



22956 Highway 61 Morley, MO 63767 Phone: (573) 262-3545 Fax: (573) 262-3369

# Bi-Directional Tow Plow Owners Manual 2017



Record the **MODEL** and **SERIAL NUMBER** of equipment for parts ordering information.

**PURCHASED FROM:** \_\_\_\_\_  
**DATE:** \_\_\_\_\_  
**MODEL:** \_\_\_\_\_  
**SERIAL NUMBER:** \_\_\_\_\_



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## **INTRODUCTION**

Congratulations and thank you for your purchase of new Viking-Cives Snow & Ice Control equipment. This manual has been created to provide you with installation, set-up, operation, and maintenance information for the Viking-Cives **Bi-Directional Tow Plow**. It has been prepared to familiarize you or any other person who will be assembling, operating, maintaining, or working with this product with the design features, and to instruct you in the recommended operation and maintenance of the unit.

Read this manual carefully before you operate or service your **Tow Plow**. Remember that you are working with heavy equipment that can injure you or someone else. You can help lessen the chance of injury by following the procedures in this manual carefully.

**DANGER: If incorrectly used, this equipment can cause severe injury.** Your chance of injury can be greatly reduced by following all safety decal notifications. All decals must be kept clean and complete. Replace any decals that are unreadable. Decals may be purchased directly from Viking-Cives Group and/or your nearest authorized dealer. All Operator/Service people should review this manual carefully and become familiar with its contents. **If anyone else beside you operates or services this equipment, make sure they read this manual and are instructed to follow all the safety procedures related to this equipment. Keep this manual available for reference whenever this product is being handled or used. Provide this manual to any new owners and/or operators.**

The Tow Plow is primarily used in conjunction with either a one-way or reversible front plow to provide additional plowing width. The snow discharge from a plow truck's front mounted plow, is picked up by the Tow Plow and carried/pushed further back onto the road shoulder; the width of the road cleared is thereby increased in a single pass.

The Viking-Cives Midwest, Inc. / VCL Bi-Directional Tow Plow has been engineered and built with durability and safety of operation in mind. The Tow Plow has been designed to cushion sudden shock, in the event contact between the plow cutting edge and an obstruction such as railway tracks, manhole covers, etc.

To ensure safe and trouble free operation of the Tow Plow, careful attention must be given to the critical adjustments during the initial installation and set-up, as well as following periodic maintenance and inspection schedules. This operation manual is designed to assist in the repair, inspection, adjustment, and operation of the Tow Plow. It also sets out the recommended method for mounting and dismounting the plows and the general maintenance necessary to keep them in proper working order.

## **GENERAL INFORMATION**

The purpose of this manual is to assist in assembling, mounting, operating, and maintaining your new Viking-Cives Snow & Ice Control equipment. Read this manual carefully to obtain valuable information and instructions that will help you achieve years of safe and dependable service.

The illustrations and data used in this manual were current at the time of printing, but due to possible engineering and/or production changes, the actual product may vary slightly in detail. Viking-Cives reserves the right to redesign and/or change components as may be necessary without notification.

Throughout this manual, references may be made to:

Prime Mover	The chassis/vehicle to which this product is attached.
Right, Left, Front, Rear, Drivers Side, Curb Side	Directions as determined in relation to the operator when seated in the normal operation position.
<b>IMPORTANT</b>	Precautions that must be followed to prevent damage to equipment.
<b>NOTICE</b>	Precautions that must be followed to prevent substandard performance.



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**\*\*\*LIMITED WARRENTY\*\*\***

**VIKING-CIVES MIDWEST, INC.** warrants products of its manufacture against defects in workmanship and material for a period of one year from the date of shipment to the customer. In consequence of this warranty, any component part or parts of such products proving defective within the above specified time will be repaired or replaced F.O.B. factory.

Providing such parts are returned, transportation prepaid, to the factory and found defective by **VIKING-CIVES MIDWEST, INC..**

This warranty will not apply to any product which has been repaired or altered outside of **VIKING-CIVES MIDWEST, INC.** factory in any way, so as in **VIKING-CIVES MIDWEST, INC.'s** judgment, to affect its stability or reliability, nor which has been subject to misuse or accident.

The obligations of **VIKING-CIVES MIDWEST, INC.** under this warranty are limited to the replacement of defective parts. Such obligations are exclusive and in lieu of all other remedies, warranties, guarantees of liabilities, expressed or implied, with respect to each product delivered, hereunder, arising by law or otherwise (including without limitation any obligation or liability by **VIKING-CIVES MIDWEST, INC.** arising from negligence or with respect to fitness, merchantability, loss of use, revenue, or profit, or consequential damages or injuries).

This limited warranty shall not be extended, altered, or varied except by a written instrument signed by **VIKING-CIVES MIDWEST, INC..**

**VIKING-CIVES MIDWEST, INC.** assumes no responsibility for engines, electrical equipment or any other equipment and accessories not manufactured by **VIKING-CIVESMIDWEST, INC.** beyond the warranty of the manufacturer of such equipment of accessories.

All warranty work done on **VIKING-CIVES MIDWEST, INC.** equipment must have prior authorization from **VIKING-CIVES MIDWEST, INC.** along with a "Return Goods Authorization" number. All labour and parts issued by user for **VIKING-CIVES MIDWEST, INC.** warranty without an authorization number and a signed authorization warranty form will be at the users own cost.



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## **REGISTRATION OF EQUIPMENT AND WARRANTY INFORMATION**

You should register your equipment with VIKING-CIVES MIDWEST, INC., by filing out a warranty certificate and registration card and returning them to VIKING-CIVES MIDWEST, INC.. The warranty period becomes effective upon date of delivery of equipment unless other arrangements have been made with VIKING-CIVES MIDWEST, INC.. The information required to register the equipment may be found on the serial number and/or VIN tag secured to the equipment/vehicle. Check for damage before using this equipment. Report any damage to equipment at once to VIKING-CIVES MIDWEST, INC..

Viking-Cives Midwest, Inc. will not commend any modification to its products without prior written approval. Any modifications carried out without prior approval from VCM will VOID ALL WARRANTY, and will be the responsibility of the party who completed the modifications.

**Viking-Cives Midwest, Inc.**  
Hwy 61, Morley, MO (573) 262-3545

SERIAL NO:

MODEL:  DATE:

( **SERIAL NUMBER TAG** )

**Viking-Cives Midwest, Inc.**  
• Morley, MO 63767 Phone 573-262-3545 •

VIN

( **VIN TAG** )

MFD. BY: VIKING-CIVES MIDWEST INC.  
MONTH AND YEAR OF MANUFACTURE:  
MO. JULY YR. 2016  
GVWR: 16,328 KG( 36,060 LB)  
GAWR-FRONT:  
8,164 KG( 18,000 LB)  
WITH 385/65R22.5 TIRES,  
12.25X22.5 RIMS, @ 830 KPA  
( 120 PSI) COLD DUAL  
GAWR-INTERMEDIATE (1):  
KG( LB)  
WITH RIMS @ TIRES,  
( PSI) COLD KPA  
GAWR-INTERMEDIATE (2):  
KG( LB)  
WITH RIMS @ TIRES,  
( PSI) COLD KPA  
GAWR-REAR:  
8,164 KG( 18,000 LB)  
WITH 385/65R22.5 TIRES,  
12.25X22.5 RIMS @ 830 KPA  
( 120 PSI) COLD DUAL

THIS VEHICLE CONFORMS TO ALL  
APPLICABLE FEDERAL MOTOR  
VEHICLE SAFETY STANDARDS IN  
EFFECT ON THE DATE OF  
MANUFACTURE SHOWN ABOVE

VEHICLE IDENTIFICATION NUMBER:  
CV6PP000GM000000  
VEHICLE TYPE: TRAILER

( **MANUFACTURE TAG** )



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## **WARRANTY REQUEST PROCEDURE**

All repairs considered for warranty that are performed outside of VIKING-CIVES MIDWEST, INC.; require prior written authorization from VIKING-CIVES MIDWEST, INC.. Failure to obtain written warranty authorization prior to repairs may result in the rejection of the warranty claim. **To obtain warranty consideration one must provide all required VIKING-CIVES MIDWEST, INC. with unit information including date of manufacture and serial numbers.** In most cases, this information is easily obtained from the Manufactured Tag and/or individual Serial Tag located at the front driver's side frame rail.

### **(A) To obtain Parts Warranty Consideration:**

In the event that repairs are required outside of VIKING-CIVES MIDWEST, INC. facility that may be considered for warranty the following steps must occur. **Notification of VIKING-CIVES MIDWEST, INC. customer service must take place prior to the start of any repairs.**

- (1) Contact VIKING-CIVES MIDWEST, INC. customer service to obtain a Return Goods Authorization (RGA) number. Any product arriving at VIKING-CIVES MIDWEST, INC. without a RGA number will be rejected and returned to the sender at his or her own expense.
- (2) Goods are to be shipped prepaid to VIKING-CIVES MIDWEST, INC., 22956 Highway 61, Morley MO 63767. **All items should be clearly marked with the appropriate RGA number.**
- (3) When a replacement item is shipped to replace a defective part for warranty consideration the following additional steps will occur:
  1. An invoice will be generated for the value of the replacement item(s).
  2. The defective part(s) must be returned (prepaid) to VIKING-CIVES MIDWEST, INC..
  3. Upon receiving the defective part(s), VIKING-CIVES MIDWEST, INC. will issue and process a Discrepant Material Report (DMR). Once the evaluation of the DMR report is complete and the parts are deemed warranty, a credit will be issued against the outstanding invoice. **If the part(s) are deemed Non-warranty, the invoice will remain outstanding to be paid to VIKING-CIVES MIDWEST, INC..** Any part(s) to be returned to the customer will be at his or her own expense.

### **(B) To obtain Labour Parts Repair Warranty Consideration:**

In the event that repairs are required outside of VIKING-CIVES MIDWEST, INC. facility that may be considered for warranty the following steps must occur. **Notification of VIKING-CIVES MIDWEST, INC. customer service must take place prior to the start of any repairs.**

- (1) Contact VIKING-CIVES MIDWEST, INC. customer service to obtain a Warranty Claim Form (WCF) and warranty authorization number.
- (2) Fill out all required WCF information and fax or mail the completed form to VIKING-CIVES MIDWEST, INC., attention Customer Service Department.
- (3) Once the WCF report has been reviewed, warranty authorization will be granted or denied. **NOTE: VIKING-CIVES MIDWEST, INC. warranty labour rates will apply unless specifically determined otherwise.** Any part(s) involved in a WCF request must follow the Parts Warranty Consideration procedures.

### **For Customer Service and/or Parts requests please contact:**

Customer Service: Viking-Cives Midwest Inc.: Ralph Parker ([rparker@vikingcivesmidwest.com](mailto:rparker@vikingcivesmidwest.com)) P: (573) 318-0755

Parts Service: Viking-Cives Midwest Inc.: Darren Miller ([dmiller@vikingcivesmidwest.com](mailto:dmiller@vikingcivesmidwest.com)); P: (573) 262-3545  
F: (573) 262-3540





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## **ORDERING PARTS**

Delays and errors can be eliminated when ordering instructions are followed correctly.

1. Place orders direct with Viking - Cives Midwest, Inc. / nearest dealer.
2. State Company name, address, and postal zip code.
3. Give the exact model and serial number of the equipment/unit (stamped on the unit identification plate.)
4. Furnish part number, description and quantities required. *Note: An alpha designation in the Item ID column indicates a sub-component for that parent item. When placing parts orders reference the parent item to receive a complete assembly. Individual items can be ordered separately if required by ordering the alpha designated item number.*
5. Print or type order clearly. **Note: A purchase order is required for the warranty parts.**
6. Give specific shipping instructions.

**VIKING - CIVES MIDWEST, INC.** – 22956 Hwy 61 Morley, MO 63767  
(573) 262-3545 Phone; (573) 262-3369 Fax

## **A WORD ABOUT SAFETY**

The equipment described in this manual is normally being operated in winter conditions with bad weather and snow & ice conditions. Due to these adverse operating conditions it is important that you the operator use good safety practices at all times to protect yourself, co-workers, and others when using the equipment.

It is not practical or possible to warn you about all the hazards associated with the operation and maintenance of this equipment. You use your own good judgment supplemented with the information found on the safety decals, instructions in this manual, your employer's safety programs, safety codes, local, state/provincial, and federal laws, rules and regulations.

When operating/performing maintenance on this equipment, trouble shooting equipment operations and loading or unloading the sanders/spreaders with material observe and obey all safety decals on the equipment and warnings listed in the manual. Failure to do this could result in serious injury or death to you or others.

Remember at all times that as the operator you are responsible for the safe operation of this equipment and responsible for the safety of others. Good safety practices not only protect you but also protect the people around you



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## **DEFINITION OF SAFETY TERMS AND SYMBOLS**

Throughout this manual, the terms **CAUTION**, **DANGER**, and **WARNING** are used to indicate the degree of hazard to personnel if proper safety procedures are not followed. These words will be used in conjunction with the Safety Alert Symbol: a dark triangle containing a white exclamation mark.



**The Safety Alert Symbol means: ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!**

<b>CAUTION</b>	Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury; OR may also be used to alert against unsafe practices that may result in personal injury.
<b>DANGER</b>	Indicates an imminently hazardous situation that, if not avoided, <b>WILL</b> result in death or serious injury.
<b>WARNING</b>	Indicates an imminently hazardous situation that, if not avoided, could result in death or serious injury.
<b>NOTE</b>	Identifies tips, helpful hints, and maintenance information the owner/operator should know.

## **SAFETY INSTRUCTIONS**

### **WARNING SECTION**



#### **WARNING**

**Obey all the safety instructions listed in this section and throughout this manual. Failure to obey instructions in this section could result in death or serious injury.**

**BEFORE ATTEMPTING ANY TYPE OF ASSEMBLY, OPERATION, MAINTENANCE, OR OTHER WORK ON OR NEAR THIS PRODUCT:**

- **READ AND COMPLETELY UNDERSTAND THIS MANUAL.**
- **READ AND COMPLETELY UNDERSTAND THE MANUALS PROVIDED WITH YOUR PRIME MOVER/VEHICLE.**
- Read and understand all safety signs on this product and on your prime mover/vehicle.
- Know all your controls and know how to quickly stop all equipment and vehicle movement in case of an emergency.
- Know and follow good work practices when assembling, mounting, maintaining, repairing, removing, and storing this product.
- Never allow anyone, except the operator, to be around the prime mover or this product when either is in motion. Do not start-up unless others are clear of the work area.
- Do not stand or climb on this product.
- Before leaving the operator's position or beginning any type of work on this product, lower this product to the ground, apply the prime mover's parking brake, stop the engine, remove the starter key, wait for all moving parts to stop, and then relieve all pressure in the hydraulic system.



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## SAFETY DECAL SHEET



### SAFETY ALERT SYMBOL

THIS SYMBOL MEANS **ATTENTION!**  
**BECOME ALERT!**  
**YOUR SAFETY IS INVOLVED!**

PLEASE READ AND UNDERSTAND ALL SAFETY AND MAINTENANCE INSTRUCTIONS COMPLETELY BEFORE CONTINUING FURTHER!

### SAFE EQUIPMENT INSTALLERS and OPERATORS:



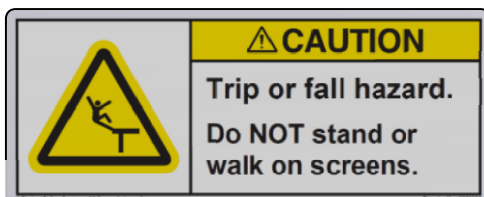
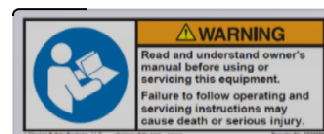
**TURN OFF ALL POWER BEFORE PERFORMING ANY SERVICE OPERATIONS**

FOLLOW RECOMMENDED OPERATING PROCEDURES.

KEEP EQUIPMENT IN SAFE OPERATING CONDITION AT ALL TIMES.

RECOGNIZE AND AVOID HAZARDS WHILE OPERATING, SERVICING AND MAINTAINING EQUIPMENT.

