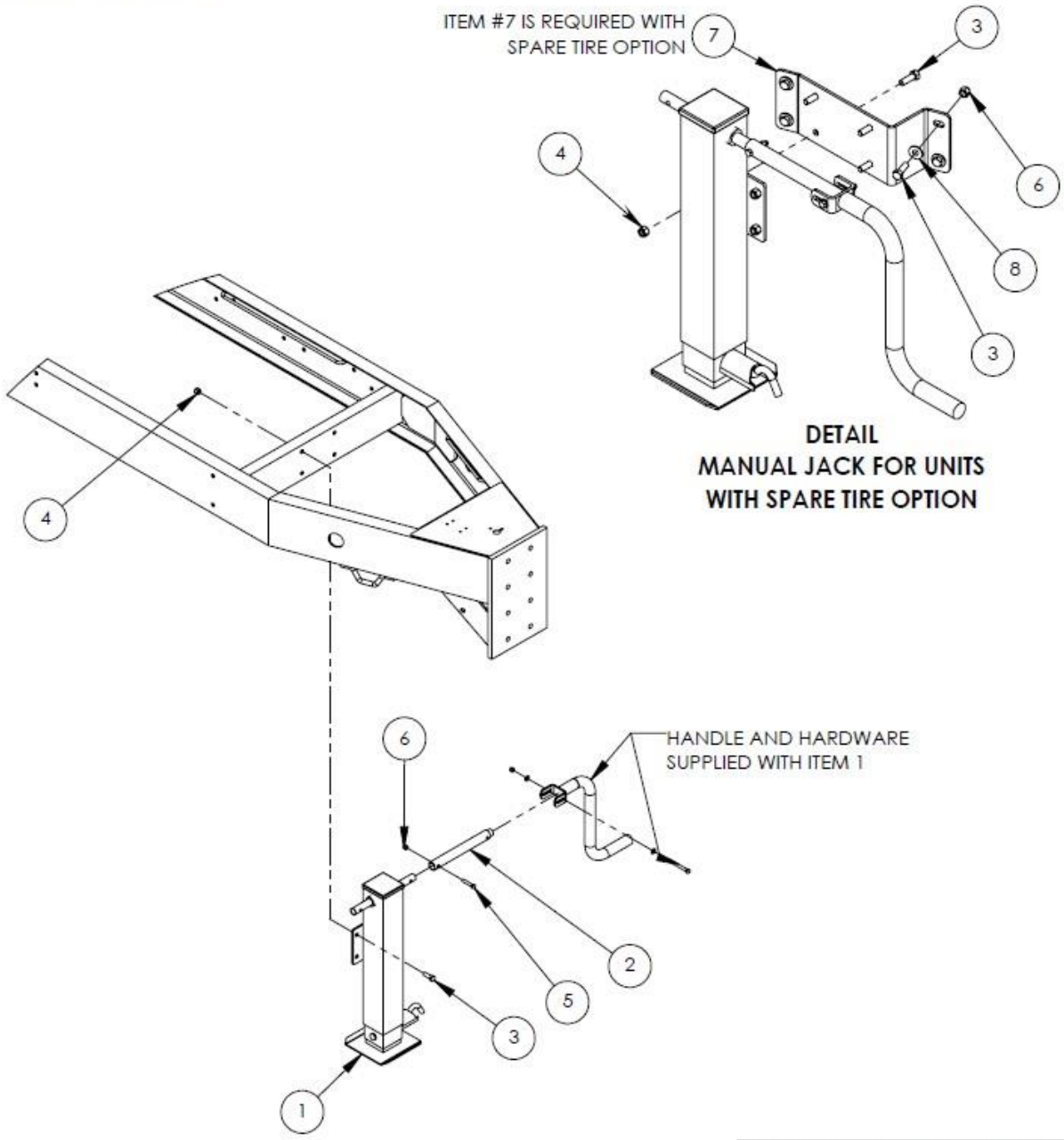
ITEM	QTY	PART NUMBER	DESCRIPTION
3	1	LV-4273	HARNESS, MAIN CHASSIS WIRE
2	2	PM-M194A	LED CLEARANCE LIGHT 2" AMBER
1	2	PM-146-18	GROMMET, 2" CLEARANCE/MARKER

MANUAL TRAILER JACK

FILE NAME	LV-4417
DWG NAME	LV-4417 PG6

OLYMPIAN MANUAL TRAILER JACK



DETAIL
MANUAL JACK FOR UNITS WITH SPARE TIRE OPTION

ITEM	QTY	PART NUMBER	DESCRIPTION
8	4	BON-000340	FLATWASHER, 1/2 ZP
7	1	LV-4281	JACK ADAPTER BRACKET
6	1	BON-000319	LOCKNUT, 3/8-16 NYLON ZP
5	1	BON-000061	BOLT, 3/8-16 X 2 HEX ZP
4	4	BON-000321	LOCKNUT, 1/2-13 NYLON ZP
3	4	BON-000107	BOLT, 1/2-13 X 1-1/2 HEX ZP
2	1	LV-4437	11" HANDLE EXTENSION
1	1	LV-4422	MANUAL JACK

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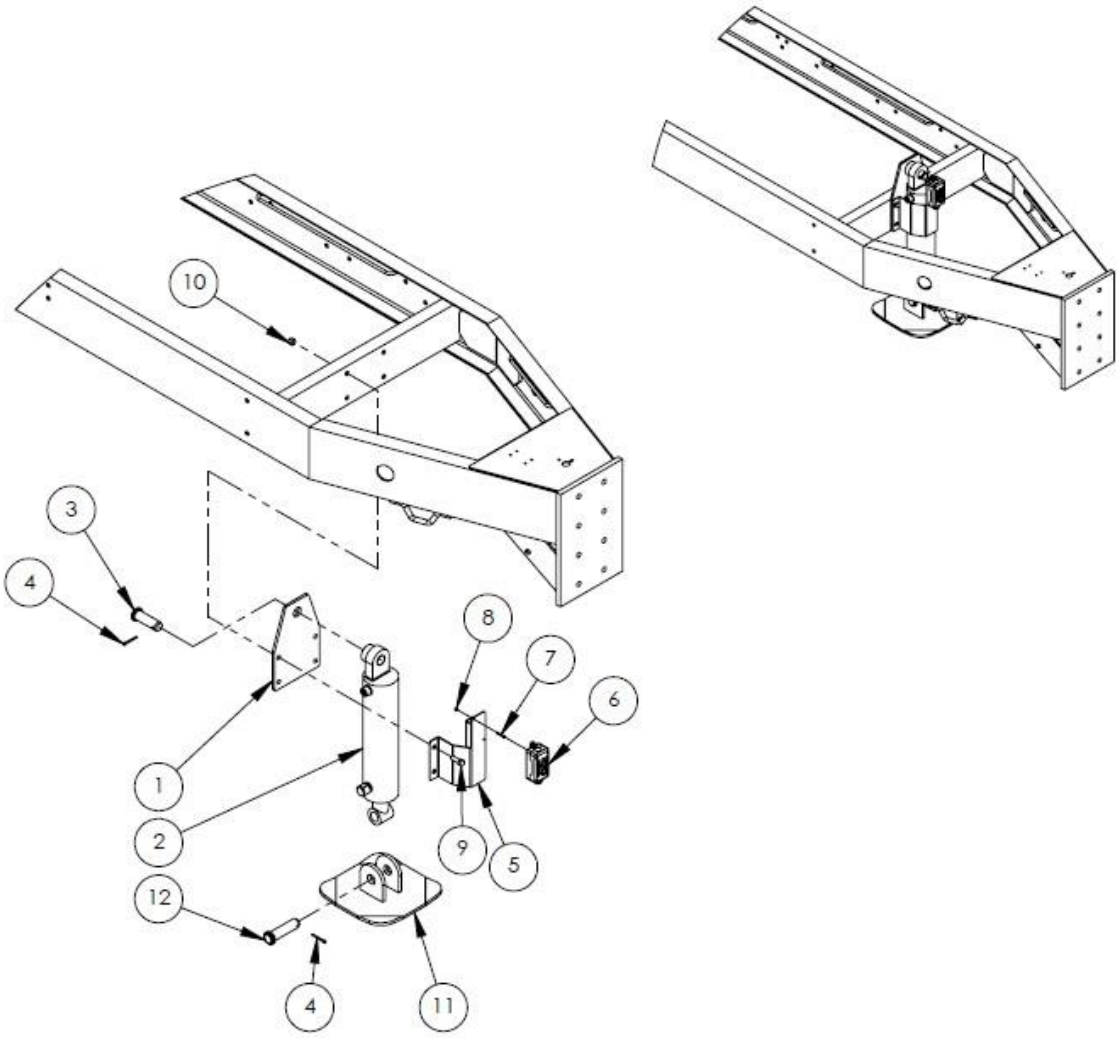
HYDRAULIC JACK

FILE NAME	LV-4417
DWG NAME	LV-4417 PG7

OLYMPIAN HYDRAULIC TRAILER JACK



ITEM	QTY	PART NUMBER	DESCRIPTION
12	1	BON-003261	PIN, 1-1/4" X 5-1/4"
11	1	LV-4426	JACK FOOT
10	4	BON-000321	LOCKNUT, 1/2-13 NYLON ZP
9	4	BON-000107	BOLT, 1/2-13 X 1-1/2 HX ZP
8	2		10-24 LOCKNUT WITH STAR WASHER
7	2		10-24 X 1-1/4 MACHINE SCREW
6	1	MON-07995	CONTROLLER
5	1	LV-4424	CYLINDER BRACKET
4	2	BON-000383	COTTER PIN 3/16" X 2"
3	1	BON-003263	PIN 1-1/4" DIA X 3-1/8"
2	1	BON-003648N	CYLINDER, HYDRAULIC
1	1	LV-4423	JACK MOUNTING PLATE

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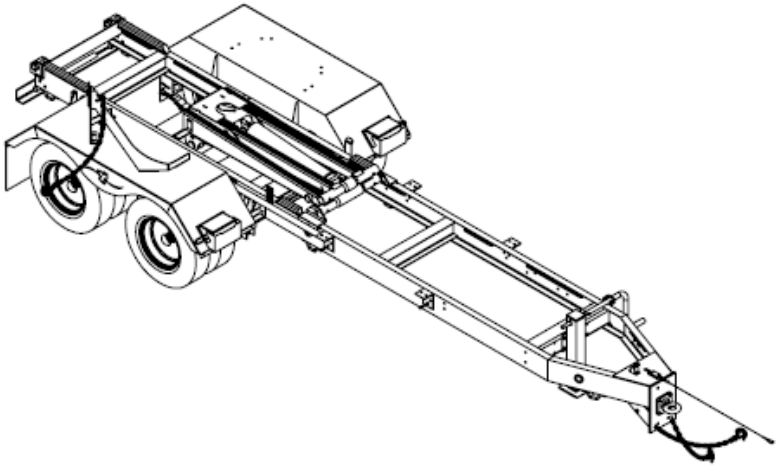
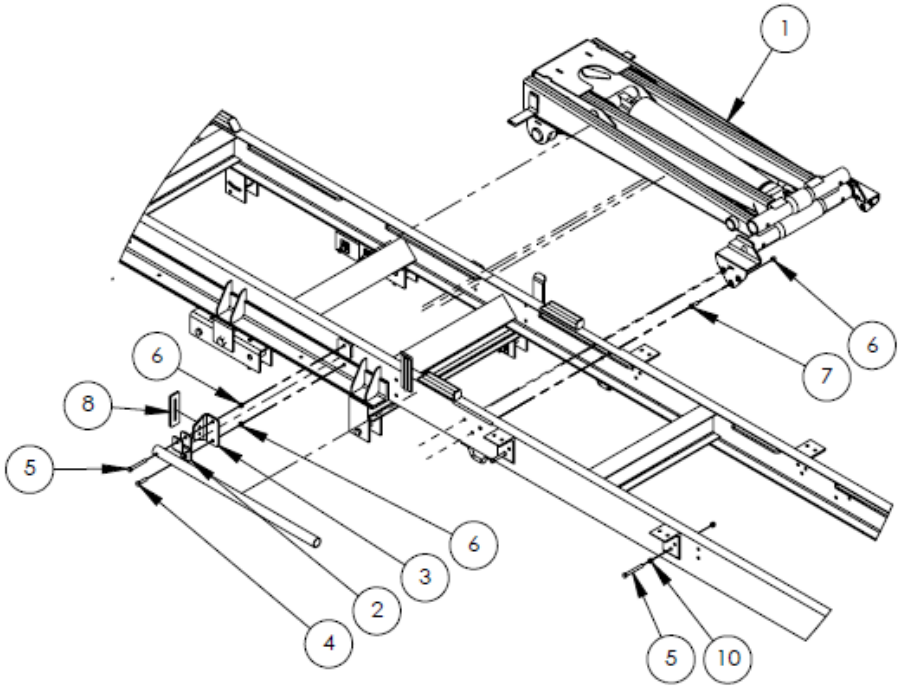
HOIST

FILE NAME	LV-4417
DWG NAME	LV-4417 PG8

OLYMPIAN 23 YARD HOIST





ITEM	QTY	PART NUMBER	DESCRIPTION
8	1	LV-4401	BODY JACK, ADJUSTABLE STOP
7	6	BON-000107	BOLT, 1/2-13 X 1-1/2 HEX ZP
6	10	BON-000321	LOCKNUT, 1/2 NYLON ZP
5	2	BON-000118	BOLT, 1/2-13 X 4-1/2 HEX ZP
4	1	BON-000111	BOLT, 1/2-13 X 2-1/2 HEX ZP
3	1	LV-4400	BODY JACK, ADJUSTABLE STOP BRACKET
2	1	LV-4412	SAFETY PROP & CUP
1	1	LV-4370	HOIST, CS628

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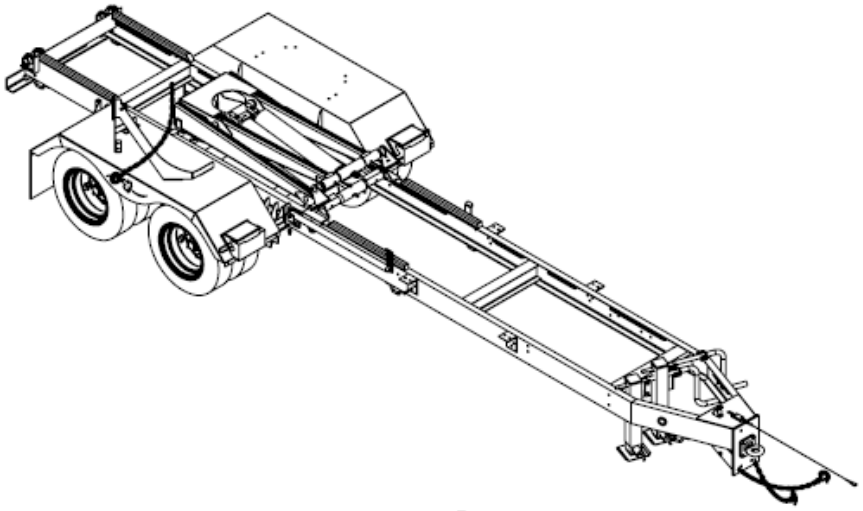
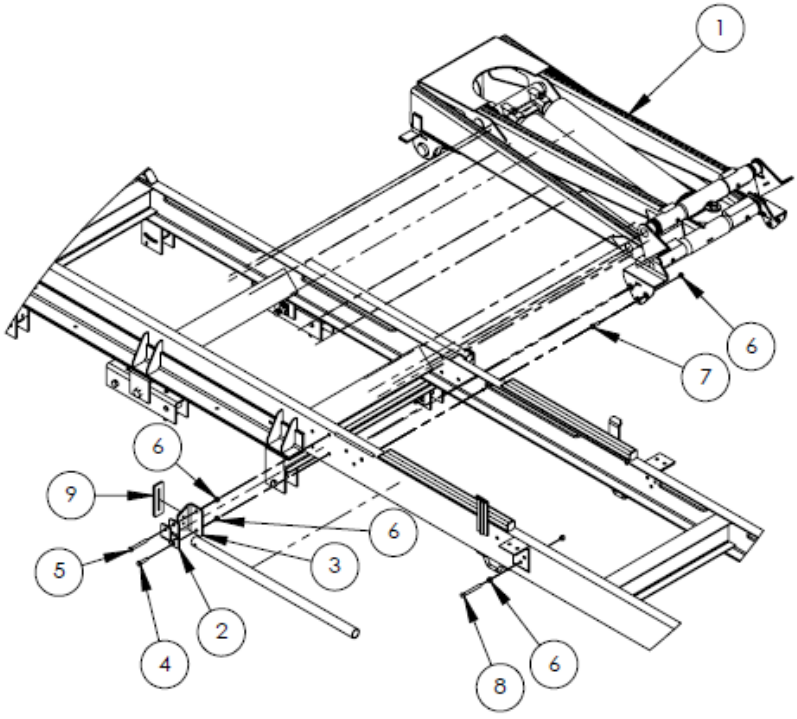
DIXON, ILLINOIS
PHONE: 800-851-9664

FILE NAME	LV-4417
DWG NAME	LV-4417 PG9

OLYMPIAN 30 YARD HOIST





ITEM	QTY	PART NUMBER	DESCRIPTION
9	2	LV-4401	BODY PROP, ADJUSTABLE STOP
8	2	BON-000118	BOLT, 1/2-13 X 4-1/2 HEX ZP
7	6	BON-000107	BOLT, 1/2-13 X 1-1/2 HEX ZP
6	14	BON-000321	LOCKNUT, 1/2 NYLON ZP
5	2	BON-000117	BOLT, 1/2-13 X 4 HEX ZP
4	2	BON-000109	BOLT, 1/2-13 X 2 HEX ZP
3	2	LV-4400	BODY PROP, AJDUSTABLE STOP BRACKET
2	2	LV-2613	SAFETY PROP & CUP
1	1	LV-4369	HOIST, CS6630

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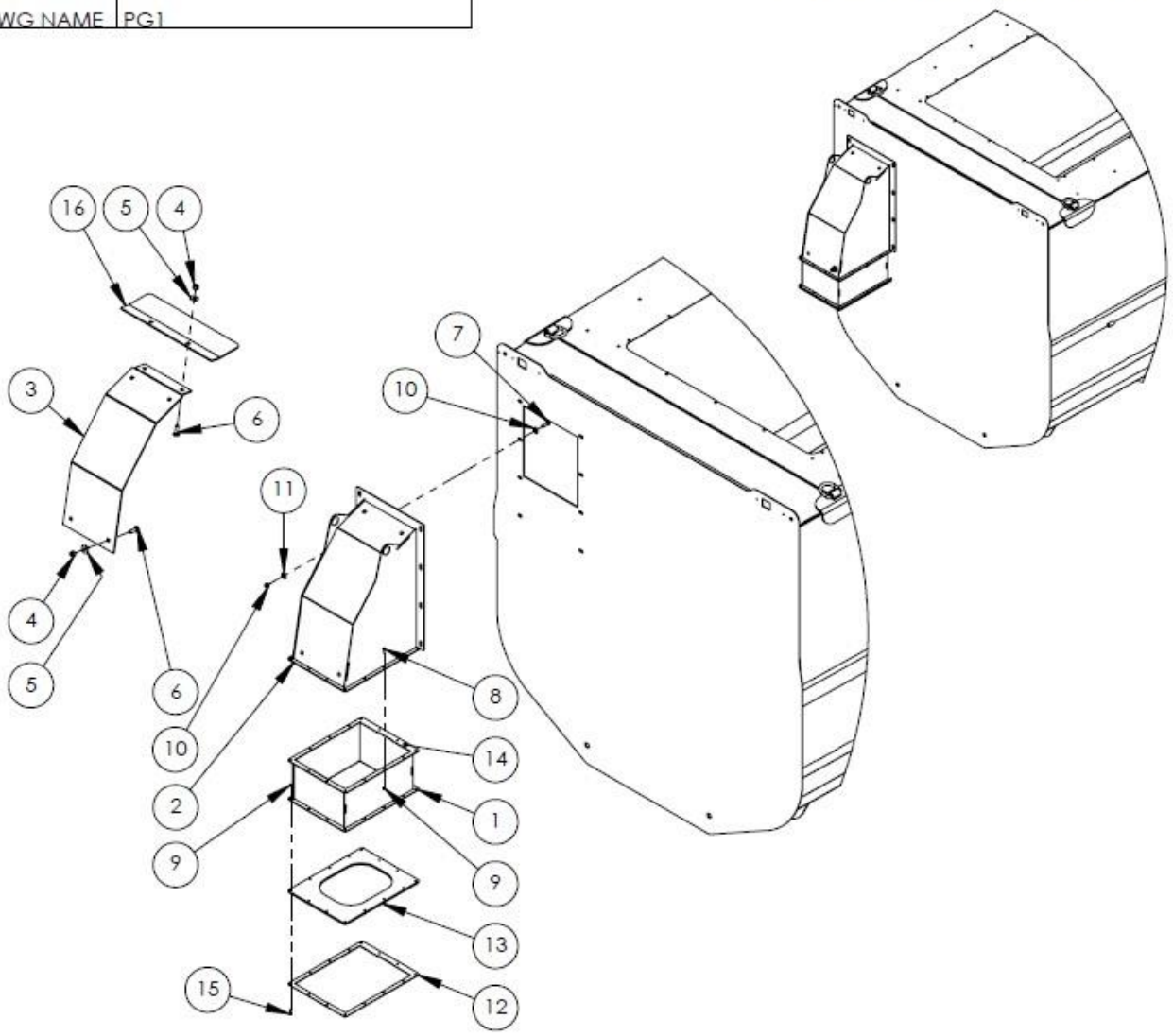
BODY TRANSITION

FILE NAME	OLYMPIAN BODY ASSY
DWG NAME	PG1

OLYMPIAN BODY TRANSITION



ITEM	QTY	PART NUMBER	DESCRIPTION
16	1	LV-4831	TRANSITION LINER EXTENSION
15	14	BON-000006	BOLT, 1/4-20 X 1-1/4 HEX ZP
14	6	LV-4213	SEAL, D BULB X 1/2" WIDE
13	1	LV-4826	TRANSITION GASKET
12	1	LV-4825	TRANSITION SEAL FLANGE
11	16	BON-000340	FLATWASHER, 1/2 ZP
10	8	BON-000321	LOCKNUT, 1/2-13 NYLON ZP
9	24	BON-000318.5	LOCKNUT, 1/4-20 NYLON ZP
8	10	BON-000005	BOLT, 1/4-20 X 1 HEX ZP
7	8	BON-000107	BOLT, 1/2 -13 X 1-1/2 HEX ZP
6	6	BON-000288	BOLT, 5/8 -11 X 2 CARRIAGE ZP
5	6	BON-000341	FLATWASHER, 5/8 ZP
4	6	BON-000322	LOCKNUT, 5/8-11 NYLON ZP
3	1	LV-4824	TRANSITION LINER
2	1	LV-4823	TRANSITION
1	1	LV-4827	TRANSITION EXTENSION

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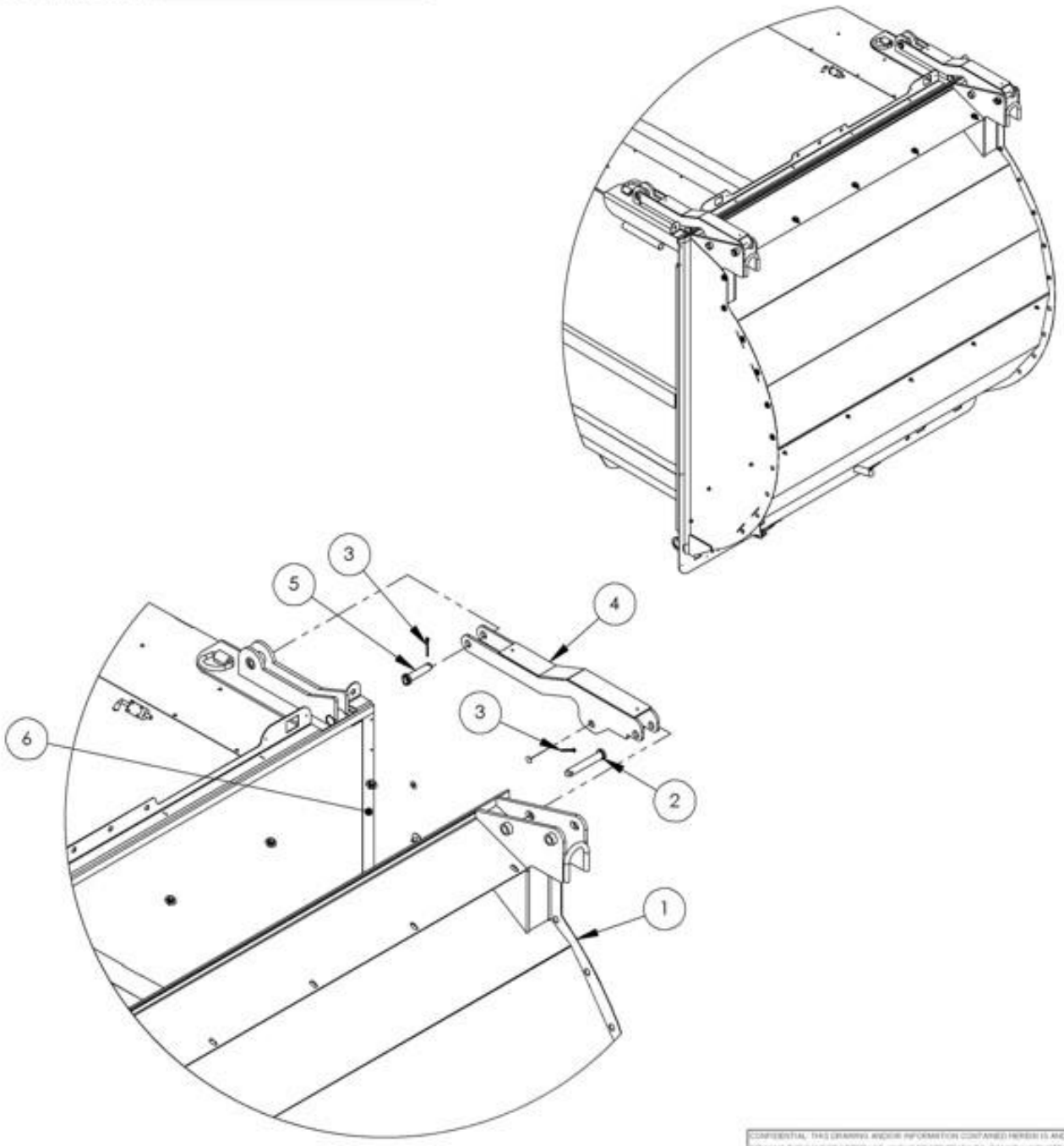
TAILGATE AND HINGE

FILE NAME	OLYMPIAN BODY ASSY
DWG NAME	PG2

OLYMPIAN TAILGATE & HINGE



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ITEM	QTY	PART NUMBER	DESCRIPTION
6	20'	LV-4213	SEAL, D BULB 1/2" WIDE
5	2	BON-000991	PIN,1" DIA. x 4-1/4"
4	2	LV-4371	LATCH WELDMENT
3	4	BON-000385	COTTER PIN 1/4" X 2"
2	2	BON-000995	PIN, 1" X 6-3/8"
1	1	LV-4350	TAILGATE

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DIXON, ILLINOIS
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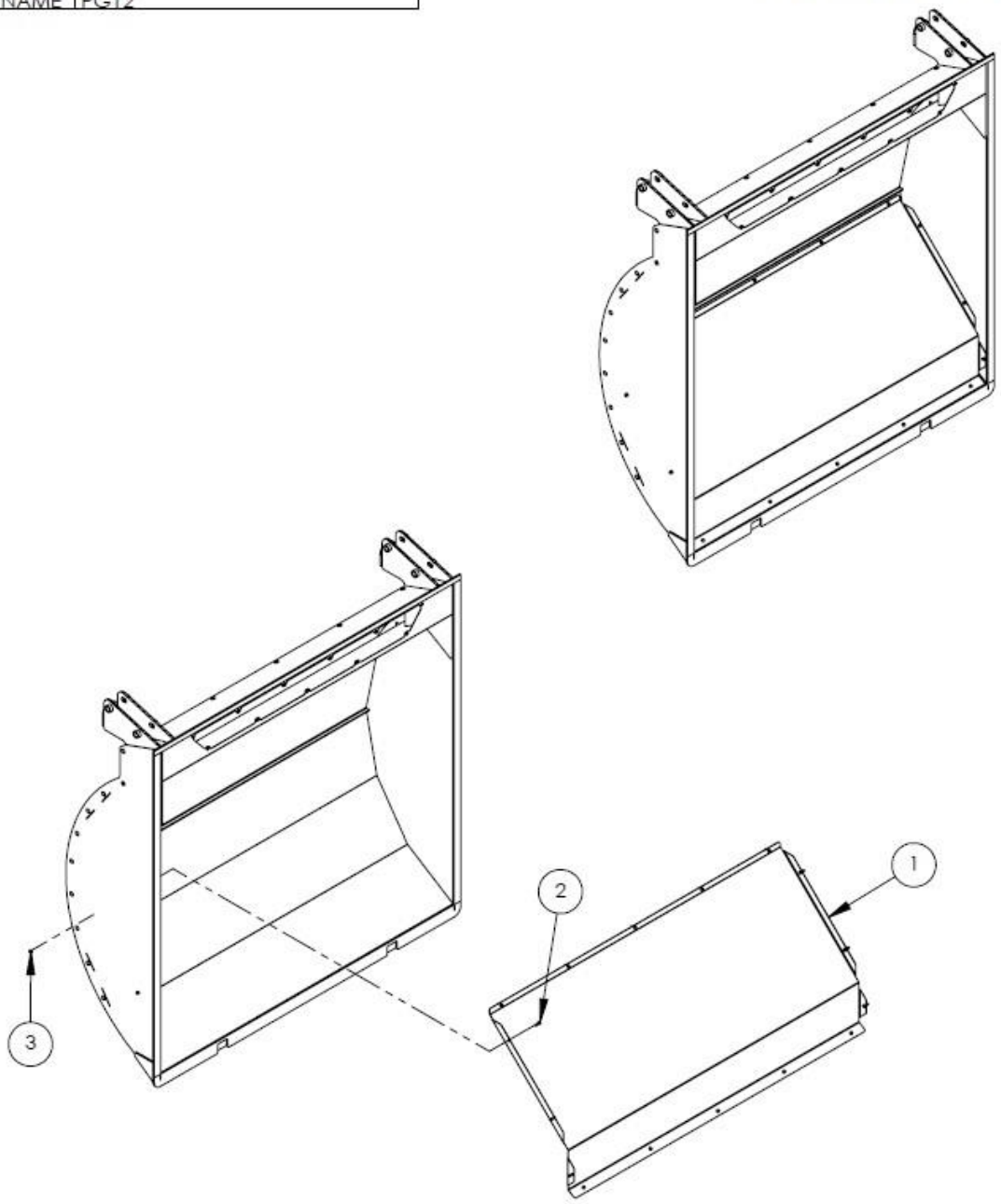
TAILGATE BAFFLE

FILE NAME	OLYMPIAN BODY ASSY
DWG NAME	PG12

OLYMPIAN DOOR BAFFLE



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Titan LEAF SOLUTIONS

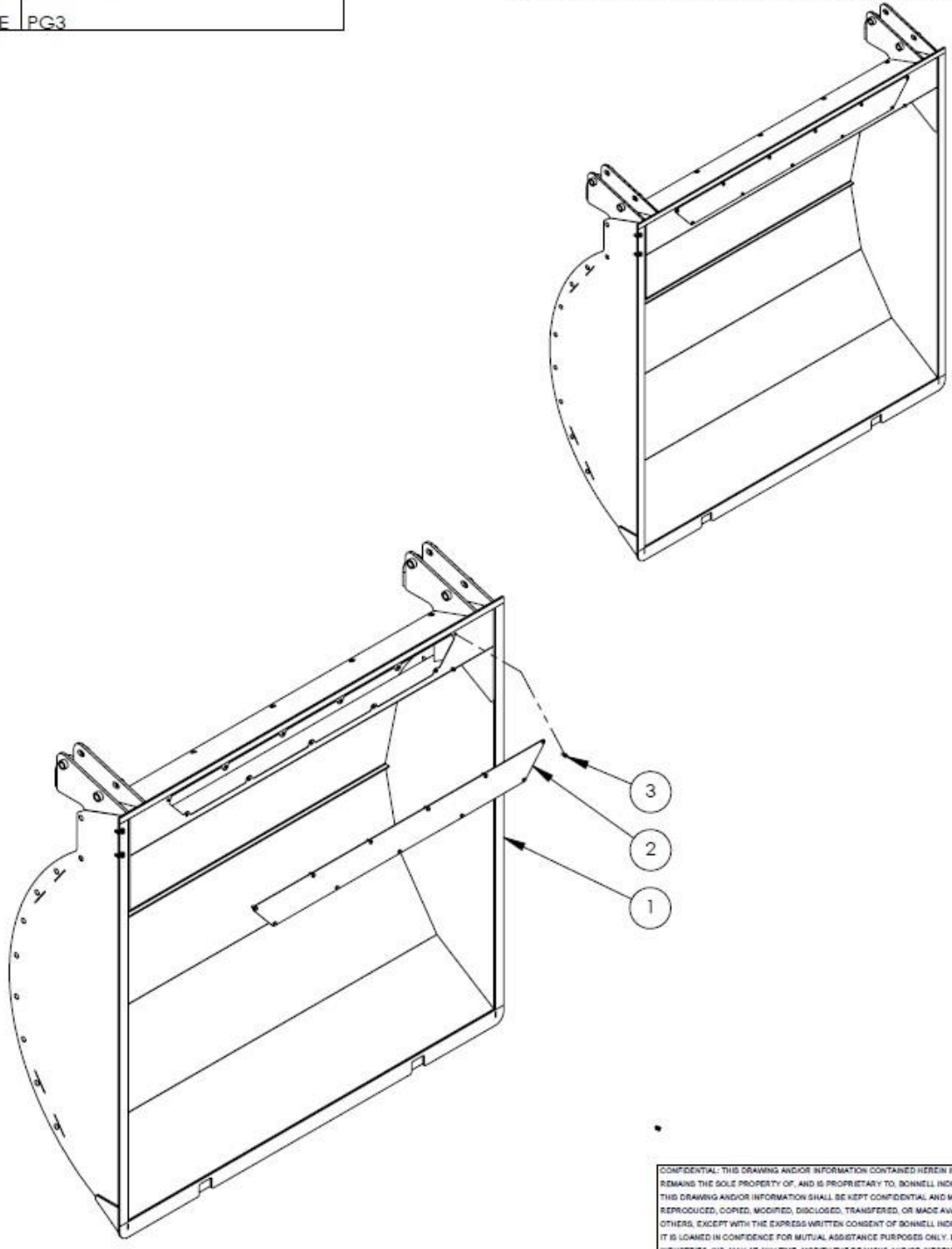
DIXON, ILLINOIS
PHONE: 800-851-9664

ITEM	QTY	PART NUMBER	DESCRIPTION
3	16	BON-000319	LOCKNUT, 3/8-16 VINYL ZP
2	16	BON-000057	BOLT, 3/8-16 X 1 HEX ZP
1	1	LV-4372	DOOR BAFFLE