### THE BEST SAFETY DEVICE IS A CAREFUL OPERATOR!

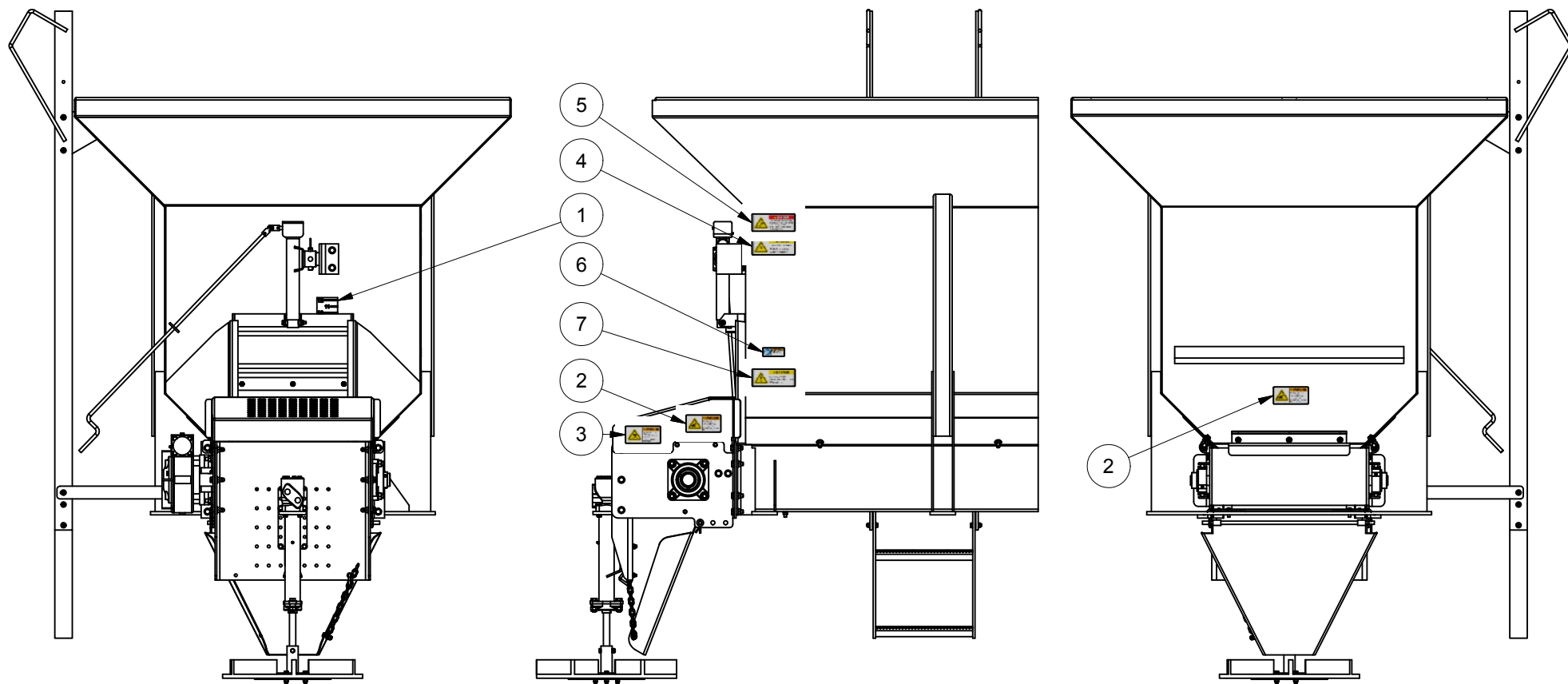


EQUIPMENT MAY NOT BE EXACTLY AS SHOWN. SOME COMPONENTS MAY BE OPTIONAL.  
TO MAINTAIN OUR ON-GOING PRODUCT AND DEVELOPMENT IMPROVEMENT PROGRAM, VIKING-CIVES RESERVES THE RIGHT TO CHANGE EQUIPMENT & SPECIFICATION WITHOUT NOTICE.



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## TOW PLOW SPREADER SAFETY DECAL LOCATIONS



NOTE: ITEMS #2 & #3 ARE ALSO LOCATED  
ON OPPOSITE SIDE OF SPREADER  
IN THE SAME LOCATION AS SHOWN.

EQUIPMENT MAY NOT BE EXACTLY AS SHOWN. SOME COMPONENTS MAY BE OPTIONAL.  
TO MAINTAIN OUR ON-GOING PRODUCT AND DEVELOPMENT IMPROVEMENT PROGRAM, VIKING-CIVES RESERVES THE RIGHT TO CHANGE EQUIPMENT & SPECIFICATION WITHOUT NOTICE.



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## SAFETY DECAL LOCATIONS

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	0820052		DECAL GATE DOOR HEIGHT	1
2	0820092		DECAL WARNING CHAIN	3
3	0820094		DECAL CAUTION SPINNER	2
4	0820096		DECAL CAUTION SCREENS	1
5	0820098		DECAL DANGER ENTER BODY	1
6	0820099		DECAL WARNING READ MANUAL	1
7	0820126		DECAL CAUTION LOAD GVW RATING	1

EQUIPMENT MAY NOT BE EXACTLY AS SHOWN. SOME COMPONENTS MAY BE OPTIONAL.  
TO MAINTAIN OUR ON-GOING PRODUCT AND DEVELOPMENT IMPROVEMENT PROGRAM, VIKING-CIVES RESERVES THE RIGHT TO CHANGE EQUIPMENT & SPECIFICATION WITHOUT NOTICE.



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## **DAILY INSPECTION AND LUBRICATION** **PERIODIC MAINTENANCE INSPECTION**

Daily inspection along with periodic preventive maintenance will reduce the chance of any major repairs and down time during equipment use. Before any plow is attached onto the vehicle, all equipment should be inspected and checked to ensure that everything is in safe operating condition. Any and all defects, when noted, should be scheduled for repair(s) and/or immediate replacement. The following checklist should be performed prior to and at the completion of each plowing shift, to ensure operational readiness when required.

1. Check the fluid level in the hydraulic oil reservoir. If the sight indicates low oil level, add the appropriate amount of the specified hydraulic fluid.
2. Grease all required components:
  - All plow harness sheave nipples.
  - All pump drive shaft nipples.
  - All moldboard arm attachment points.
  - All hydraulic cylinders mount points.
  - All front harness pivot points.
3. Check all components for loose and/or missing fasteners, if required tighten and/or replace.
4. Visually inspect all hydraulic connections and hoses for cracks and/or leaks.
5. Check all cables, chains, and sheaves for excessive wear or damage.
6. Visually inspect front plow and Tow Plow units. Check cutting edges and wear shoes. If cutting edge has excessive wear, remove and rotate, or if required, replace. NOTE: Do not allow cutting edge to wear down to mounting angle. Any wear to the mounting angle may affect the operation and safety of the equipment. Replacement is costly.
7. At the beginning of each shift, visually inspect all caution and warning decals. All decals should be complete and legible. If decals are not legible, clean them. If cleaning the decals does not make them legible, install new decals.

## **GENERAL OPERATING INSTRUCTIONS**

1. The operator should familiarize himself with all equipment prior to operation. The cab controls are placed at a comfortable reach of the operator, with an allowable amount of adjustment. If necessary, the controls can be adjusted for either driver or passenger use.  
The in cab control levers are clearly marked as to the equipment/function they control.
2. To raise the Tow Plow, pull back on the appropriate control level, to lower the Tow Plow, push the control level forward.  
**NOTE:** The in cab controls are proportional to the hydraulic valve, therefore, the further the control lever is moved the faster the plow or Tow Plow will raise or lower.
3. Before putting any equipment into use, check for any worn, damaged or loose components, if necessary repair or replace.  
Listen for any unusual sounds, if necessary repair and/or replace worn or damaged parts.
4. Before operating any equipment, be sure to read and fully understand all caution and safety warnings. Familiarize yourself and others with all caution/warning labels and their locations. Make sure all labels are complete and legible. Replace any labels that have become unreadable and/or missing. Replacement labels can be purchased directly from Viking-Cives Group and/or your nearest authorized dealer.





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## **TOW PLOW INSTALLATION**



**SAFETY FIRST!! READ AND UNDERSTAND THE SAFETY INSTRUCTIONS BEFORE PROCEEDING WITH ANY INSTALLATION.**

**NOTE:** These installation instructions are intended as a guide to aid in the mounting of your Viking-Cives Midwest, Inc. **Tow Plow**. All dimensions provided in these instructions are approximate and could vary due to variables such as: chassis make and model, tire size, type of suspension, customer preference, and/or unknown interference caused by immovable attachments. Viking-Cives Midwest, Inc. assumes no responsibility/liability for improper Tow Plow installation, unless installed by Viking-Cives Midwest, Inc.. The Tow Plow mounting location should be discussed with the end-user, chassis dealer, and the installer prior to beginning installation in order to achieve the best possible installation.

### **ATTACHMENT TO PRIME MOVER**

The Tow Plow attaches to the prime mover by means of a pintle hook. Care must be taken to ensure the size of the pintle hook on the prime mover is compatible with the Tow Plow requirements. Check to ensure the trailer attachment items such as air glad hand connectors, lighting connector(s), safety chains, hydraulic quick disconnects, and pintle hook components are in good working order. Any damaged components should be repaired or replaced.

During the initial installation of the Tow Plow to the vehicle, some adjustments will be necessary to insure proper operation of the plow and trip mechanisms.



**WARNING: All Viking-Cives Midwest, Inc. installed cab controls for steering of Tow Plow, have a two-stage lockout device to prevent the chance for accidental deployment of the steering feature. In the event you have chosen to purchase the Tow Plow without Viking-Cives Midwest, Inc. installing the controls, we STRONGLY RECOMMEND that you install a lockout mechanism to prevent accidental steering deployment. DO NOT OPERATE without the correct type of controls.**

**Viking-Cives Midwest, Inc. takes no responsibility whatsoever for any issues arising from or related to cab controls not installed by Viking-Cives Midwest, Inc.**

**When plow is being raised or lowered – STAND CLEAR!**



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## **TOW PLOW INSTALLATION**

1. Set Tow Plow unit on a firm, level surface (such as a concrete garage floor or paved area) that is large enough to safely accommodate this product.
2. Drive the prime mover into position. **DANGER: NEVER stand between the prime mover and the Tow Plow when the vehicle is being moved into position.** Before connecting the Tow Plow to the prime mover, shut the vehicle engine down and make sure that the parking brake is engaged.
3. Position the pintle ring over the pintle hook and slowly lower the ring by using the handle provided on the Tow Plow frame jacks (landing gear) to raise the landing gear. When the pintle hook is fully connected, continue to raise landing gear and ensure adequate ground clearance.
4. Connect the trailer safety chains.
5. Connect the main and auxiliary trailer lighting plug(s).
6. Connect the plow lift hydraulic circuit (single acting).
7. Connect the steering hydraulic circuit (double acting).
8. With prime mover running, test all functions to ensure:
  - a. Moldboards move freely from stored (up) position to deployed (down) position. **CAUTION:** When removing lock pins from moldboard arms, always remove the two pins at the centre, one each side of the Tow Plow first. Then remove the two pins at the front end of the moldboards, then remove both rear pins last. When replacing the lock pins, reverse the order. Begin by putting the two rear pins in place and then install the two front pins and then reinstall the two centre pins last.  
**WARNING: Lock pins must always be in place when the Tow Plow moldboards are in transport position.**
  - b. Steering wheels move freely thru full stroke of activating cylinder.  
All lights on rotating light bar are clear and working, and that the light bar rotates the full 30° each way.



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## **TOW PLOW SET-UP AND OPERATION**



**SAFETY FIRST!! READ AND UNDERSTAND THE SAFETY INSTRUCTIONS BEFORE PROCEEDING WITH ANY SET-UP AND/OR OPERATION.**

When all conditions of installation have been met, the Tow Plow is ready to operate. The levers for controlling the Tow Plow lift and steering functions are located in the cab of the prime mover. **WARNING: When the moldboards are being raised or lowered – STAND CLEAR!**

### **DAILY INSPECTION INSTRUCTIONS**

Before any plow is attached onto the vehicle, all equipment should be inspected and checked to ensure that everything is in safe operating condition. Any and all defects, when noted, should be scheduled for repair(s) and/or immediate replacement. The following checklist should be performed prior to and at the completion of each plowing shift, to ensure operational readiness when required.

1. The operator should familiarize himself with all equipment prior to operation.
2. Inspect Tow Plow for damaged or worn cutting edges and/or wear shoes.
3. Inspect moldboards for signs of damage such as broken or worn bolts and pins, cracked welds, bent sections and/or excessive rusting.
4. Inspect mounting arms for signs of damage such as cracked welds, bent or broken sections, and excessive rusting.
5. Inspect mounting holes on the arms and lugs for excessive wear. Holes having greater than 3/16-inch clearance are to be repaired.
6. Inspect plow for broken, worn or stretched lift chains, grab links and clevises.
7. Inspect plow assembly to ensure that all fasteners (bolts, nuts, cotter pins, lock rings, etc.) are properly secured. Replace any components that are damaged and/or missing.

### **OPERATING INSTRUCTIONS**

**WARNING: The Bi-directional Tow Plow swings out to the left and to the right and the operator must be alert at all times to ensure the area is clear when deploying and using the Tow Plow in the deployed position.**

#### **GENERAL:**

- Similar to other snowplows and wings, the operator must ensure plow area is free from any and all people and obstacles when lowering the moldboards.
- The Tow Plow should always be moved to its transport position prior to negotiating turns, especially right turns.
- The Tow Plow is designed to operate on pavement and shoulders constructed of solid materials. The Tow Plow was not designed to be deployed over inslopes or ditches. Caution should be used when plowing shoulders that may have obstacles or grade changes, such as side entrances and curbs, which are higher than the shoulder grade.
- The Tow Plow is to be used on multilane roads that enable the operator to clear up to approximately 24 to 26 feet without encountering any obstacles.
- The Tow Plow is intended to operate internally in gang plowing situations. Owners may wish to add additional lights or signs to provide better warning to traffic.



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## **OPERATOR INSTRUCTIONS PRIOR TO OPERATING TOW PLOW ON ROADWAY:**

- Operators must read the owners manual and demonstrate their ability to fully manoeuvre the Tow Plow on an off-road site before actively plowing on roadways. Before operating the unit on the roadway, the operator should be able to:
  - Recognize the three in cab controls. On control stick should raise and lower moldboards and also deploy tow plow out and return it to its towed position. A simple toggle switch is provided to select which direction you would like to deploy. This is accomplished by Viking-Cives's switch box or is incorporated into some hydraulic control systems. (example FA 6000 series)
  - Operate the Tow Plow from a towed to deployed positions, with accuracy in judging its clearing width to clear any roadway obstacles (Cone test with 2 or more cones. Operator must plow the first cone without touching the rest).
  - Steer in and out to clear obstacles (Cone test with offset cones at 80' spacing and 10' laterally).
  - Operate the Tow Plow from a towed position, plow up to an obstacle, and then back the unit while correcting the steering to cause the Tow Plow to move directly behind the truck (Plow up to the cones, pick up the moldboards, back up until the Tow Plow is behind the prime mover, stop, reset the steering to the towed position, proceed forward to clear obstacle (two cones), and then deploy the Tow Plow to full width again).
- Operators should perform test runs on off-road sites to ensure they understand the Tow Plow motions and speed of the transition from the towed position to the deployed positions and back to the towed position again. Operators should practice on an obstacle course to ensure they are familiar with the movement and reaction of the Tow Plow.
- Operators must become aware of the Tow Plow motion when backing up. If an operator has the Tow Plow in the deployed right hand position and backs up, the trailer will swing back behind the truck and to the left. The operator must first steer the trailer to its towed position to prevent it from swinging to the left. Practicing on an obstacle course is very beneficial to gain experience with this motion.

## **DEPLOYING BI-DIRECTIONAL TOW PLOW ON ROADWAY:**

-The tow plow should be deployed in the following sequence:

1. There are four push arms on each side of the tow plow, two on each moldboard. The first push arms or push arms closest to the prime mover and the third push arms are manually installed safety pins to lock moldboards in the up position. The second push arm safety pin is a pneumatically activated pin by a cylinder located in front of the second push arms. The two rear safety pins are a sliding manual pins. When the tow plow is needed; remove the two third push arm pins first. Then go to the front push arms and remove those two pins. Finally remove the two rear sliding pins. **NOTE: the two rear sliding pins should be the last two pins out and always the first two pins back in when storing the tow plow.**
2. After removing all safety pins and if is selected to be in right hand mode the left hand second push arm pneumatic lock pin will be engaged and the right hand pneumatic lock pin will be in its unlocked mode. **Caution must always be used to respect the drop area next to any unlocked moldboard.**
3. Going to the road to begin plowing. When the operator wants to reverse plowing and plow to the left; the operator must first fully retrieve the trailer to the towed position behind the prime mover by first raising the moldboards 6 to 12 inches above ground level then retrieving the trailer. Then, the operator can select the "left" position on the selection switch in the cab which locks the right hand moldboard in its stowed position and unlocks the left hand moldboards. At the same time the switch is flipped it also locks the right hand deployment function and unlocks the left hand deployment functions. Now the operator can use the same cab controls to control left hand steering and the up and down of the left side moldboards.
4. Sometimes operators may notice hesitation in reversing the steering upon returning tow plow to center. For example, this action is evident when one has retrieved from the right, raised the right side moldboards, flipped the switch to left hand deploy and the tow plow doesn't respond. One can merely "rock" the steering control back to the right and immediately back to the left which allows the steering lock to fully release and reset to allow deployment. This same action can happen in the reverse sequence, This is caused by the trailer's hydraulic steering cylinder creating pressure against the steel stop when the tow plow is returned to the towed position. The hydraulic control "rocking" action allows the hydraulic pressure to be momentarily relieved, allowing the lock to move freely to unlock desired direction while locking the opposite direction. Post storm washing and good preventative maintenance helps to assure proper tow plow operations.



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5. When operators have to leave the cab or park the unit; they should always reset the unit to the right hand deploy position and use caution at all times and respect the drop area of the right hand moldboards. Operators should also lower the unlocked moldboards to the ground when leaving the cab and not pinning the moldboards is highly recommended. If operator is going to leave the tow plow for an extended period of time it is recommended to replace all moldboard safety pins.



## **SAFETY FIRST!! READ AND UNDERSTAND THE SAFETY INSTRUCTIONS BEFORE BEGINNING ANY MAINTENANCE OPERATION.**

In preparation for the snow plowing season a visual equipment inspection must be performed. Look for any damaged components, bends, cracked welds, hydraulic leaks, etc. Inspect all fasteners; tighten any that have loosened and replace any that are damaged. Check all hydraulic hoses for cuts, cracks, and/or leaks. Visually check plow lift chains and cable(s) for loose clamps and frays. **Immediately replace any damaged chains and/or frayed cables.**

Periodically during plowing, stop to inspect plow cutting edges and moldboard shoes for wear. At the first sign of excessive wear, discard and replace with new parts.

When the Tow Plow is disconnected from the prime mover, be sure to couple the hydraulic hoses together, to prevent damage to the quick disconnect hose ends and to help prevent the introduction of foreign material into the hydraulic system.

### **BEFORE EACH USE**

- Make sure that all nuts and bolts are in place and properly tightened.
- Make sure that all other fasteners are in place and are performing their specified function.
- Make sure all safety signs are in place, are clean, and are legible.
- Replace any damaged parts or excessively worn parts.
- Inspect for damage to any part of the plow moldboard or push frame, such as broken or worn bolts or pins, cracked welds, bent sections and/or excessive rusting.
- Inspect for damage to trip mechanisms, such as broken springs, cracked welds, worn or broken bolts.
- Check all hoses for cuts, cracks and leaks.

### **AFTER EVERY 10 HOURS OF USE**

- Grease all grease fittings and pivot points: see Parts Pages and Parts Lists for reference.

### **REPLACEMENT OF CUTTING EDGE**

1. Park the prime mover/vehicle on a level surface (such as a concrete garage floor or paved area) that is large enough to safely accommodate unit with the Tow Plow attached.
2. Place the vehicle's transmission in "Park," and set the parking brake.
3. Lower the Tow Plow moldboards onto suitable blocking, positioned immediately behind the moldboard. This blocking must be of sufficient height to hold the cutting edge approximately 6 to 8 inches above the level surface.
4. Shut off the prime mover's engine, remove the starter key, wait for all moving parts to come to a stop, and relieve all pressure in the hydraulic lines.
5. Loosen the nuts on all the cutting edge bolts; remove all nuts and bolts except the bolts on each end of the cutting edge.
6. While holding up the end of the cutting edge, remove the nut and bolt from that end and allow the cutting edge to pivot down to the level surface.
7. Repeat Step 6 for the other end of the cutting edge. If using a standard centre punched reversible cutting edge, flip the edge from top-to-bottom and reinstall. Properly dispose of worn-out edges and all bolts and nuts.
8. Reinstall a new wear edge by reversing the procedures in steps 7 thru 5; tightening all nuts to recommended torque values.

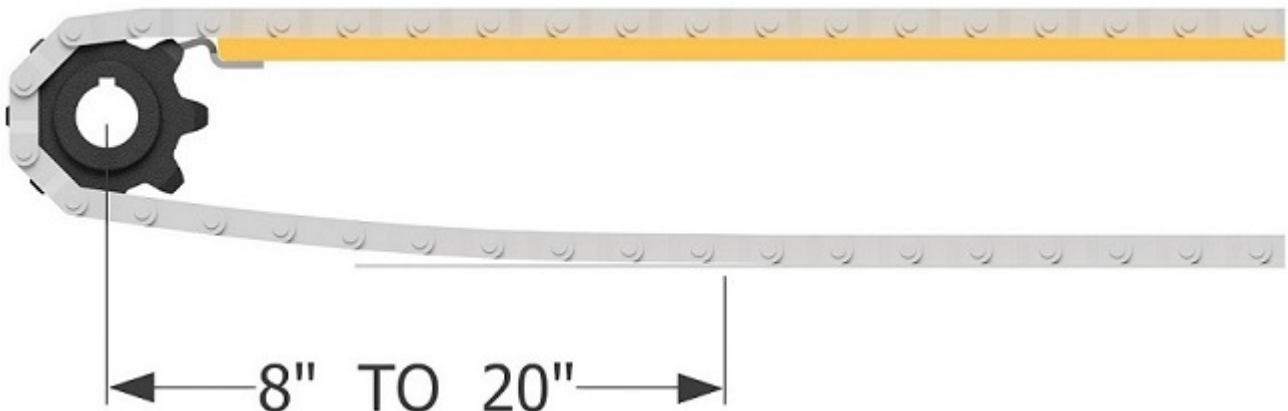


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## **PREVENTIVE MAINTENANCE INSPECTION AND LUBRICATION** **RECOMMENDATIONS**

Daily inspection along with periodic preventive maintenance will reduce the chance of any major repairs and down time during equipment use.

1. Check the fluid level in the hydraulic oil reservoir. If the sight indicates low oil level, add the appropriate amount of the specified hydraulic fluid.
2. Grease all required components: beginning of each season, then once a week.
  - All main conveyor, cross conveyor and spinner bearings.
3. Check all components for loose and/or missing fasteners, if required tighten and/or replace.
4. Visually inspect all hydraulic connections and hoses for cracks and/or leaks.
5. Check all conveyor chains, chain covers, sprockets, and conveyor beds for excessive wear or damage.
6. Adjust conveyor chains as required.
7. Oil conveyor chains frequently, at least every five working days and once monthly off-season.
8. At the beginning of each shift, visually inspect all caution and warning decals. All decals should be complete and legible. If decals are not legible, clean them. If cleaning the decals does not make them legible, install new decals.
9. Chain Tension:
  - The main conveyor chain assembly should not be tightened any more than necessary to prevent the chain links from jumping the sprocket teeth, or jamming between the back side of drive sprocket teeth and the under side of the conveyor floor. Over-tightening of the conveyor chain will cause excessive wear on all parts and/or jamming, as well as higher working pressures. It is recommended that the tension should be checked with a loaded box which will show a greater slackening of the chain on the under side. New chains will stretch in the first month of operation and therefore require greater attention to proper adjustment during this break-in period.
  - Drag chain slack should be checked periodically and taken up until distance between centreline of idler sprocket and where chain contacts lower flange on longitudinal is 8 inches to 20 inches.







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## **MAINTENANCE SCHEDULE**

### **AFTER FIRST 20 HOURS OF OPERATION**

- Inspect hydraulic fluid for contamination and level.
- Change hydraulic system filter(s).
- Inspect main conveyor gearbox oil for contamination and level. Oil sample should be taken from the oil level hole, not the drain hole.
- Thoroughly lube all mechanical parts – bearings, hoist mounting, chains, and adjusters.
- Inspect for loose bolts, pins, conveyor chains, and tighten/adjust as required.

### **AFTER FIRST 50 AND 100 HOURS OF OPERATION**

- Change main conveyor planetary gearbox gear oil. **NOTE: Never mix mineral and synthetic oils in gearbox.** Viking-Cives Group recommends using an antifoaming gear oil grade SAE80/90EP.

### **DAILY MAINTENANCE**

- Check fluid level in the hydraulic oil reservoir, if the sight indicates low oil level, add appropriate amount of the specified oil.
- Adjust conveyor chains as required.
- Check all conveyor beds for excessive wear or damage.
- Clean unit - wash all areas clean of salt and road dirt to prevent corrosion.
- Visually inspect all battery terminals and electrical connections, wires, switches, etc. for signs of corrosion, wear, loose and/or broken connections, etc. At the beginning of each shift review all lighting accessories to ensure proper working conditions, immediately replace any broken or non-functioning bulbs and/or lenses.
- At the beginning of each shift, visually inspect all caution and warning decals. All decals should be complete and legible. If decals are not legible, clean them. If cleaning the decals does not make them legible, install new decals.

### **WEEKLY MAINTENANCE**

- As part of an on-going preventive maintenance program, your Hopper Sander should be regularly lubricated. The following list indicates both the location and number of lubrication points for the Hopper Sander. Additional lubrication points may exist on your particular unit. Please consult Viking-Cives and/or nearest authorized dealer for specific lubrication diagrams.
  - Total number of grease fittings: five.
    - Drive shaft bearing (1)
    - Idle shaft bearings (2)
    - Gear Reducer (2)

### **AFTER TWO WEEKS OF NON-OPERATION OR AT THE END OF THE PLOWING SEASON**

- Chock tow plow wheels
- Cage the brakes on all four brake pots



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## MAINTENANCE SCHEDULE

### MONTHLY MAINTENANCE

- Check bolt tightness at valve, cab controls, body guides, and drive shaft bearings.
- Check structural welds on the body for cracks due to fatigue or overload.
- Inspect conveyors for possible wear; check set screws/bolts for tightness on sprockets, glider blocks, and gearbox coupler.
- Inspect hydraulic fluid colour for possible contamination. If oil appears thick or dirty, drain and replace fluid/filter(s).  
**NOTE: Excessive foaming can be an indication of air and/or moisture presence in the hydraulic system.**
- Check for oil leaks in all hydraulic fittings and hoses. Retighten and/or replace fittings and hoses as required.

### SEMI-ANNUAL/ SIX-MONTH MAINTENANCE

- Replace hydraulic system return oil filter (10-micron absolute) element.
- Inspect oil(s) for contaminants in conveyor gearbox and hydraulic reservoir.
- Replace oil(s) and all filters if excessive dirt or metallic particles are evident.

### END OF SEASON MAINTENANCE

- Remove spinner(s) inspect bearings, couple hoses on spinner and on truck.
- Inspect sprockets, chains, chain covers, bearings, and shafts for wear or damage.
- Thoroughly wash down conveyor chains and conveyor beds, and lubricate each with a non-water soluble lubricant.
- Change main conveyor gearbox oil and hydraulic fluid and filters.

The following electronic spreader control systems require additional filtration and shall be equipped with an in-line high-pressure filter and element. Viking-Cives Group recommends changing filter elements more frequently at three (3) month intervals.

- GRESER GRS II & GRS 31
- DICKEY JOHN W/ VICKERS VALVE
- COMPU SPREAD 220

The following is a list of recommended filter units and lubricants approved for use by Viking-Cives Group. **NOTE: Viking-Cives recommends that all hydraulic filter elements are 10 micron absolute.**

### FILTER PARTS

<u>ITEM Number</u>	<u>ALT ITEM Number</u>	<u>DESCRIPTION</u>
0560011	80225H	Inline High Pressure Filter Assembly - STAUFF
0560032		Inline High Pressure Filter Assembly - MP FILTRI
0560010	80225HE	Inline High Pressure Filter Element 10 Micron – STAUFF
0560004	80225K	Inline High Pressure Filter Element 10 Micron – PARKER
0560031		Inline High Pressure Filter Element 10 Micron – MP FILTRI
0560009	80225A	Return Manifold Filter Element 10 Micron



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## **OPERATING INSTRUCTIONS FOR HOPPER SANDER**

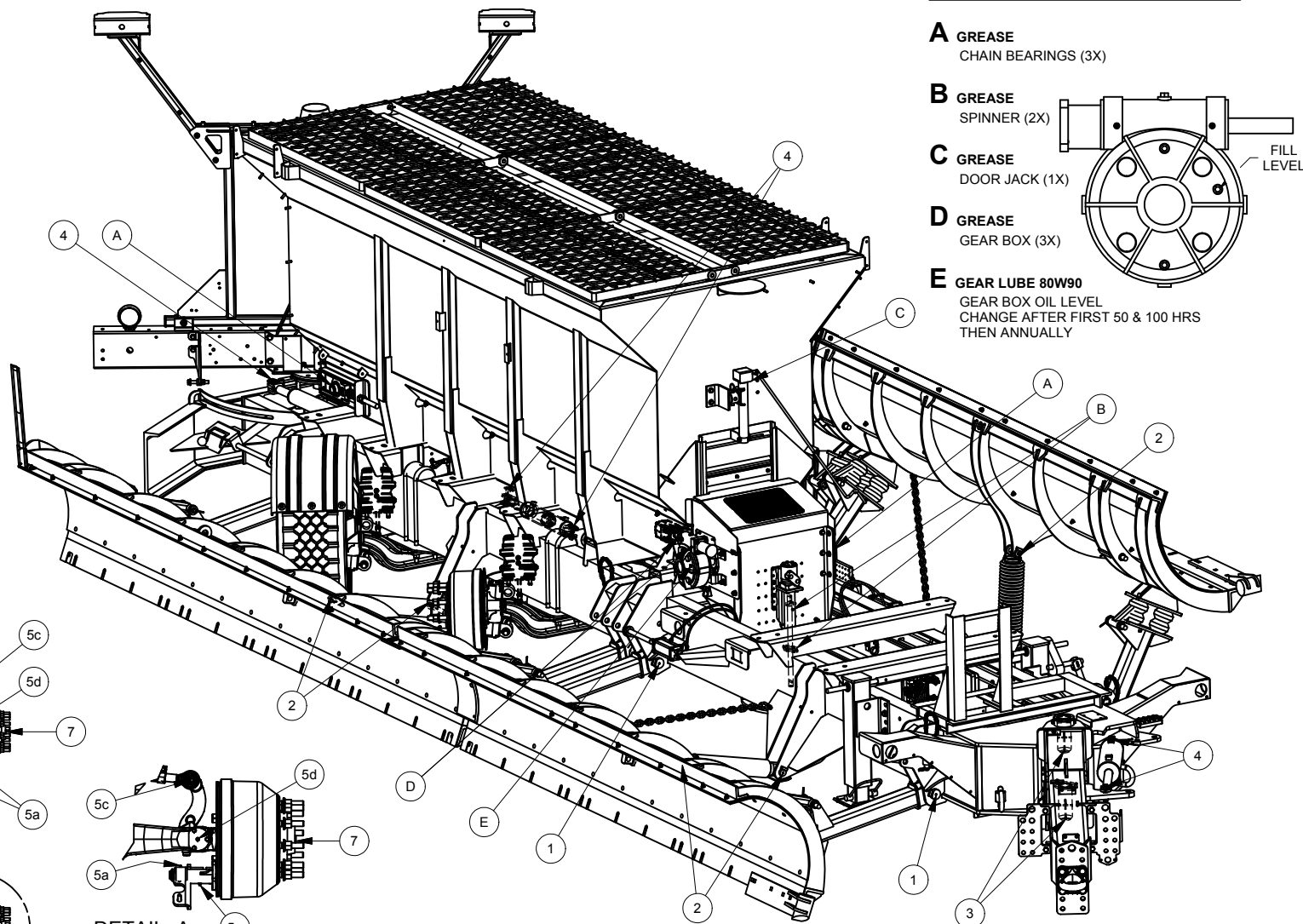
1. Before putting any equipment into use, check for any worn, damaged or loose components, if necessary repair or replace. Listen for any unusual sounds, if necessary repair and/or replace worn or damaged parts.
2. Before operating any equipment, be sure to read and fully understand all caution and safety warnings. Familiarize yourself and others with all caution/warning labels and their locations. Make sure all labels are complete and legible. Replace any labels that have become unreadable and/or missing. Replacement labels can be purchased directly from Viking-Cives Group, and/or nearest authorized dealer.
3. The operators should familiarize themselves with all equipment prior to operation. The in cab controls are placed at a comfortable reach of the operator and are clearly marked as to the equipment/function they control.
4. Sander Operation (Manual Spreader System)
  1. The sander valve is located to the right of the driver's seat. To operate the conveyor chain and spinner, raise the lever with the round black knob to the on position. Both spinner and conveyor will begin to move. The two knobs on top of the valve block control the speed of the conveyor and spinner. Warning: Do not use flow knobs to shut off hydraulic flow, this would cause oil to blow past the relief valve and causing excessive heat.
  2. To stop sander operation, push the lever with black knob down.
  3. One method of controlling the discharge rate is with the control gate. Each unit is equipped with a manually operated gate.
  4. The spinner chute can be adjusted to locate sand in various locations on the spinner. In addition, by relocating the six bolts connecting the spinner to the support plate, the spinner disc to ground height can be adjusted.
  5. For operation of an Electronic Spreader System refer to and follow the operating instructions supplied by the individual equipment vendor.