TAILGATE EXHAUST COVER

FILE NAME	OLYMPIAN BODY ASSY
DWG NAME	PG3

OLYMPIAN TAILGATE EXHAUST COVER



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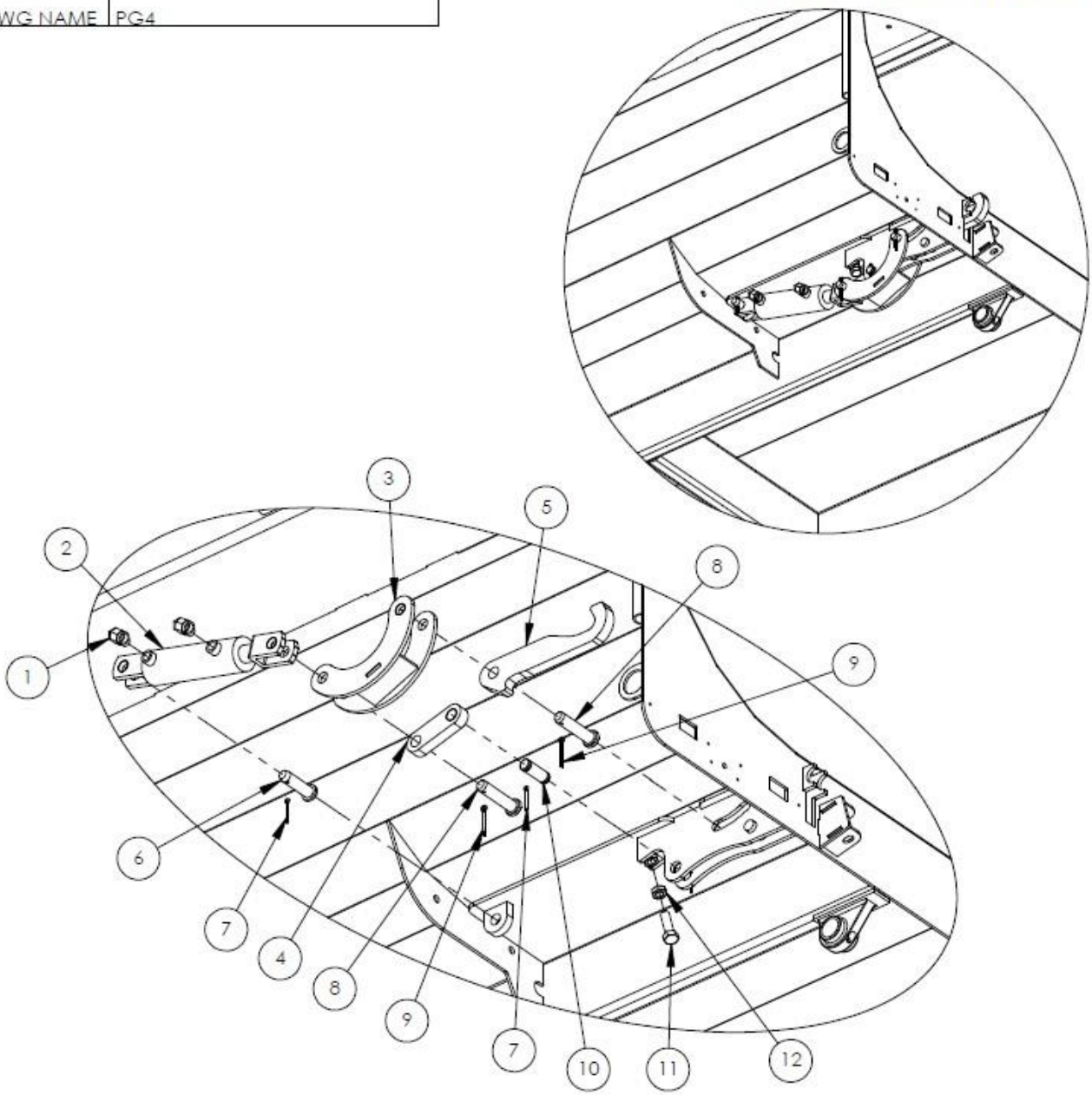
ITEM	QTY	PART NUMBER	DESCRIPTION
3	11	BON-000055	BOLT, 3/8-16 X 3/4 HEX ZP
2	1	LV-4357	TAILGATE EXHAUST COVER
1	1	LV-4350	TAILGATE

TAILGATE LATCH

FILE NAME	OLYMPIAN BODY ASSY
DWG NAME	PG4

OLYMPIAN TAILGATE LATCH



ITEM	QTY	PART NUMBER	DESCRIPTION
12	2	BON-000333.3	NUT, 3/4-10 HEX JAM ZP
11	2	BON-000184	BOLT, 3/4-10 X 2-1/2 HEX ZP
10	2	PMC-190400005	CLEVIS PIN, 1" X 2-1/8"
9	4	BON-000385	COTTER PIN 1/4" X 2"
8	4	BON-000991	PIN,1" DIA. x 4-1/4"
7	6	BON-000383	COTTER PIN 3/16" X 2"
6	2	WES-93079K	RIVET, 1" X 3-1/2"
5	2	LV-2107	DOOR LATCH
4	2	LV-2013	FRONT LATCH PIVOT
3	2	LV-2108	LATCH WELDMENT
2	2	LV-4594	CYLINDER, 2-1/2" BORE X 6" STROKE
1	4	60UB 08X08	MALE PIPE X 90DEG FEMALE PIPE 1/2" NPTF

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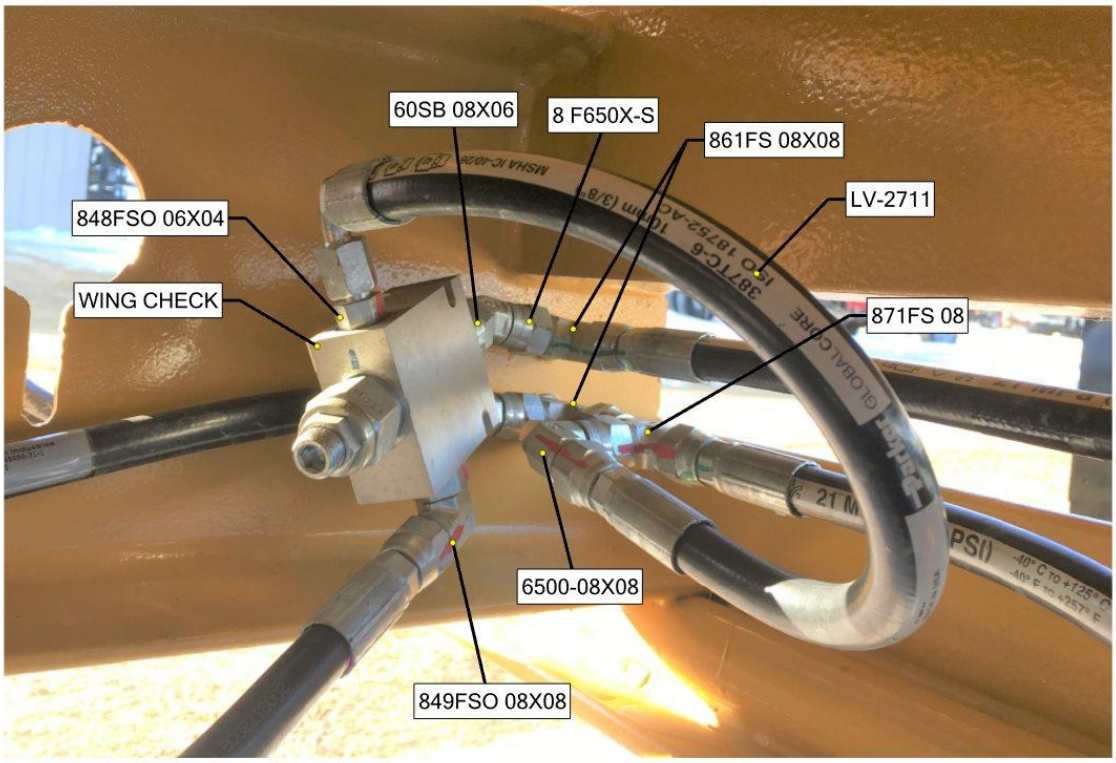
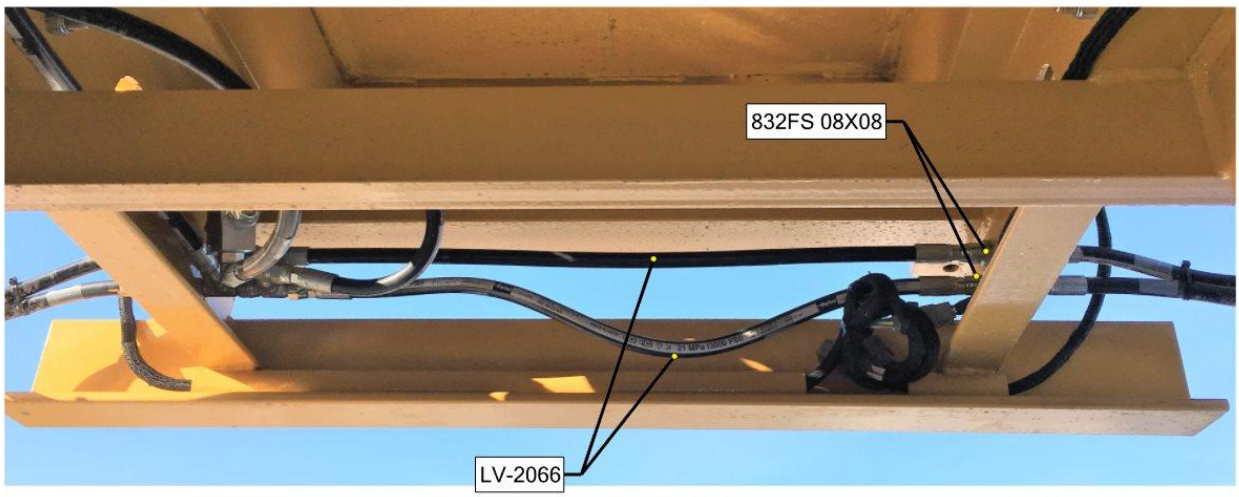
TAILGATE LATCH HYDRAULIC HOSES & FITTINGS

HYDRAULIC DOOR CYLINDER FITTINGS AND HOSE ASSEMBLY
SPARTAN LEAF VACUUM
011221 LV-2002-HYDRAULICSREV1.SMG





TAILGATE LATCH HYDRAULIC HOSES & FITTINGS

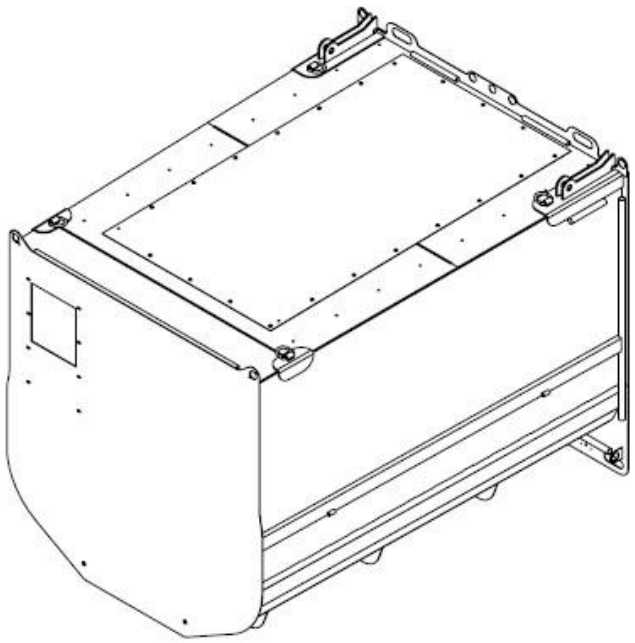
HYDRAULIC DOOR CYLINDER FITTINGS AND HOSE ASSEMBLY
SPARTAN LEAF VACUUM
021121 LV-2002-HYDRAULICSREV2.SMG

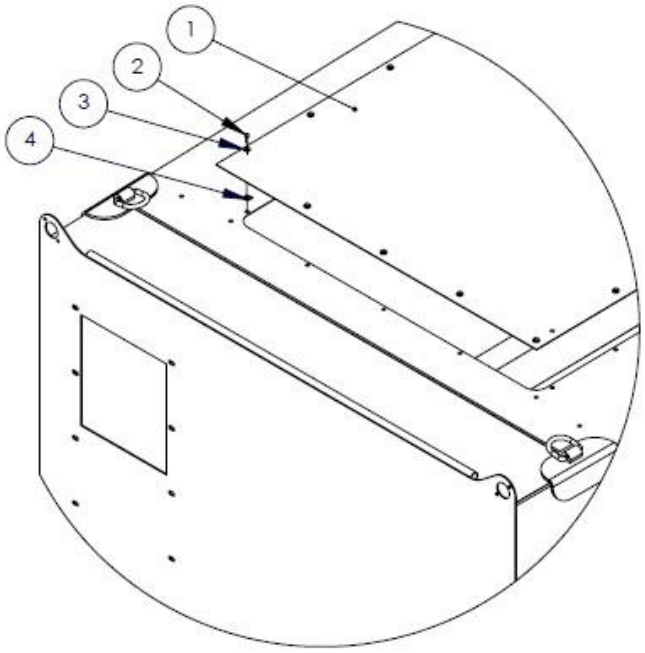
BOM	QTY.	PART NO.	DESCRIPTION:
1	2	LV-2112	REAR DOOR LATCH CYLINDER HOSE - SHORT
2	2	LV-2113	REAR DOOR LATCH CYLINDER HOSE - LONG
3	4	60UB 08X08	MALE ORB X 90DEG FMALE PIPE SW 3/4-16TPI TO 1/2 NPSM

BOLT-IN TOP SCREEN

FILE NAME	GEN2 SPARTAN BODY ASSY
DWG NAME	PG5

OLYMPIAN BOLT-IN TOP SCREEN





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ITEM	QTY	PART NUMBER	DESCRIPTION
4	28	BON-000302C	NUT, 5/16-18 CLIP-ON
3	28	BON-000337	FLATWASHER, 5/16 ZP
2	28	BON-000030	BOLT, 5/16-18 X 1 HEX ZP
1	1	LV-4342	TOP SCREEN

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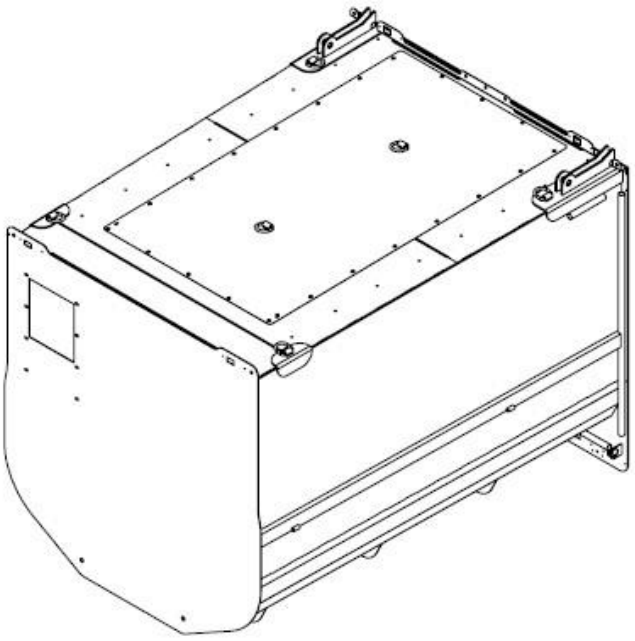
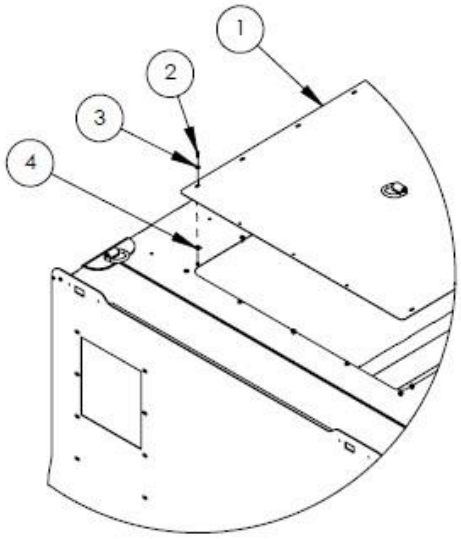
ROOF EXHAUST COVER

FILE NAME	OLYMPIAN BODY ASSY
DWG NAME	PG6

OLYMPIAN ROOF EXHAUST COVER





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ITEM	QTY	PART NUMBER	DESCRIPTION
5	30'	LV-4213	SEAL, D BULB 1/2" WIDE
4	22	BON-000302C	NUT, 5/16-18 CLIP-ON
3	22	BON-000337	FLATWASHER, 5/16 ZP
2	22	BON-000030	BOLT, 5/16-18 X 1 HEX ZP
1	1	LV-4358	EXHAUST COVER

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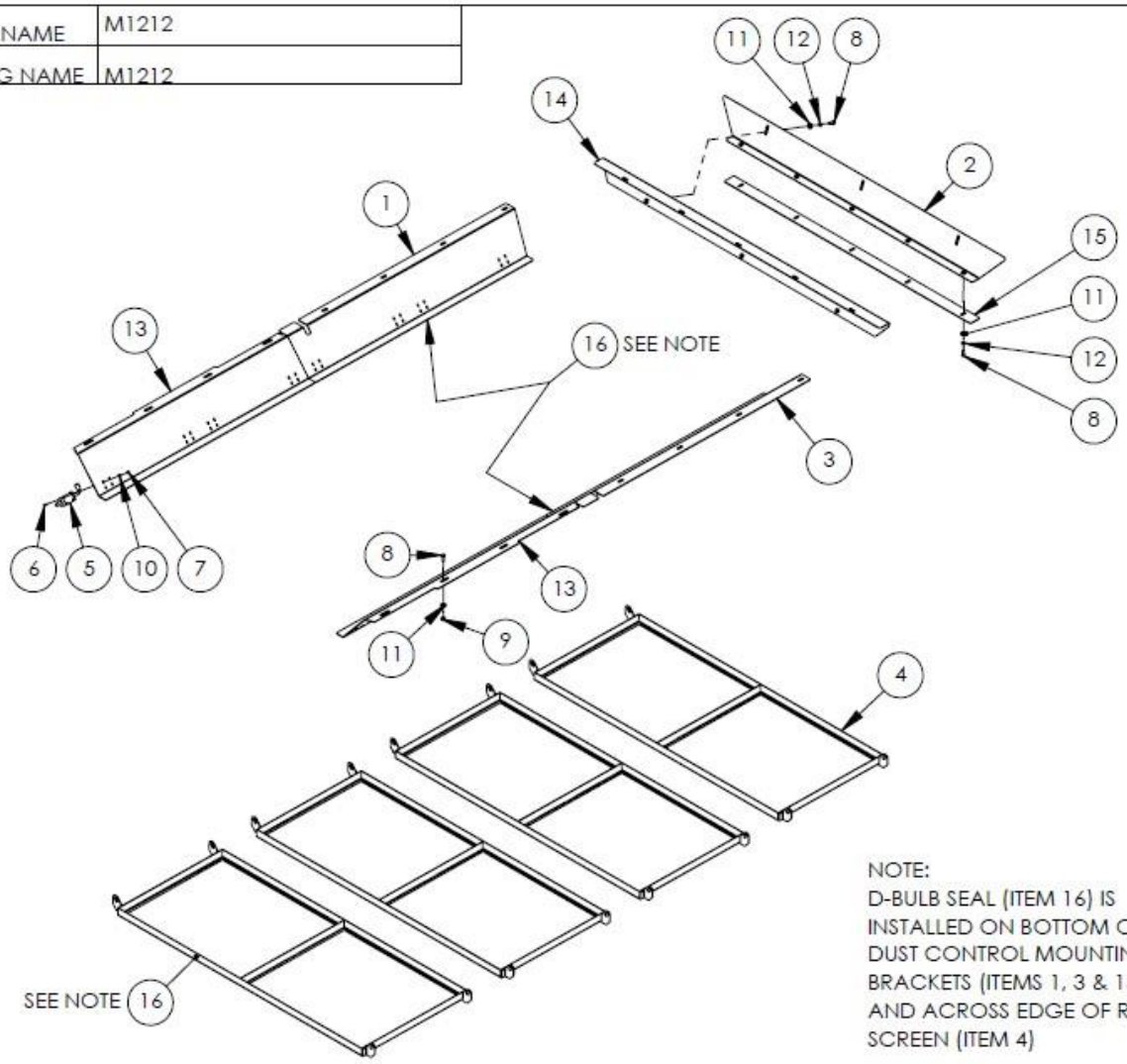
REAR EXHAUST CONVERSION

FILE NAME	M1212
DWG NAME	M1212



NOTE:
D-BULB SEAL (ITEM 16) IS INSTALLED ON BOTTOM OF DUST CONTROL MOUNTING BRACKETS (ITEMS 1, 3 & 13), AND ACROSS EDGE OF REAR SCREEN (ITEM 4)

REF	PART NO.	QTY	DESCRIPTION
16	LV-4213	24	SEAL, D-BULB
15	LV-4495	1	LOWER DEFLECTOR COVER PLATE
14	LV-4344	1	UPPER DEFLECTOR
13	LV-4162	2	DUST CONTROL MOUNTING BRACKET
12	BON-000352	8	3/8 LOCKWASHER ZP
11	BON-000338	34	3/8 FLAT WASHER
10	BON-000335	64	3/16 FLAT WASHER
9	BON-000319	21	3/8-16 NYLON HEX LOCKNUT
8	BON-000057	29	3/8-16 x 1 HEX BOLT
7	10-24 NYLOK	64	NYLON LOCKNUT, 10-24 UNC
6	LV-4158	64	10-24 x 3/4 MACHINE SCREW SS
5	LV-4362	16	SPRING LATCH 1/2" ZINC PLATED
4	LV-4185	4	DUST CONTROL SCREEN
3	LV-4190R	1	DUST CONTROL MOUNTING BRACKET, RH
2	LV-4496	1	LOWER DEFLECTOR
1	LV-4190L	1	DUST CONTROL MOUNTING BRACKET, LH

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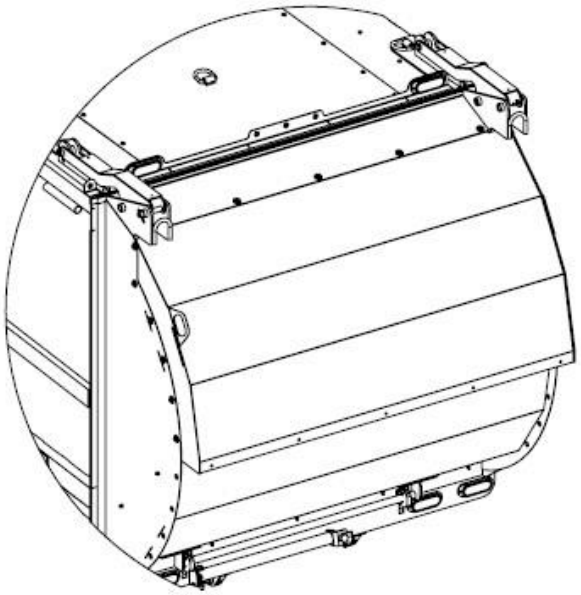
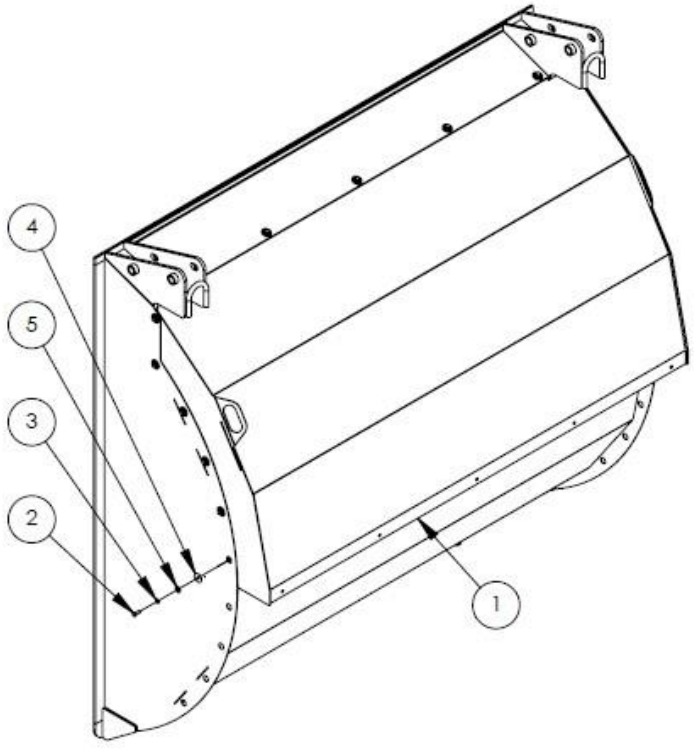
TAILGATE DOWN DRAFT MODULE

FILE NAME	OLYMPIAN BODY ASSY
DWG NAME	PG8

OLYMPIAN TAILGATE DOWN DRAFT MODULE





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ITEM	QTY	PART NUMBER	DESCRIPTION
5	17	BON-000338	FLATWASHER, 3/8 ZP
4	17	91090A115	FENDER WASHER, 3/8 X 1-1/2 ZP
3	17	BON-000352	LOCKWASHER, 3/8 ZP
2	17	BON-000057	BOLT, 3/8-16 X 1 HEX ZP
1	1	LV-4351	GEN2 DOWN DRAFT MODULE

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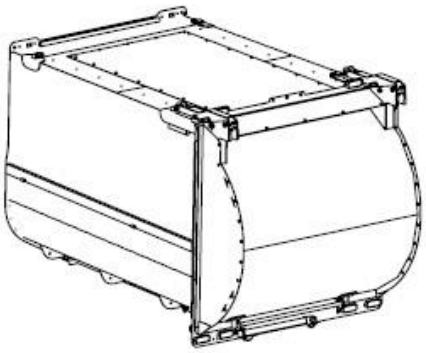
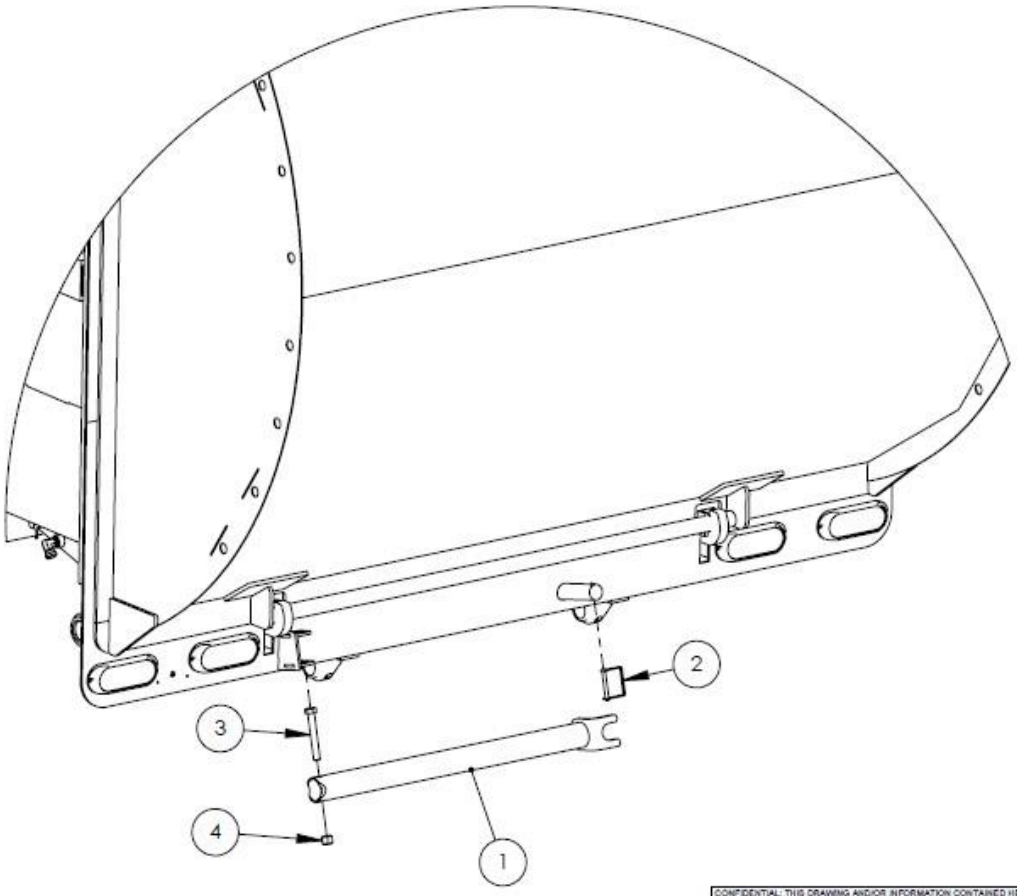
REAR DOOR PROP

FILE NAME	OLYMPIAN BODY ASSY
DWG NAME	PG9

OLYMPIAN REAR DOOR PROP





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ITEM	QTY	PART NUMBER	DESCRIPTION
4	1	BON-000322	LOCKNUT, 5/8-11 NYLON ZP
3	1	BON-000162	BOLT, 5/8-11X4-1/2 HEX ZP
2	1	BUY-66053	SNAPPER PIN, 5/16" X 2-1/4"
1	1	LV-3041	DOOR PROP

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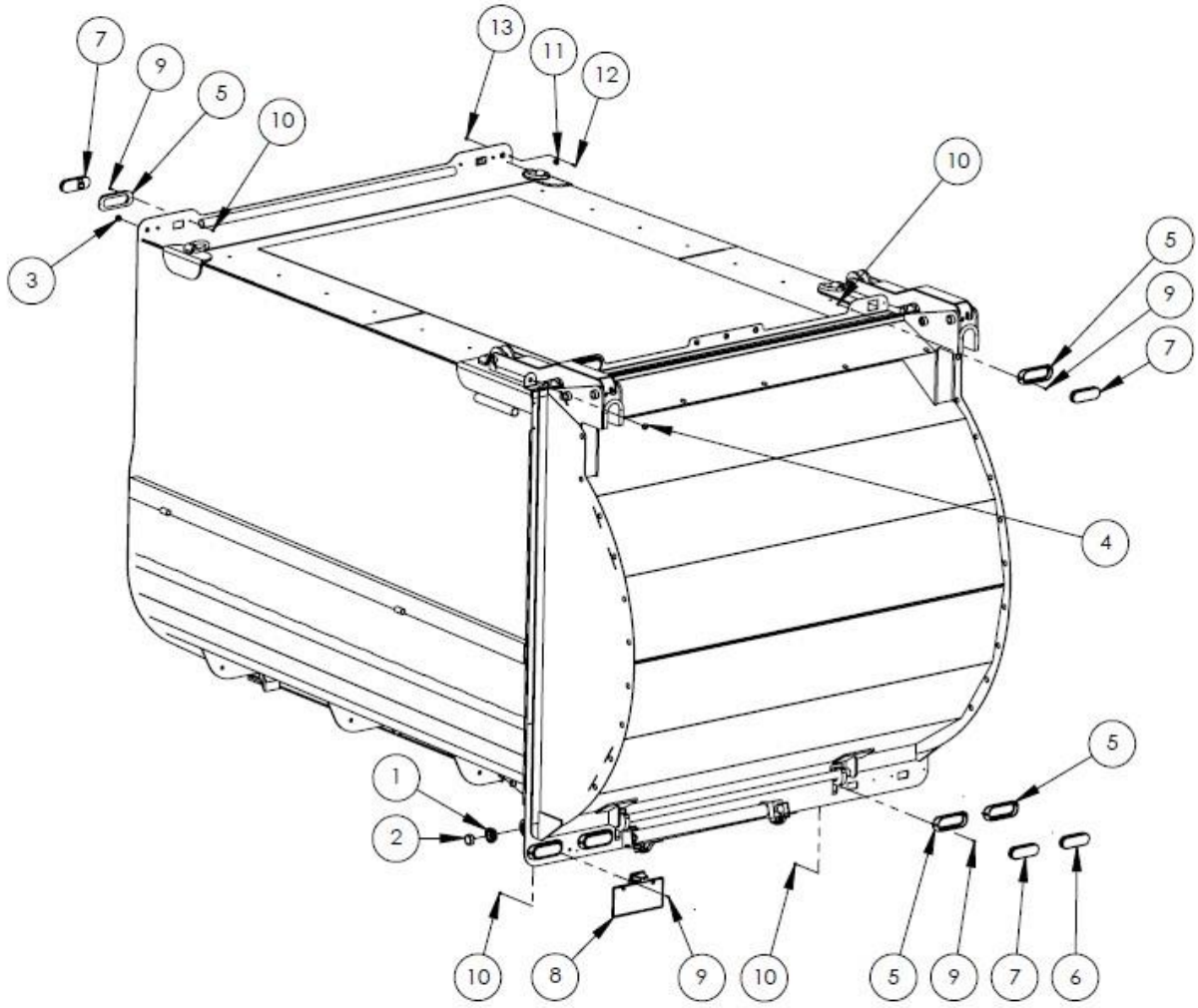
BODY LIGHTS AND LICENSE PLATE BRACKET

FILE NAME	OLYMPIAN BODY ASSY
DWG NAME	PG10

OLYMPIAN BODY LIGHTS & LICENSE PLATE BRACKET



ITEM	QTY	PART NUMBER	DESCRIPTION
13	3	BON-000318.5	LOCKNUT, 1/4-20 NYLON ZP
12	3	BON-00003	BOLT, 1/4-20 X 3/4 HEX ZP
11	3	WAY-25110	5/8" CABLE CLAMP
10	18		LOCKNUT, 10-24 NYLON
9	18		10-24 X 3/4" MACHINE SCREW
8	1	NAP-12250304	LICENSE PLATE BRACKET
7	6	PM-820SA-1	OVAL AMBER LED STROBE LIGHT
6	2	PM-M820R-10	OVAL RED LED ST&T LIGHT
5	8	PM-820-09	OVAL SURFACE MOUNT BRACKET
4	5	BUY-5627513	3/4" RED LED MARKER LIGHT
3	2	BUY-5627523	3/4" AMBER LED CLEARANCE LIGHT
2	2	PM-M194R	2" RED LED MARKER LIGHT
1	2	PM-146-18	GROMMET, 2"

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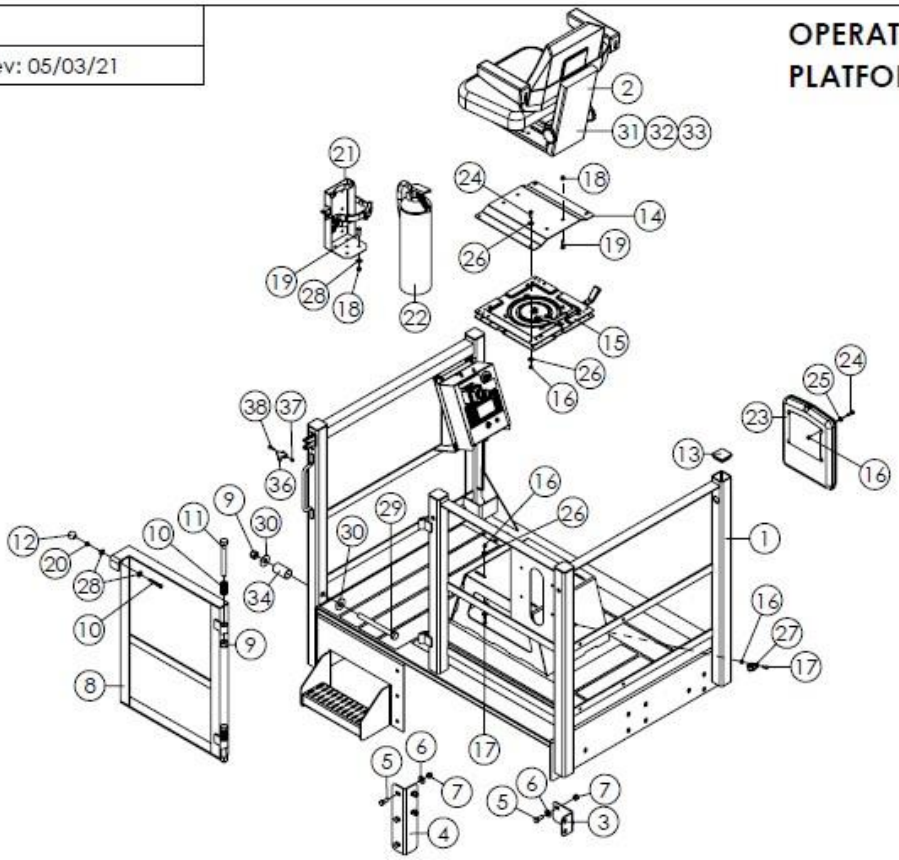
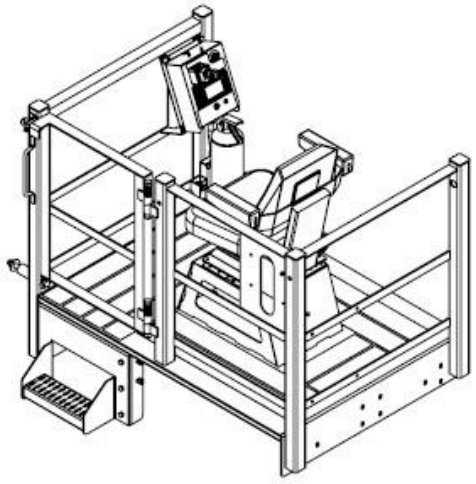
OPERATOR PLATFORM