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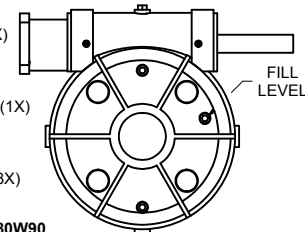
## TOW PLOW FRAME LUBRICATION POINTS

- 1 GREASE  
LOWER PLOW LIFT ARMS (8X)
- 2 GREASE  
LIFT CYLINDERS (8X)
- 3 GREASE  
TONGUE PINS (2X)
- 4 GREASE  
STEERING CYLINDERS (5X)
- 5 GREASE  
a. SLACK ADJUSTERS (8X)  
b. S-CAM (4X)  
c. TIE ROD ENDS (10X)  
d. KING PINS (8X)
- 6 GREASE  
LANDING GEAR (5X)
- 7 GEAR LUBE 80W90  
AXLE BEARINGS (4X)  
FILL TO MARKED LEVEL
- 8 GREASE  
RATCHET JACKS (4X)
- 9 GREASE  
STEERING GATE (1X)
- 10 GREASE  
STEERING PIVOTS (2X)



## HOPPER LUBRICATION

- A GREASE  
CHAIN BEARINGS (3X)
- B GREASE  
SPINNER (2X)
- C GREASE  
DOOR JACK (1X)
- D GREASE  
GEAR BOX (3X)
- E GEAR LUBE 80W90  
GEAR BOX OIL LEVEL  
CHANGE AFTER FIRST 50 & 100 HRS  
THEN ANNUALLY



DETAIL A  
SCALE 5 : 64

GREASE WEEKLY UNDER HEAVY USE  
OR BI-WEEKLY UNDER LIGHT USE

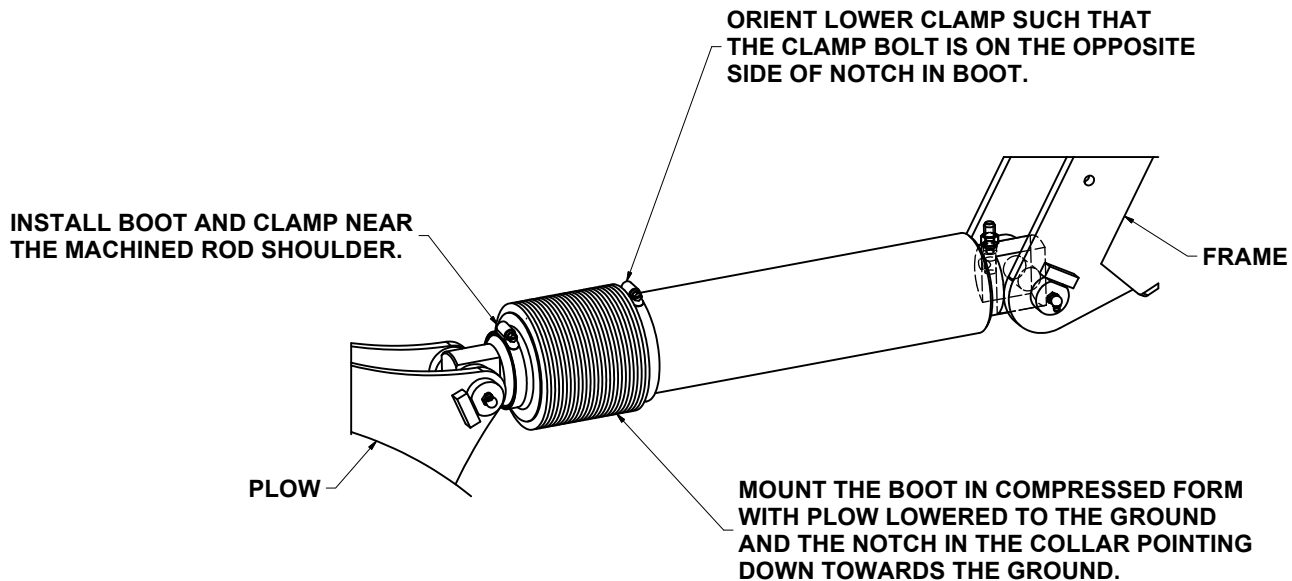
EQUIPMENT MAY NOT BE EXACTLY AS SHOWN. SOME COMPONENTS MAY BE OPTIONAL.  
TO MAINTAIN OUR ON-GOING PRODUCT AND DEVELOPMENT IMPROVEMENT PROGRAM, VIKING-CIVES RESERVES THE RIGHT TO CHANGE EQUIPMENT & SPECIFICATION WITHOUT NOTICE.

## TOW PLOW CYLINDER MAINTENANCE

Refer to figure below.

The cylinder boot is designed to keep debris away from the cylinder rod. However, there may still be a chance that sand, dirt and moisture will enter the boot. **Viking-Cives Midwest, Inc. recommends disassembling the boot and cleaning out the inside after every operating season.**

Lower the plow and detach the cylinder rod from the plow **ONLY**, leaving it attached on the frame side. Remove both clamps holding the boot and slide the boot off. Clean out the inside and outside of the boot. Remove any dirt and debris that may have accumulated on the cylinder. Reinstall the boot following the instruction in this manual.



## REINSTALLING TOW PLOW CYLINDERS

Refer to above figure

1. With the plow resting on the ground slip the cylinder boot and gear clamps over the rod and onto the body of the cylinder, starting with the larger end. Do not tighten gear clamp at this point.
2. Install cylinder back onto the plow.
3. Secure the top end of the boot with the gear clamp near the machined shoulder of the rod.
4. Without stretching the boot, secure the bottom side of the boot with the gear clamp. There is a notch in the collar of the boot. This notch should be on the bottom side of the cylinder facing the ground. This allows air to inter and exit the boot as it is compressed and expanded. It also provides a drain for any liquid that may enter the boot. **NOTE: ensure the bolt of the clamp is on the opposite side of the notch on the inside of the boot collar.**
5. Repeat steps 1 - 4 for the other cylinders.



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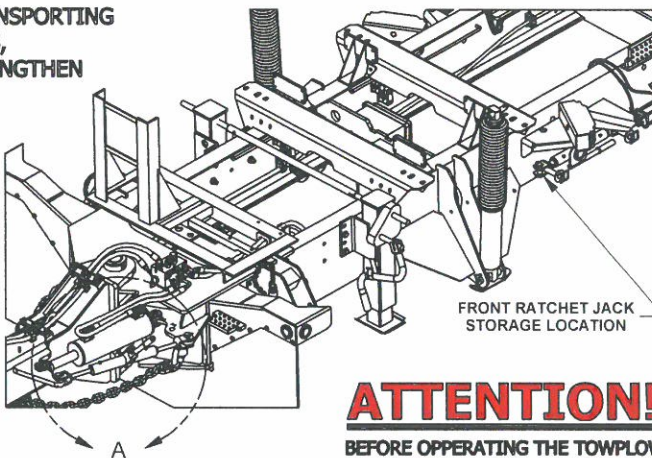
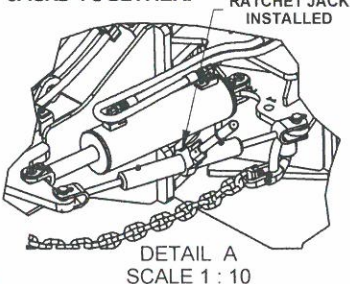
## INSTALLATION AND STORAGE OF RATCHET JACKS



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IN CASE OF BLOWN HOSE OR TRANSPORTING WITHOUT HYDRAULIC FUNCTIONS, INSTALL RATCHET JACKS TO STRENGTHEN AND HOLD STEERING FUNCTIONS

ALWAYS USE BOTH RATCHET JACKS TOGETHER.



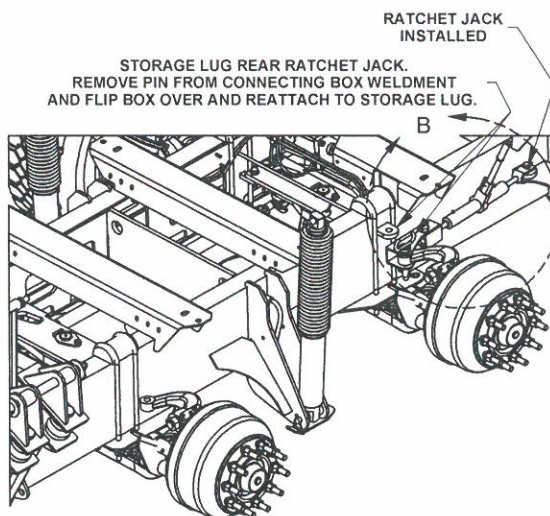
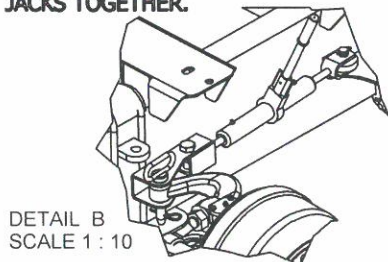
**ATTENTION!**  
BEFORE OPERATING THE TOWPLOW  
REMOVE TWO SHIPPING JACKS



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IN CASE OF BLOWN HOSE OR WHEN TRANSPORTING WITHOUT HYDRAULIC FUNCTIONS, INSTALL RATCHET JACKS TO STRENGTHEN AND HOLD STEERING FUNCTIONS.

ALWAYS USE BOTH RATCHET JACKS TOGETHER.



**ATTENTION!**  
BEFORE OPERATING THE TOWPLOW  
REMOVE TWO SHIPPING JACKS

EQUIPMENT MAY NOT BE EXACTLY AS SHOWN. SOME COMPONENTS MAY BE OPTIONAL  
TO MAINTAIN OUR ON-GOING PRODUCT AND DEVELOPMENT IMPROVEMENT PROGRAM, VIKING-CIVES RESERVES THE RIGHT TO CHANGE EQUIPMENT & SPECIFICATION WITHOUT NOTICE.





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## BI-DIRECTIONAL RATCHET JACKS INSTALLED / STORED LOCATIONS

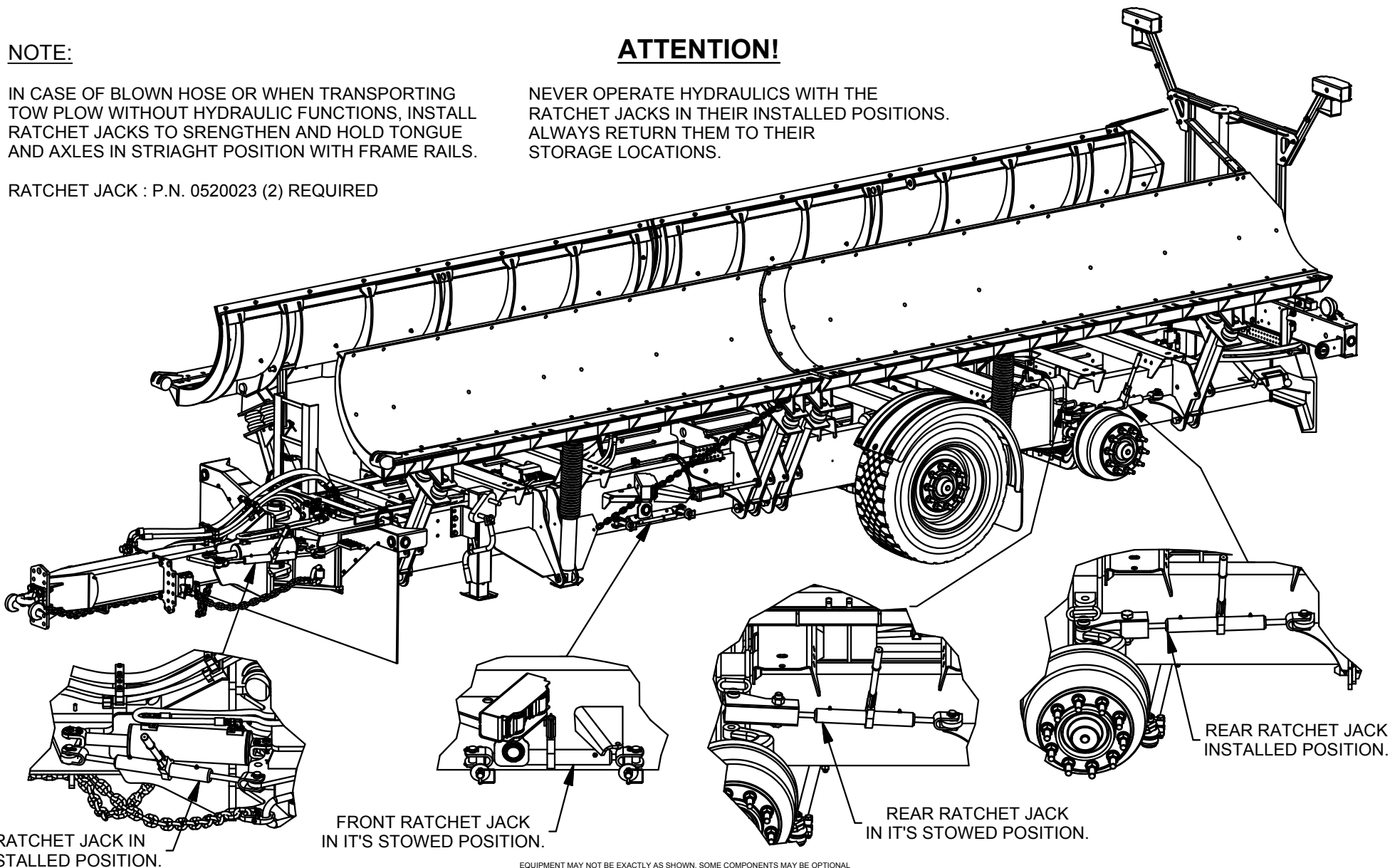
### NOTE:

IN CASE OF BLOWN HOSE OR WHEN TRANSPORTING TOW PLOW WITHOUT HYDRAULIC FUNCTIONS, INSTALL RATCHET JACKS TO STRENGTHEN AND HOLD TONGUE AND AXLES IN STRAIGHT POSITION WITH FRAME RAILS.

RATCHET JACK : P.N. 0520023 (2) REQUIRED

### ATTENTION!

NEVER OPERATE HYDRAULICS WITH THE RATCHET JACKS IN THEIR INSTALLED POSITIONS. ALWAYS RETURN THEM TO THEIR STORAGE LOCATIONS.



EQUIPMENT MAY NOT BE EXACTLY AS SHOWN. SOME COMPONENTS MAY BE OPTIONAL.  
TO MAINTAIN OUR ON-GOING PRODUCT AND DEVELOPMENT IMPROVEMENT PROGRAM, VIKING-CIVES RESERVES THE RIGHT TO CHANGE EQUIPMENT & SPECIFICATION WITHOUT NOTICE.



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### **TRUCK REQUIREMENTS WITH ALL VALVING ON CHASSIS:**

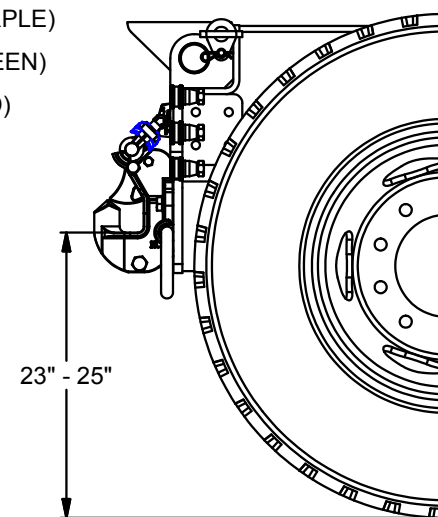
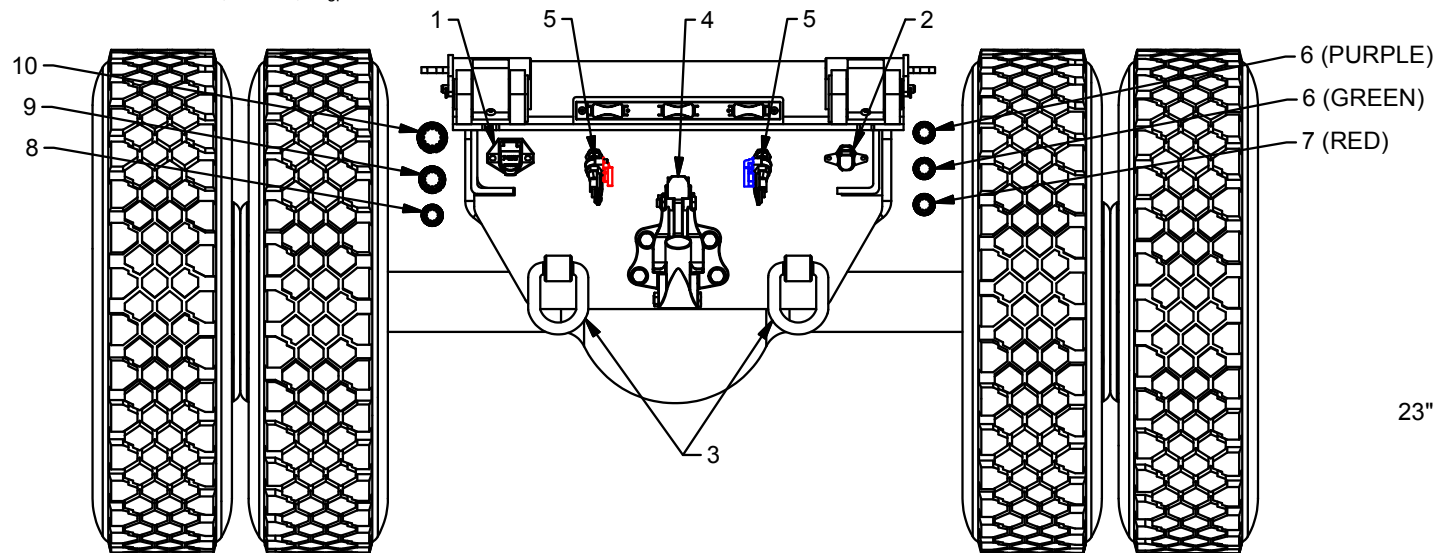
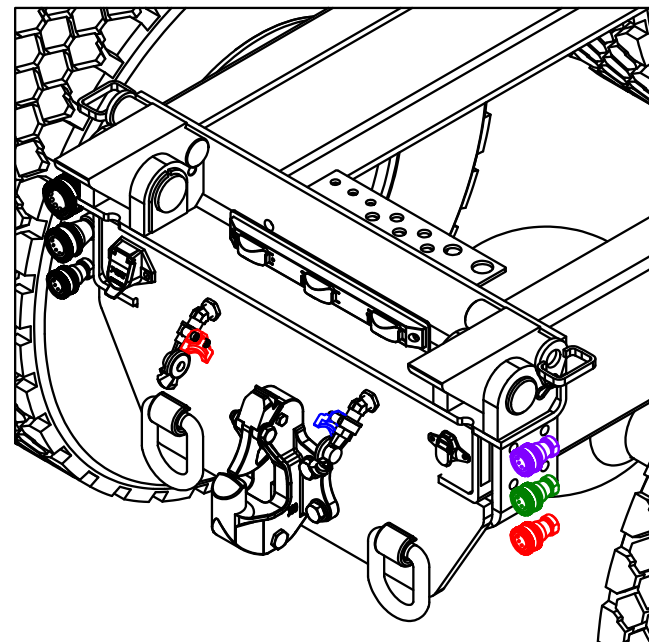
IT IS STRONGLY RECOMENDED TO HAVE 2-STAGE LOCKOUT TO PREVENT ACCIDENTAL TOW PLOW DEPLOYMENT OF CAB CONTROLS!

- 1 STANDARD 7 WIRE TRAILER LIGHT RECIEVER. BRAND = BOB TAIL
- 2 ADDITIONAL 6 WIRE RECIEVER (AUX. LIGHTS). BRAND = BOB TAIL
- 3 SAFETY CHAIN 1" D-RINGS, (2X) 46,700 LBS. BREAKING STRENGTH.
- 4 PINTLE HOOK. BRAND = PREMIER SAFETITE 100  
(20,000 Lbs. VERT. LOAD 100,000 Lbs. GROSS)
- 5 AIR BRAKE GLAD HANDS. (SERVICE BLUE AND EMERGENCY RED)
- 6 STEERING, (2X) 1/2" FEMALE QUICK CONNECT. DOUBLE ACTING, BRAND = HANSEN  
1/2" HOSE, 6 gpm. MIN FLOW @ 2000 psi.
- 7 PLOW LIFT, (1X) 1/2" FEMALE QUICK CONNECT, SINGLE ACTING, BRAND = HANSEN  
1/2" HOSE, 10 gpm. MIN FLOW @ 2000 psi.

**NOTE:** ALL QUICK DISCONNECTS WILL BE SHIPPED WITH TOW PLOW

### **HOPPER SANDER OPTIONS:**

- 8 CONTROLLED SPINNER CIRCUIT. (OR ANTI-ICE) BRAND = HANSEN  
(1X) 1/2" FEMALE QUICK CONNECT, 1/2" HOSE, 6 gpm. MIN.
- 9 CONTROLLED MAIN CONVEYOR CIRCUIT. BRAND = HANSEN  
(1X) 3/4" FEMALE QUICK CONNECT, 3/4" HOSE, 15 gpm. MIN.
- 10 CONVEYOR /SPINNER OR ANTI-ICE RETURN. BRAND = HANSEN  
(1X) 1" FEMALE QUICK CONNECT, 1" HOSE, 21 gpm. MIN.



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TO MAINTAIN OUR ON-GOING PRODUCT AND DEVELOPMENT IMPROVEMENT PROGRAM, VIKING-CIVES RESERVES THE RIGHT TO CHANGE EQUIPMENT & SPECIFICATION WITHOUT NOTICE.

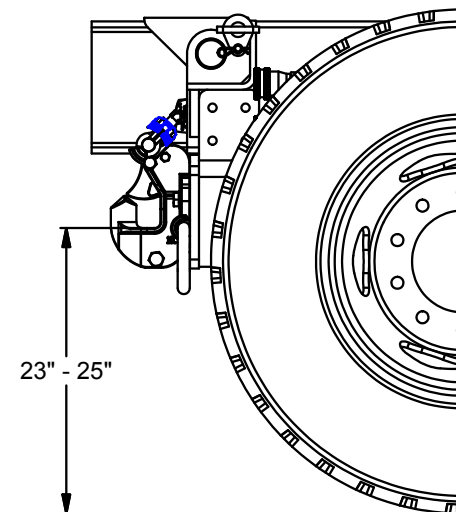
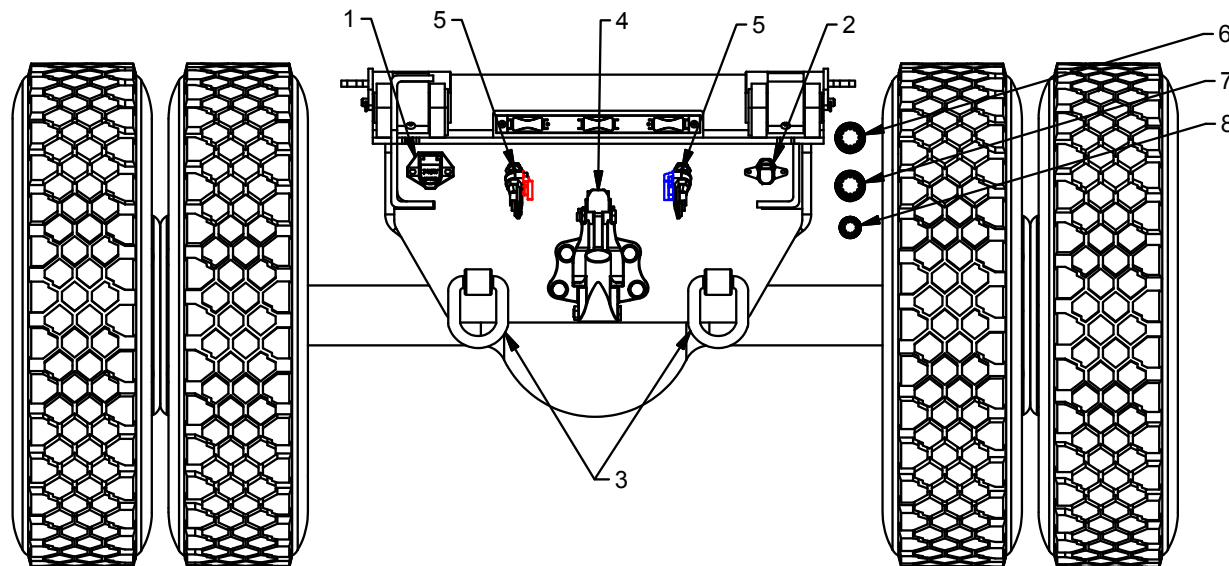
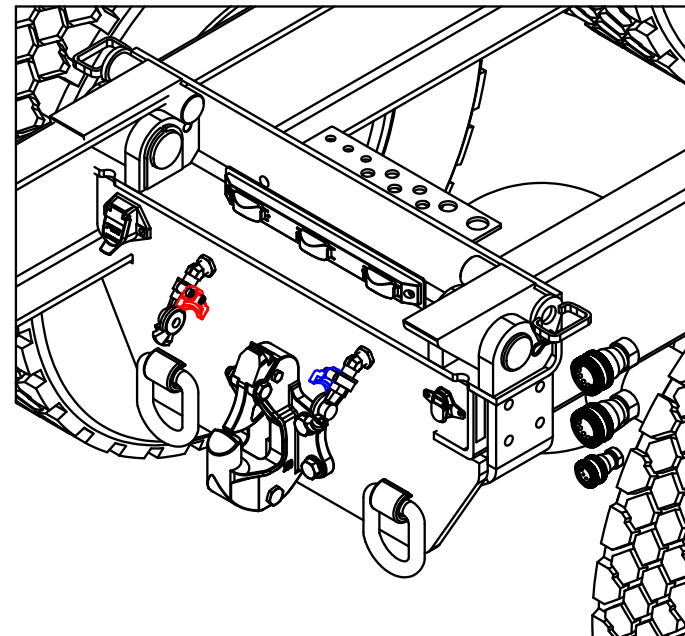


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### **TRUCK REQUIREMENTS WITH VALVING ON TOW PLOW:**

IT IS STRONGLY RECOMENDED TO HAVE 2-STAGE LOCKOUT TO PREVENT ACCIDENTAL TOW PLOW DEPLOYMENT OF CAB CONTROLS!

- 1 STANDARD 7 WIRE TRAILER LIGHT RECIEVER. BRAND = BOB TAIL
- 2 ADDITIONAL 6 WIRE RECIEVER (AUX. LIGHTS). BRAND = BOB TAIL
- 3 SAFETY CHAIN 1" D-RINGS, (2X) 46,700 LBS. BREAKING STRENGTH.
- 4 PINTLE HOOK. BRAND = PREMIER SAFETITE 100  
(20,000 Lbs. VERT. LOAD 100,000 Lbs. GROSS)
- 5 AIR BRAKE GLAD HANDS. (SERVICE BLUE AND EMERGENCY RED)
- 6 HYD. PRESSURE TO TOW PLOW MOUNTED VALVE. BRAND = HANSEN  
(1X) 1" FEMALE QUICK CONNECT, 1" HOSE, 21 gpm. MIN.
- 7 HYD. RETURN FROM TOW PLOW MOUNTED VALVE. BRAND = HANSEN  
(1X) 1" FEMALE QUICK CONNECT, 1" HOSE, 21 gpm. MIN.
- 8 HYD. LOAD SENSE. BRAND = HANSEN  
(1X) 3/8" FEMALE QUICK CONNECT, 3/8" HOSE, 3 gpm. MIN.



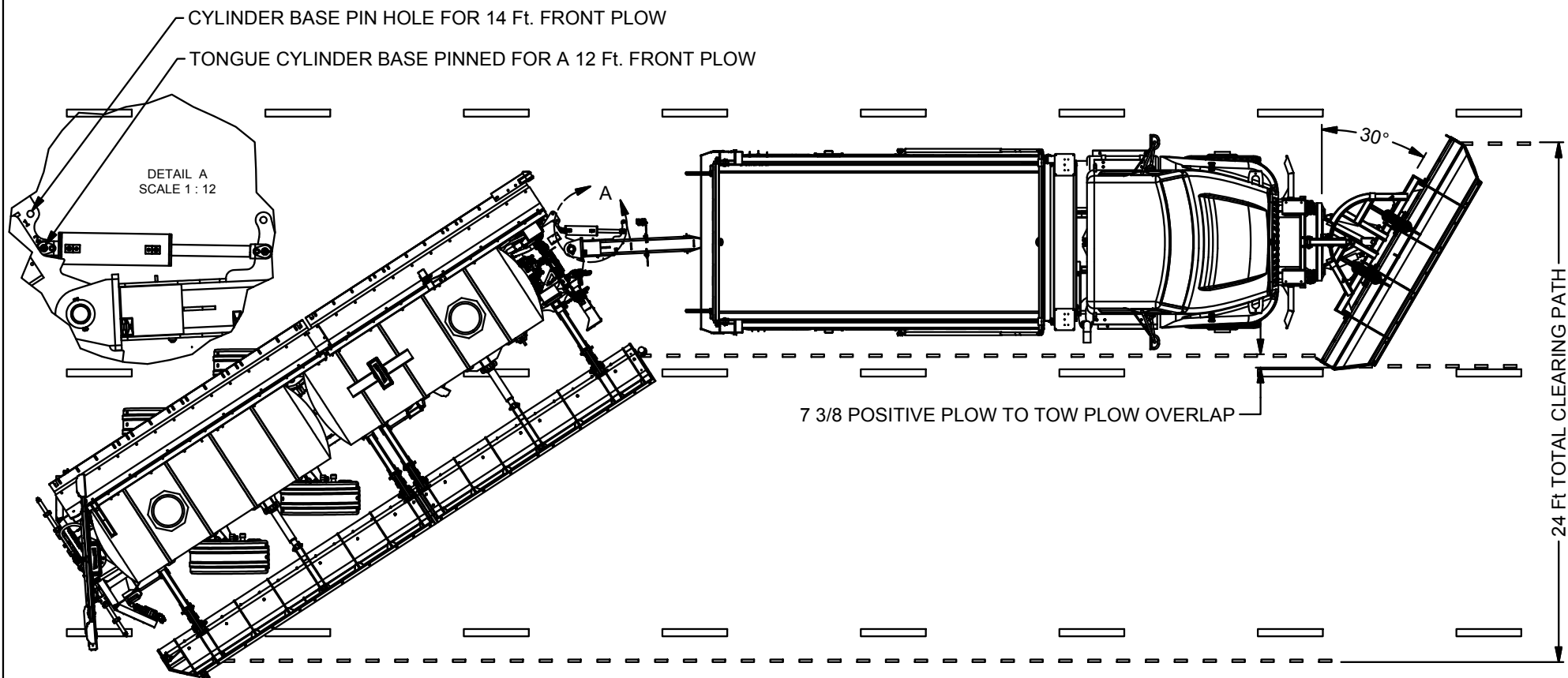
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## BI-DIRECTIONAL TOW PLOW SET-UP / CLEARING PATH LAYOUT

### 12 Ft. FRONT PLOW

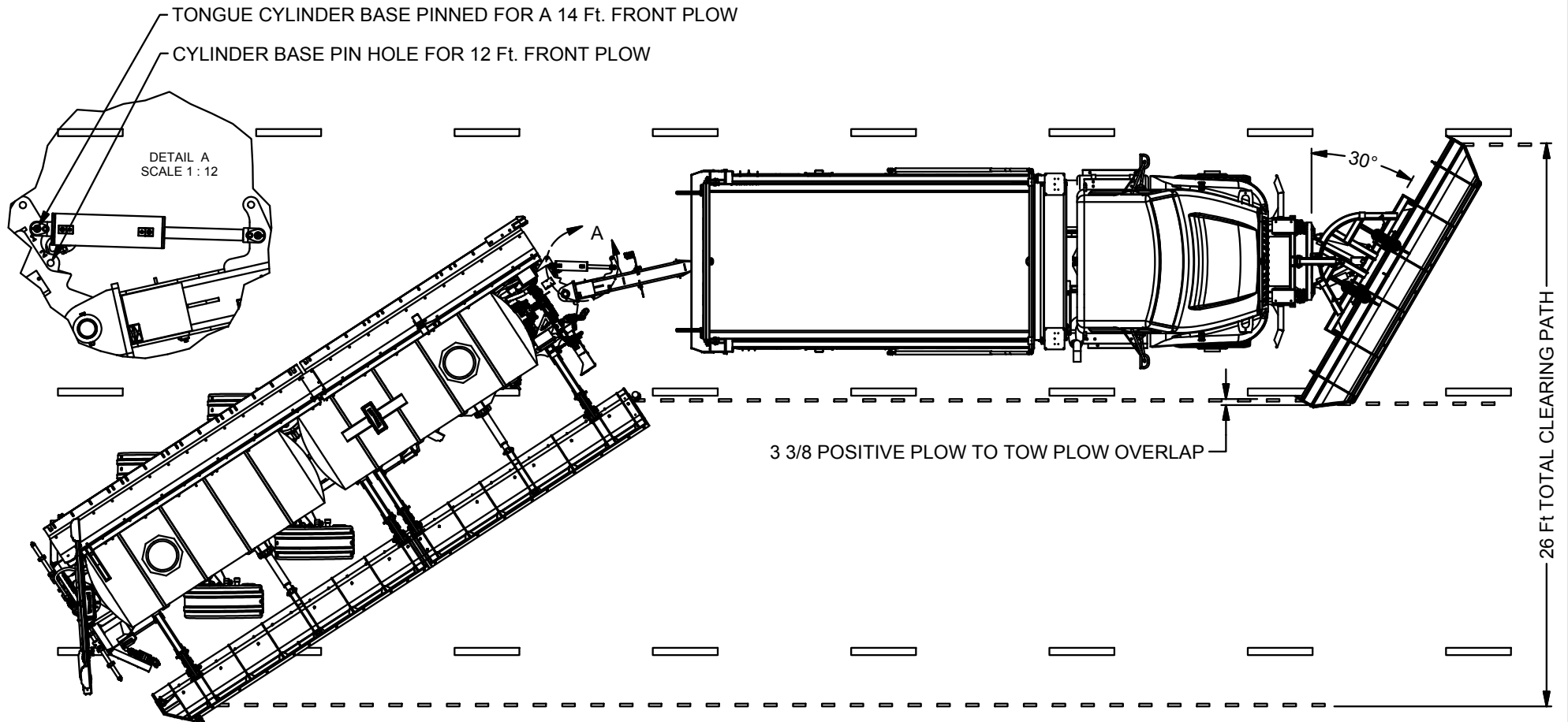


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## BI-DIRECTIONAL TOW PLOW SET-UP / CLEARING PATH LAYOUT 14 Ft. FRONT PLOW

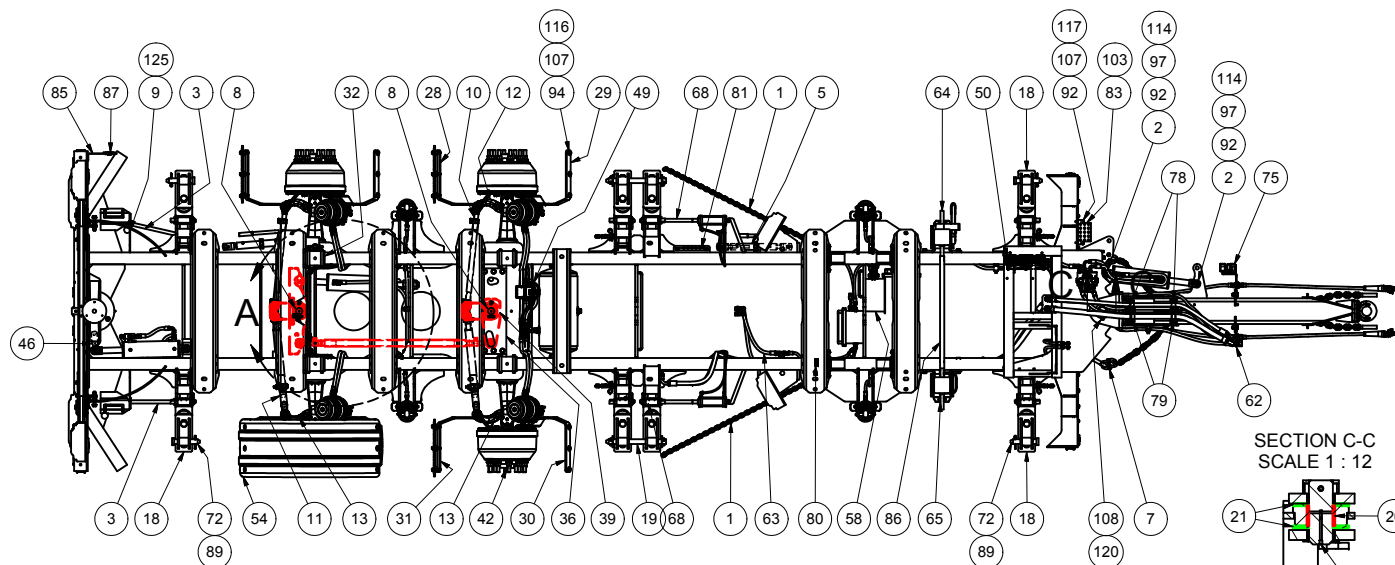
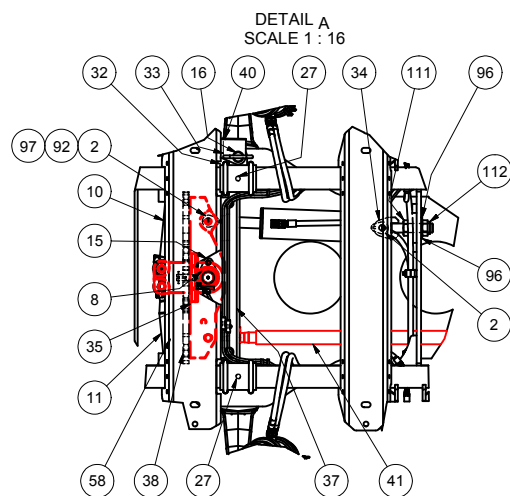