FILE NAME	M1182
DWG NAME	M1182 PG1 Rev: 05/03/21





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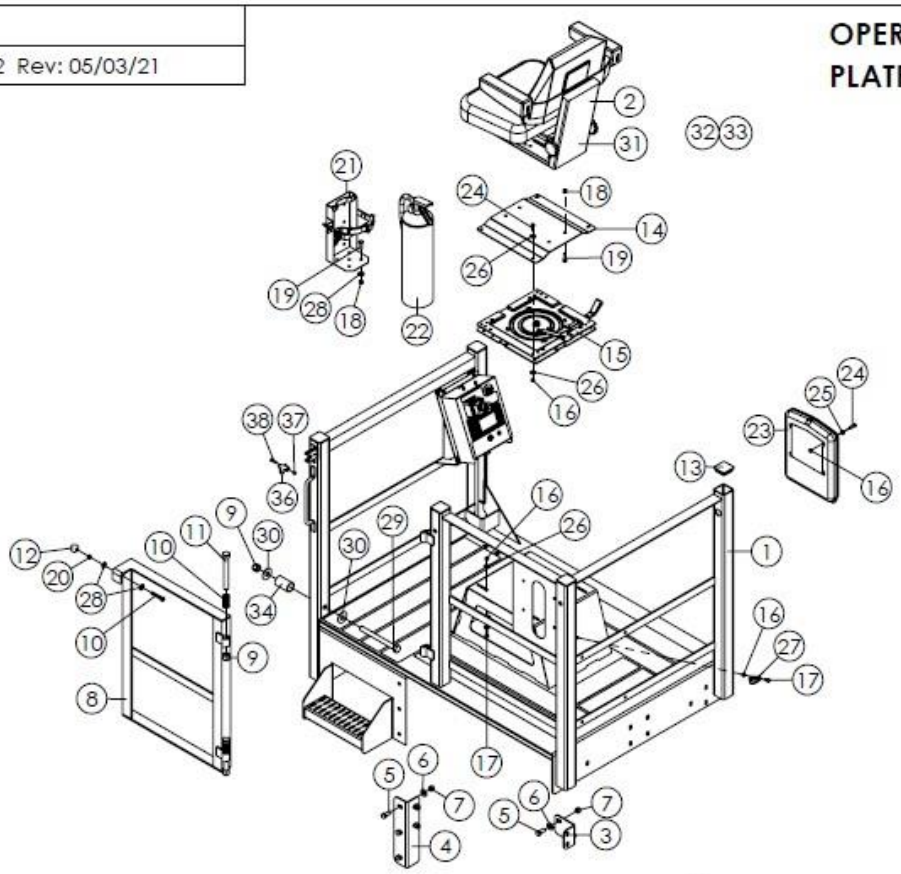
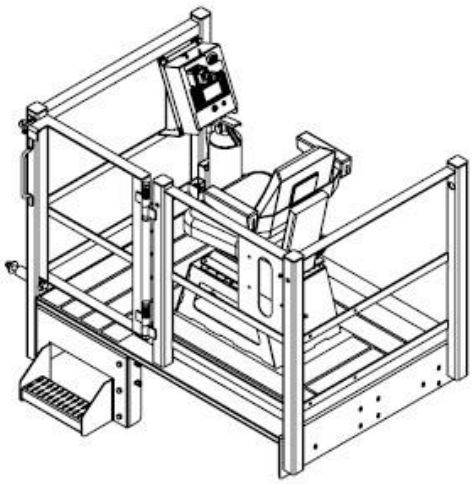
PAGE 1 OF 2

REF	PART NO.	QTY	DESCRIPTION
19	BON-000058	8	3/8-16 x 1-1/4 HEX BOLT
18	BON-000319	8	3/8-16 NYLON HEX LOCKNUT
17	BON-000028	6	5/16-18 x 3/4 HEX BOLT
16	BON-000320	10	5/16-18 NYLON HEX LOCKNUT
15	LV-4101	1	SEAT SWIVEL
14	LV-4103	1	PLATE - SEAT ADAPTER
13	LV-4111	5	CAP - 2-1/2 SQ TUBE
12	LV-4113	1	KNOB - ROUND, 1/2-13 x 1-1/2
11	BON-000195	2	3/4-10 x 6-1/2 HEX BOLT
10	LC-135M-1-S	2	COMPRESSION SPRING
9	BON-000323	3	3/4-10 NYLON HEX LOCKNUT
8	LV-4106	1	WA - OPERATOR PLATFORM DOOR
7	BON-000321	15	1/2-13 NYLON HEX LOCKNUT
6	BON-000340	15	1/2 FLAT WASHER
5	BON-000106	15	1/2-13 x 1-1/4 HEX BOLT
4	LV-2669	1	BRACKET - OPERATOR PLATFORM , LT
3	LV-4108	1	BRACKET - OPERATOR PLATFORM , RT
2	LV-1140	1	OPERATOR SEAT
1	LV-4105	1	WA - OPERATOR PLATFORM

FILE NAME	M1182
DWG NAME	M1182 PG2 Rev: 05/03/21

OPERATOR PLATFORM





PAGE 2 OF 2

REF	PART NO.	QTY	DESCRIPTION
38	BON-000005	1	1/4-20 x 1 HEX BOLT
37	BON-000318.5	1	1/4-20 NYLON HEX LOCKNUT
36	LV-4156	1	GATE LOCK
35	BON-000063FT	1	3/8-16 x 2-1/2 FT HEX BOLT
34	LV-4380	1	SPACER-PIPE, 1-1/4 SCHD 40 x 2-3/4"
33	BON-000083.5	2	7/16-20 x 3/4" HEX BOLT
32	LV-1636	1	SEATBELT
31	BON-000339	2	7/16 FLAT WASHER ZP
30	BON-000342	2	3/4 STANDARD FLAT WASHER
29	BON-000198	1	3/4-10 x 8" HEX BOLT GR8
28	BON-000338	10	3/8 STANDARD FLAT WASHER ZP
27	WAY-25112	2	CABLE CLAMP - 3/4 METAL
26	BON-000337	16	5/16 STANDARD FLAT WASHER ZP
25	BON-008939	4	5/16 BONDED FLAT WASHER
24	BON-000030	8	5/16-18 x 1 HEX BOLT
23	BON-000952	1	MANUAL BOX - LARGE
22	LV-1259	1	FIRE EXTINGUISHER - 10# ABC
21	LV-4585	1	10# FIRE EXTINGUISHER BRACKET
20	BON-000303	1	3/8-16 HEX NUT

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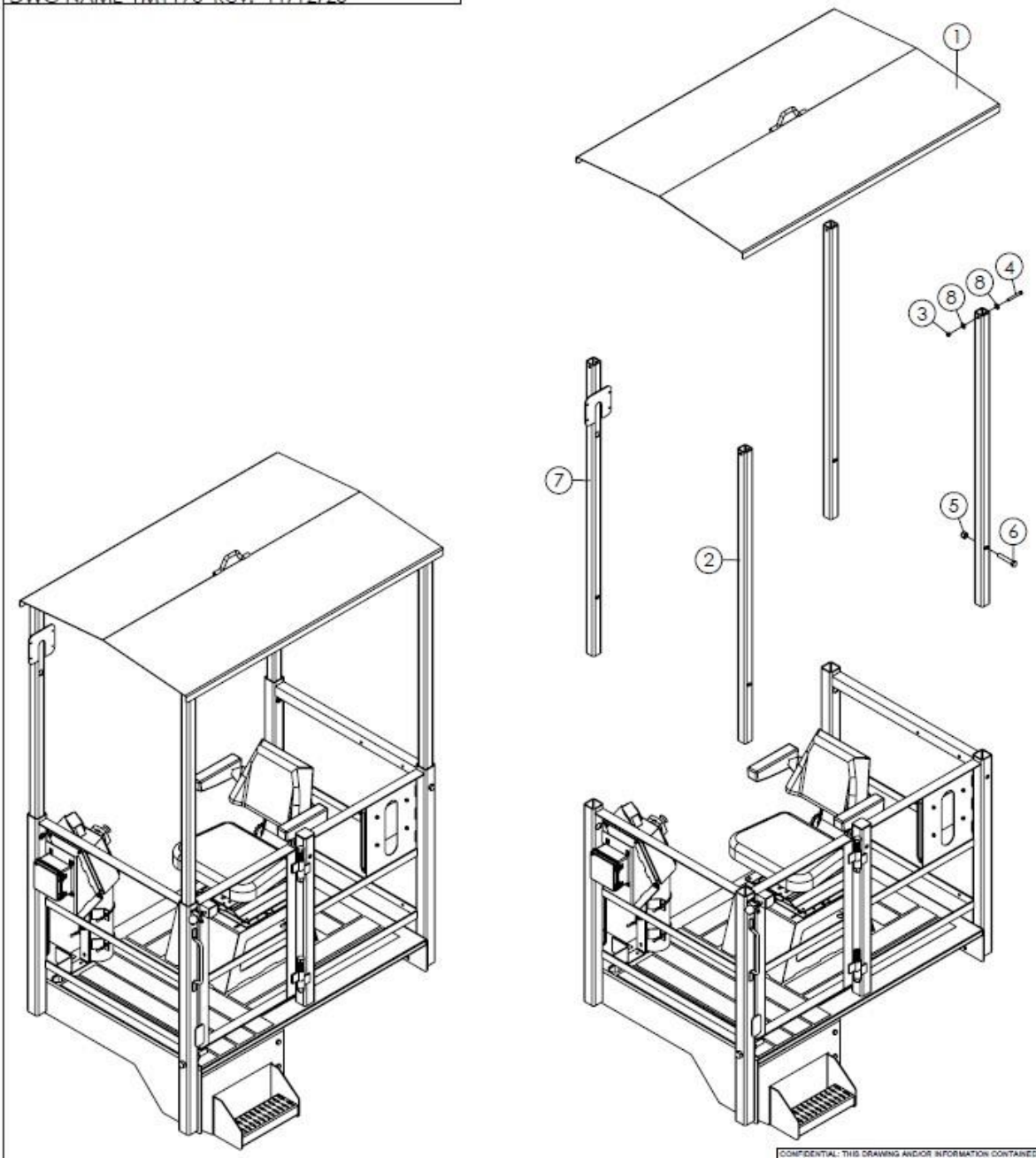
OPERATOR PLATFORM CANOPY

FILE NAME	M1196
DWG NAME	M1196 Rev: 11/12/20

OLYMPIAN OPERATOR PLATFORM CANOPY



REF	PART NO.	QTY	DESCRIPTION
8	BON-000338	8	3/8 STANDARD FLAT WASHER ZP
7	LV-4122	1	OLYMPIAN CANOPY CORNER POST W/WIRELESS BRKT
6	BON-000159	4	5/8-11 x 3-1/2 HEX BOLT GR8
5	BON-000322	4	5/8-11 NYLON HEX LOCKNUT
4	BON-000066	4	3/8-16 x 3-1/4" HEX BOLT GR8
3	BON-000319	4	3/8-16 NYLON HEX LOCKNUT
2	LV-2666	3	OLYMPIAN CANOPY CORNER POST
1	LV-2668	1	OLYMPIAN CANOPY TOP

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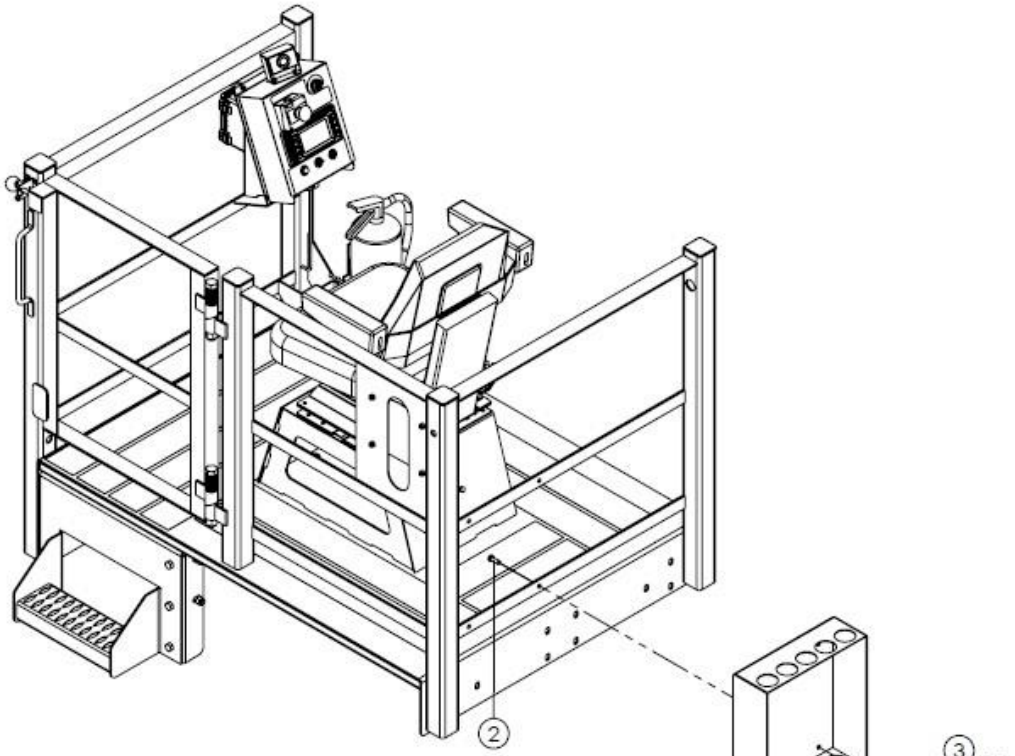
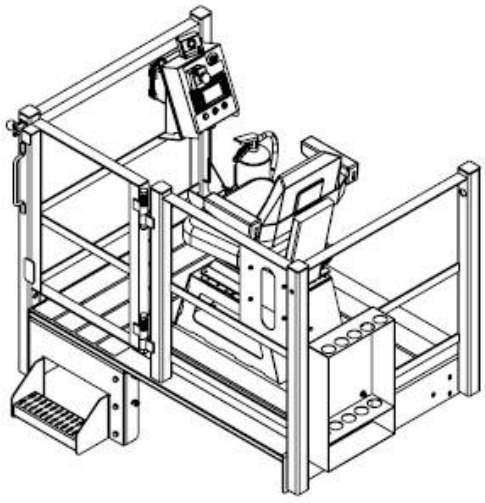
TOOL CARRIER

FILE NAME	M1198
DWG NAME	M1198 Rev: 10/18/20

OLYMPIAN TOOL CARRIER





REF	PART NO.	QTY	DESCRIPTION
4	BON-000319	4	3/8-16 NYLON HEX LOCKNUT
3	BON-000338	4	3/8 FLAT WASHER
2	BON-000057	4	3/8-16 x 1 HEX BOLT
1	LV-2664	1	SPARTAN GEN 2 TOOL CARRIER

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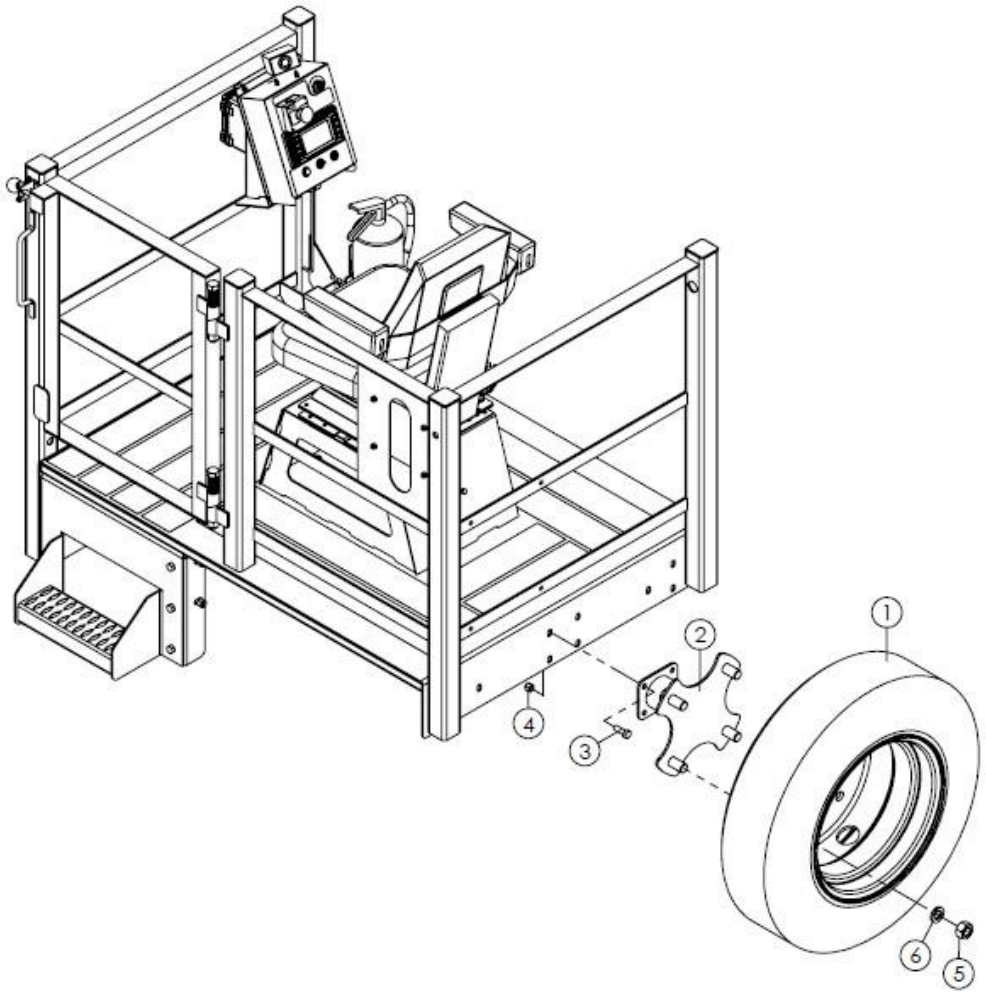
SPARE TIRE HOLDER

FILE NAME	M1199
DWG NAME	M1199 Rev: 10/16/20

OLYMPIAN SPARE TIRE HOLDER



REF	PART NO.	QTY	DESCRIPTION
12K AXLE			
6	BON-000356	4	5/8 STANDARD LOCKWASHER
5	BON-000307	4	5/8-11 HEX NUT
4	BON-000321	4	1/2-13 NYLON HEX LOCKNUT
3	BON-000107	4	1/2-13 x 1-1/2 HEX BOLT GR8
2	LV-4176	1	OLYMPIAN GEN 2 SPARE TIRE HOLDER
1	LV-2051	1	SPARTAN TIRE ST235/85R16 LARGE MASTERTRACK
16K AXLE			
6	BON-000359	4	1" STANDARD LOCKWASHER
5	BON-000310	4	1-8 HEX NUT
4	BON-000321	4	1/2-13 NYLON HEX LOCKNUT
3	BON-000107	4	1/2-13 x 1-1/2 HEX BOLT GR8
2	LV-4121	1	OLYMPIAN GEN 2 SPARE TIRE HOLDER
1	LV-4521	1	SPARTAN TIRE ST215/75R17 LARGE MASTERTRACK

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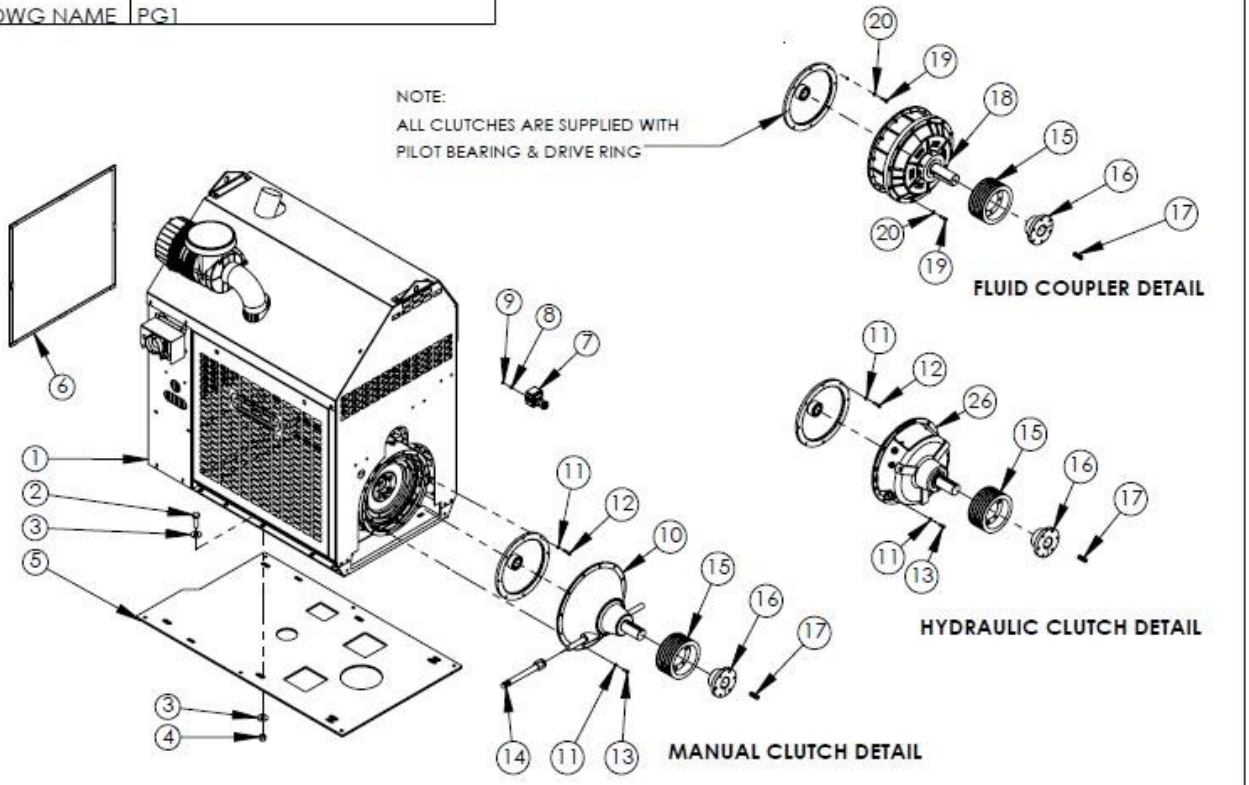
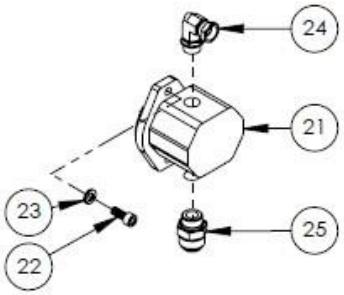
ENGINE ASSEMBLIES

FILE NAME	OLYMPIAN Engine Assy
DWG NAME	PG1

OLYMPIAN ENGINE ASSEMBLY - 99 HP DEERE



ITEM	QTY	PART NUMBER	DESCRIPTION
26	1	LV-4598	HYDRAULIC CLUTCH
25	1	848FSO 16X12	MALE 37° X MALE ORB, 1-5/16-12 X 1-1/16
24	1	60UB 10X08	M ORB X 90° F PIPE SW 7/8-14 X 1/2 NPSM
23	2	BON-000353	LOCKWASHER, 7/16 ZP
22	2	91290A520	BOLT, M10-1.5 X 25MM SHCS
21	1	LV-2029	HYDRAULIC PUMP
20	20	BON-000352	3/8 LOCKWASHER ZP
19	20	BON-000058	3/8-16 X 1 HEX BOLT ZP
18	1	LV-1089	FLUID POWER TAKE OFF
17	1	LV-1132	STEP KEY 1/2" X 5/8" X 2" LONG
16	1	LV-1273	ENGINE SHEAVE BUSHING
15	1	LV-1270	ENGINE SHEAVE
14	1	LV-1339	EXTENSION ARM WELDMENT
13	12	BON-000057	3/8-16 X 1 HEX BOLT ZP
12	8	BON-000059	3/8-16 X 1-1/2 HEX BOLT ZP
11	20	BON-000352	3/8 LOCKWASHER ZP
10	1	LV-4530	OVER CENTER CLUTCH
9	2		#6-32 HEX NUT W/ STAR WASHER ZP
8	2		#6-32 X 1 MACHINE SCREW ZP
7	1	LV-1398	EMERGENCY STOP SWITCH
6	1	LV-2454	MAGNETIC PRESCREEN
5	1	LV-4248	GEN2 ENGINE PLATE
4	6	BON-000323	3/4-10 LOCKNUT, NYLON ZP
3	12	BON-000341	FLATWASHER, 3/4 ZP
2	6	BON-000184	3/4-10 X 2-1/2 HEX BOLT
1	1	LV-4542	ENGINE, JOHN DEERE, 99 HP



HYDRAULIC PUMP DETAIL

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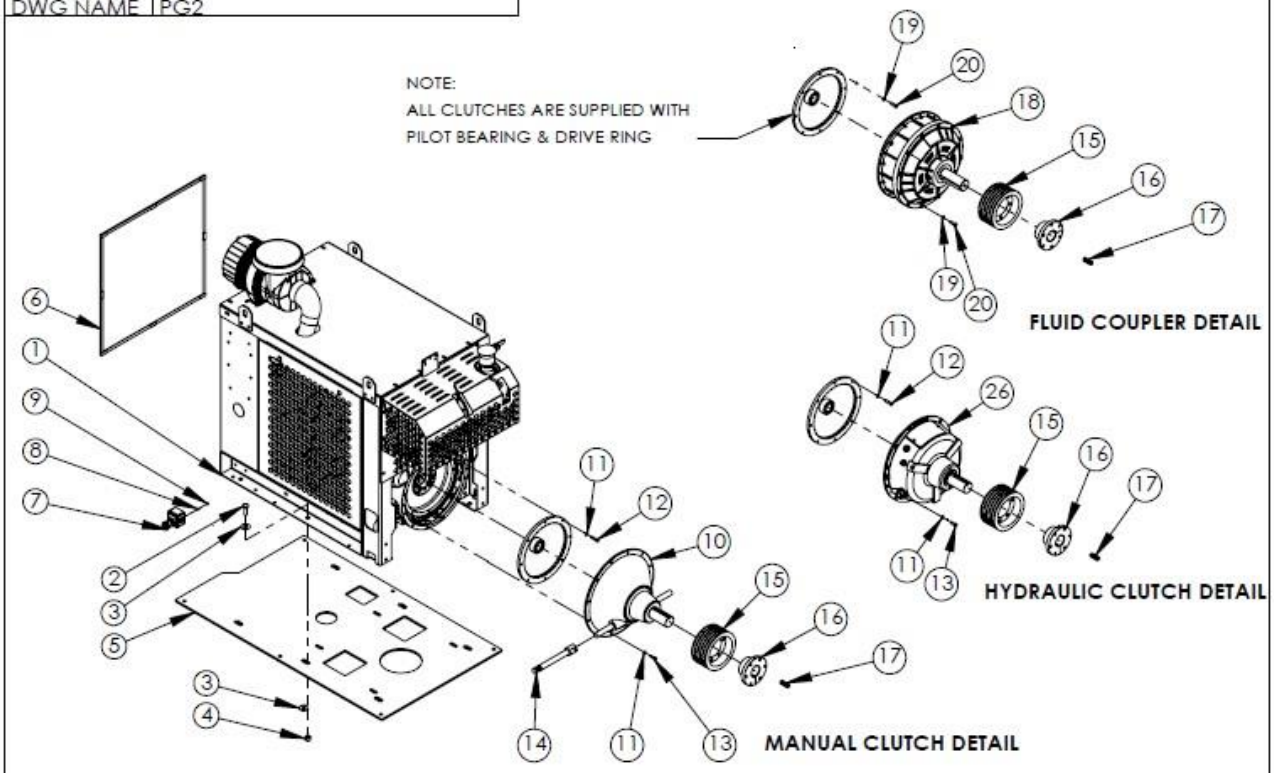
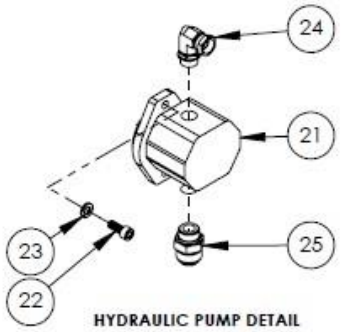
FILE NAME	OLYMPIAN Engine Assy
DWG NAME	PG2

OLYMPIAN ENGINE ASSEMBLY - 74 HP DEERE

NOTE:
ALL CLUTCHES ARE SUPPLIED WITH
PILOT BEARING & DRIVE RING



ITEM	QTY	PART NUMBER	DESCRIPTION
26	1	LV-4598	HYDRAULIC CLUTCH
25	1	848FSO 16X12	MALE 37° X MALE ORB, 1-5/16-12 X 1-1/16
24	1	60UB 10X08	M ORB X 90° F PIPE SW 7/8-14 X 1/2 NPSM
23	2	BON-000353	LOCKWASHER, 7/16 ZP
22	2	91290A520	BOLT, M10-1.5 X 25MM SHCS
21	1	LV-2029	HYDRAULIC PUMP
20	20	BON-000352	3/8 LOCKWASHER ZP
19	20	BON-000058	3/8-16 X 1 HEX BOLT ZP
18	1	LV-1089	FLUID POWER TAKE OFF
17	1	LV-1132	STEP KEY 1/2" X 5/8" X 2" LONG
16	1	LV-1273	ENGINE SHEAVE BUSHING
15	1	LV-1270	ENGINE SHEAVE
14	1	LV-1339	EXTENSION ARM WELDMENT
13	12	BON-000057	3/8-16 X 1 HEX BOLT ZP
12	8	BON-000059	3/8-16 X 1-1/2 HEX BOLT ZP
11	20	BON-000352	3/8 LOCKWASHER ZP
10	1	LV-4530	OVER CENTER CLUTCH
9	2		#6-32 HEX NUT W/ STAR WASHER ZP
8	2		#6-32 X 1 MACHINE SCREW ZP
7	1	LV-1398	EMERGENCY STOP SWITCH
6	1	LV-2455	MAGNETIC PRESCREEN
5	1	LV-4249	GEN2 ENGINE PLATE
4	6	BON-000322	5/8-11 LOCKNUT, NYLON ZP
3	12	BON-000341	FLATWASHER, 5/8 ZP
2	6	BON-000152	5/8-11 X 1-3/4 HEX BOLT
1	1	LV-4540	ENGINE, JOHN DEERE, 74 HP



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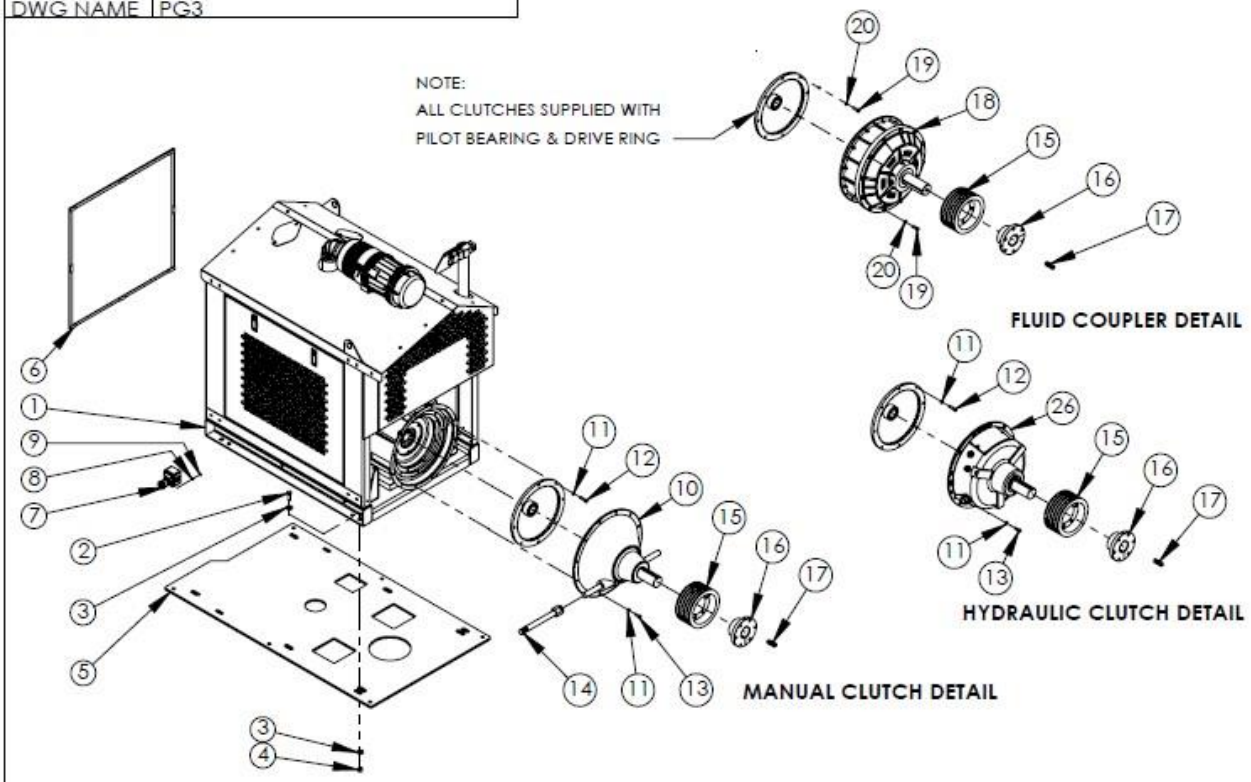
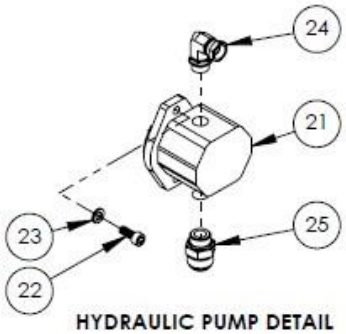
FILE NAME	OLYMPIAN Engine Assy
DWG NAME	PG3

OLYMPIAN ENGINE ASSEMBLY - 87 HP KUBOTA



ITEM	QTY	PART NUMBER	DESCRIPTION
26	1	LV-4598	HYDRAULIC CLUTCH
25	1	854FSO 16X12	MALE 37° X MALE ORB, 1-5/16-12 X 1-1/16
24	1	60UB 10X08	M ORB X 90° F PIPE SW 7/8-14 X 1/2 NPSM
23	2	BON-000353	LOCKWASHER, 7/16 ZP
22	2	96144A256	BOLT, M10-1.25 X 25MM SHCS
21	1	LV-2029	HYDRAULIC PUMP
20	20	BON-000352	3/8 LOCKWASHER ZP
19	20	BON-000058	3/8-16 X 1 HEX BOLT ZP
18	1	LV-1089	FLUID POWER TAKE OFF
17	1	LV-1132	STEP KEY 1/2" X 5/8" X 2" LONG
16	1	LV-1273	ENGINE SHEAVE BUSHING
15	1	LV-1270	ENGINE SHEAVE
14	1	LV-1339	EXTENSION ARM WELDMENT
13	12	BON-000057	3/8-16 X 1 HEX BOLT ZP
12	8	BON-000059	3/8-16 X 1-1/2 HEX BOLT ZP
11	20	BON-000352	3/8 LOCKWASHER ZP
10	1	LV-4530	OVER CENTER CLUTCH
9	2		#6-32 HEX NUT W/ STAR WASHER ZP
8	2		#6-32 X 1 MACHINE SCREW ZP
7	1	LV-1398	EMERGENCY STOP SWITCH
6	1	LV-2455	MAGNETIC PRESCREEN
5	1	LV-4248	GEN2 ENGINE PLATE
4	6	BON-000321	1/2-13 LOCKNUT, NYLON ZP
3	12	BON-000340	FLATWASHER, 1/2 ZP
2	6	BON-000107	1/2-13 X 1-1/2 HEX BOLT
1	1	LV-4544	ENGINE, KUBOTA, 87 HP GASOLINE



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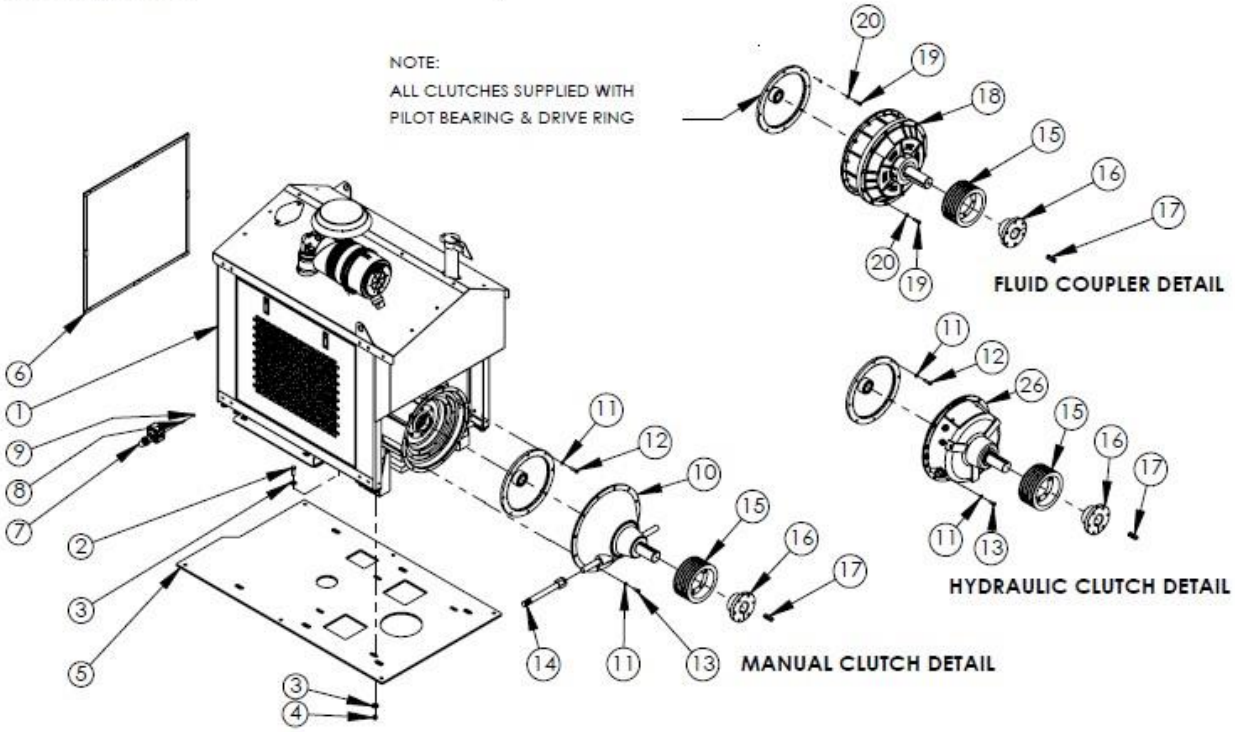
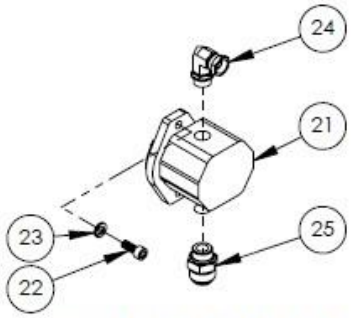
FILE NAME	OLYMPIAN Engine Assy
DWG NAME	PG4

OLYMPIAN ENGINE ASSEMBLY - 74 HP KUBOTA



ITEM	QTY	PART NUMBER	DESCRIPTION
26	1	LV-4598	HYDRAULIC CLUTCH
25	1	848FSO 16X12	MALE 37° X MALE ORB, 1-5/16-12 X 1-1/16
24	1	60UB 10X08	M ORB X 90° F PIPE SW 7/8-14 X 1/2 NPSM
23	2	BON-000353	LOCKWASHER, 7/16 ZP
22	2	96144A256	BOLT, M10-1.25 X 25MM SHCS
21	1	LV-2029	HYDRAULIC PUMP
20	20	BON-000352	3/8 LOCKWASHER ZP
19	20	BON-000058	3/8-16 X 1 HEX BOLT ZP
18	1	LV-1089	FLUID POWER TAKE OFF
17	1	LV-1132	STEP KEY 1/2" X 5/8" X 2" LONG
16	1	LV-1273	ENGINE SHEAVE BUSHING
15	1	LV-1270	ENGINE SHEAVE
14	1	LV-1339	EXTENSION ARM WELDMENT
13	12	BON-000057	3/8-16 X 1 HEX BOLT ZP
12	8	BON-000059	3/8-16 X 1-1/2 HEX BOLT ZP
11	20	BON-000352	3/8 LOCKWASHER ZP
10	1	LV-4530	OVER CENTER CLUTCH
9	2		#6-32 HEX NUT W/ STAR WASHER ZP
8	2		#6-32 X 1 MACHINE SCREW ZP
7	1	LV-1398	EMERGENCY STOP SWITCH
6	1	LV-2455	MAGNETIC PRESCREEN
5	1	LV-4249	GEN2 ENGINE PLATE
4	6	BON-000321	1/2-13 LOCKNUT, NYLON ZP
3	12	BON-000340	FLATWASHER, 1/2 ZP
2	6	BON-000107	1/2-13 X 1-1/2 HEX BOLT
1	1	LV-2442	ENGINE, KUBOTA, 74 HP



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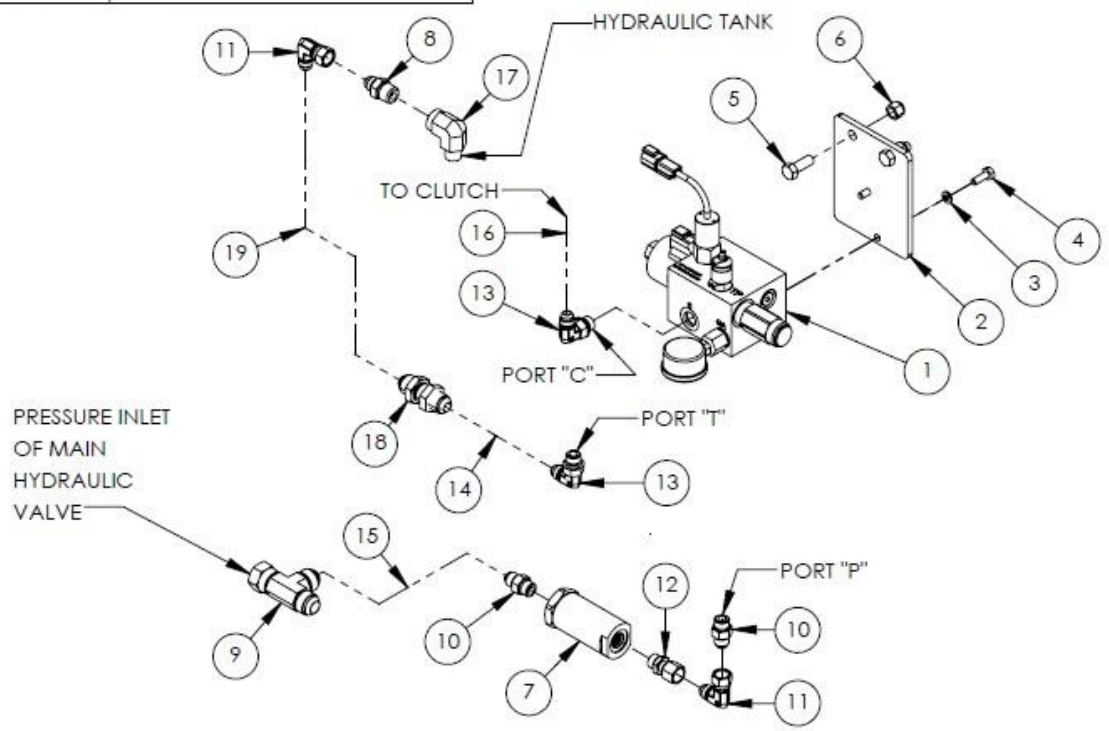
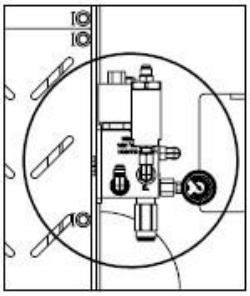
HYDRAULIC CLUTCH MANIFOLD

FILE NAME	Olympian Power Skid Assy CM2
DWG NAME	PG100

HYDRAULIC CLUTCH MANIFOLD



ITEM	QTY	PART NUMBER	DESCRIPTION
19	1	LV-4481	HOSE, BULKHEAD TO TANK
18	1	832FS 08X08	FITTING, M37DEG X M37DEG BH
17	1	25UG 06	ELBOW, 3/8" NPT 90°
16	1	LV-4499	HOSE, MANIFOLD "C" TO CLUTCH
15	1	LV-4411	HOSE, MANIFOLD "P" TO PRESSURE
14	1	LV-4408	HOSE, MANIFOLD "T" TO BULKHEAD
13	2	6801-06X06	FITTING, M37DEG X MORB 90°
12	1	6402-06-06	FITTING, F37DEG X MORB STRAIGHT
11	2	879FS 06	FITTING, M37DEG X M37DEG 90°
10	2	848FSO 06X06	FITTING, M37DEG X MORB STRAIGHT
9	1	10-R6X-S	FITTING, F37DEG X M37DEG X M37DEG TEE
8	1	848FS 06X06	FITTING, M37DEG X 3/8" NPTM
7A	1	LV-4410	10 MICRON FILTER ELEMENT
7	1	LV-4407	INLINE HYD FILTER
6	2	BON-000319	LOCKNUT, 3/8-16 VINYL ZP
5	2	BON-000057	BOLT, 3/8-16 X 1" HEX ZP
4	2	BON-000003	BOLT, 1/4-20 X 3/4" HEX ZP
3	2	BON-000350	LOCKWASHER, 1/4 ZP
2	1	LV-4406	HYD MANIFOLD MTG BRACKET
1	1	LV-4599	HYD CLUTCH MANIFOLD



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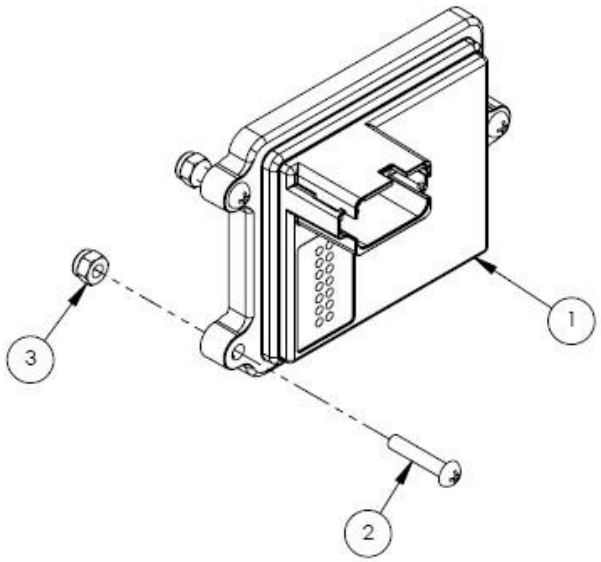
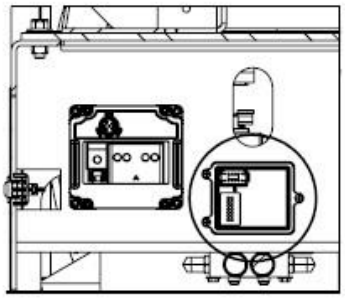
I/O EXPANSION MODULE

FILE NAME	Olympian Power Skid Assy CM2
DWG NAME	PG101

I/O EXPANSION MODULE





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ITEM	QTY	PART NUMBER	DESCRIPTION
4	1	LV-4405	HARNESS, I/O MODULE
3	3		LOCKNUT, 10-24 VINYL ZP
2	3		10-24 X 1" MACHINE SCREW
1	1	LV-4404	I/O EXPANSION MODULE

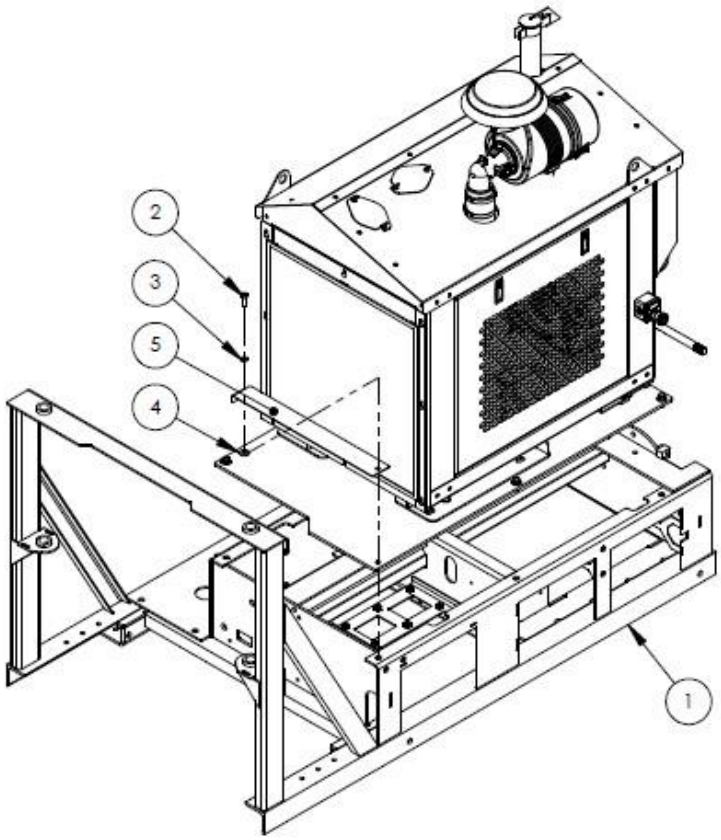
Titan LEAF SOLUTIONS

DIXON, ILLINOIS
PHONE: 800-851-9664

POWERSKID FRAME & ENGINE PLATE MOUNTING

FILE NAME	OLYMPIAN Power Unit Skid Assy
DWG NAME	PG1

OLYMPIAN POWERSKID & ENGINE PLATE MOUNTING



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ITEM	QTY	PART NUMBER	DESCRIPTION
5	1	LV-4299	FAN BEARING COVER PLATE
4	6	BON-000340	FLATWASHER,1/2 ZP
3	6	BON-000354	LOCKWASHER,1/2 ZP
2	6	BON-000107	BOLT, 1/2-13 X 1-1/2 HEX ZP
1	1	LV-4290	POWERSKID WELDMENT

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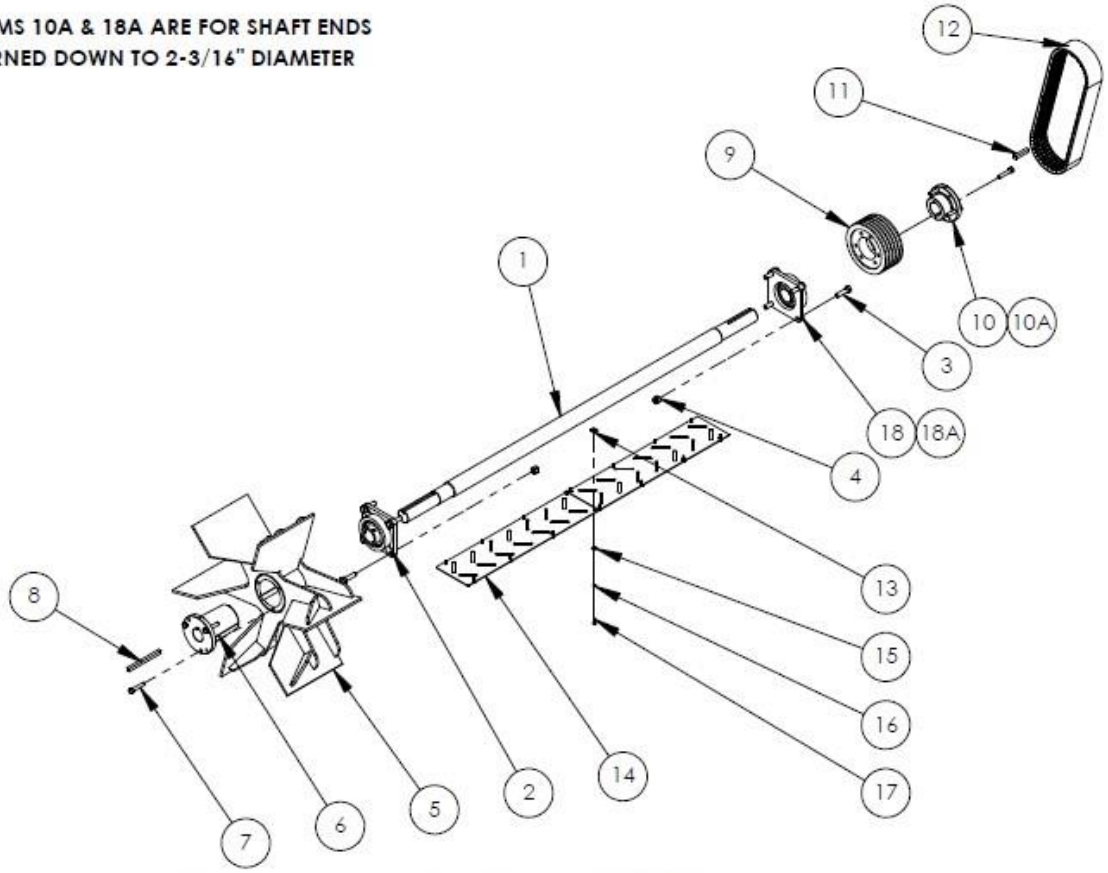
JACKSHAFT, BEARINGS & FAN

FILE NAME	OLYMPIAN Power Unit Skid Assy
DWG NAME	PG2

OLYMPIAN JACKSHAFT, BEARINGS & FAN

ITEMS 10A & 18A ARE FOR SHAFT ENDS TURNED DOWN TO 2-3/16" DIAMETER



ITEM	QTY	PART NUMBER	DESCRIPTION
18A	1	LV-4600	BEARING, 2-3/16" FLANGE
18	1	LV-4589	BEARING, 2-1/4" FLANGE
17	16	BON-000003	BOLT, 1/4-20 X 3/4 HEX ZP
16	16	BON-000350	LOCKWASHER, 1/4 ZP
15	16	BON-000336	FLATWASHER, 1/4 ZP
14	2	LV-4231	SHAFT GUARD COVER
13	16	BON-000301C	CLIP NUT, 1/4-20
12	1	LV-4458	5V600 V-BELT (SET OF 5 BELTS)
11	1	LV-4233	PULLEY DRIVE KEY
10A	1	LV-1272	SHEAVE BUSHING E 2-3/16
10	1	LV-1273	SHEAVE BUSHING E 2-1/4
9	1	LV-1271	FAN SHEAVE, (5 5V 925 E) 74 HP ENGINES
		LV-1280	FAN SHEAVE, (5 5V 900 E) 87 HP ENGINES
		LV-1279	FAN SHEAVE, (5 5V 850 E) 99 HP ENGINES
8	1	LV-4232	FAN DRIVE KEY
7	3	BON-000110	BOLT, 1/2-13 X 2-1/4 HEX ZP
6	1	LV-1633	2-3/16" SPLIT TAPER BUSHING
5	1	LV-1629	30" BELT DRIVE CW FAN
4	8	BON-000322	LOCKNUT, 5/8-11 NYLON ZP
3	8	BON-000154	BOLT, 5/8-11 X 2-1/4 HEX ZP
2	1	LV-4589	BEARING, 2-1/4" FLANGE
1	1	LV-4588	JACKSHAFT, POWERSKID

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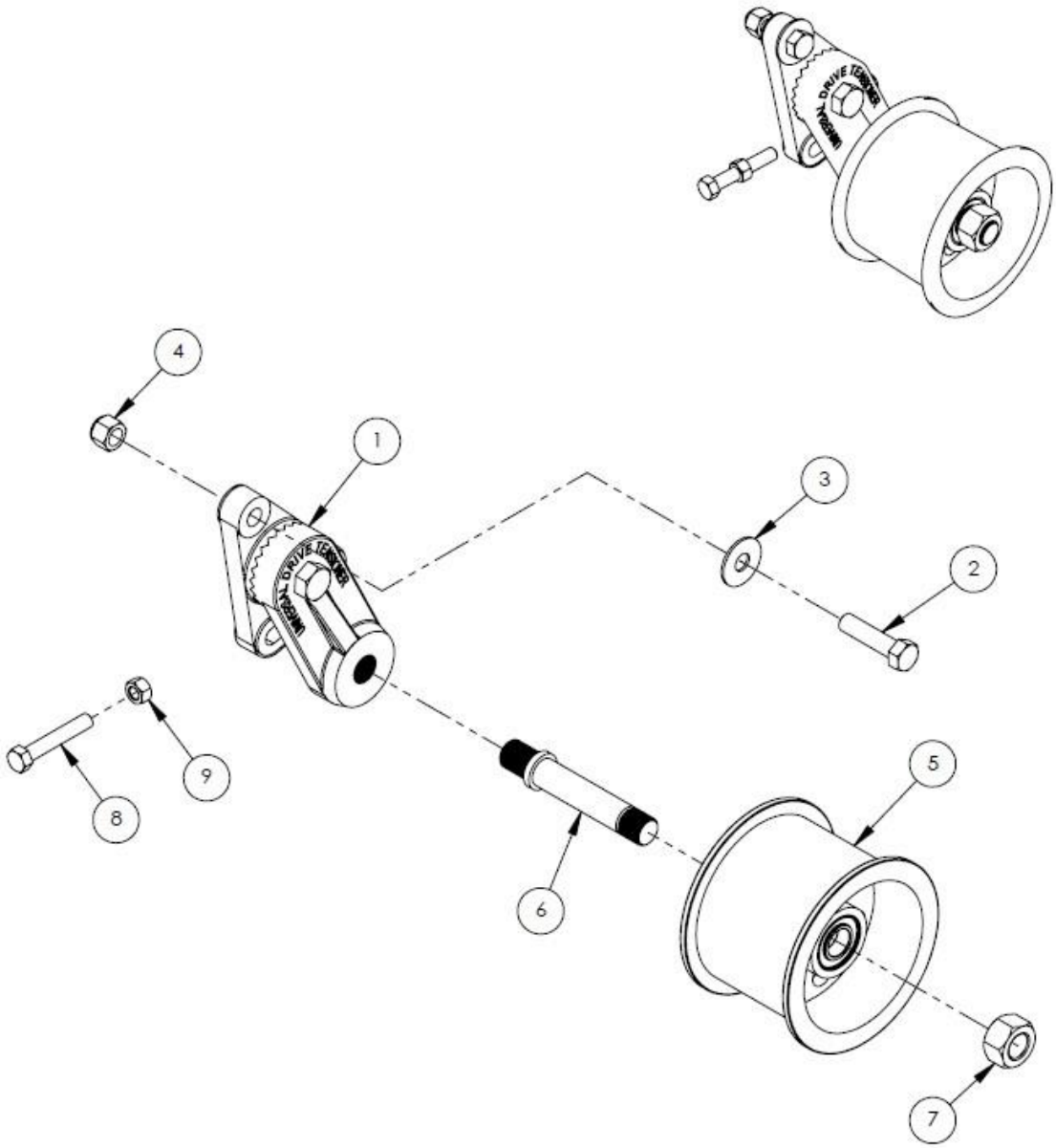
BELT TENSIONER

FILE NAME	Gen2 Power Unit Skid Assy
DWG NAME	PG3

OLYMPIAN BELT TENSIONER



ITEM	QTY	PART NUMBER	DESCRIPTION
9	1	BON-000305	LOCKNUT, 1/2-13 NYLON ZP
8	1	BON-000115FT	BOLT, 1/2-13 X 3-1/2 HEX ZP
7	1	BON-000310	NUT, 1" HEX ZP
6	1	LV-1662	MACHINED SHOULDER STUD, 1"
5	1	LV-1661	FLANGED PULLEY IDLER, 7" OD
4	2	BON-000322	LOCKNUT, 5/8-11 NYLON ZP
3	2	BON-000341	FLATWASHER, 5/8 ZP
2	2	BON-000155	BOLT, 5/8-11 X 2-1/2 HEX ZP
1	1	LV-2491	BELT TENSIONER

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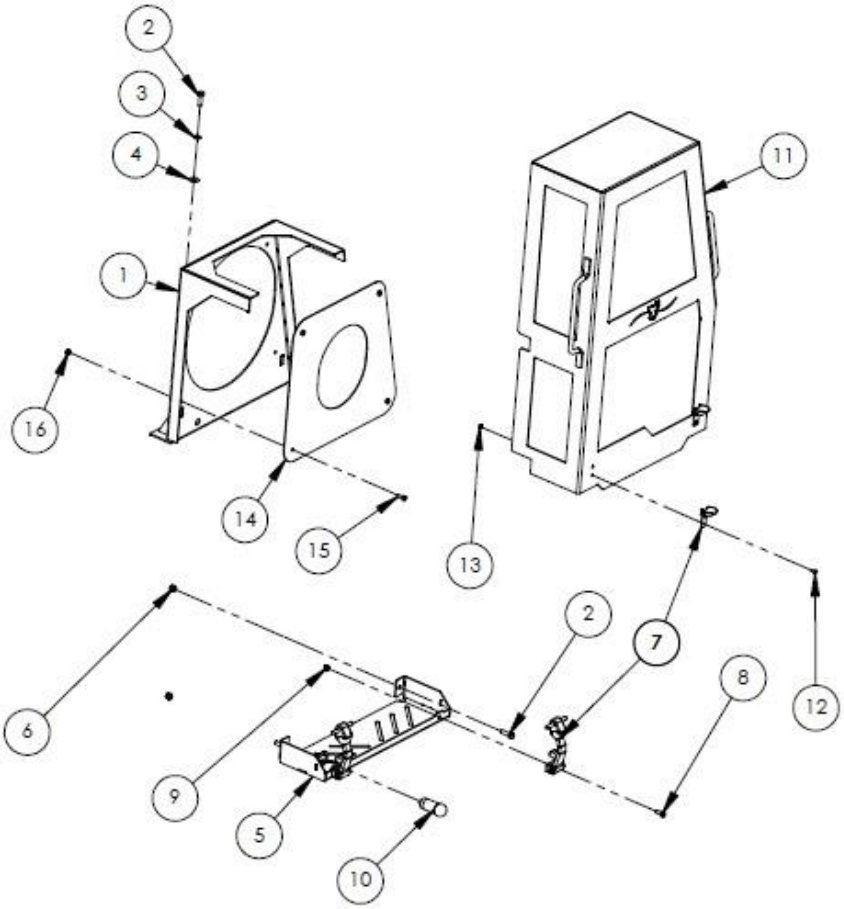
BELT GUARD

FILE NAME	OLYMPIAN Power Unit Skid Assy
DWG NAME	PG4

OLYMPIAN BELT GUARD



ITEM	QTY	PART NUMBER	DESCRIPTION
16	4	BON-000318.5	LOCKNUT, 1/4-20 NYLON ZP - CLUTCH ONLY
15	4	BON-000003	BOLT, 1/4-20 X 3/4 HEX - CLUTCH ONLY
14	1	LV-4298	BELT GUARD BACK PLATE - CLUTCH ONLY
13	4		#10-24 HEX NUT W/ STAR WASHER ZP
12	4		#10-24 X 1/2 MACHINE SCREW ZP
11	1	LV-4222	BELT GUARD COVER
10	1	LV-4519	PROXIMITY SENSOR
9	2	BON-000320	LOCKNUT, 5/16-18 NYLON ZP
8	2	BON-000028	BOLT, 5/16-18 X 3/4 HEX ZP
7	2	ORR-H-5800	RUBBER LATCH ASSEMBLY
6	2	BON-000319	LOCKNUT, 3/8-16 NYLON ZP
5	1	LV-4221	BELT GUARD BOTTOM
4	4	BON-000338	FLATWASHER, 3/8 ZP
3	4	BON-000352	LOCKWASHER, 3/8 ZP
2	6	BON-000058	BOLT, 3/8-16 X 1-1/4 HEX ZP
1	1	LV-4223	BELT GUARD BACK

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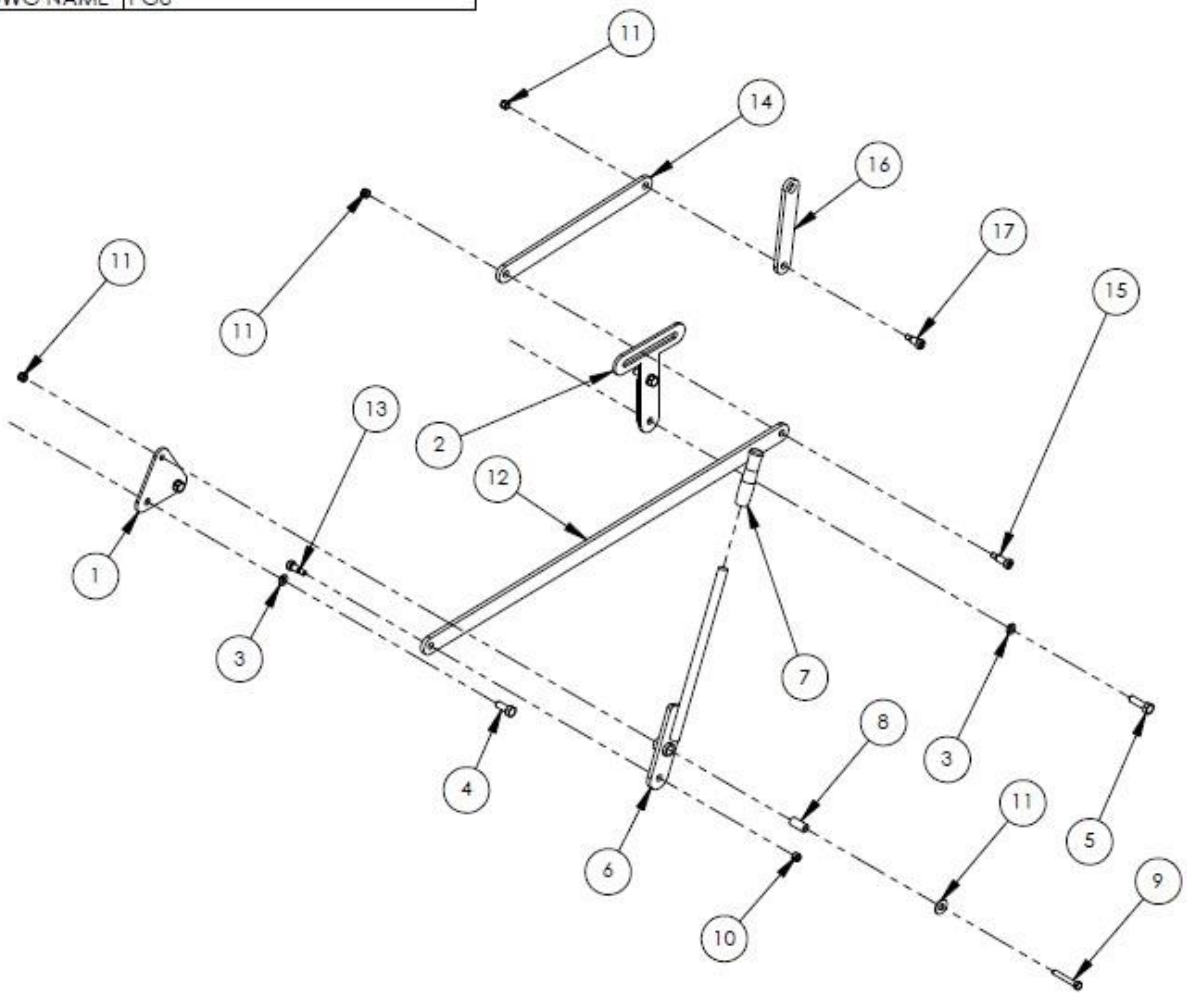
REMOTE CLUTCH ENGAGEMENT

FILE NAME	OLYMPIAN Power Unit Skid Assy
DWG NAME	PG8

OLYMPIAN REMOTE CLUTCH ENGAGEMENT



ITEM	QTY	PART NUMBER	DESCRIPTION
17	1	LV-4523	BOLT, 3/8-16, 1/2x7/8 SHSS ZP
16	1	LV-4242	REMOTE CLUTCH LINKAGE SHORT
15	1	LV-4524	BOLT, 3/8-16, 1/2x1-1/4 SHSS ZP
14	1	LV-4301	REMOTE CLUTCH LINKAGE INTERMEDIATE
13	1	LV-4522	BOLT, 3/8-16, 1/2x5/8 SHSS ZP
12	1	LV-4302	REMOTE CLUTCH LINKAGE LONG
11	4	BON-000319	LOCKNUT, 3/8-16 NYLON ZP
10	1	BON-000338	FLATWASHER, 3/8 ZP
9	1	BON-000063	BOLT, 3/8-16 X 2-1/2 HEX ZP
8	1	LV-4246	REMOTE CLUTCH SPACER
7	1	LV-1219	RUBBER GRIP
6	1	LV-4300	REMOTE CLUTCH HANDLE
5	2	BON-000108	BOLT, 1/2-13 X 1-3/4 HEX ZP
4	2	BON-000106	BOLT, 1/2-13 X 1-1/4 HEX ZP
3	4	BON-000354	LOCKWASHER, 1/2 ZP
2	1	LV-4245	REMOTE CLUTCH SLOT BRACKET
1	1	LV-4240	REMOTE CLUTCH BRACKET