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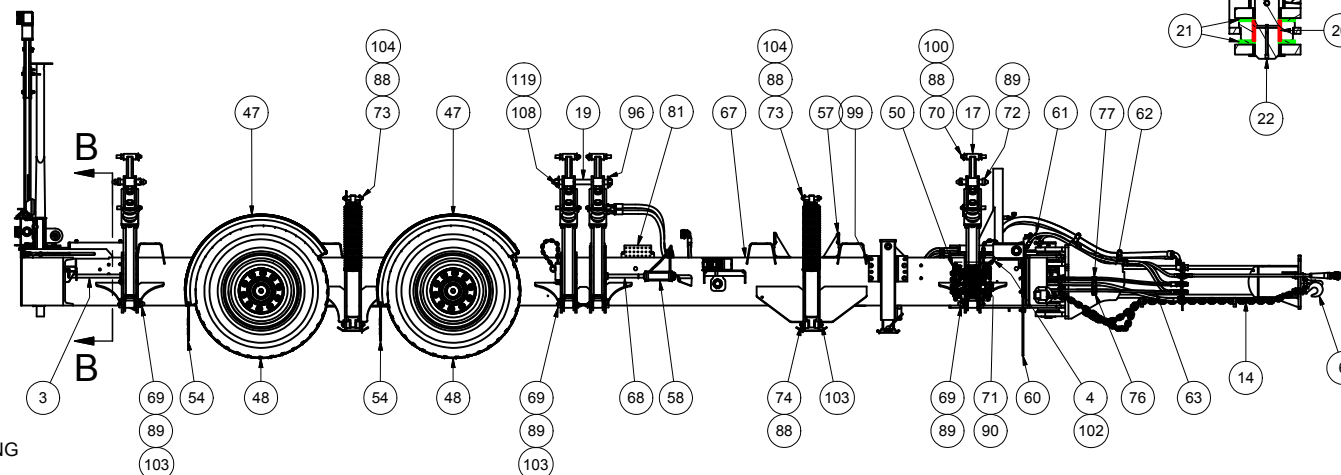
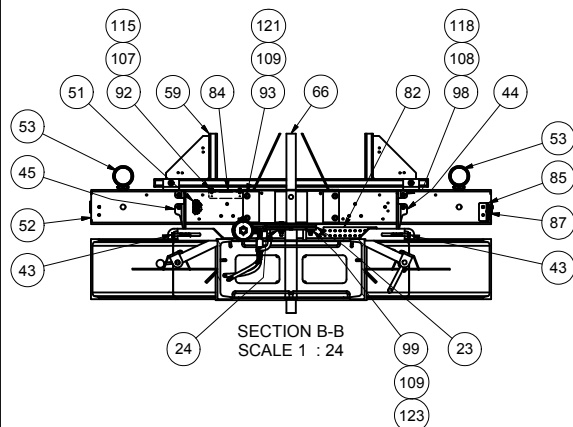
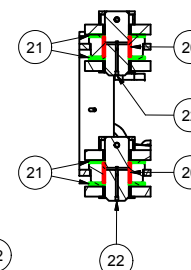


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## BI-DIRECTIONAL TOW PLOW ASSEMBLY



SECTION C-C  
SCALE 1 : 12



NOTE: IF YOU WOULD LIKE AN ENLARGED COPY OF THIS DRAWING  
PLEASE CONTACT US AND WE WILL GET YOU ONE.

NOTE: NOT ALL ITEMS SHOWN  
IN ALL OF THE VIEWS.

NOTE: STEERING ARM / PITMAN ARM TO  
SPINDLE NUT - 775-1050 ft-lbs.  
THEN UP TO 1450 ft-lbs. MAX.  
TO ALIGN COTTER PIN HOLES.

NOTE: ALL AXLE U-BOLTS TO BE  
TORQUED TO 300 ft-lbs.

NOTE: RIMS TO BE TORQUED TO 500 ft-lbs.  
TIE ROD ARMS TO BE OILED + WET  
AND TORQUED TO 600 ft-lbs. MIN.

NOTE: PLOWS REMOVED FOR CLARITY  
RTH FRONT PLOW: 41412561  
RTH REAR PLOW: 41412564  
LTH REAR PLOW: 51401064  
LTH FRONT PLOW: 51401065

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## BI-DIRECTIONAL TOW PLOW ASSEMBLY

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY	ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	00402496		CHAIN 3/8 GR 70 X 62 LG	2	33	41412734		U-BOLT KIT TOW PLOW ROUND 3/4 DIA	8
2	00900353		PIN 1.000 DIA X 2.563 WELD'T	7	34	41412774		STEER CYL ADJ. ROD WELD'T BI-DI	1
3	00900421		SAFETY PIN 1.000 DIA X 23.75 FR REAR PLOW	2	35	41412780		BI-DI PITMAN DRIVING ASS'Y	1
4	02100540	102-2316	CHAIN 3/16 GR 30 X 18.000 LG	4	36	41412784		TRAILING PITMAN TOP PLATE WELD'T	1
5	0520023	80317	RATCHET JACK AHW	2	37	41412785		LEADING PITMAN TOP PLATE WELD'T	1
6	0590080		CHAIN CLEVIS 1/2 GR70 SLIP HOOK CV LATCH	2	38	41412789		STEERING GATE BI-DI	1
7	0590081		CONNECTOR LINK 1/2 FOR SAFETY CHAIN G70	2	39	41412797		BI-DI PITMAN IDLING ASS'Y	1
8	0610071	2872T36	BRONZE THRUST BEARING 2 X 3 X 1/8	2	40	41412798		RATCHET JACK AXLE ADAPTER WELD'T	1
9	0620075		BALL KNOB W BRASS INSERT, SAFETY PIN	2	41	41412800		DRAG LINK WELD'T BI-DI	1
10	0720313	3102L4718	TIE ROD ASS'Y TOWPLOW LTH	2	42	41412818		FL943LX124 BI-DI AXLE ASS'Y	2
11	0720314	3102M4719	TIE ROD ASS'Y TOWPLOW RTH	2	43	41412849		STABILIZER PIN WEJDMNT	2
12	0720325	3133K9371	STEERING ARM BI DI LTH 3133K9371	2	44	41412850		MTG BRKT - BOSS WELDMNT	1
13	0720326	3133L9372	STEERING ARM BI DI RTH 3133L9372	2	45	41412851		MTG BRKT & BOSS WELDMNT	1
14	40401267		CHAIN 1/2 GR 70 X 103.250 LG	2	46	41413010		BI-DI REPHASING LIGHT BAR CYL ARM WELD'T	1
15	40901062		PIN 2.000 DIA X 15.000 WELD'T	2	47	42940022	0720241	MINIMIZER FENDER 18 IN BLK	4
16	40901076		PIN 1.000 DIA X 4.500 DRAWPIN	1	48	42940039	0510066	385/65 R22.5 TIRE AND RIM ASSEMBLY	4
17	41412014		BACK BRACE WELD'T	8	49	42940125		BI-DIRECTIONAL ABS INSTALL KIT	1
18	41412030		PLOW LIFT ARM ASS'Y	8	50	42940128		BI-DIRECTIONAL ELECTRICAL WIRING HARNESS	1
19	41412206		PIN 1.500 DIA X 16.438 BODY	2	51	44843018		SMALL RECTANGULAR LICENSE LAMP	1
20	41412318		JOURNAL BEARING 3.5 OD X 3.0 ID X 2.5 LENGTH	2	52	44843025		LIGHT PACKAGE FOR BI-DIRECTIONAL TOW PLOW	1
21	41412320		THURST BEARING 7.0 OD X 3.062 ID	4	53	44843417		SPREADER LIGHT (GROTE)	2
22	41412330		PIN 3.000 X 7.625 WELD'T	2	54	46867050		12" X 17 3/4" HD MUDFLAPS, PER PAIR	4
23	41412470		BEARING DISC REAR LIGHT BAR	1	55	51401064		TOW PLOW WING ASS'Y 14 FT WITH CROP LH	1
24	41412485		POLYMER WASHER FOR DISC, REAR LIGHT BAR	3	56	51401065		TOW PLOW WING ASS'Y 12 FT LH	1
25	41412561		TOW PLOW WING ASS'Y 12 FT	1	57	51401070		ANTI-SLIDING BRACKET ASSEMBLY BI-DI	4
26	41412564		TOW PLOW WING ASS'Y 14 FT WITH CROP	1	58	51401099		PNEUMATIC STEERING LOCK ASSEMBLY	1
27	41412577		TOW PLOW AXLE DOWEL	4	59	51401123		STD. HIGH VISABLILITY LIGHT BAR ASSEMBLY (WLK)	1
28	41412685		LH BACKING PLATE FENDER BRK'T WELD'T	2	60	51401149		FRONT RUBBER SKIRT ASSEMBLY	1
29	41412689		S-CAM FENDER BRK'T LH	2	61	51401163		2017 BI-DIRECTIONAL HYDRAULIC KIT ASSEMBLY	1
30	41412690		S-CAM FENDER BRK'T RH	2	62	41413025		TONGUE ASSEMBLY VCM BI-DI ANTI-ICE	1
31	41412691		RH BACKING PLATE FENDER BRK'T WELD'T	2	62	51401169		TONGUE ASSEMBLY VCM BI-DI SPRD/TANK COMBO	1
32	41412732		HALF ROUND U-BOLT BLOCK	4					

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## BI-DIRECTIONAL TOW PLOW ASSEMBLY

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY	ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
63	51401170		BI-DIRECTIONAL SPRD & PRE-WET HYDRAULIC KIT	1	94	HW14B-06		FLATWASHER USS 3/8 ZINC	24
64	51403015		TWO SPEED LANDING GEAR WELD'T LTH	1	95	HW14B-16	81013A	FLATWASHER USS 1" ZINC	2
65	51403016		TWO SPEED LANDING GEAR WELD'T RH	1	96	HW14B-24		FLATWASHER USS 1 1/2 ZINC	6
66	51403098		STD.REAR LIGHT WELDMENT.BI-DI TOW PLOW	1	97	HW14C-06		LOCKWASHER SPLIT 3/8" ZINC	8
67	51403157		BI-DI PRE-WET TANK/SPRD BASE FRAME WELD'T	1	98	HW14D-08		FLATWASHER HARDENED 1/2 ZINC	9
67	51403215		STANDARD BI-DI ANTI-ICE FRAME WELD'T	1	99	HW14D-10	81070E	FLATWASHER HARDENED 5/8 ZINC	22
68	51408006		LOCK PIN 1.00 DIA X 10.375 PLOW LOCK	2	100	HW14D-16	81013A	FLATWASHER HARDENED 1 ZINC	24
69	51409000	41412019	PIN 1.500 DIA X 5.563 UH	8	101	HW16A-12		FLATWASHER HARDENED 3/4 ZINC	24
70	51409001	41412033	PIN 0.938 DIA X 5.313 UH	16	102	HW24C-02		3/16 QUICK LINK	8
71	51409003	41412150	TOW PLOW MOLDBOARD SAFETY PROP PIN	4	103	HW29A-02	80577	GREASE FITTING 1/8 NPT STR	66
72	51409004	41412566	MOLDBOARD TO STANDOFF ARM OUTSIDE PIN	4	104	HW29B-02		GREASE FITTING 1/8 NPT 90 DEG	4
73	51409005	41412035	UPPER CYLINDER TO MOLDBOARD PIN	4	105	HW29E-04	80577D/80579	GREASE FITTING 1/4 28 STR	1
74	51409006	41412037	LOWER CYLINDER TO FRAME PIN	4	106	HW30A-08		NUT HEX 1/2 UNC ZINC	4
75	51415029		CABLE CADDY	1	107	HW30E-06		NUT HEX 3/8 UNC TOPLOCK ZINC	44
76	51415175	02056174	HYDAC HRS 3/8" SINGLE HOSE CLAMP ASSEMBLY	13	108	HW30E-08		NUT HEX 1/2 UNC TOP LOCK ZINC	11
77	51415176		HYDAC HRS 1/2" DOUBLE HOSE CLAMP ASSEMBLY	22	109	HW30E-10		NUT HEX 5/8 UNC TOPLOCK ZINC	15
78	51415181		HYDAC HRS 3/4" SINGLE HOSE CLAMP ASSEMBLY	5	110	HW30E-12		NUT HEX 3/4 UNC TOPLOCK ZINC	12
79	51415182		HYDAC SINGLE CLAMP W/WELD PLATE - 1" PIPE	5	111	HW31A-24		NUT HEX 1 1/2 UNF ZINC	1
80	51415183		HYDAC HRS 3/8" DOUBLE CLAMP ASSEMBLY	1	112	HW31D-24		NUT HEX 1 1/2 UNF ZINC STOVER	1
81	51419000		GREASE BANK MIDDLE TOW PLOW	1	113	HW36D-10		NUT HEX NYLON 5/8" UNC ZINC	2
82	51419001		GREASE BANK REAR TOW PLOW	1	114	HW40A-0606		BOLT HEX 3/8 X 3/4 UNC ZINC	8
83	51419002		GREASE BANK FRONT TOW PLOW	1	115	HW40A-0608		BOLT HEX 3/8 X 1 UNC ZINC	2
84	51422091		TOW PLOW LICENSE PLATE MOUNTING PLATE	1	116	HW40A-0610		BOLT HEX 3/8 X 1 1/4 UNC ZINC	36
85	51422243		MOUNTING PLATE FOR ABS LIGHT 2017	1	117	HW40A-0620		BOLT HEX 3/8 X 2 1/2 UNC ZINC	6
86	51429003	42940045	CONNECTING TUBE 2 SPEED TOW PLOW JACK	1	118	HW40A-0812		BOLT HEX 1/2" X 1 1/2" UNC ZINC	4
87	53615013		ABS SUPERNOVA 2.5" LED MARKER LIGHT	1	119	HW40A-0820		BOLT HEX 1/2 X 2 1/2 UNC ZINC	4
88	HW13A-0648	80507A	COTTER PIN 3/16 X 3 ZINC	24	120	HW40A-0840		BOLT HEX 1/2 X 5 UNC ZINC	2
89	HW13A-1248		COTTER PIN 3/8 X 3 ZINC	14	121	HW40A-1012	81072	BOLT HEX 5/8 X 1 1/2 UNC ZINC	4
90	HW13P-7GA56	80536	COTTER HAIRPIN 3/16" X 3 3/4" ZINC	4	122	HW40A-1020	81075E	BOLT HEX 5/8 X 2 1/2 UNC ZINC	8
91	HW13Q-1028	81112A	LOCK PIN 5/16 X 1 3/4 ZINC	2	123	HW40A-1024		BOLT HEX 5/8 X 3 UNC ZINC	3
92	HW14A-06		FLATWASHER SAE 3/8 ZINC	48	124	HW40A-1224		BOLT HEX 3/4 X 3 UNC ZINC	12
93	HW14A-10	81070A	FLATWASHER SAE 5/8 ZINC	10	125	HW56A-0848		THREADED ROD 1/2-13 UNC x 6	2