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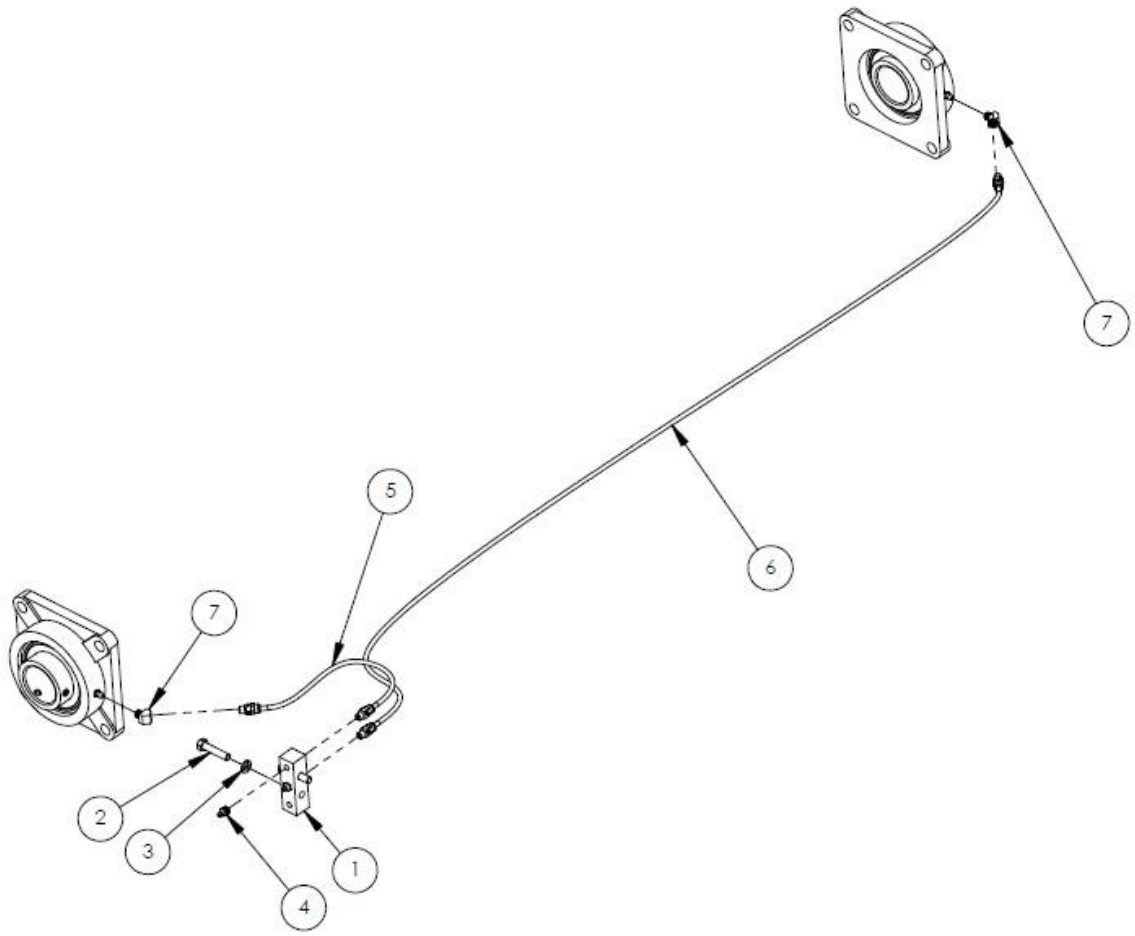
LUBRICATION COMPONENTS

FILE NAME	Olympian Power Skid Assy CM2
DWG NAME	PG13

OLYMPIAN LUBRICATION COMPONENTS



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ITEM	QTY	PART NUMBER	DESCRIPTION
7	2	50785K81	GREASE FITTING, 45 DEG
6	1	BV2-002405	GREASE EXTENSION HOSE, 60"
5	1	BV2-002404	GREASE EXTENSION HOSE, 12"
4	2	BON-000652	GREASE FITTING, STRAIGHT 1/8 NPT
3	2	BON-000352	LOCKWASHER, 3/8 ZP
2	2	BON-000060	BOLT, 3/8-16 X 1-3/4 HEX, ZP
1	1	BV2-001827	MANIFOLD GREASE EXTENSION

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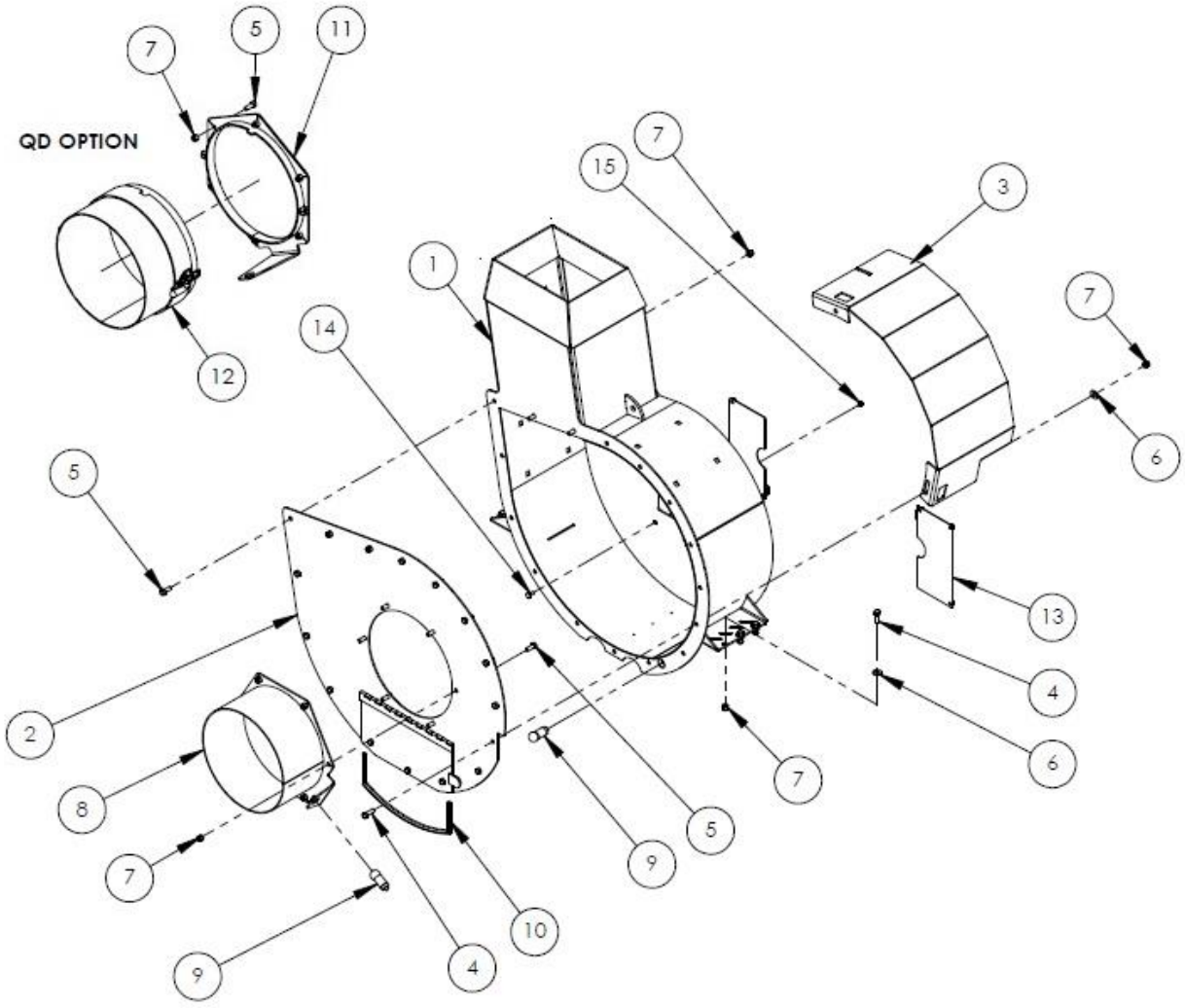
BLOWER HOUSING

FILE NAME	OLYMPIAN Power Unit Skid Assy
DWG NAME	PG6

OLYMPIAN BLOWER HOUSING



ITEM	QTY	PART NUMBER	DESCRIPTION
15	6	BON-000319	LOCKNUT, 3/8-16 NYLON ZP
14	6	BON-000285.3	CARRIAGE BOLT, 3/8-16 X 1
13	2	LV-4289	BLOWER HOUSING BACK PLATE
12	1	LV-4283	QD SUCTION HOSE ADAPTER
11	1	LV-4282	QD SUCTION HOSE RECEIVER
10	2.5	LV-4213	SEAL, D BULB 1/2" WIDE
9	2	LV-4519	PROXIMITY SENSOR
8	1	LV-4239	SUCTION HOSE ADAPTER
7	28	BON-000321	LOCKNUT, 1/2-13 NYLON ZP
6	7	BON-000340	FLATWASHER, 1/2 ZP
5	17	BON-000106	BOLT, 1/2-13 X 1-1/4 HEX ZP
4	11	BON-000107	BOLT, 1/2-13 X 1-1/2 HEX ZP
3	1	LV-4218	BLOWER HOUSING SHIELD
2	1	LV-4217	BLOWER HOUSING COVER WITH DOOR
		LV-4216	BLOWER HOUSING COVER WITHOUT DOOR
1	1	LV-4291	BLOWER HOUSING WELDMENT

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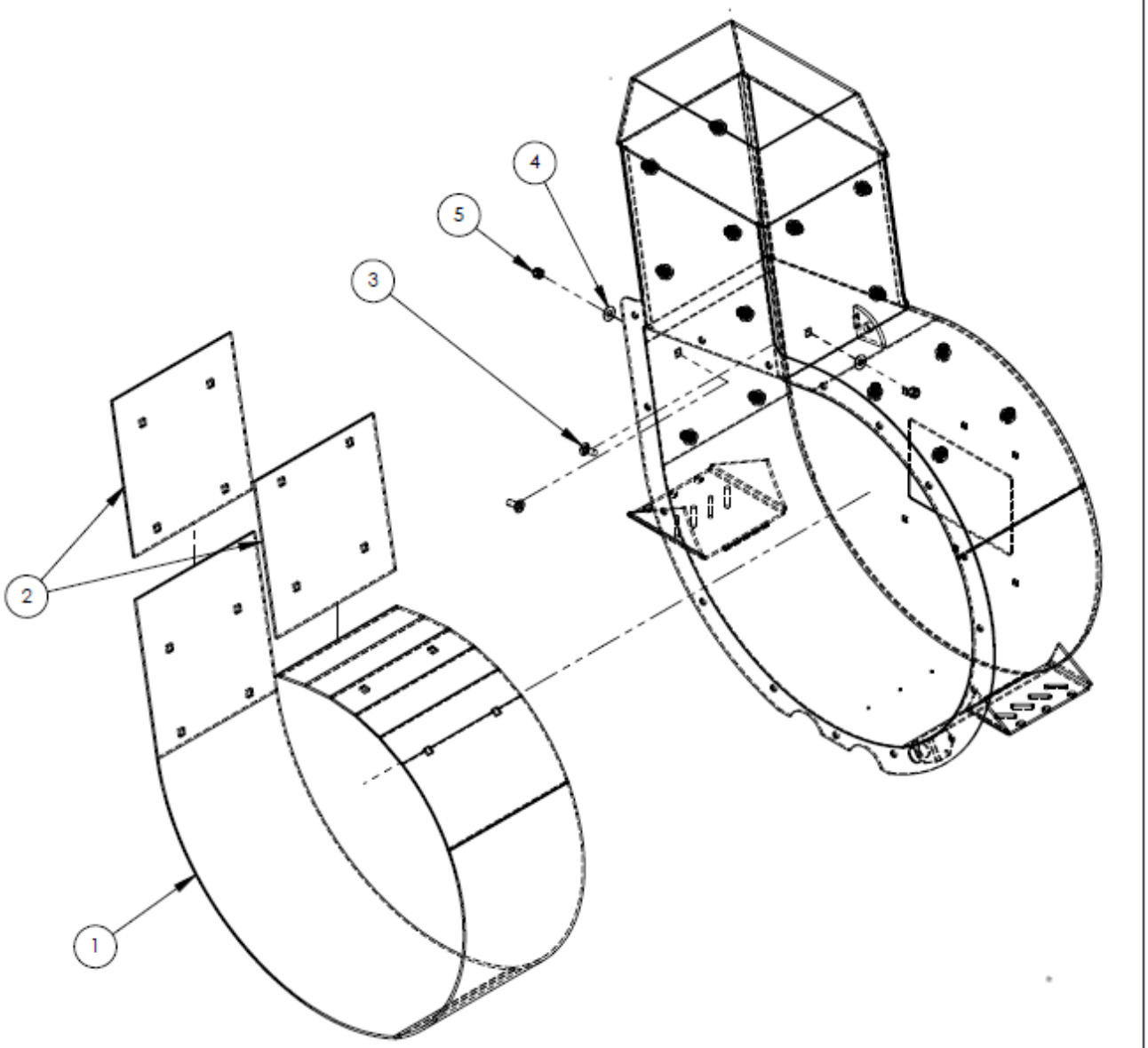
BLOWER HOUSING LINER

FILE NAME	Blower Housing Assy
DWG NAME	Current Units

OLYMPIAN BLOWER HOUSING LINER



ITEM	QTY	PART NUMBER	DESCRIPTION
5	16	BON-000321	LOCKNUT, 1/2"-13 NYLON
4	16	BON-000340	WASHER, 1/2" FLAT
3	16	BON-000261.5	BOLT, 1/2"-13 X 1-1/2" CARRIAGE
2	2	LV-4311-AR	LINER, AR, BLOWER ELBOW
1	1	LV-3024-AR	LINER, AR, BLOWER HOUSING

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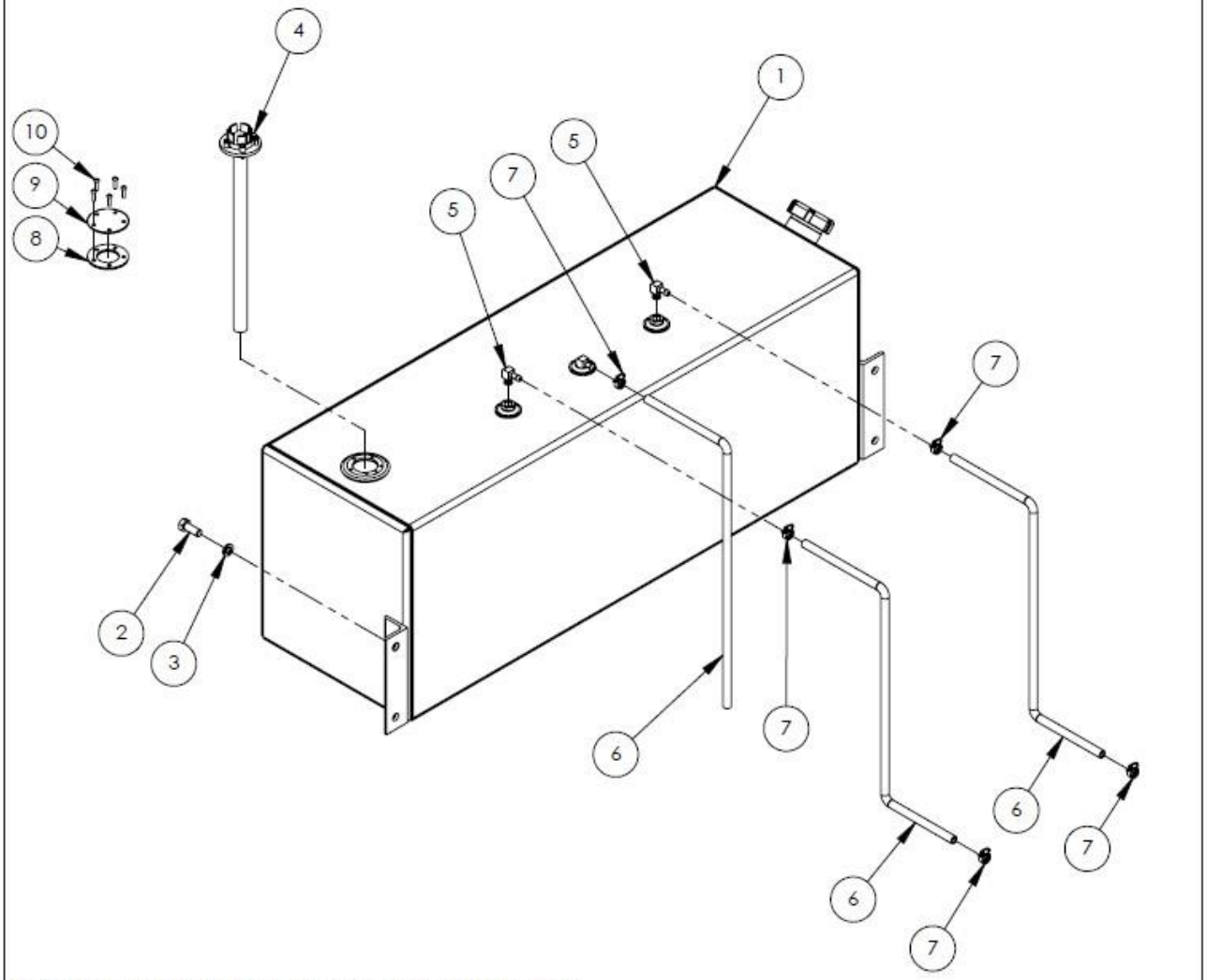
DIESEL FUEL TANK ASSEMBLY

FILE NAME	Gen2 Power Unit Skid Assy
DWG NAME	PG9

OLYMPIAN FUEL TANK ASSEMBLY
KUBOTA 74 HP DIESEL ENGINE



ITEMS 8 , 9 & 10 FOR UNITS WITHOUT A FUEL SENDING UNIT

ITEM	QTY	PART NUMBER	DESCRIPTION
10	1	LV-1374	HARDWARE KIT, FOR FUEL SENDING PORT
9	1	LV-1326	COVER PLATE, FUEL SENDING PORT
8	1	LV-1373	GASKET, FUEL SENDING PORT
7	5	VEL-022204	HOSE CLAMP, SAE 4 7/32-5/8
6	15	LV-1159	FUEL LINE, 5/16 IN. ID, SAE 30R7
5	2	LV-1161	1/4" NPTF MALE PIPE X 5/16" ID HOSE BARB
4	1	LV-4518	FUEL SENDING UNIT
3	4	BON-000354	LOCKWASHER,1/2 ZP
2	4	BON-000106	BOLT, 1/2-13 X 1-1/4 HEX ZP
1	1	LV-4508	FUEL TANK, 40 GAL ALUMINUM DIESEL

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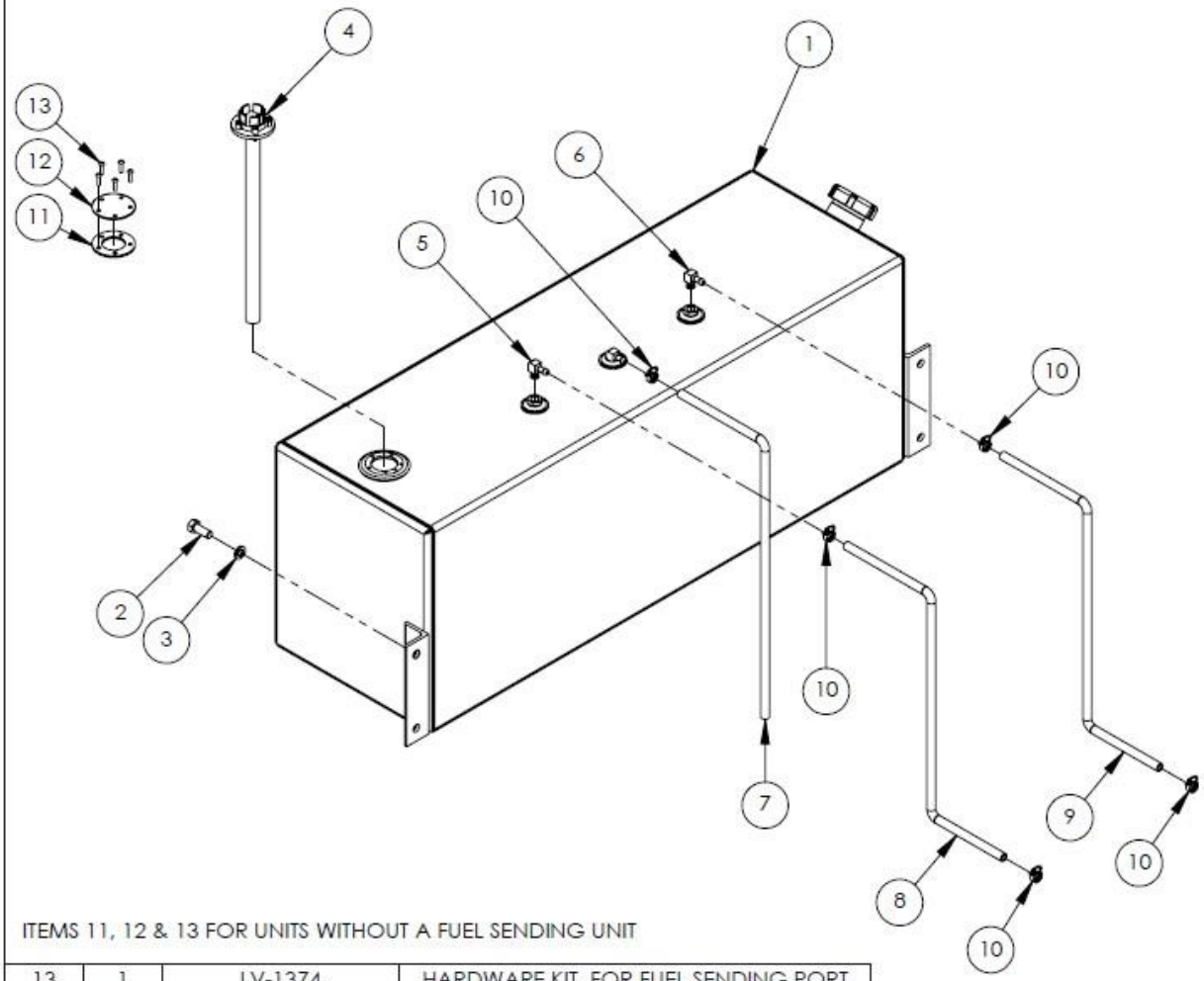
FILE NAME	Gen2 Power Unit Skid Assy 2
DWG NAME	PG10

OLYMPIAN FUEL TANK ASSEMBLY
JOHN DEERE 74 HP DIESEL ENGINE
JOHN DEERE 99 HP DIESEL ENGINE
KOHLER 74 HP DIESEL ENGINE



ITEMS 11, 12 & 13 FOR UNITS WITHOUT A FUEL SENDING UNIT

ITEM	QTY	PART NUMBER	DESCRIPTION
13	1	LV-1374	HARDWARE KIT, FOR FUEL SENDING PORT
12	1	LV-1326	COVER PLATE, FUEL SENDING PORT
11	1	LV-1373	GASKET, FUEL SENDING PORT
10	5	VEL-022204	HOSE CLAMP, SAE 4 7/32-5/8
9	6	LV-1444	FUEL LINE, 3/8 IN. ID, SAE 30R7
8	6	LV-1443	FUEL LINE, 1/4 IN. ID, SAE 30R7
7	3	LV-1159	FUEL LINE, 5/16 IN. ID, SAE 30R7
6	1	LV-1442	1/4" NPTF MALE PIPE X 3/8" ID HOSE BARB
5	1	LV-1441	1/4" NPTF MALE PIPE X 1/4" ID HOSE BARB
4	1	LV-4518	FUEL SENDING UNIT
3	4	BON-000354	LOCKWASHER,1/2 ZP
2	4	BON-000106	BOLT, 1/2-13 X 1-1/4 HEX ZP
1	1	LV-4508	FUEL TANK, 40 GAL ALUMINUM DIESEL

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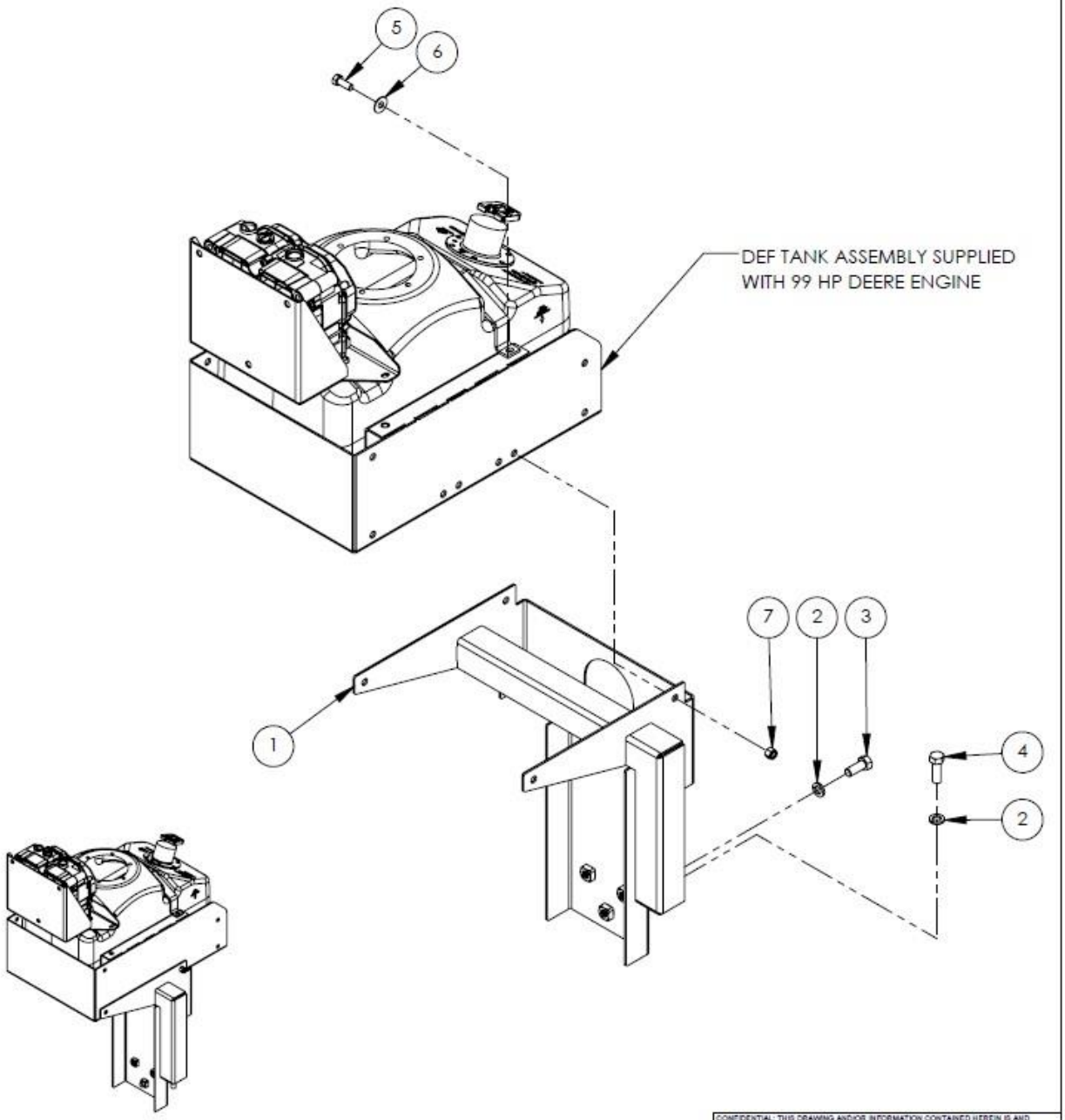
DEF TANK MOUNTING

FILE NAME	Gen2 Power Unit Skid Assy 2
DWG NAME	PG15

OLYMPIAN DEF TANK MOUNTING
99 HP JOHN DEERE ENGINE



ITEM	QTY	PART NUMBER	DESCRIPTION
7	4	BON-000319	LOCKNUT, 3/8-16 NYLON ZP
6	4	BON-000338	FLATWASHER, 3/8 ZP
5	4	BON-000057	BOLT, 3/8-16 X 1 HEX ZP
4	1	BON-000107	BOLT, 1/2-13 X 1-1/2 HEX ZP
3	3	BON-000106	BOLT, 1/2-13 X 1-1/4 HEX ZP
2	4	BON-000354	LOCKWASHER, 1/2 ZP
1	1	LV-4226	DEF TANK MOUNTING BRACKET

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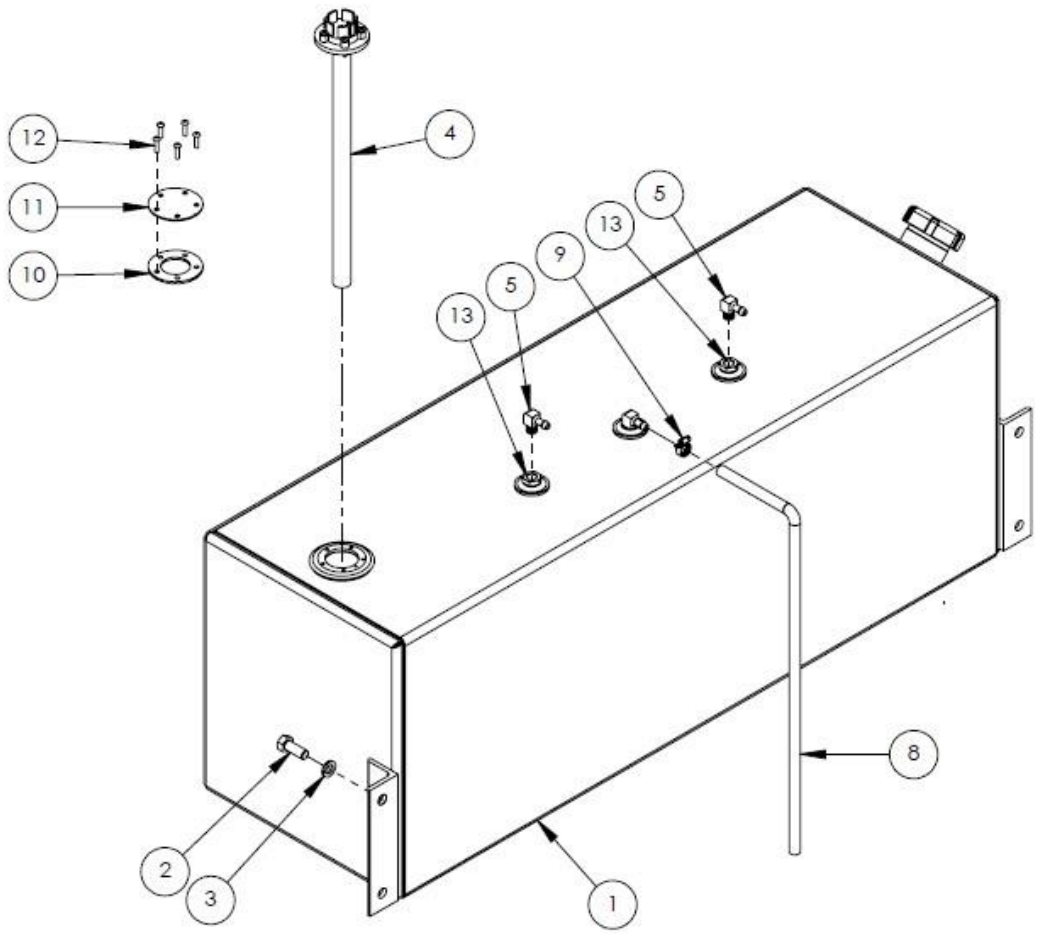
GASOLINE TANK ASSEMBLY

FILE NAME	Gen2 Power Unit Skid Assy 2
DWG NAME	PG11

OLYMPIAN FUEL TANK ASSEMBLY
KUBOTA 87 HP GASOLINE ENGINE



ITEMS 10, 11 & 12 FOR UNITS WITHOUT A FUEL SENDING UNIT

ITEM	QTY	PART NUMBER	DESCRIPTION
13	2	5406-06X04	3/8X1/4 REDUCER BUSHING
12	1	LV-1374	HARDWARE KIT, FOR FUEL SENDING PORT
11	1	LV-1326	COVER PLATE, FUEL SENDING PORT
10	1	LV-1373	GASKET, FUEL SENDING PORT
9	1	LV-4583	HOSE CLAMP
8	3	LV-4581	FUEL LINE, 5/16" 100 PSI
5	1	LV-4582	1/4" NPTF MALE PIPE X 5/16" ID HOSE BARB
4	1	LV-4518	FUEL SENDING UNIT
3	4	BON-000354	LOCKWASHER,1/2 ZP
2	4	BON-000106	BOLT, 1/2-13 X 1-1/4 HEX ZP
1	1	LV-4517	FUEL TANK, 40 GAL ALUMINUM GAS

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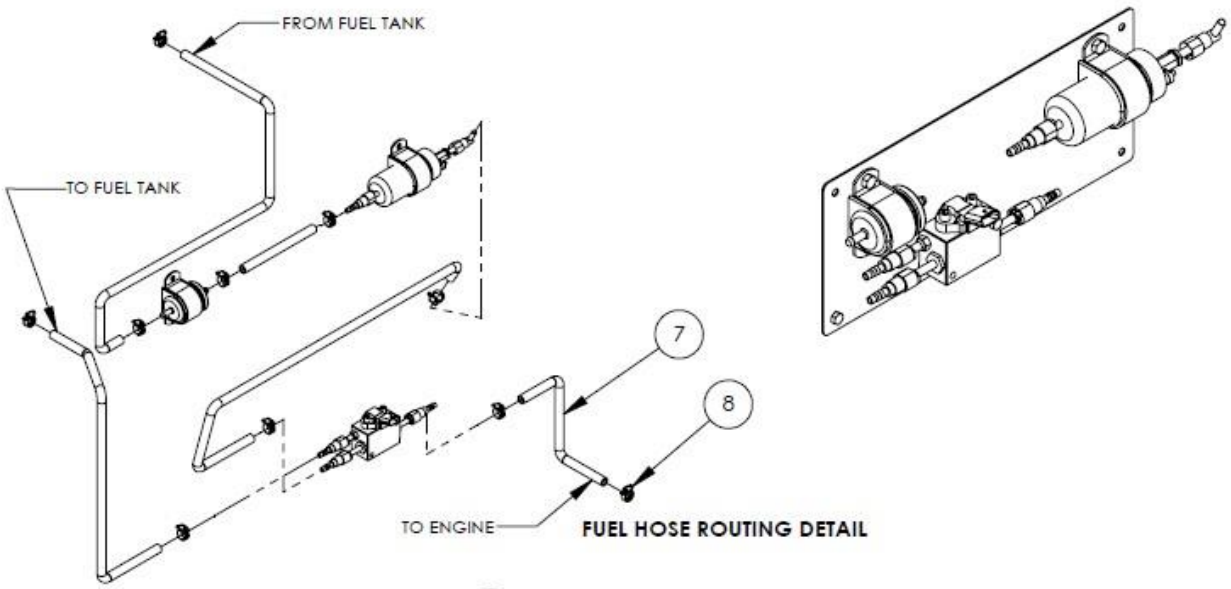
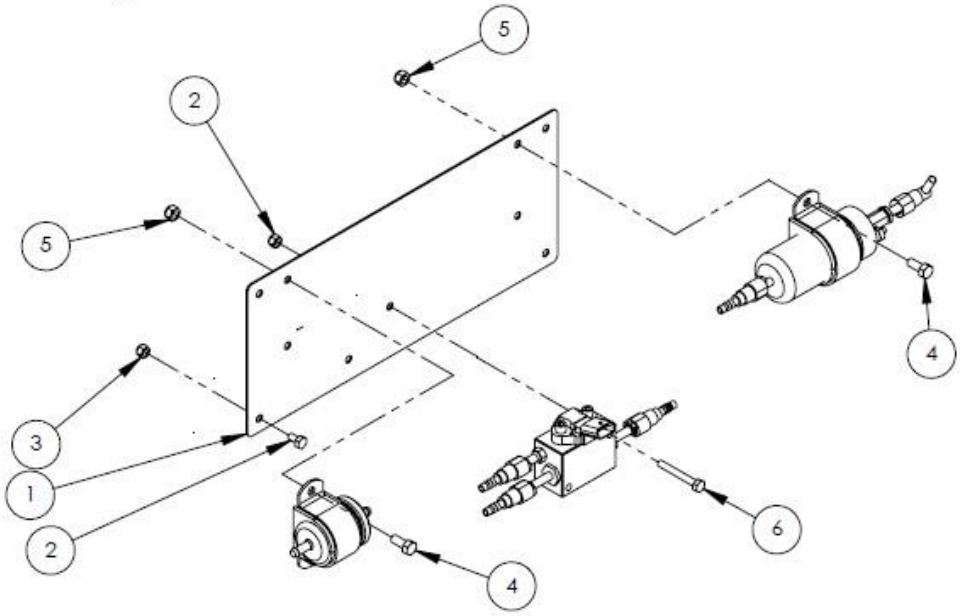
FUEL COMPONENT GROUP

FILE NAME	Gen2 Power Unit Skid Assy 2
DWG NAME	PG12

OLYMPIAN FUEL COMPONENT GROUP
KUBOTA 87 HP GASOLINE ENGINE



FUEL HOSE ROUTING DETAIL



FUEL FILTER, FUEL PUMP AND FUEL PRESSURE MANIFOLD
ARE SUPPLIED WITH THE 87 HP KUBOTA ENGINE

ITEM	QTY	PART NUMBER	DESCRIPTION
8	8	LV-4583	HOSE CLAMP
7	17	LV-4581	FUEL LINE, 5/16" 100 PSI
6	2	BON-000009	BOLT, 1/4-20 X 2 HEX ZP
5	4	BON-000320	LOCKNUT, 5/16-18 NYLON ZP
4	4	BON-000028	BOLT, 5/16-18 X 3/4 HEX ZP
3	6	BON-000318.5	LOCKNUT, 1/4-20 NYLON ZP
2	4	BON-000001	BOLT, 1/4-20 X 1/2 HEX ZP
1	1	LV-4280	FUEL COMPONENT MOUNTING BRACKET

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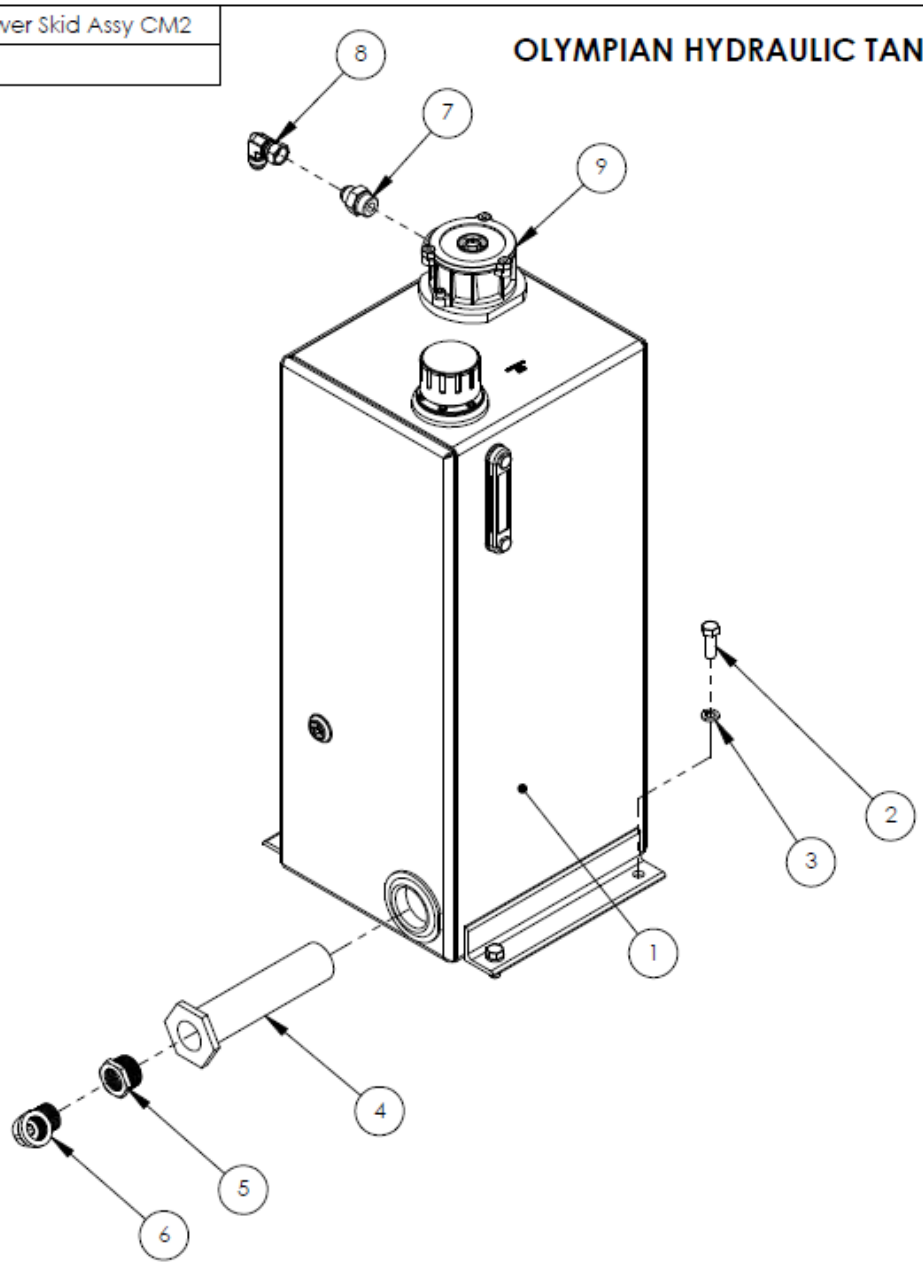
HYDRAULIC TANK

FILE NAME	Olympian Power Skid Assy CM2
DWG NAME	PG99

OLYMPIAN HYDRAULIC TANK



ITEM	QTY	PART NUMBER	DESCRIPTION
9	1	LV-4575	FILTER, RETURN, IN-TANK, LITA-750-25
8	1	879FS 10	FITTING, M37DEG X F37DEG 90DEG
7	1	848FSO 10X12	ADAPTER, STRAIGHT M37DEG X MORB
6	1	BON-000442	PIPE FITTING, 1" 90DEG STREET ELBOW
5	1	BON-000472	PIPE FITTING BUSHING, 1-1/4X1
4	1	BUY-SW2001253	SUCTION STRAINER
3	4	BON-000354	LOCKWASHER, 1/2 ZP
2	4	BON-000107	BOLT, 1/2-13 X 1-1/2 HEX ZP
1	1	LV-4507	HYDRAULIC TANK 22GAL ALUMINUM

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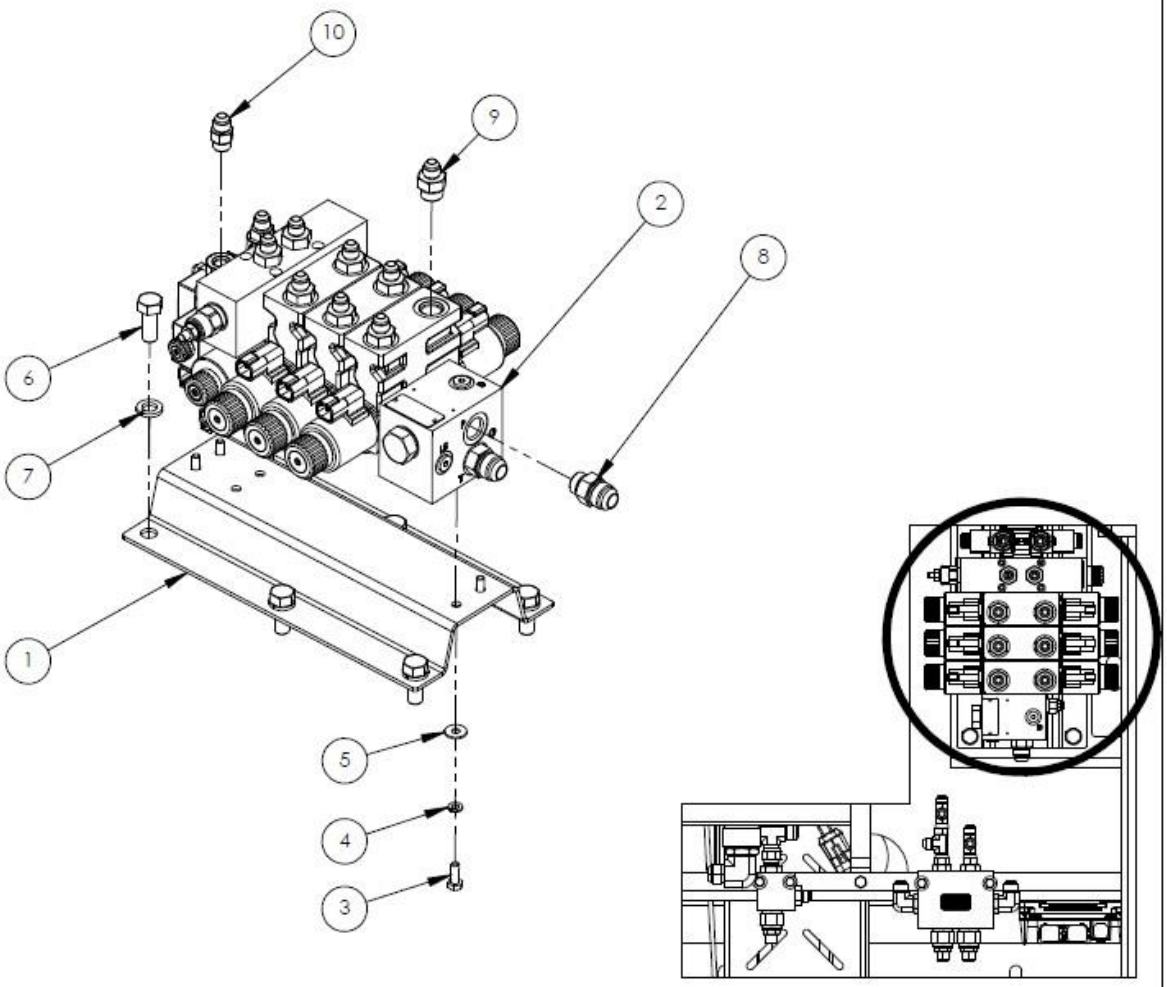
HYDRAULIC PROPORTIONAL VALVE

FILE NAME	Olympian Power Skid Assy CM2
DWG NAME	PG96

OLYMPIAN MAIN VALVE ASSEMBLY



ITEM	QTY	PART NUMBER	DESCRIPTION
10	2	839FS 06	PLUG, M37DEG, NO HYD JACK
	2	848FSO 06X06	FITTING, M37DEG X MORB, HYD JACK ONLY
9	8	848FSO 06X08	FITTING, M37DEG X MORB
8	2	848FSO 10X08	FITTING, M37DEG X MORB
7	6	BON-000354	LOCKWASHER, 1/2 ZP
6	6	BON-000106	BOLT, 1/2-13 X 1-1/4 ZP
5	4	BON-000336	FLATWASHER, 1/4 ZP
4	4	BON-000350	LOCKWASHER, 1/4 ZP
3	4	BON-000003	BOLT, 1/4-20 X 3/4 ZP
2	1	LV-2195-REX	VALVE, 5-SECTION PROPORTIONAL
1	1	LV-4230	BRACKET, MAIN VALVE

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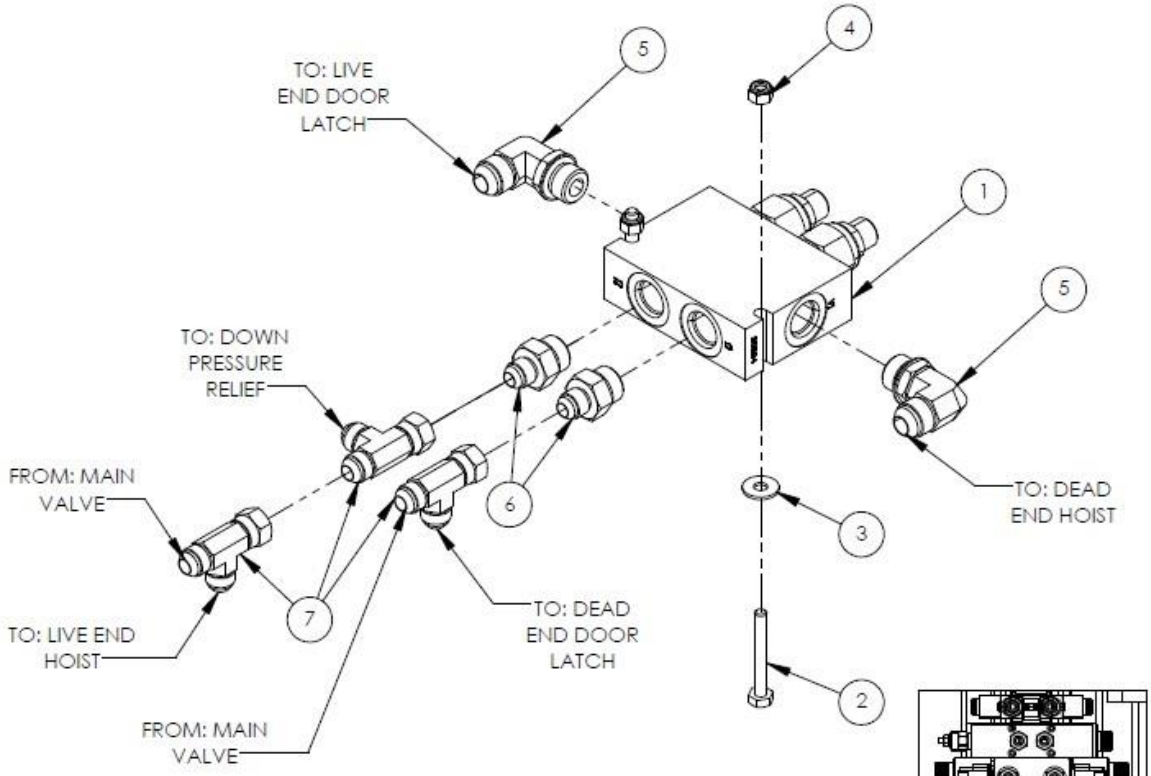
SEQUENCING VALVE

FILE NAME	Olympian Power Skid Assy CM2
DWG NAME	PG98

OLYMPIAN SEQUENCE VALVE ASSEMBLY



ITEM	QTY	PART NUMBER	DESCRIPTION
7	3	871FS 06	FITTING, M37DEG X F37DEG X M37DEG TEE
6	2	848FSO 06X08	FITTING, M37DEG X MORB STRAIGHT
5	2	849FSO 08X08	FITTING, M37DEG X MORB 90DEG
4	2	BON-000318.5	LOCKNUT, 1/4-20 NYLON ZP
3	2	BON-000336	FLATWASHER, 1/4 ZP
2	2	BON-000009	BOLT, 1/4-20 X 2 HEX ZP
1	1	DPSVP-10-N-S-08TA-30/10	SEQUENCE VALVE

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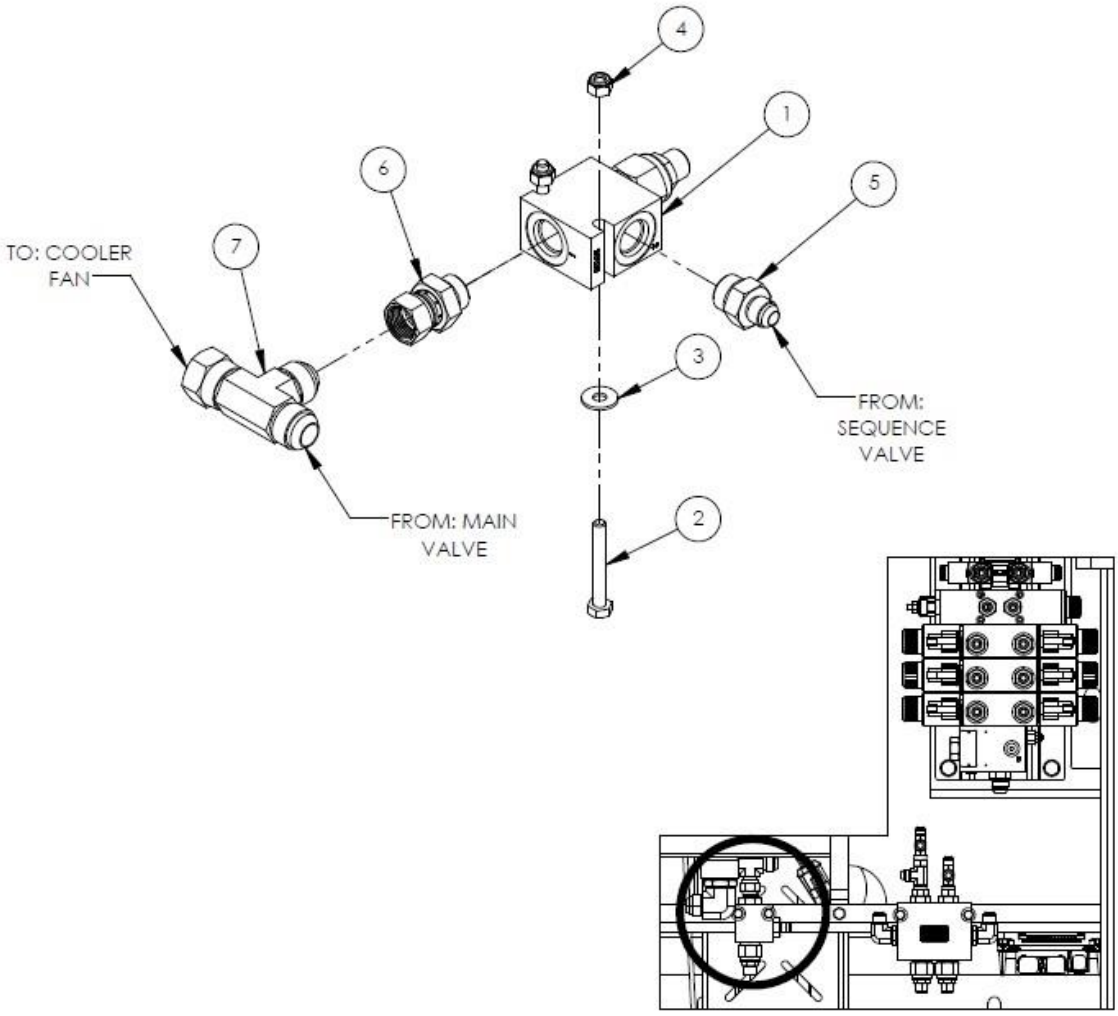
HOIST DOWN PRESSURE RELIEF

FILE NAME	Olympian Power Skid Assy CM2
DWG NAME	PG97

OLYMPIAN DOWN PRESSURE RELIEF VALVE ASSY



ITEM	QTY	PART NUMBER	DESCRIPTION
7	1	10-R6X-S	FITTING, M37DEG X F37DEG X M37DEG TEE
6	1	10-8-F650X-S	FITTING F37DEG X MORB
5	1	848FSO 06X08	FITTING M37DEG X MORB
4	2	BON-000318.5	LOCKNUT, 1/4-20 NYLON ZP
3	2	BON-000336	FLATWASHER, 1/4 ZP
2	2	BON-000009	BOLT, 1/4-20 X 2 HEX ZP
1	1	RVDA-10-S-08TA-30/08	DOWN PRESSURE RELIEF VALVE

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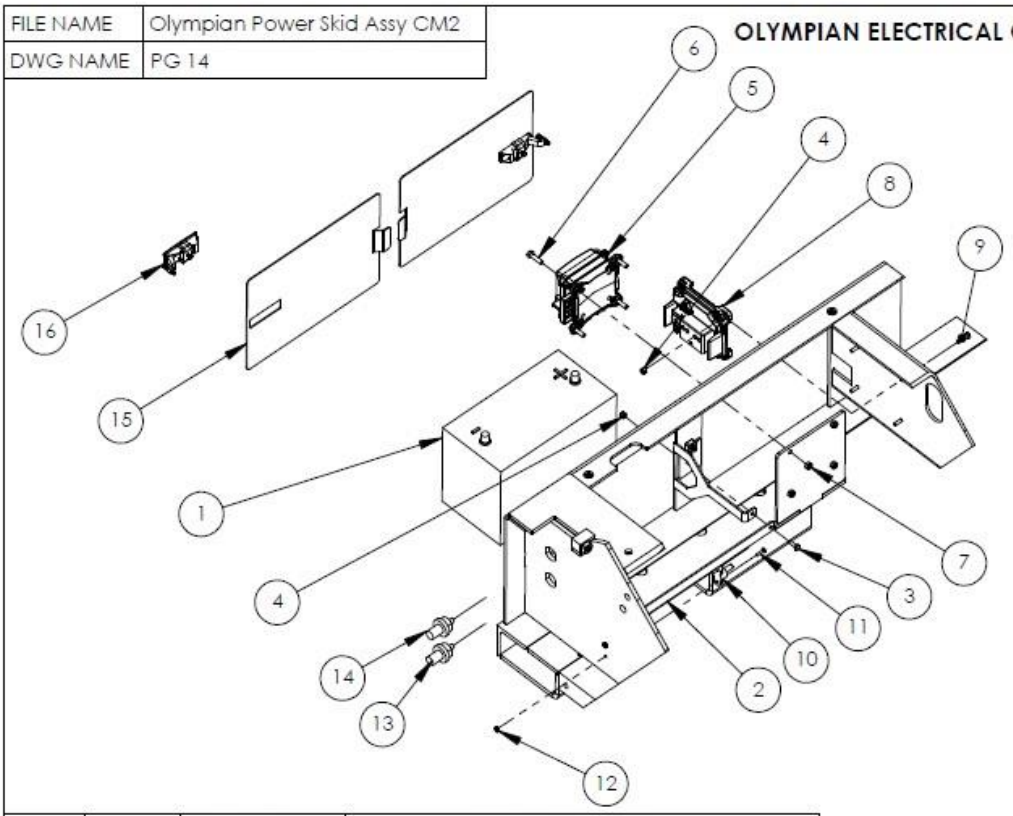
ELECTRICAL COMPONENTS

FILE NAME	Olympian Power Skid Assy CM2
DWG NAME	PG 14

OLYMPIAN ELECTRICAL COMPONENTS



ITEM	QTY	PART NUMBER	DESCRIPTION
16	2	LV-4359	PUSH BUTTON LATCH
15	2	LV-4293	ACCESS PANEL
14	1	LV-4511	JUMPER TERMINAL, 6-36V, 250A BLACK
13	1	LV-4510	JUMPER TERMINAL, 6-36V, 250A RED
12	2		#10-24 HEX NUT W/ STAR WASHER ZP
11	2		#10-24 X 3/4 MACHINE SCREW ZP
10	1	WAY-47211	JUNCTION BLOCK, 3/8-16 STUD, BLACK
9	4	BON-000005	BOLT, 1/4-20 X 1 HEX ZP
8	1	LV-2532	HFX 20 I/O CONTROLLER 74HP KUBOTA
		LV-2685	HFX 20 I/O CONTROLLER 87HP KUBOTA
		LV-2684	HFX 20 I/O CONTROLLER 74HP DEERE
		LV-2600	HFX 20 I/O CONTROLLER 99HP DEERE
7	4	BON-000320	LOCKNUT, 5/16 ZP
6	4	BON-000031	BOLT, 5/16-18 X 1-1/4 HEX ZP
5	1	LV-2533	VEHICLE ELECTRICAL CENTER
4	6	BON-000318.5	LOCKNUT, 1/4-20 NYLON ZP
3	2	BON-0000003	BOLT, 1/4-20 X 3/4 HEX ZP
2	1	LV-4294	BATTERY RETAINER BRACKET
1	1	LV-1144	BATTERY, 12V

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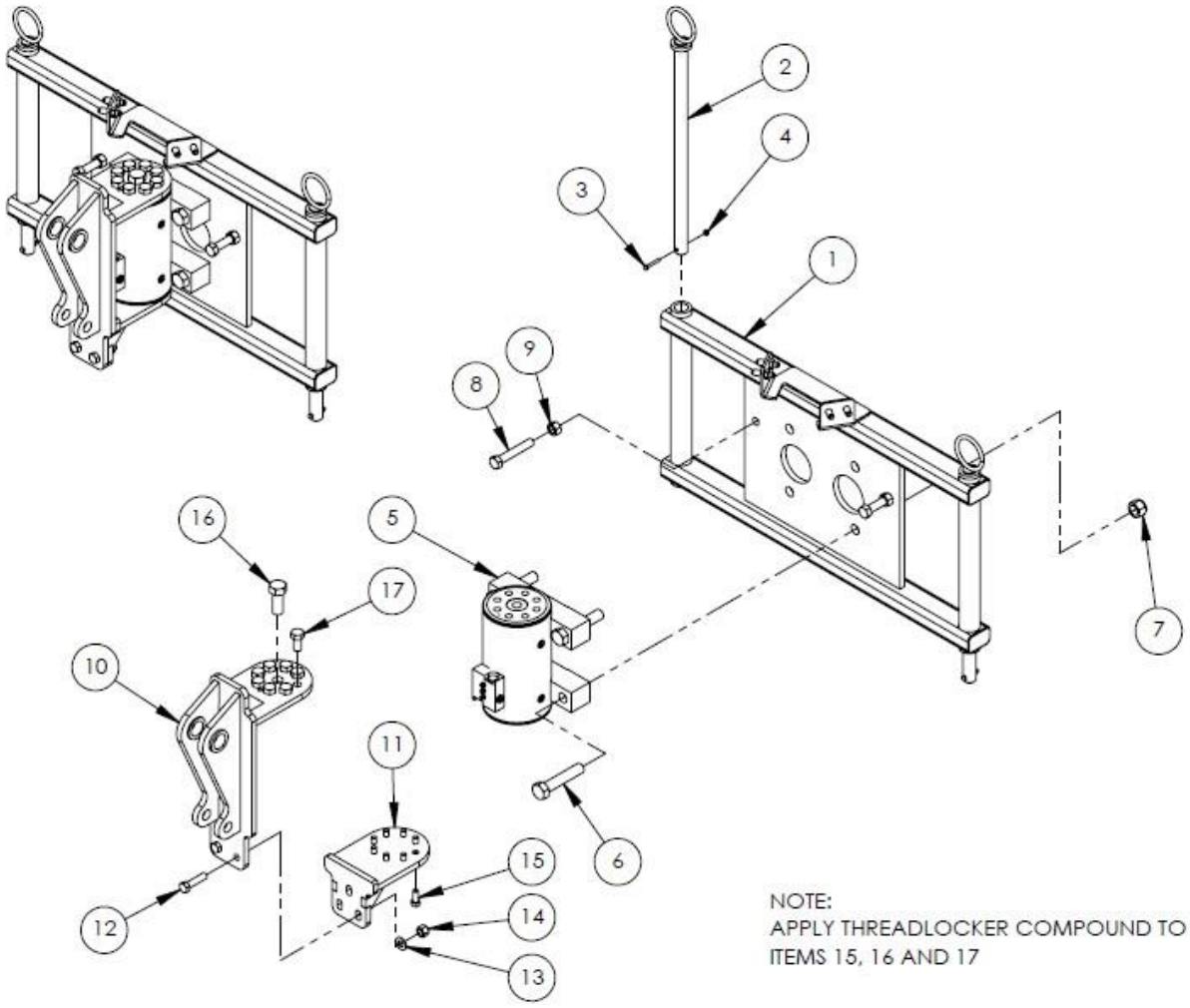
CONTROL ARM PIVOT

FILE NAME	OLYMPIAN Power Unit Skid Assy 2
DWG NAME	PG16 B

OLYMPIAN CONTROL ARM PIVOT



NOTE:
APPLY THREADLOCKER COMPOUND TO ITEMS 15, 16 AND 17

ITEM	QTY	PART NUMBER	DESCRIPTION
17	8	BON-000180	BOLT, 3/4-10 X 1-1/2 HEX ZP GR 8
16	1	BON-000232	BOLT, 1-8 X 2-1/2 HEX ZP GR 8
15	8	BON-000106	BOLT, 1/2-13 X 1-1/4 HEX ZP GR 8
14	3	BON-000322	LOCKNUT, 5/8-11 NYLON ZP
13	3	BON-00341SAEH	FLATWASHER, 5/8" SAE HARD ZP
12	3	BON-000155	BOLT, 5/8-11 X 2-1/2 HEX ZP
11	1	LV-4379	LOWER TORQUE BRACKET
10	1	LV-4378	UPPER TORQUE BRACKET
9	2	BON-000308	NUT, 3/4-10 HEX ZP
8	2	BON-000191	BOLT, 3/4-10 X 4-1/2 HEX ZP
7	4	BON-000310.3	LOCKNUT, 1-8 NYLON ZP
6	4	BON-000240	BOLT, 1-8 X 5 HEX ZP
5	1	LV-4549	HYDRAULIC ROTARY ACTUATOR
4	2	BON-000318.5	LOCKNUT, 1/4-20 NYLON ZP
3	2	BON-000008	BOLT, 1/4-20 X 1-3/4 HEX ZP
2	2	LV-4234	HINGE PIN
1	1	LV-4377	COLLECTION ARM PIVOT FRAME

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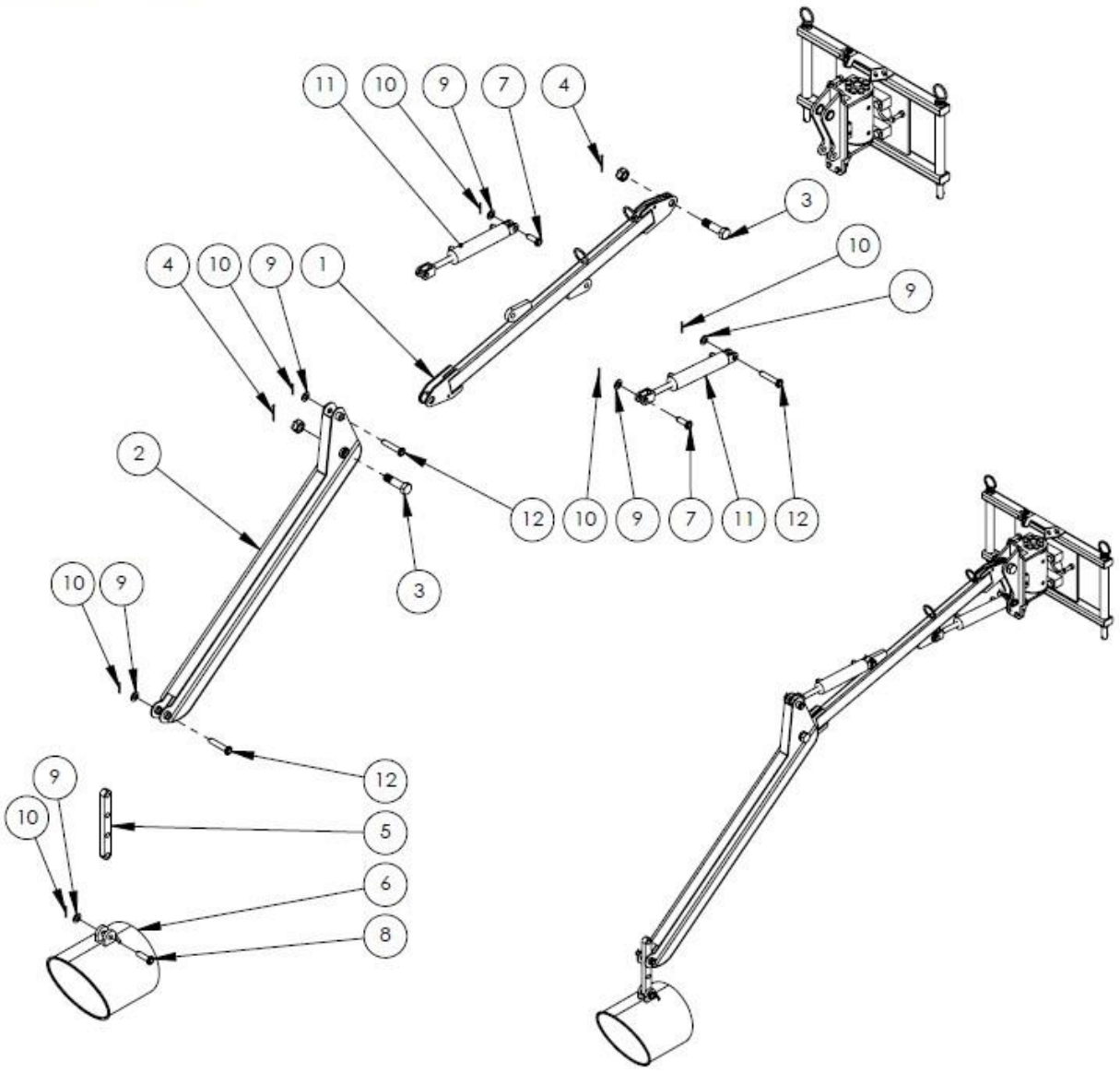
CONTROL ARM ASSEMBLY

FILE NAME	OLYMPIAN Power Unit Skid Assy 2
DWG NAME	PG17 B

OLYMPIAN CONTROL ARM



ITEM	QTY	PART NUMBER	DESCRIPTION
12	3	BON-000993	PIN DRAG HITCH, 1" x 5-1/4"
11	2	LV-4526	CYLINDER, HYD 2-1/2" BORE X 12" STROKE
10	6	BON-000602	ROLL PIN 1/4" X 2-1/2"
9	6	BON-000345SAEH	FLATWASHER,1" SAE HARD ZP
8	1	BON-000997	PIN LIFT RAM, 1" DIA. X 3-1/2"
7	2	BON-000999	PIN LIFT RAM, 1" DIA. X 3"
6	1	LV-1529	PICKUP NOZZLE
5	1	LV-1528	PIVOT BAR
4	2	BON-000386	PIN, 1/4 X 3 COTTER
3	2	BON-003681	SWIVEL BOLT ASSEMBLY
2	1	LV-1527	ARM, LENGTHENED FOR HL, 180°
1	1	LV-1526	SUPPORT, ARM, SUCTION HOSE, SHORT

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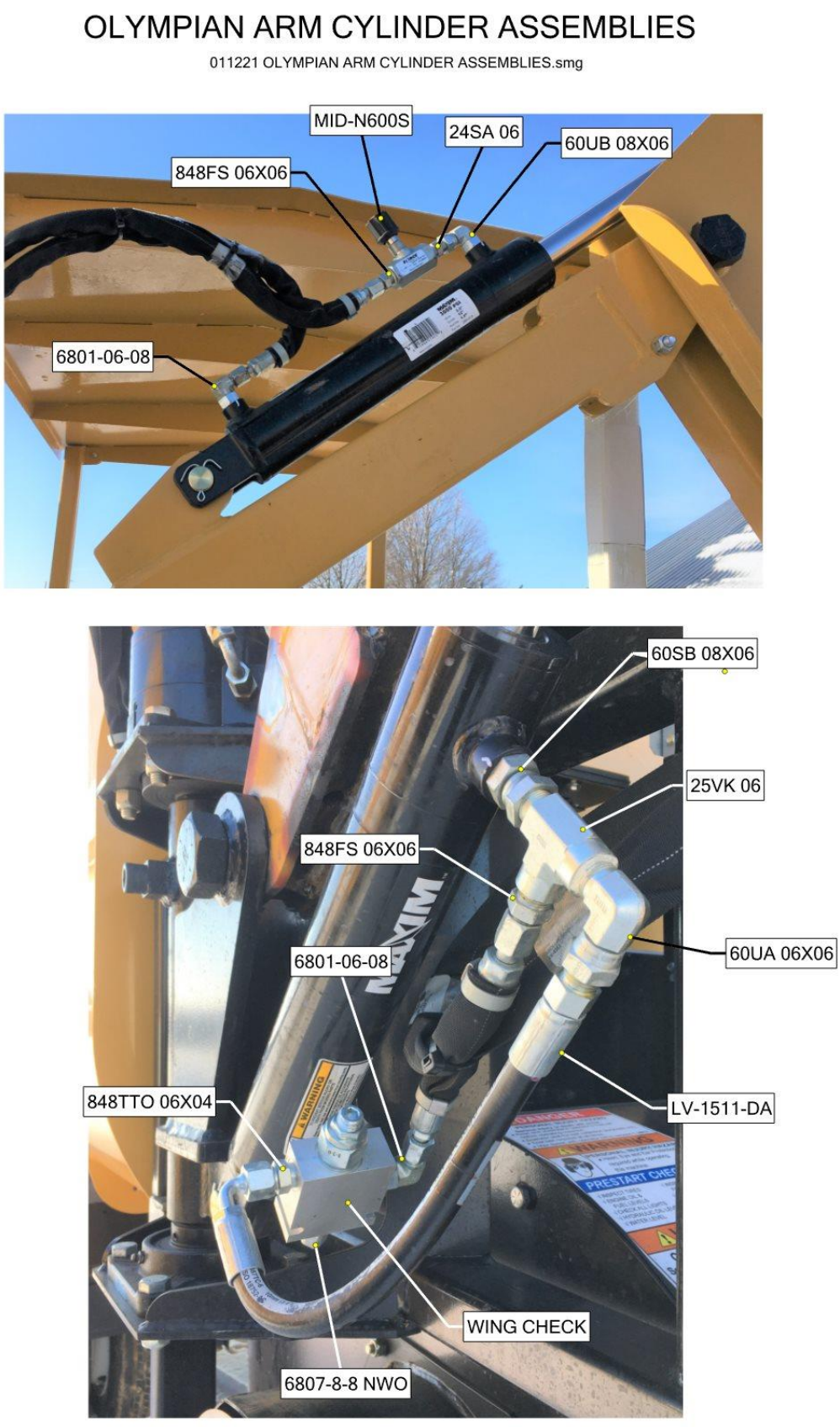
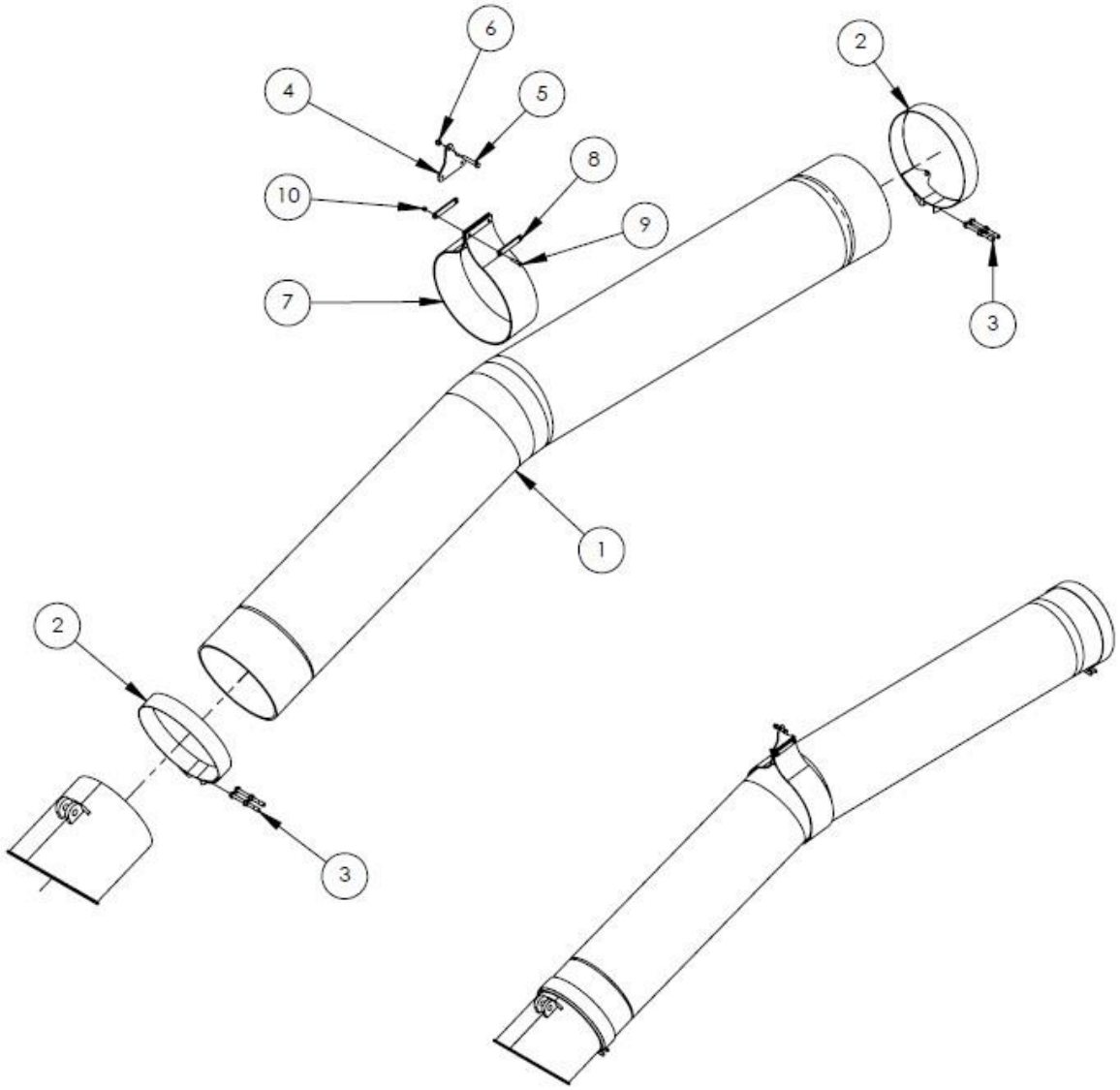
CONTROL ARM HYDRAULIC CYLINDER ASSEMBLIES



SUCTION HOSE

FILE NAME	OLYMPIAN Power Unit Skid Assy 2
DWG NAME	PG18

OLYMPIAN HEAVY DUTY SUCTION HOSE



ITEM	QTY	PART NUMBER	DESCRIPTION
10	2	BON-000319	LOCKNUT, 3/8-16 NYLON ZP
9	2	BON-000061	BOLT, 3/8-16 X 2 HEX ZP
8	2	LV-1313	OUTER CLAMP STRIP
7	1	LV-3040	RUBBER HOSE STRAP
6	1	BON-000321	LOCKNUT, 1/2-13 NYLON ZP
5	1	BON-000113	BOLT, 1/2-13 X 3 HEX ZP
4	1	LV-4247	HOSE SADDLE BRACKET
3	2	BK-1053	BOLT KIT, HOSE CLAMP
2	2	LV-4250	HOSE CLAMP
1	1	LV-4534	16" X 13'-6" HEAVY DUTY SUCTION HOSE

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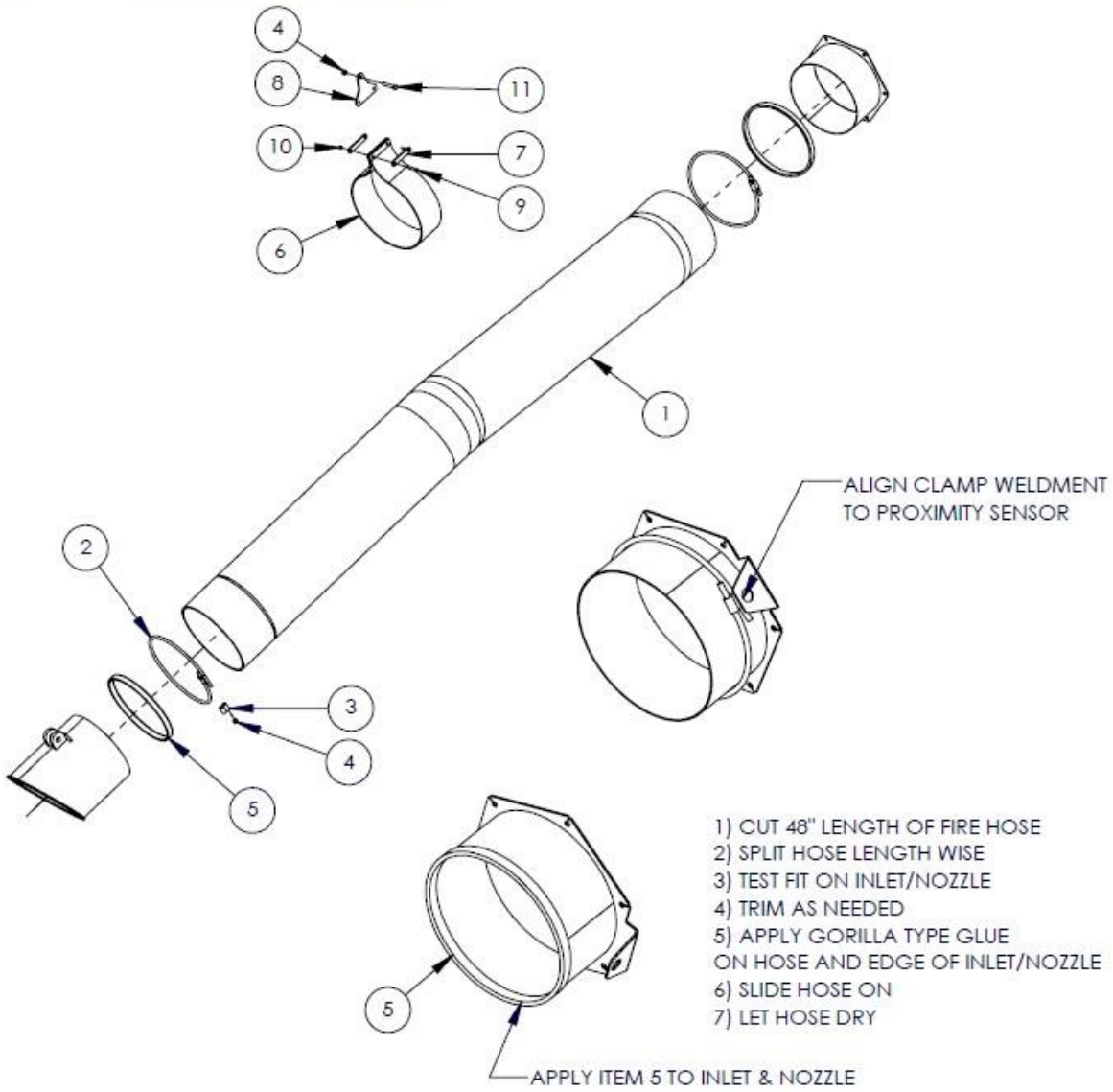
FILE NAME	HOSE CLAMP BREAK DOWN
DWG NAME	HOSE CLAMP BREAKDOWN OLYMPIAN

OLYMPIAN FLX-THANE SUCTION HOSE



1) CUT 48" LENGTH OF FIRE HOSE
2) SPLIT HOSE LENGTH WISE
3) TEST FIT ON INLET/NOZZLE
4) TRIM AS NEEDED
5) APPLY GORILLA TYPE GLUE ON HOSE AND EDGE OF INLET/NOZZLE
6) SLIDE HOSE ON
7) LET HOSE DRY

ITEM	QTY	PART NUMBER	DESCRIPTION
11	1	BON-000113	BOLT, 1/2-13 X 3 HEX ZP
10	2	BON-000319	LOCKNUT, 3/8-16 NYLON ZP
9	2	BON-000061	BOLT, 3/8-16 X 2 HEX ZP
8	1	LV-4247	HOSE SADDLE BRACKET
7	2	LV-1313	OUTER CLAMP STRIP
6	1	LV-3040	RUBBER HOSE STRAP
5	8FT	2 ML DISCHARGE	FIRE HOSE COVER
4	5	BON-000321	LOCKNUT, 1/2-13 NYLON ZP
3	2	LV-1669	HOSE CLAMP WELDMENT
2	2	LV-1668	HOSE CLAMP RING
1	1	LV-4533	FLX-THANE VHD 16" X 13' SUCTION HOSE

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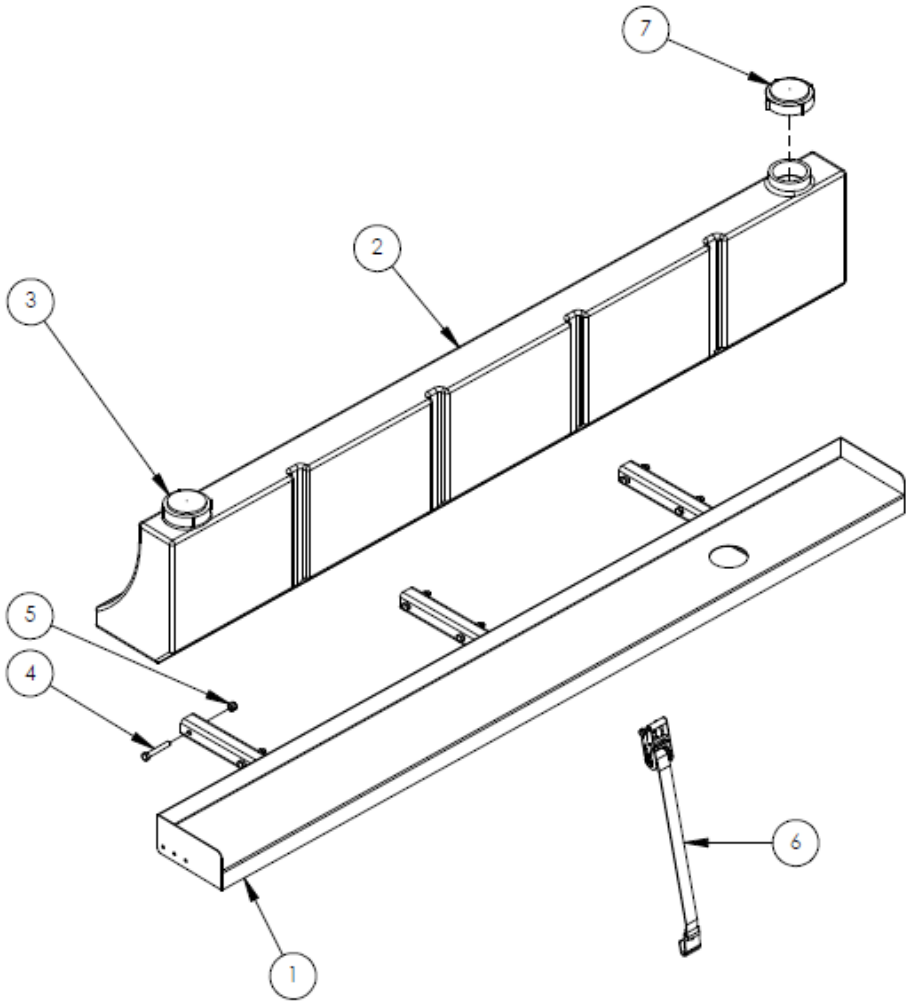
DUST CONTROL SYSTEM

FILE NAME	OLYMPIAN BODY ASSY
DWG NAME	PG11

OLYMPIAN DUST CONTROL TANK & MOUNTING



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ITEM	QTY	PART NUMBER	DESCRIPTION
7	1	LDS1003X002	TANK LID, REAR, NON-VENTED
6	2	R2X7WF0	STRAP, RATCHET
5	6	BON-000322	LOCKNUT, 5/8-11 NYLON ZP
4	6	BON-000161	BOLT, 5/8-11 X 4 HEX ZP
3	1	LDS1003X001	TANK LID, FRONT, VENTED
2	1	LDS1001X008	95 GAL TANK
1	1	LV-4326	95 GAL TANK PAN WELDMENT

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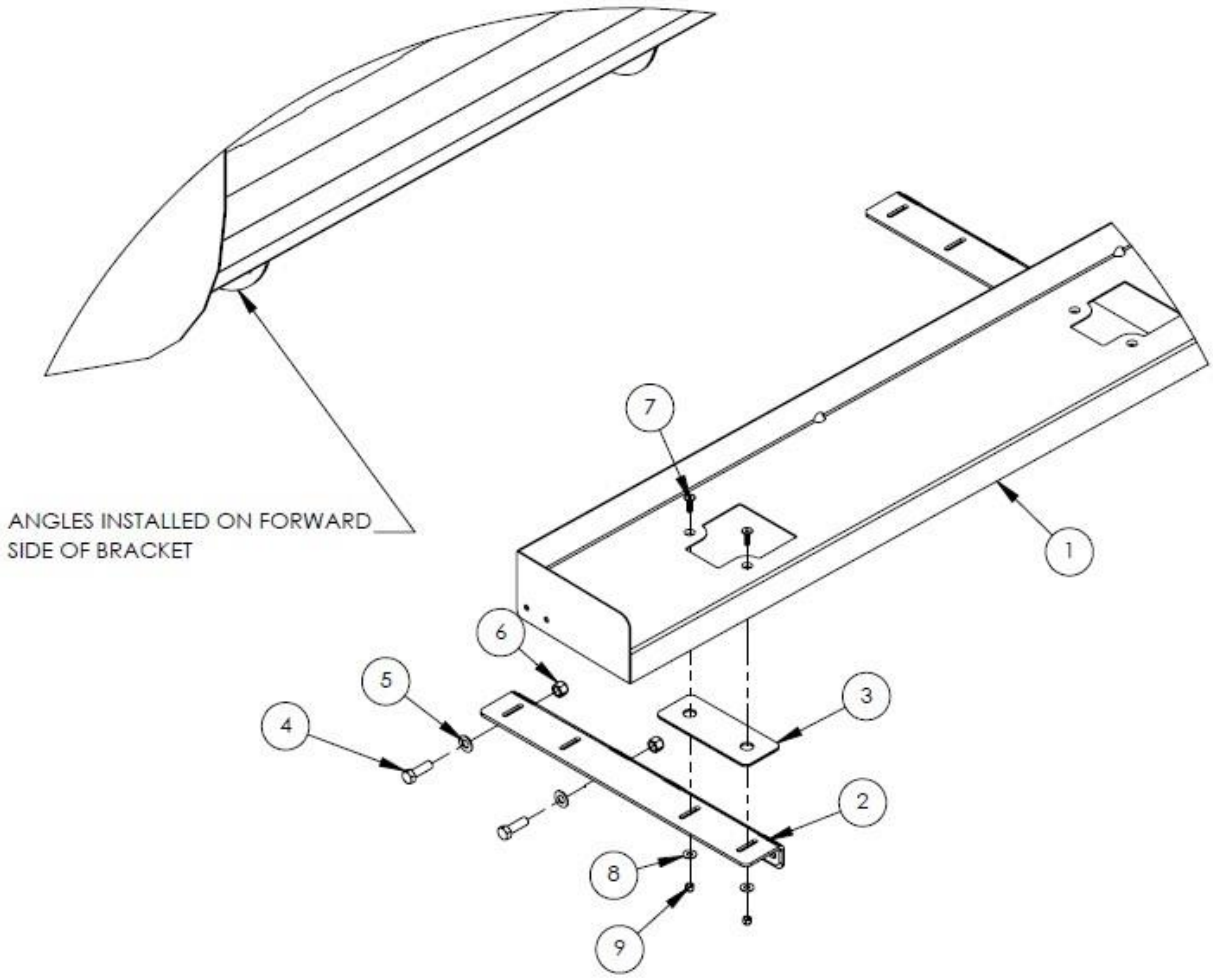
FILE NAME	SPARTAN ADJUSTABLE TANK PAN
DWG NAME	ADJ TANK PAN



ITEM	QTY	PART NUMBER	DESCRIPTION
9	6	BON-000319	LOCKNUT, 3/8-16 NYLON ZP
8	6	BON-000338	FLATWASHER, 3/8 ZP
7	6	BV2-001020	BOLT, 3/8-16 X 1-1/4 CS ZP
6	6	BON-000322	LOCKNUT, 5/8-11 NYLON ZP
5	6	BON-000341SAE	FLATWASHER, 5/8 ZP HARD
4	6	BON-000153	BOLT, 5/8-11 X 2 HEX ZP
3	3	LV-4335	TANK PAN SPACER
2	3	LV-4334	TANK PAN ANGLE
1	1	LV-4332	23YD RH TANK PAN
		LV-4332L	23YD LH TANK PAN
		LV-4333	30YD RH TANK PAN
		LV-4333L	30YD LH TANK PAN

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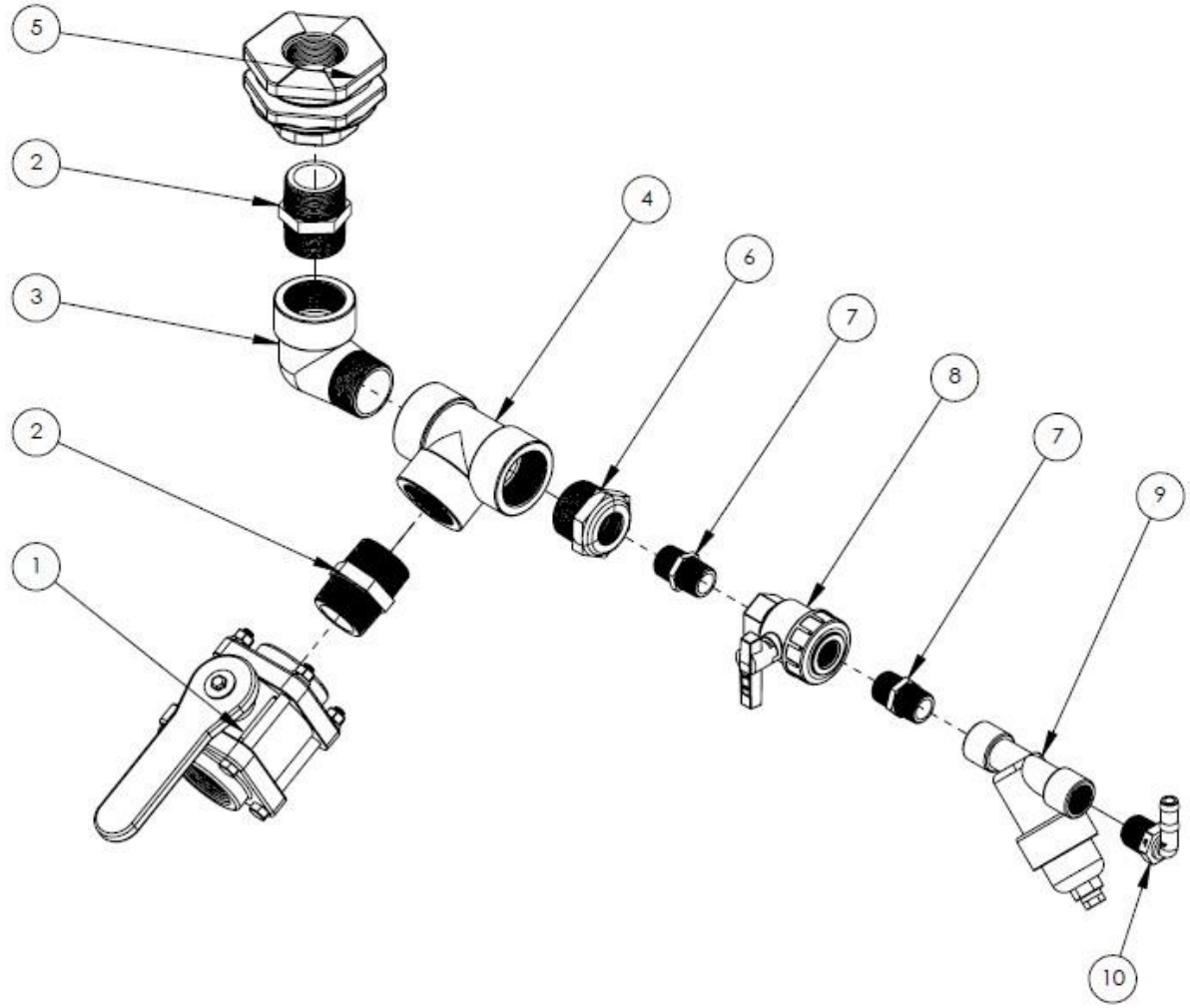
Titan LEAF SOLUTIONS

DIXON, ILLINOIS
PHONE: 800-851-9664

FILE NAME	LV-4365
DWG NAME	LV-4365 PG1

OLYMPIAN DUST CONTROL SYSTEM
TANK PLUMBING



ITEM	QTY	PART NUMBER	DESCRIPTION
10	1	HB-075/050-90	3/4" MALE THREAD X 1/2" HOSE SHANK 90
9	1	LS075 80	3/4" 80 MESH STRAINER
8	1	UV075FP	3/4" SINGLE UNION POLY VALVE
7	2	NIP075-SH	3/4" SHORT POLY NIPPLE
6	1	RB 150-075	1-1/2" X 3/4" POLY PIPE BUSHING
5	1	TF150	1-1/2" TANK FITTING
4	1	TEE150	1-1/2" POLY PIPE TEE
3	1	SL150-90	1-1/2" POLY PIPE STREET ELBOW 90°
2	2	NIP150-SH	1-1/2" SHORT POLY NIPPLE
1	1	V150	1-1/2"BALL VALVE RFD SYS

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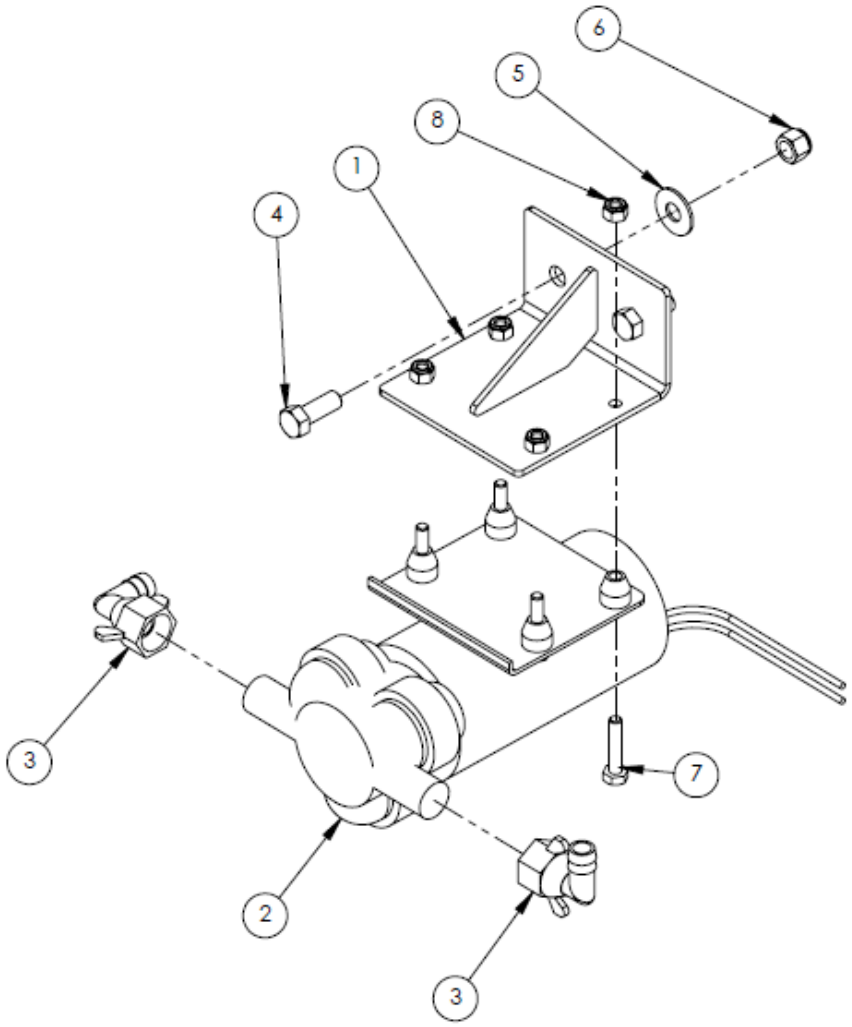
DIXON, ILLINOIS
PHONE: 800-851-9664

FILE NAME	LV-4365
DWG NAME	LV-4365 PG2

OLYMPIAN DUST CONTROL SYSTEM
PUMP ASSEMBLY



ITEM	QTY	PART NUMBER	DESCRIPTION
8	4	BON-000318.5	LOCKNUT, 1/4-20 NYLON ZP
7	4	BON-000006	BOLT, 1/4-20 X 1-1/4 HEX ZP
6	2	BON-000319	LOCKNUT, 3/8-16 NYLON ZP
5	2	BON-000338	FLATWASHER, 3/8 ZP
4	2	BON-000057	BOLT, 3/8-16 X 1 HEX ZP
3	2	LDS1070X001	1/2" FEMALE X 1/2" HOSE SHANK 90°
2	1	VAR-1066983	12V 4 GPM PUMP
1	1	LV-4327	PUMP MOUNTING BRACKET

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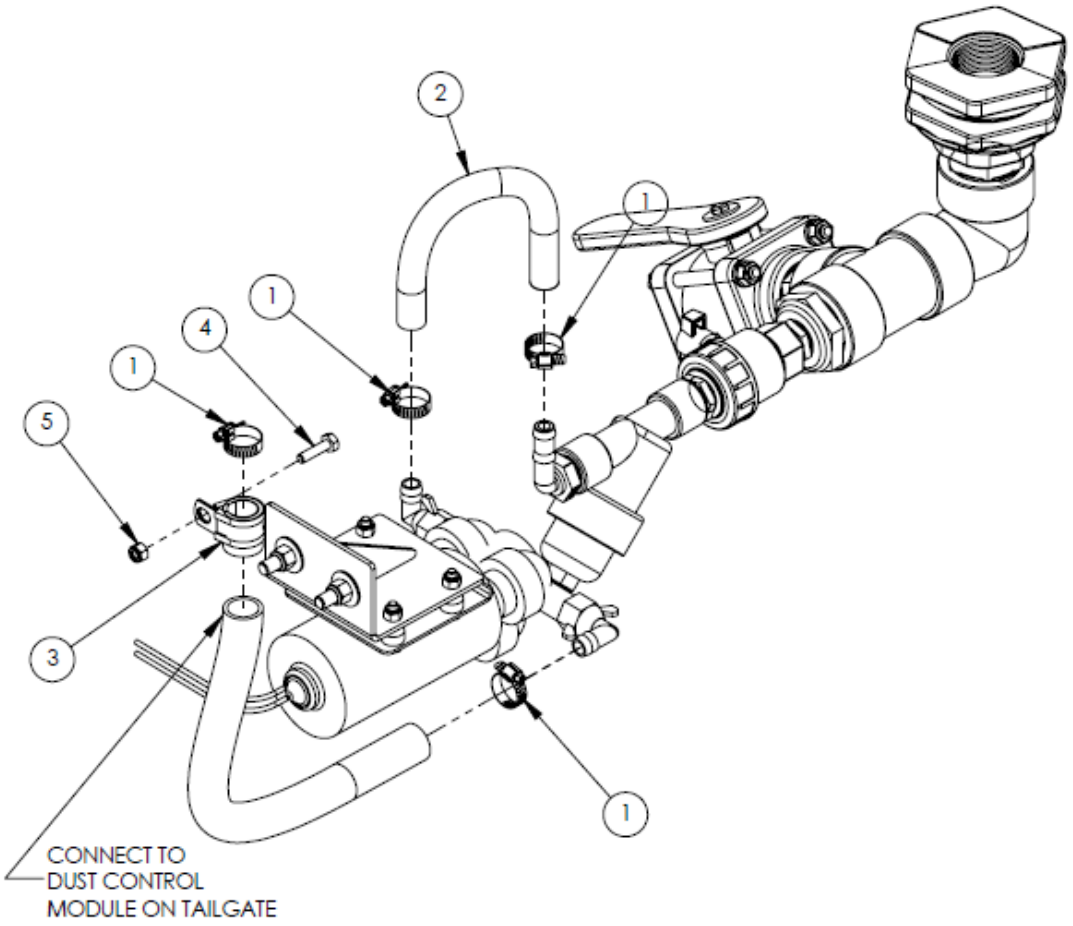
PHONE: 800-851-9664

FILE NAME	LV-4365
DWG NAME	LV-4365 PG3

OLYMPIAN DUST CONTROL SYSTEM
HOSE AND CLAMPS



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ITEM	QTY	PART NUMBER	DESCRIPTION
5	3	BON-000318.5	LOCKNUT, 1/4-20 NYLON ZP
4	3	BON-000005	BOLT, 1/4-20 X 1 ZP HEX
3	3	WAY-25112	CUSHION CLAMP
2	11	LDS1009X001	HOSE, 1/2" NYLON BRAIDED
1	4	VEL-022308	HOSE CLAMP, SAE 8 1/2-29/32

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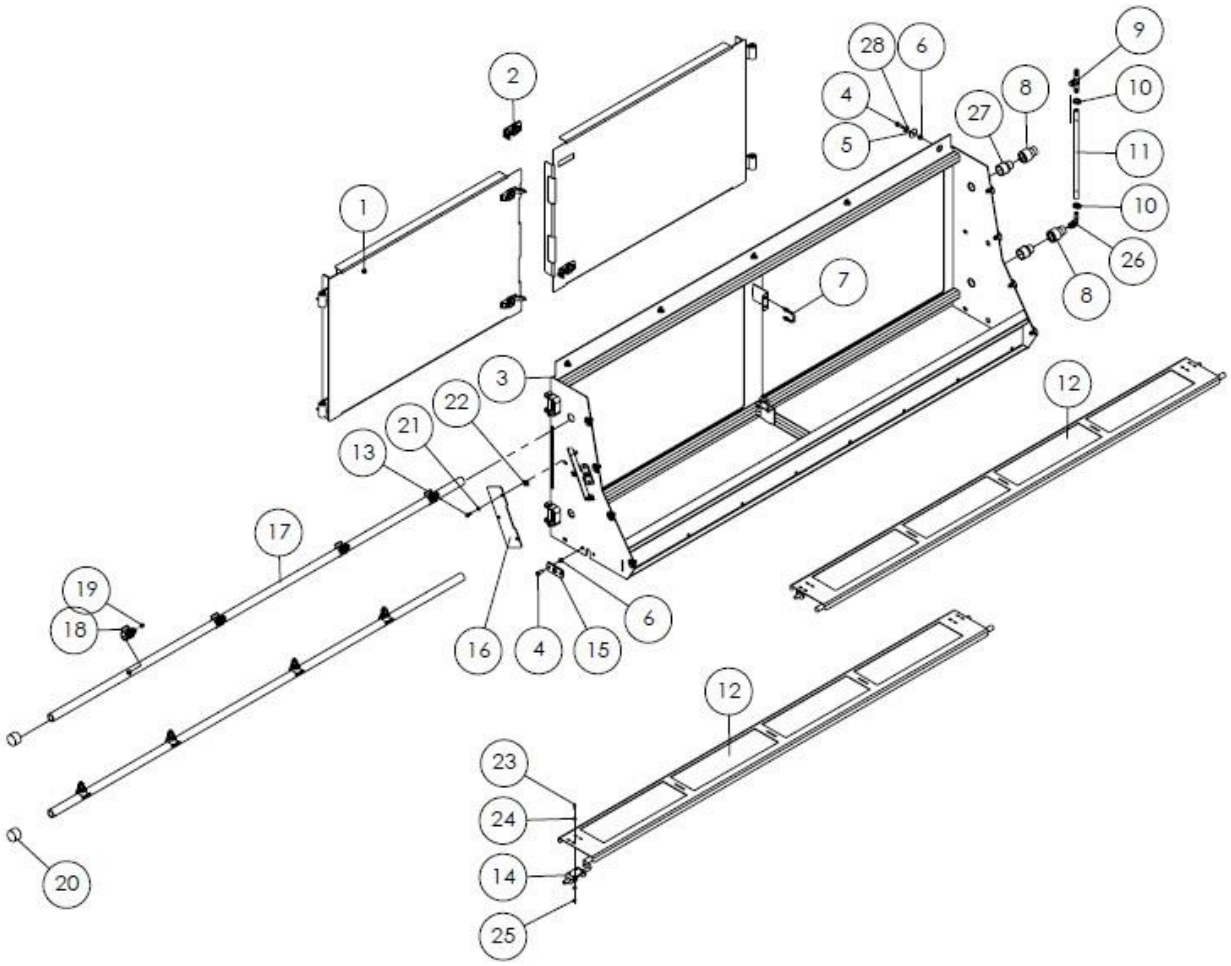
DIXON, ILLINOIS
PHONE: 800-851-9664

FILE NAME	M1213
DWG NAME	M1213_PG1 of 2

OLYMPIAN REAR DUST CONTROL MODULE



REF	PART NO.	QTY	DESCRIPTION
13	BON-000028	3	5/16-18 x 3/4 HEX BOLT
12	LV-4151	2	OLYMPIAN REAR EXHAUST SCREEN
11	LDS1009X001	1	HOSE, 1/2" NYLON BRAIDED
10	VEL-022308	2	HOSE CLAMP. SAE 8, 1/2-29/32
9	LV-4363	1	1/2" NPT TO TWO 1/2" HOSE BARB POLY TEE
8	LV-4361	2	1" NPT TO 1/2 NPT POLY REDUCER COUPLER
7	3043T622	2	5/16-18 U-BOLT FOR 1" PIPE
6	BON-000319	17	3/8-16 NYLON HEX LOCKNUT
5	91090A115	13	3/8 x 1-1/2" FENDER WASHER
4	BON-000057	17	3/8-16 x 1" HEX BOLT
3	LV-4161	1	OLYMPIAN REAR EXHAUST DOOR FRAME
2	LV-4359	4	PUSH BUTTON LATCH
1	LV-4195	2	OLYMPIAN REAR EXHAUST ACCESS DOOR

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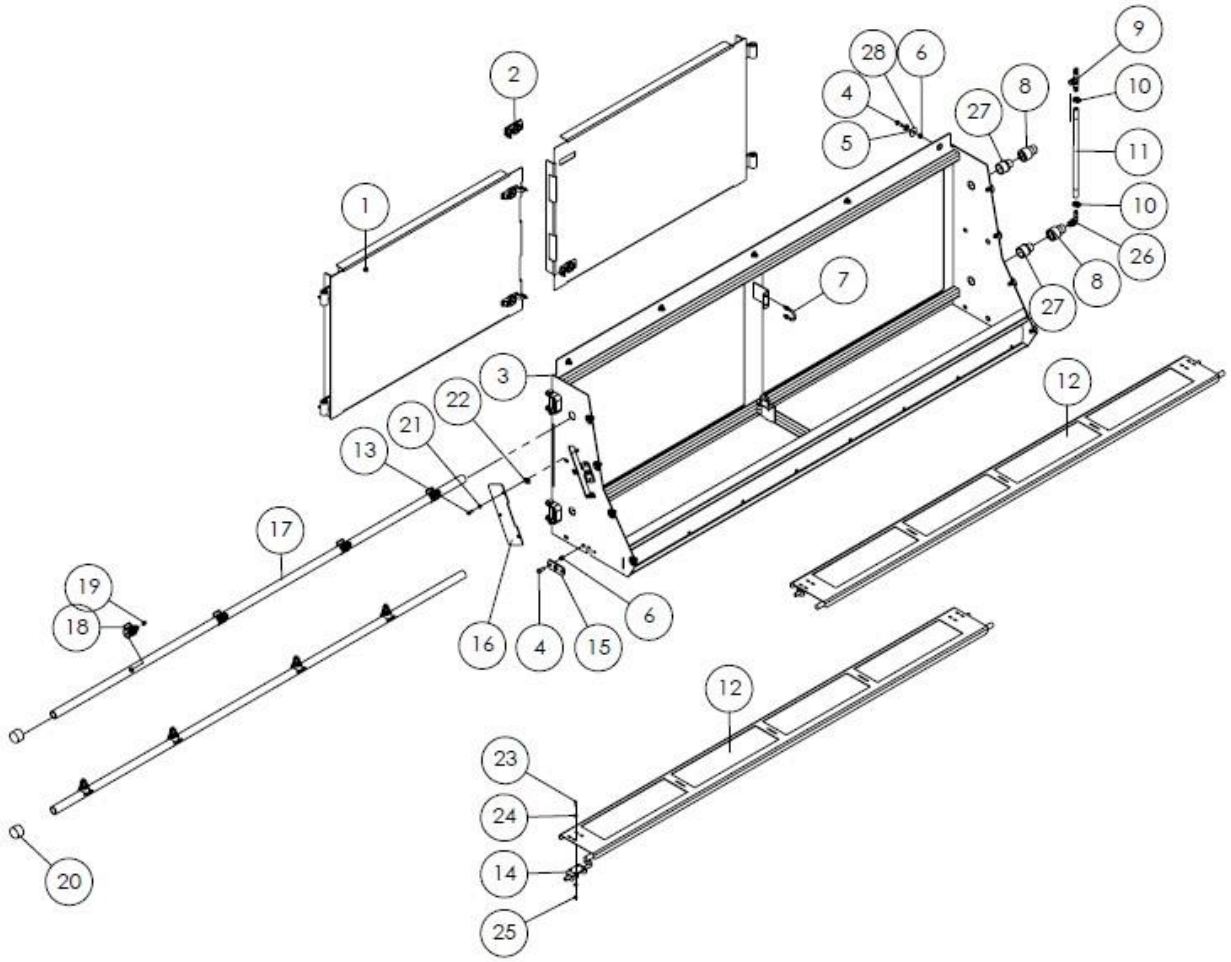
FILE NAME	M1213
DWG NAME	M1213_PG2 of 2

OLYMPIAN REAR DUST CONTROL MODULE



REF	PART NO.	QTY	DESCRIPTION
28	BON-000338	13	FLATWASHER, 3/8 ZP
27	4596K856	2	STRAIGHT ADAPTER - 1" SCF x 1" NPTM
26	HB-050-90	1	1/2" MALE THREAD x 1/2" HOSE SHANK 90°
25	10-24 NYLOK	16	10-24 NYLON LOCKNUT
24	BON-000335	32	3/16 FLAT WASHER
23		16	10-24 x 3/4 MACHINE SCREW
22	BON-000302C	3	5/16-18 CLIP-ON NUT
21	BON-000351	3	5/16 LOCKWASHER
20	4881K53	2	1" POLY PIPE CAP
19	LV-4368	8	NOZZLE, BETE - 1/8 MPLO.21W@4
18	LV-4367	8	NOZZLE HOLDER, RIGID, 1/8" NPT FOR 1" PIPE
17	LV-4154	2	OLYMPIAN NOZZLE SPRAY BOOM
16	LV-4152	1	COVER - 3/1/2" x 10-1/2"
15	LV-4198	2	PLATE - OLYMPIAN REAR EXHAUST SCREEN PIVOT
14	LV-4362	4	SPRING LATCH, 1/2" ZP

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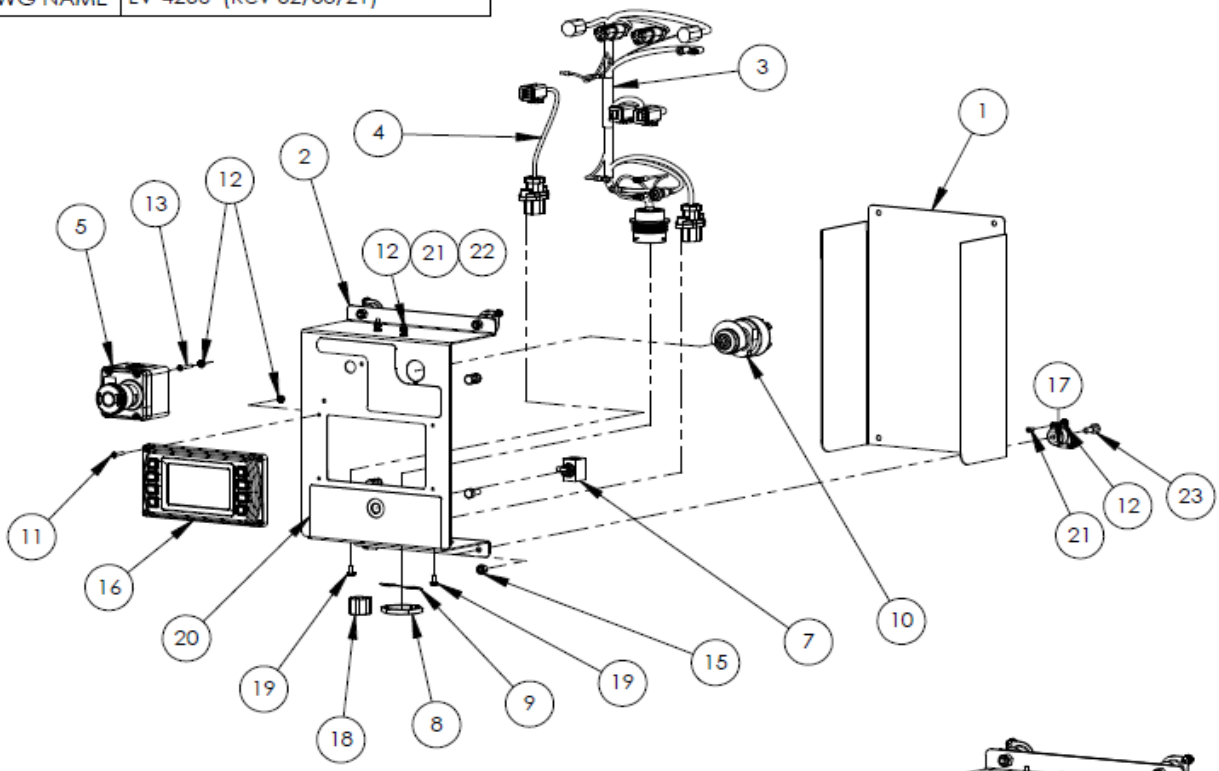
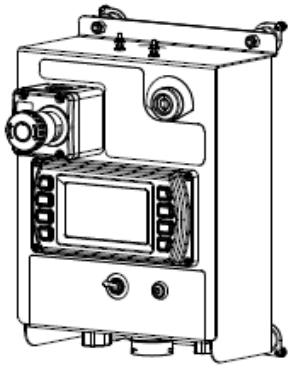
CONTROL PANEL ASSEMBLY

FILE NAME	LV-4256
DWG NAME	LV-4256 (Rev 02/03/21)

OLYMPIAN CONTROL PANEL ASSEMBLY





* IGNITION KEY P/N RC101-53630 (NOT SHOWN)

REF	PART NO.	QTY	DESCRIPTION
23	BON-000003	4	1/4-20 x 3/4 HEX BOLT
22		6	#6 FLAT WASHER ZP
21		10	#6-32 x 3/4" MACHINE SCREW ZP
20	LV-4323	1	DECAL KIT, CONTROLLER
19	LV-4321	4	SCREW, M5-0.8 X 10MM PAN HEAD, ZP
18	DT6P-DC	1	DUST CAP, 6PIN RECEPTACLE
17	LV-4192	4	VIBRATION DAMPING MOUNT
	LV-4262		ISOLATOR,DUAL STUD (used on earlier models)
16	LV-2534	1	COLOR DISPLAY PV-450
15	BON-000318.5	8	LOCKNUT, 1/4-20 NYLON ZP
14			
13		2	#6-32 X 1 MACHINE SCREW ZP
12		18	#6-32 HEX NUT W/ STAR WASHER ZP
11		4	#6-32 X 1/2 MACHINE SCREW ZP
10	EO2	1	IGNITION KEY SWITCH
9	2414-001-2486	1	WAVY LOCK WASHER, SIZE 24
8	2411-001-2405	1	PANEL NUT
7	LV-1173	1	TOGGLE SWITCH
6			
5	LV-1398	1	EMERGENCY STOP SWITCH
4	LV-4254	1	HARNESS, PROGRAMMING EXTENSION
3	LV-4253	1	HARNESS, CONTROL BOX
2	LV-4255	1	FRONT PANEL
1	LV-3047	1	REAR PANEL

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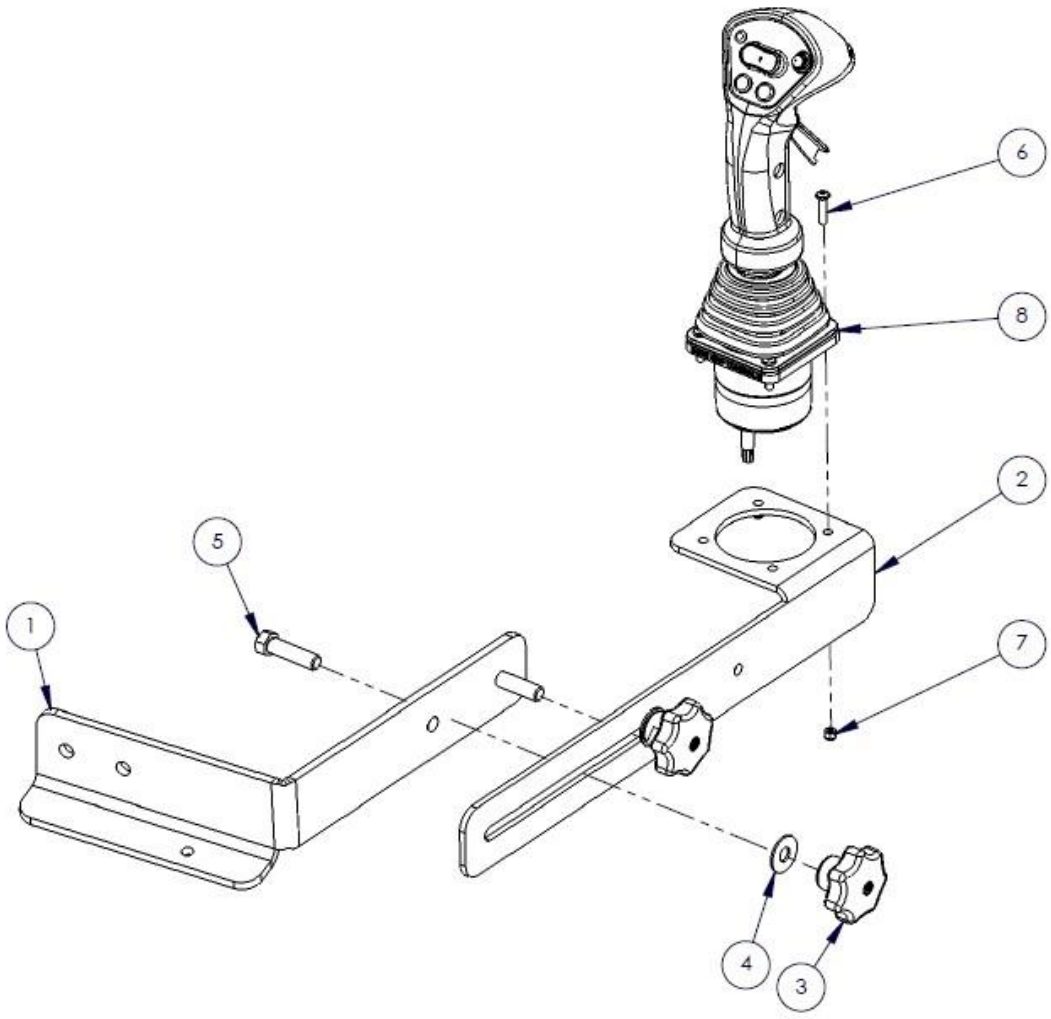
CONTROLLER - JOYSTICK

FILE NAME	GEN2 JOYSTICK ARM ASSEMBLY
DWG NAME	PG1

OLYMPIAN JOYSTICK CONTROL



ITEM	QTY	PART NUMBER	DESCRIPTION
8	1	LV-4565	PROPORTIONAL JOYSTICK
7	4	94205A230	M4 HEX LOCK NUT, STAINLESS STEEL
6	4	90116A217	M4 X 20 MACHINE SCREW, PAN HEAD PHILLIPS
5	2	BON-000338	FLATWASHER, 3/8" ZP
4	2	BON-000059	BOLT, 3/8-16 X 1-1/2 HEX ZP
3	2	BON-011317	NYLON KNOB, 3/8"-16 THREADED
2	1	LV-4126	JOYSTICK ARM BRACKET
1	1	LV-4125	JOYSTICK ARM, SEAT BRACKET

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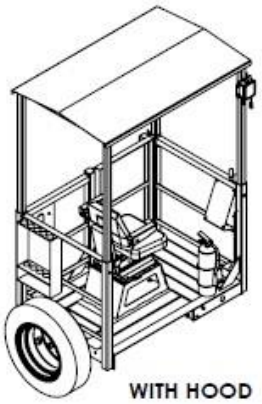
WIRELESS CONTROLLER

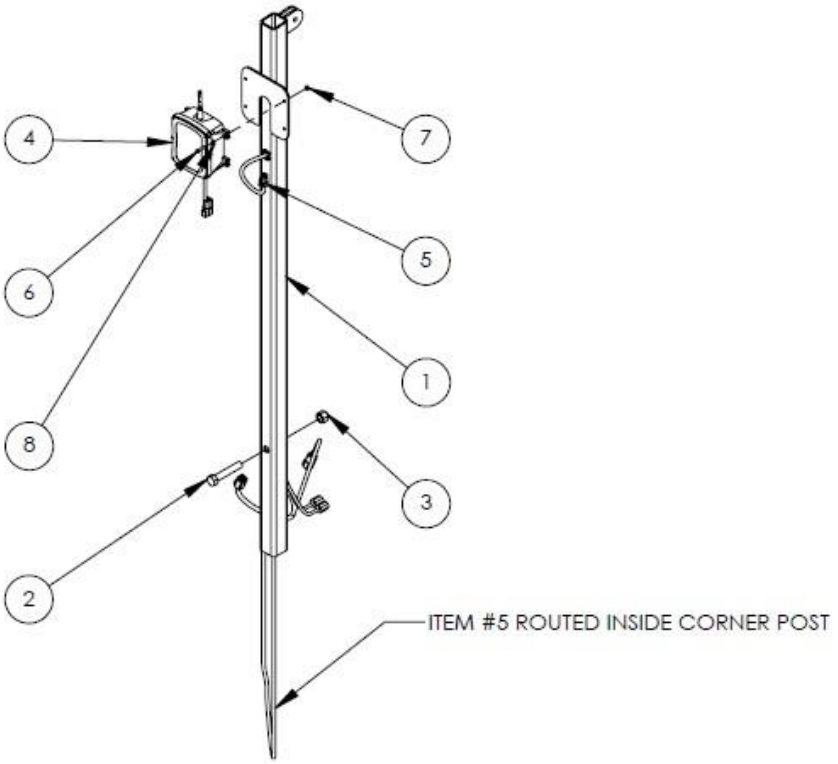
FILE NAME	GEN2 WIRELESS ASSY
DWG NAME	PG1

OLYMPIAN WIRELESS CONTROL

WITHOUT HOOD



WITH HOOD



ITEM	QTY	PART NUMBER	DESCRIPTION
8	4		FLATWASHER, #10 ZP
7	4		NUT, 10-24 HEX W/ STAR WASHER
6	4		SCREW, 10-24 X 1 MACHINE
5	1	LV-4272	HARNESS, WIRELESS CONTROL
4	1	LV-2529	WIRELESS CONTROL
3	1	BON-000322	LOCKNUT, 5/8-11 NYLON ZP
2	1	BON-000159	BOLT, 5/8-11 X 3-1/2 HEX ZP
1	1	LV-4122	CORNER POST

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DIXON, ILLINOIS
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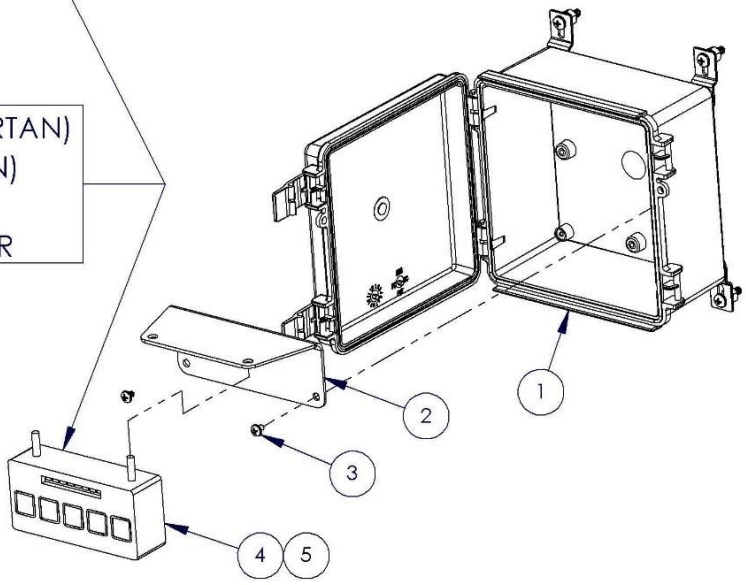
DIRECTIONAL LIGHT BAR

FILE NAME	LV-2620 WITH CONTROLLER
DWG NAME	LV-2620 HOOKLIFT/CHASSIS/GEN2

LV-2621 LIGHTBAR KIT (SPARTAN)
LV-2622 LIGHTBAR KIT (TITAN)
INCLUDES:
HARNESS AND CONTROLLER



INSTALL THE LIGHTBAR WITH THE CORD ON THE RIGHT SIDE

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	LV-2620	ENCLOSURE, 6" X 6" X 3.5"
2	1	LV-2623	CONTROLLER BRACKET
3	2	LV-2625	SCREW, M4 X.7MM PITCH X 5MM LONG
4	AR	LV-2621	SPARTAN - LOW PROFILE LED, TOUCH PAD CONTROLLER
5	AR	LV-2622	TITAN - LOW PROFILE LED, TOUCH PAD CONTROLLER

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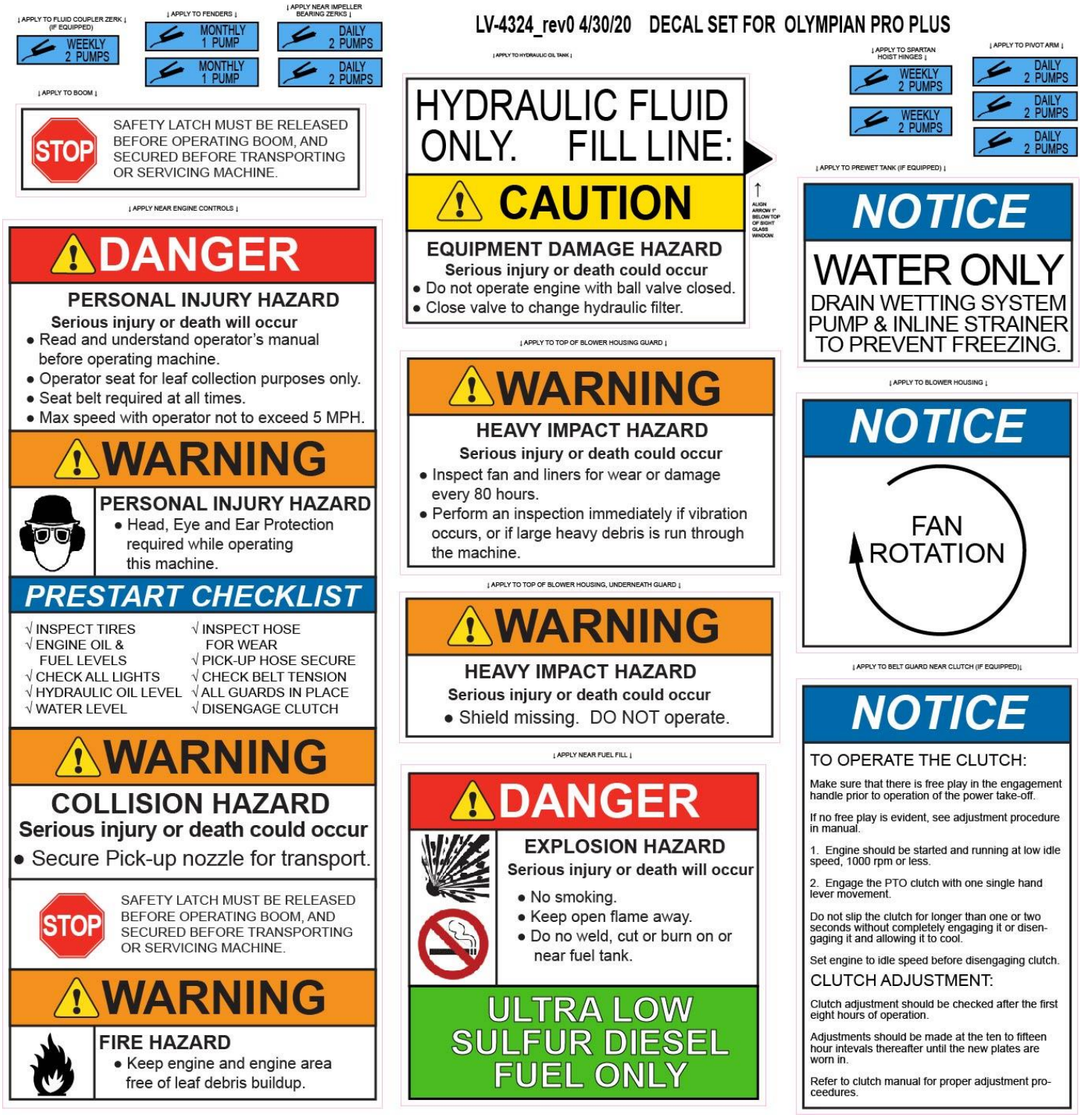
BONNELL INDUSTRIES INC
TRUCK & ROAD EQUIPMENT

DIXON, ILLINOIS
PHONE: 800-851-9664

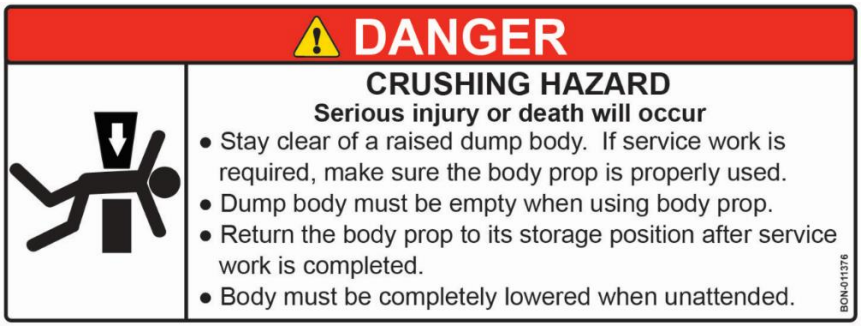
DECALS

DECAL SHEET: P/N LV-1232

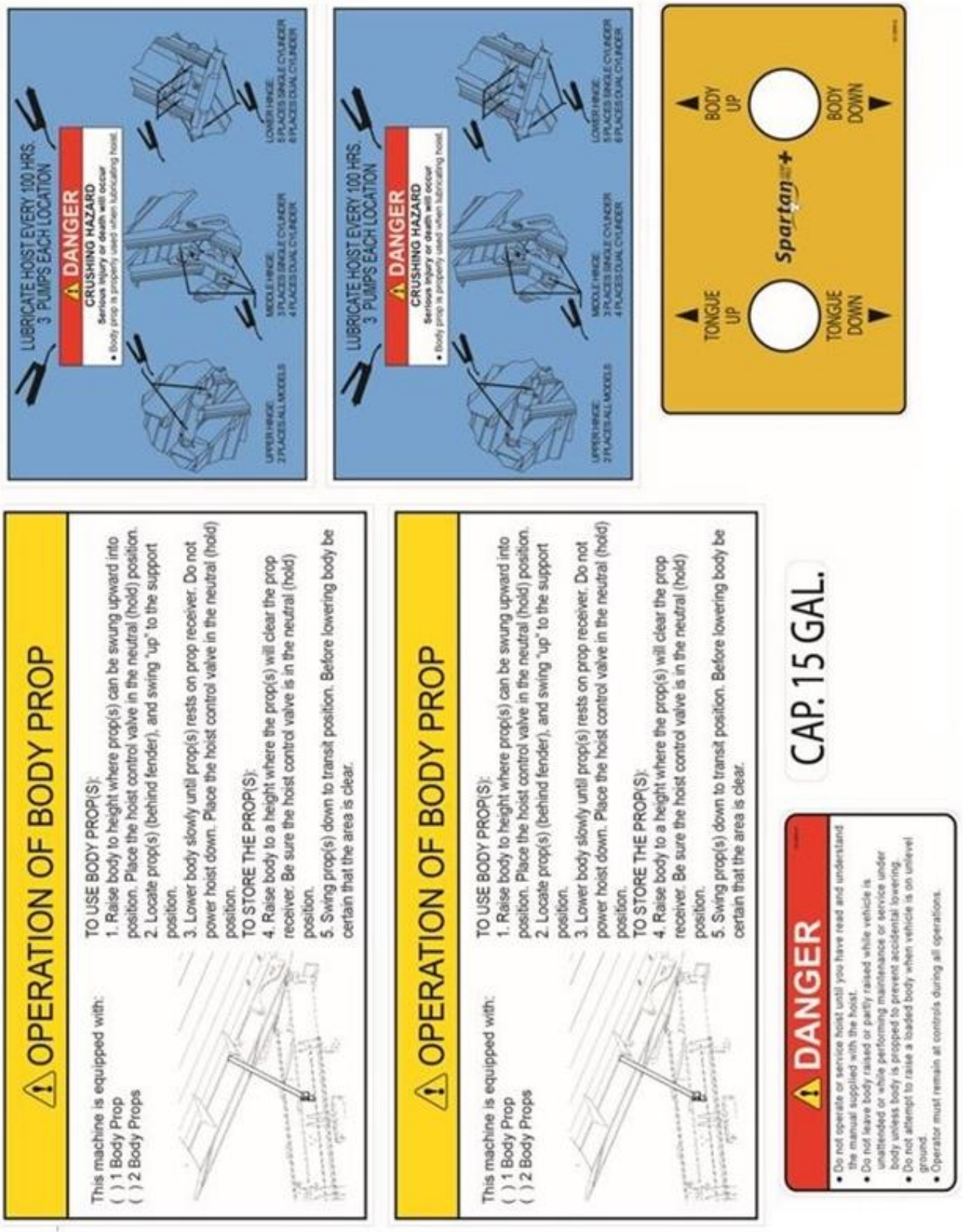
DECAL SHEET: P/N LV-4324



DECAL SHEET: P/N LV-4323



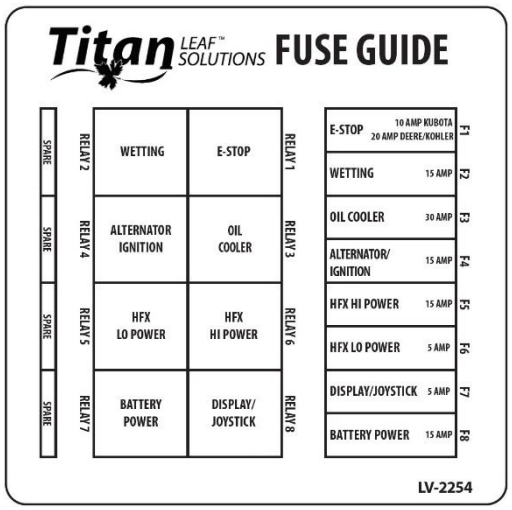
DECAL SHEET: P/N LV-2093



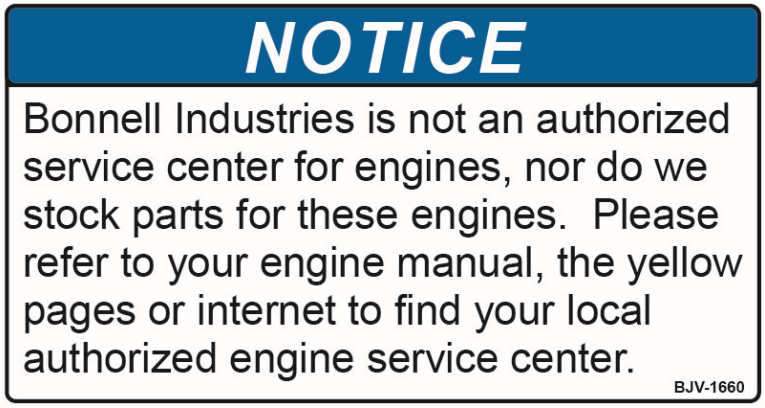
INDIVIDUAL DECALS SOLD SEPARATELY

DECAL SHEET: P/N LV-2152

INDIVIDUAL DECALS SOLD SEPARATELY



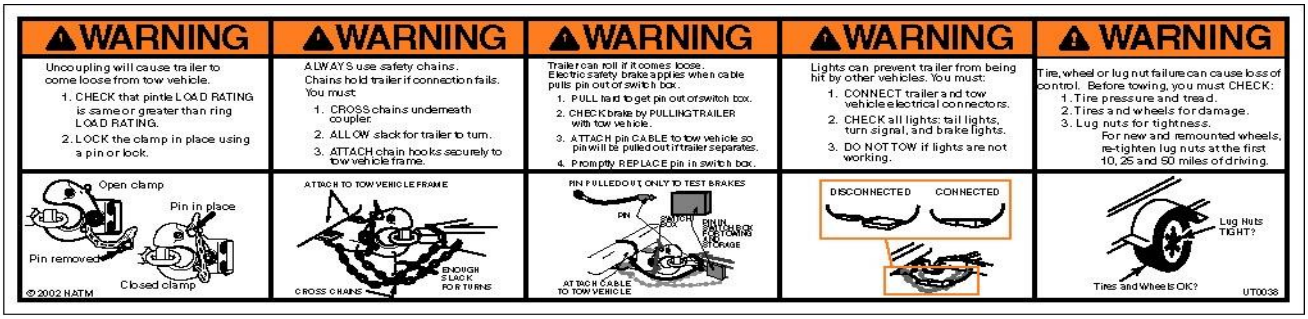
LV-2254



BJV-1660

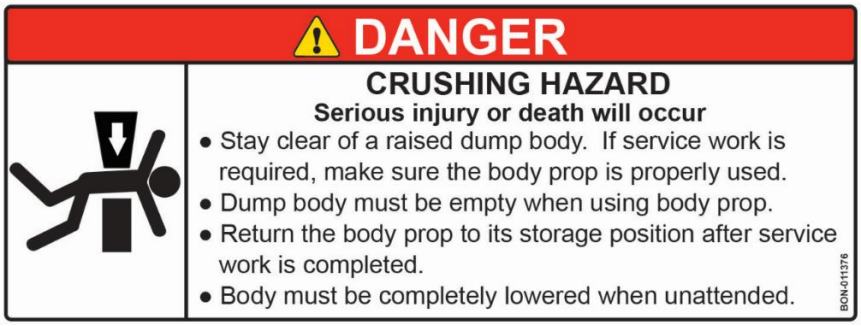
BON-011377

BON-011375



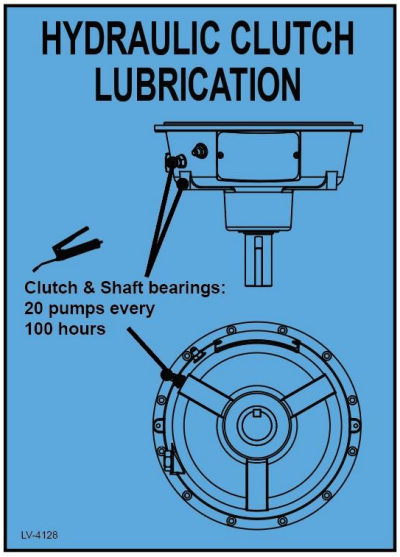
LV-1208

INDIVIDUAL DECALS SOLD SEPARATELY



BON-011376

LV-1680



LV-4128

11 NOTES

12 WARRANTY

WARRANTY

Issued: January 1, 2010

Bonnell Industries, Inc. warrants to the original purchaser that if any part of the product proves to be defective in workmanship or material within one year of the date of original installation and is returned to us freight prepaid within 30 days after such defect is discovered and notification thereof is provided Bonnell, we will either replace or repair the defective part (our option). This warranty does not apply to damage resulting from neglect, misuse, accident or improper installation or maintenance. Charges for field service, labor, or other expenses not previously authorized and approved in writing by Bonnell Industries, Inc. will not be accepted. This warranty is exclusive and in lieu of all other warranties whether expressed or implied. Bonnell Industries, Inc. neither assumes nor authorizes anyone to assume for it any other obligation or liability in connection with this warranty, and will not be liable for consequential damages. This warranty applies only to products made and/or supplied by Bonnell Industries, Inc. and does not apply to other products not made or supplied by us and to which our products may be attached, such as trucks. We accept no responsibility for damages to such other products, even if our product is alleged to have contributed to the damage of the other product.

Engines, drive line components, hydraulic, electrical, or other components furnished by other manufacturers and used with our products are warranted by that manufacturer and not by Bonnell Industries, Inc. the manufacturer's own warranty will apply to these parts. Hydraulic or electrical components are not to be disassembled without the express written permission of Bonnell Industries, Inc.

All defective parts returned from an end user must include the unit model, serial number, date installed, and dealer from whom purchased.

Bonnell Industries, Inc. reserves the right to make changes or improvements to its products without incurring any liability or obligation and without being required to make corresponding changes or improvements to products manufactured or sold prior to those changes or improvements.

The Bonnell Industries, Inc. Warranty Policy is subject to change without notice.

Product Information

When ordering parts, please refer to the information below.

INSTALLATION DATE:

This product was manufactured by Bonnell Industries, Inc.,

located at 1385 Franklin Grove Rd.,

in the city of Dixon, Illinois, U.S.A.

MADE IN THE USA