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## BI-DIRECTIONAL TOW PLOW HYDRAULIC ASSEMBLY

PART NUMBER : 51401163

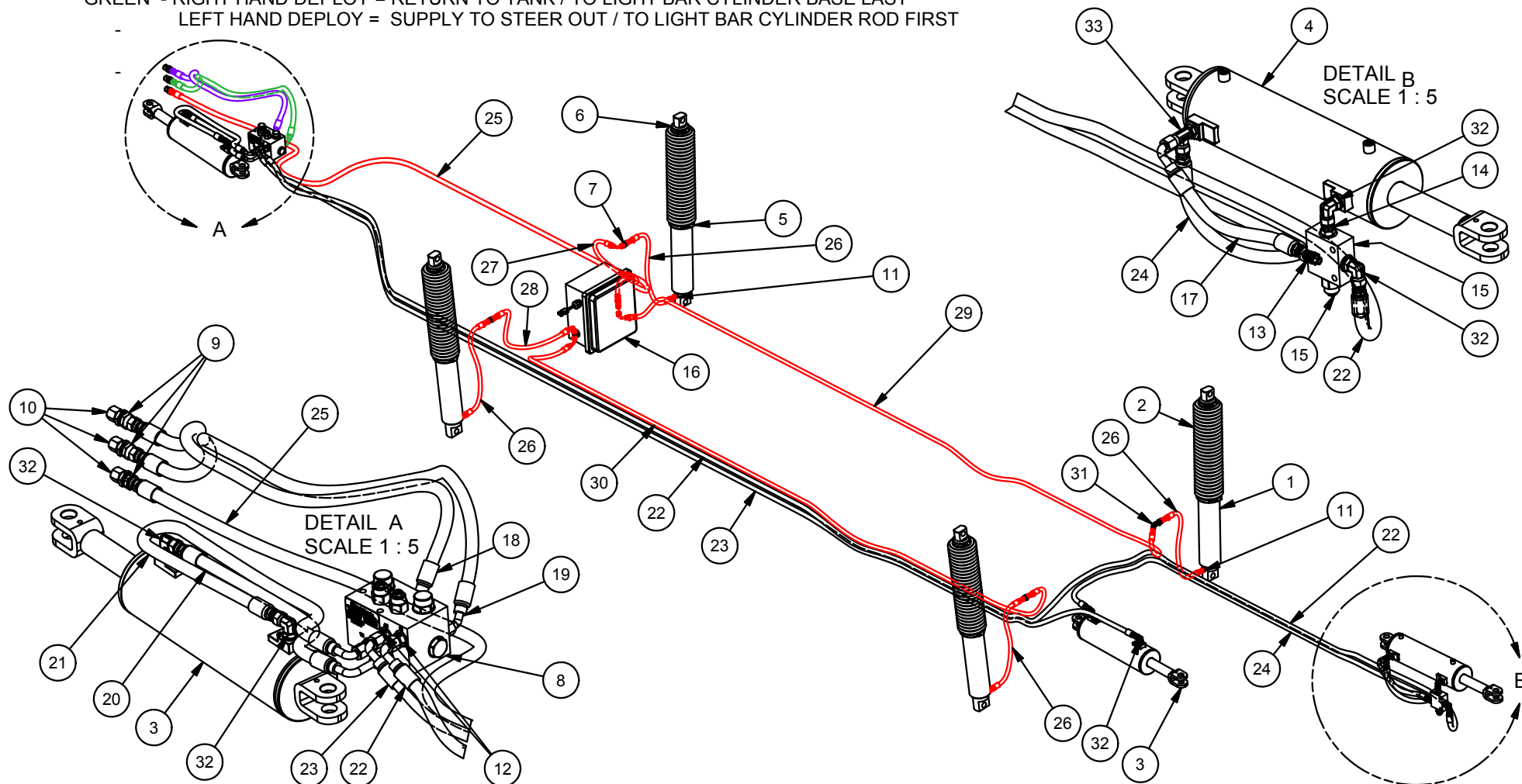
NOTE: RED - PLOW

PURPLE - RIGHT HAND DEPLOY = SUPPLY TO STEER OUT / TO TONGUE CYLINDER BASE FIRST

LEFT HAND DEPLOY = RETURN TO TANK / TO TONGUE CYLINDER ROD LAST

GREEN - RIGHT HAND DEPLOY = RETURN TO TANK / TO LIGHT BAR CYLINDER BASE LAST

LEFT HAND DEPLOY = SUPPLY TO STEER OUT / TO LIGHT BAR CYLINDER ROD FIRST



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## BI-DIRECTIONAL TOW PLOW HYDRAULIC ASSEMBLY

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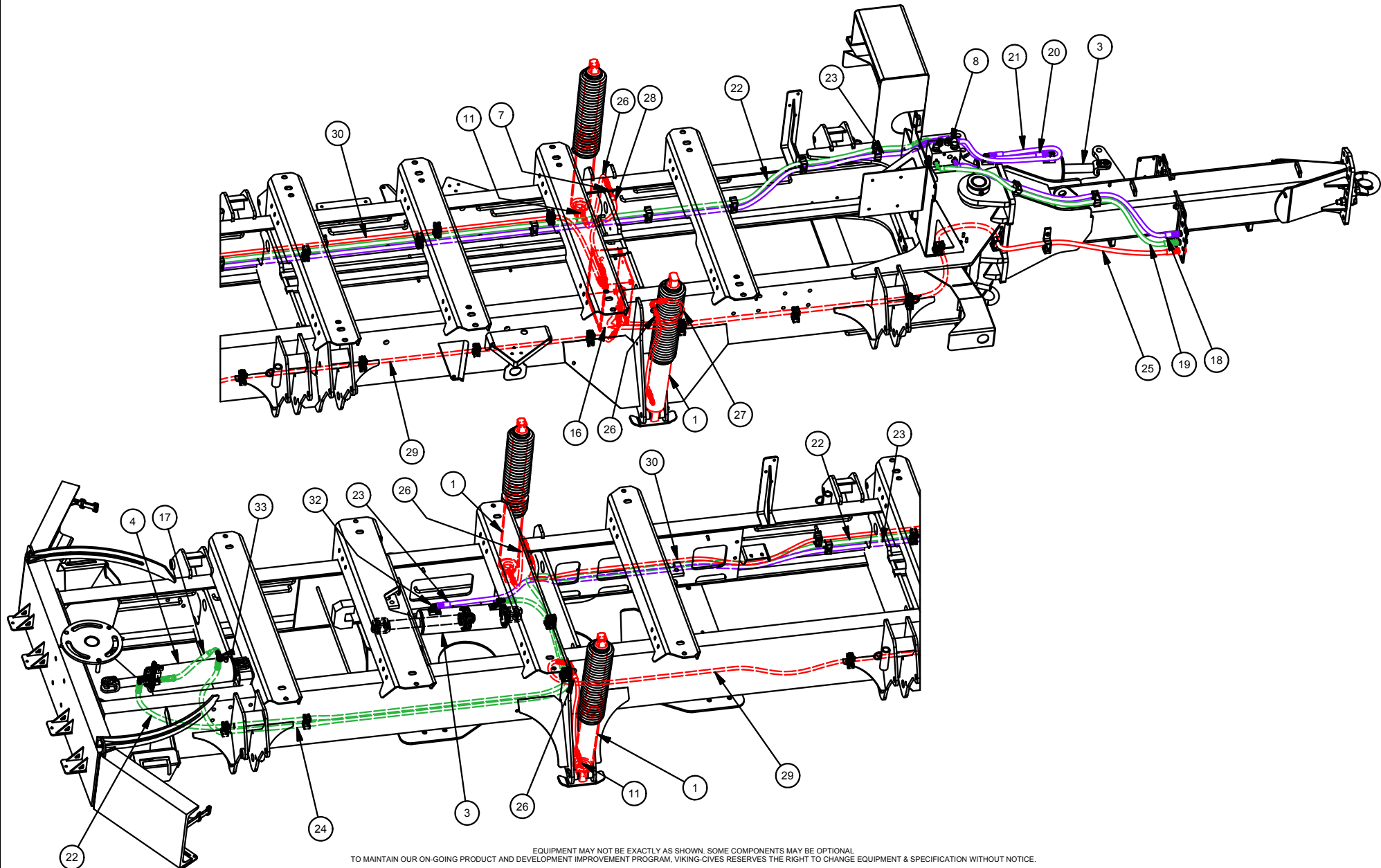
ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	0540398		CYLINDER HYD SA 3 1/2 X 16 TOW PLOW	4
2	0540400		CYLINDER BOOT FOR 0540398 TOW PLOW	4
3	0540425		CYLINDER HYD TOWPLOW 4 1/2 X 12 REFZ STEER/TONGUE	2
4	0540426		CYLINDER HYD TOWPLOW 4 1/2 X 12 REFZ LIGHT BAR	1
5	0620031		GEAR CLAMP 3-5 INCH STAINLESS	4
6	0620065		GEAR CLAMP 2 1/2 -3 1/2 STAINLESS	4
7	2700LN 6-6		6MJ - 6MJ BULKHEAD	4
8	43939229	MS04090040	FRONT VALVE MANIFOLD ASSEMBLY	1
9	441402700LN-8-8		8MJ-8MJ MALE BULKHEAD W/LOCK NUT	3
10	44140304C-8		8FJIC HEX CAP	3
11	441406400-6		6MJ-6MB O-RING CONN	4
12	441406400-8		8MJ-8MB O-RING CONNECTOR	6
13	441406400-8-6		8MJ-6MB O-RING CONNECTOR STEEL	1
14	441406402-8-8		8MB-8FJX O-RING/FEMALE 37 DEGREE SWIVEL ADAPTOR	1
15	44240217		SUN COUNTER BALANCE BODY AND CARTRIDGE T-2A 2000 PSI	1
16	51401082		BI-DI HYDRAULIC ENCLOSURE ASSEMBLY	1
17	51401288		REAR LIGHT CYL TEE TO COUNTER BALANCE HOSE ASSEMBLY 13"	1
18	51401290		1/2" HOSE ASS'Y BH PLATE TO VALVE PORT TA	1
19	51401291		1/2" HOSE ASS'Y BH PLATE TO VALVE PORT TB	1
20	51401292		1/2" HOSE ASS'Y VALVE PORT TR TO TONGUE ROD END	1
21	51401293		1/2" HOSE ASS'Y VALVE PORT TC TO BASE END TONGUE CYL	1
22	51401294		1/2" HOSE ASS'Y VALVE PORT SR TO REAR LIGHT BAR CYL. ROD	1
23	51401295		1/2" HOSE ASS'Y VALVE PORT AR TO STEERING CYL. ROD	1
24	51401296		1/2" HOSE ASS'Y STEERING CYL. BASE TO SIGN CYLINDER BASE	1
25	51401299		1/2" HOSE ASS'Y BH PLATE TO HYD ENCLOSURE	1
26	51401300		CHANNEL BH PLATE TO LIFT CYL. BASE 3/8" HOSE ASSEMBLY	4
27	51401304		3/8 HOSE ASS'Y HYD ENCLOSURE TO PASS SD FRONT BH	1
28	51401305		3/8" HOSE ASS'Y HDY ENCLOSURE TO DRVS SD FRONT BH	1
29	51401306		3/8" HOSE ASS'Y HYD ENCLOSURE TO PASS SD REAR BH	1
30	51401307		3/8" HOSE ASS'Y HYD ENCLOSURE TO DRVS SD REAR BH	1
31	6502-6-6		6MJ-6FJX45	2
32	6801-8-8		8MB-8MJ90	6
33	6804-8-8-8		8MB - 8MJ - 8MJ TEE FITTING	1

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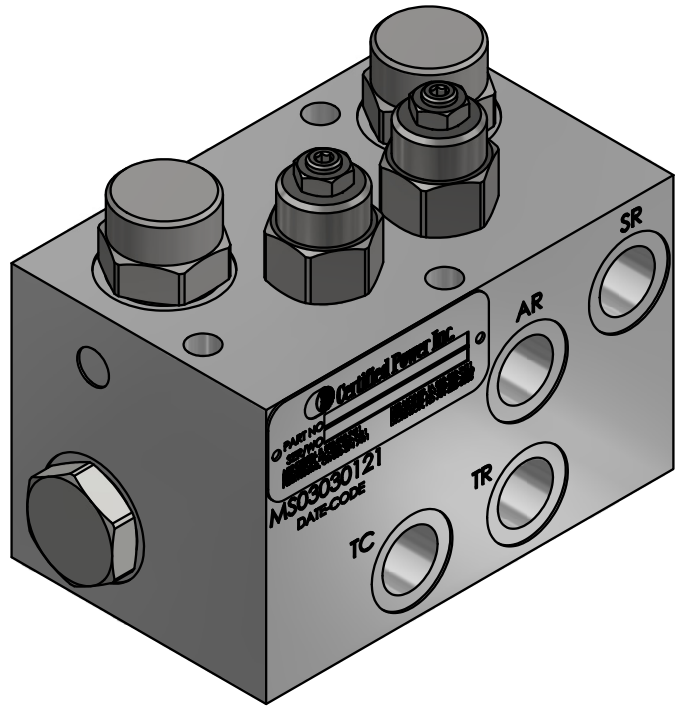


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## BI-DIRECTIONAL TOW PLOW FRAME HYDRAULIC STEERING ASSEMBLY ROUTING



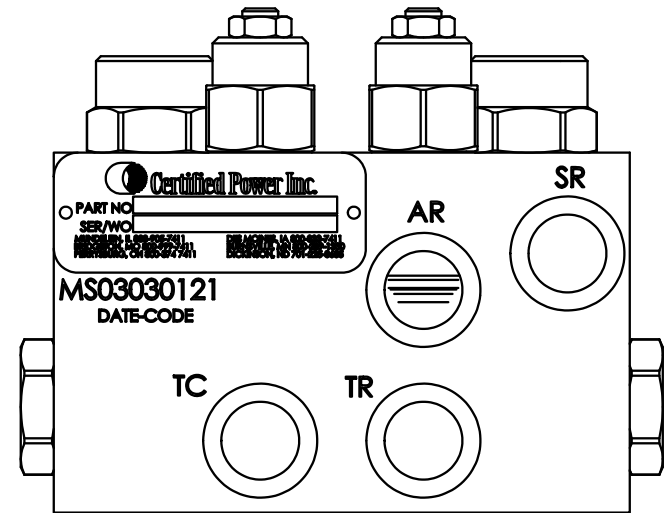
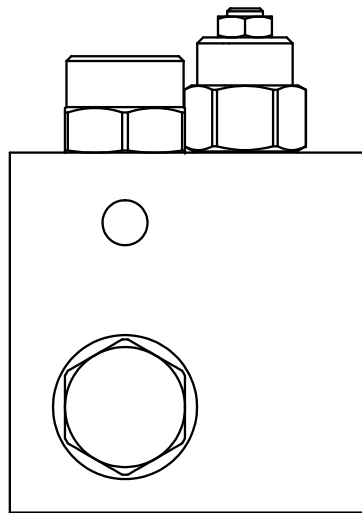
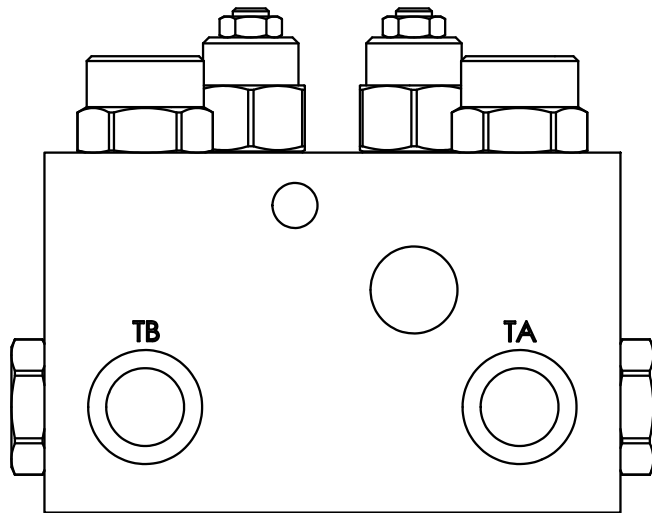
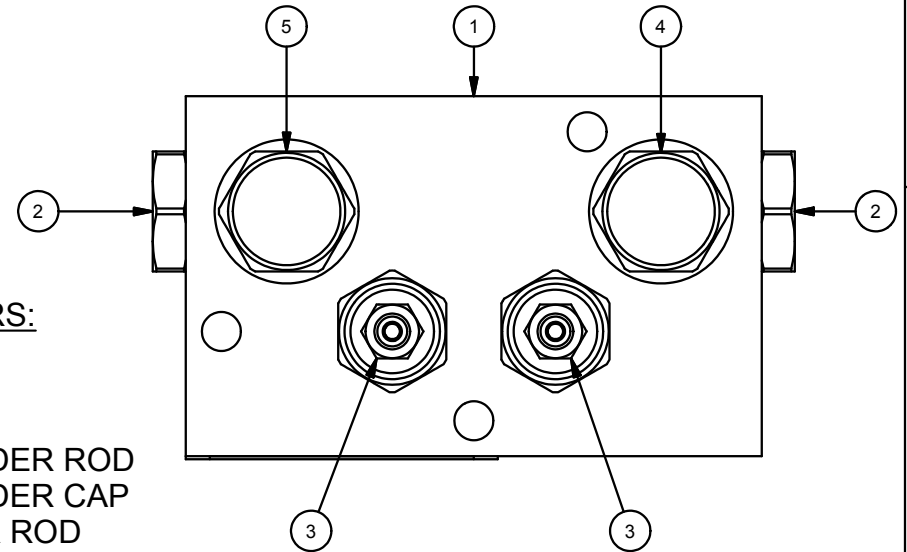
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ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	51415169	MS03030121	BI-DIRECTIONAL STEERING CIRCUIT VALVE BODY	1
2	CV12-20		HYDRAFORCE ONE-WAY CHECK VALVE	2
3	CBEG-LJN		COUNTERBAL. VALVE CARTRIDGE, T-2A 3000 PSI SETTING	2
4	FR 12-20F-0-N-11.0		11 GALLON PER MINUTE CARTRIDGE	1
5	FR 12-20F-0-N-12.0		12 GALLON PER MINUTE CARTRIDGE	1

PORT IDENTIFIERS:

TA = TRUCK A PORT  
TB = TRUCK B PORT  
TR = TONGUE CYLINDER ROD  
TC = TONGUE CYLINDER CAP  
AR = AXLE CYLINDER ROD  
SR = SIGN CYLINDER ROD



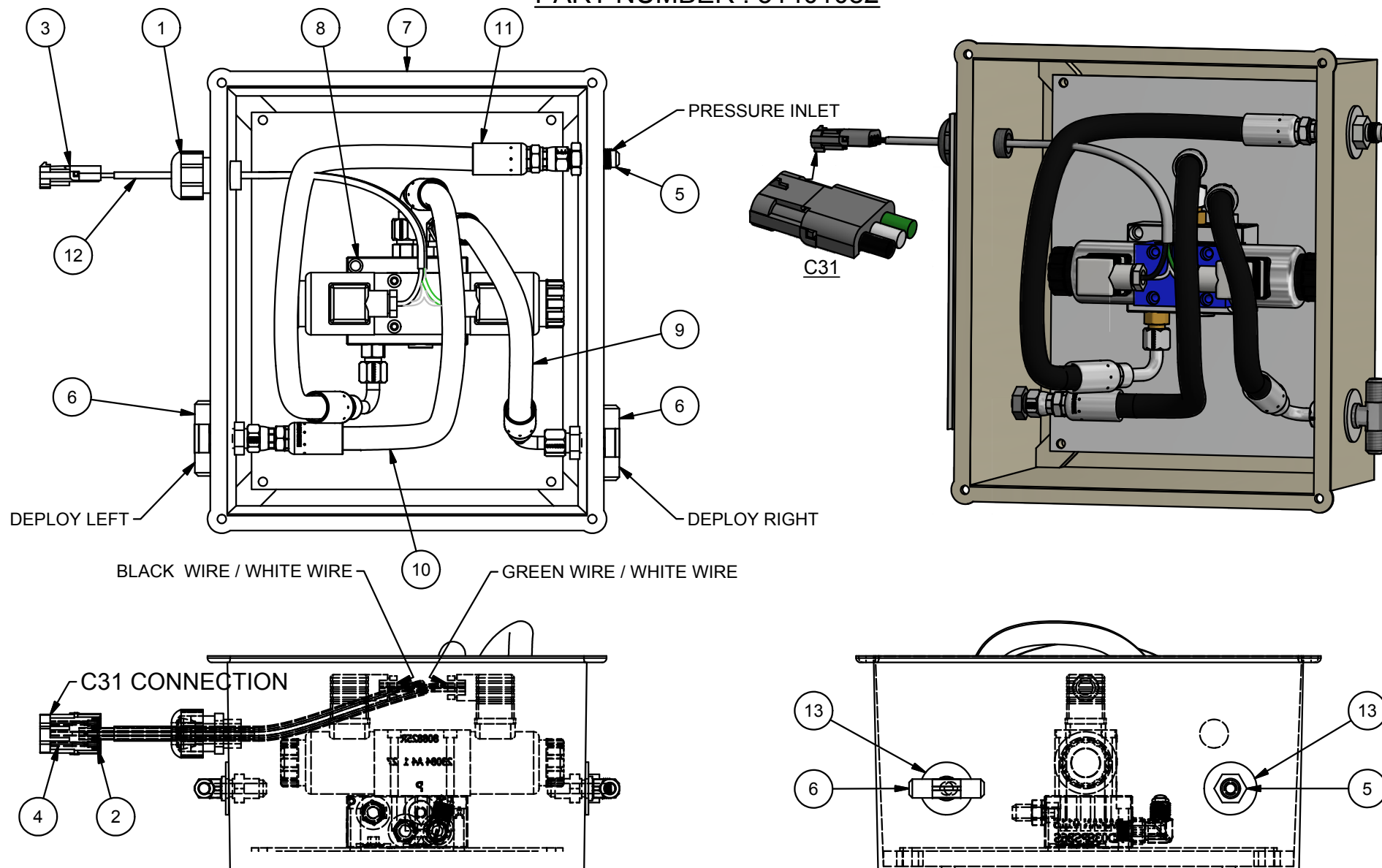
MATERIAL: ASSEMBLY		DO NOT SCALE THIS DRAWING		1		FIRST RELEASE		KMK		3/21/17	
DRAWN BY: KMK		DATE: 3/21/2017		REV		EON		DESCRIPTION		DRAWN	
CHECKED BY:		DATE:		DWG SIZE: ANSI C		SCALE: 3:4		ALT. ITEM: MS04090040		EST. UNITS: EACH	
THIRD-ANGLE PROJECTION		BI-DIRECTIONAL ALL IN ONE FRONT VALVE MANIFOLD ASSEMBLY		DWG NO. 43939229		REV NO. 1		UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES TOLERANCES ARE AS NOTED FRACTIONAL .125 .250 .500 .750 .875 .125 .250 .500 .750 .875			



22956 HWY 61, MORLEY, MO 63767, PH: 573.262.3545, FX: 573.232.3369

## BI-DIRECTIONAL HYDRAULIC CONTROL BOX

PART NUMBER : 51401082



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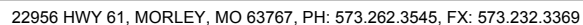


22956 HWY 61, MORLEY, MO 63767, PH: 573.262.3545, FX: 573.232.3369

**BI-DIRECTIONAL HYDRAULIC CONTROL BOX**  
**PART NUMBER : 51401082**

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	0660313		FITTING ENTRANCE 1/2 (T)SRC10	1
2	12010293		SEAL, WIRE; 12010293 (14-16)	3
3	12010717		CONNECTOR, WIRE;A; 12010717 (3-WAY/M)	1
4	12124580		PIN, FEMALE; 12124580 (14-16)	3
5	2700LN 6-6		6MJ - 6MJ BULKHEAD	1
6	2703-6-6-6		TEE 6MJ - 6MJ - 6MJ	2
7	42940014	AM1206RT	SEALED POLY ENCLOSURE BI-DI TOW PLOW	1
8	43939188		HYDRAULIC KIT BI-DIRECTIONAL TOWPLOW	1
9	51401252		INSIDE DRY BOX DEPLOY RIGHT HOSE ASS'Y	1
10	51401253		INSIDE DRY BOX DEPLOY LEFT HOSE ASS'Y	1
11	51401254		INSIDE DRY BOX PRESSURE HOSE ASSEMBLY	1
12	51415197		THREE STRAND 14 Ga. WIRE (PER FT.)	1
13	HW14B-06		FLATWASHER USS 3/8 ZINC	3

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The diagram illustrates the hydraulic system for the ST401055. The main loop consists of a long blue tube (11) and a yellow tube (10) connected by various fittings (3, 6, 9, 12, 13, 14) and actuators (2, 4, 7, 8). A detailed view of the supply tank connection shows the black tube (12) leading to the supply tank, with various fittings (3, 4, 5, 14) and actuators (1, 7, 8) connected to the blue tube (11) and yellow tube (10). The system includes two actuators labeled 0540420 (RH DEPLOY and LH DEPLOY) and one labeled 0540414.

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**PNEUMATIC STEERING LOCK ASSEMBLY**  
**PART NUMBER: 51401099**

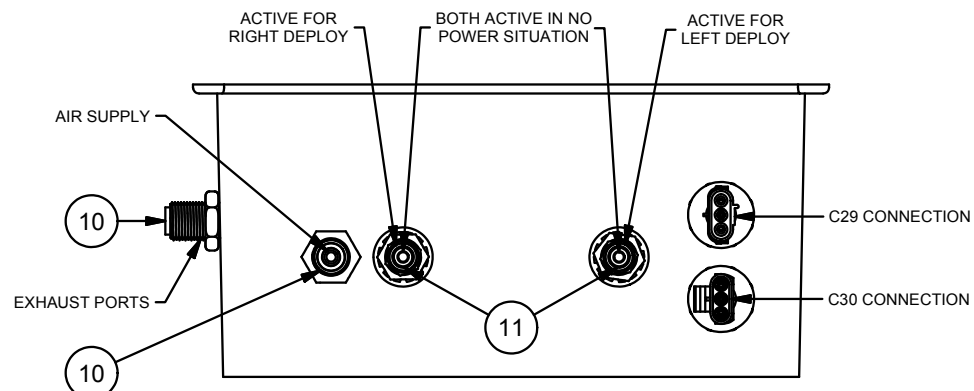
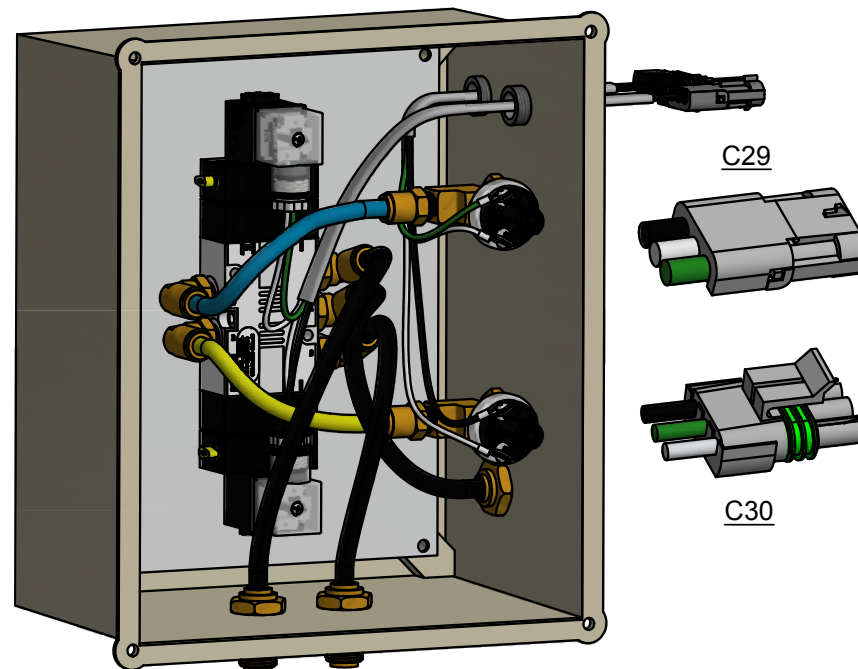
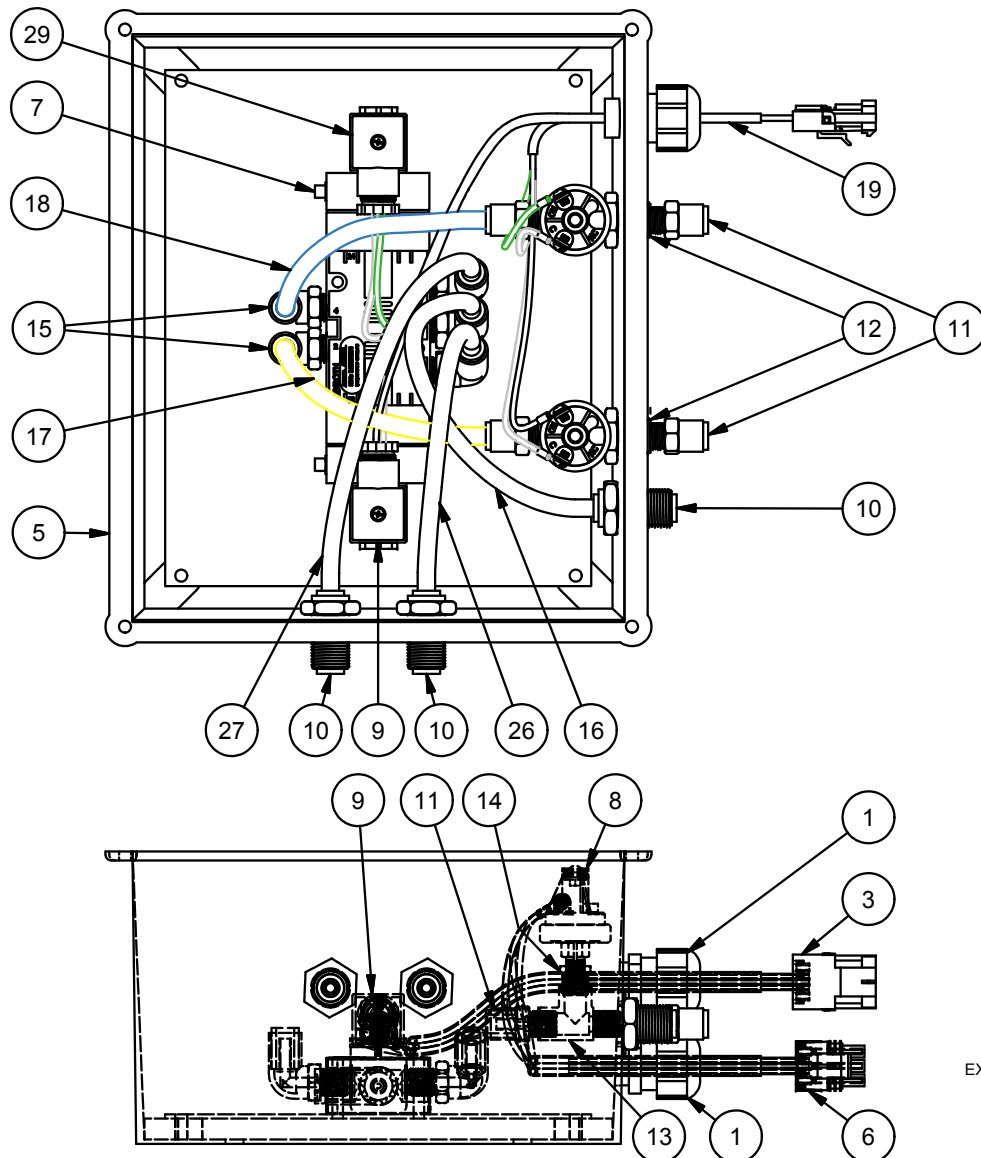
ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	0540414		CYLINDER AIR 5 X 6 1/2 SALT SAVER	1
2	0540420		AIR CYLINDER FOR PLOW- LIFT LOCK	2
3	20530058		VALVE AIR PROTECTION	1
4	43842969-6-4		3/8 INCH TUBE X 1/4 INCH MALE PIPE 90	4
5	46101196	51401083	BI-DI PNEUMATIC ENCLOSURE ASSEMBLY	1
6	51415529	95453012M	NORGREN DOT FLEETFIT 3/8" O.D. TUBE TO 1/4" NPT MALE STRAIGHT	1
7	51415541	95411420M	NORGREN DOT FLEETFIT 3/8" O.D. TUBE TO 3/8" MALE SWIVEL ELBOW	2
8	51415542	94-4514-06M	NORGREN DOT FLEETFIT 3/8" O.D. TUBE UNION TEE	4
9	51415549		3/8" OD ECLIPSE DOT TUBING BLACK (PER FOOT)	?
10	51415550	3270-0616-0500	3/8" OD ECLIPSE DOT TUBING BLUE (PER FOOT)	?
11	51415551	3270-0614-0500	3/8" OD ECLIPSE DOT TUBING YELLOW (PER FOOT)	?
12	66229		1/4 90 DEG STREET ELBOW BLACK PIPE	1
13	66287		3/8 X 1/4 HEX BUSHING BLACK PIPE	1
14	66410		1/4 CLOSE NIPPLE BLACK PIPE	1

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## BI-DIRECTIONAL PNEUMATIC CONTROL BOX ASSEMBLY PART NUMBER : 46101196



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## BI-DIRECTIONAL PNEUMATIC CONTROL BOX ASSEMBLY

### PART NUMBER : 46101196

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	0660313		FITTING ENTRANCE 1/2 (T)SRC10	2
2	12010293		SEAL, WIRE; 12010293 (14-16)	6
3	12010717		CONNECTOR, WIRE;A; 12010717 (3-WAY/M)	1
4	12124580		PIN, FEMALE; 12124580 (14-16)	3
5	42940014	AM1206RT	SEALED POLY ENCLOSURE PNEUMATIC BI-DI	1
6	44847300		CONNECTOR, WIRE;A; 12015793 (3-WAY/F)	1
7	51401190	R32030384	REXROTH AIR VALVE PRESSURE OPEN TO PORTS	1
8	51415510	43851003	HONEYWELL 5000 SERIES ULTRA DUTY PRESSURE SWITCH	2
9	51415518	R432013729	REXROTH SOLENOID DIN CONNECTOR W/LIGHT	2
10	51415525	94450706M	NORGREN DOT FLEETFIT 3/8" BULKHEAD UNION WITH NUT	3
11	51415529	95453012M	NORGREN DOT FLEETFIT 3/8" O.D. TUBE TO 1/4" NPT MALE STRAIGHT	4
12	51415530	1345	WEATHERHEAD 1/4" FP 1/4" FP BULKHEAD	2
13	51415531	3750X4	WEATHERHEAD 1/4" BRASS PIPE STREET TEE FITTING	2
14	51415532	3220X4X2	EATON 1/4" MALE X 1/8" FPT REDUCER	2
15	51415533	95411412M	NORGREN DOT FLEETFIT 3/8" O.D. TUBE TO 1/4" MALE SWIVEL ELBOW	9
16	51415535	3270-0610-0500	3/8" OD ECLIPSE DOT TUBING BLACK (PER FOOT)	2
17	51415538	3270-0614-0500	3/8" OD ECLIPSE DOT TUBING YELLOW (PER FOOT)	1
18	51415539	3270-0616-0500	3/8" OD ECLIPSE DOT TUBING BLUE (PER FOOT)	1
19	51415540	44847WD14-3	THREE STRAND 14 GA WIRE (PER FOOT)	6

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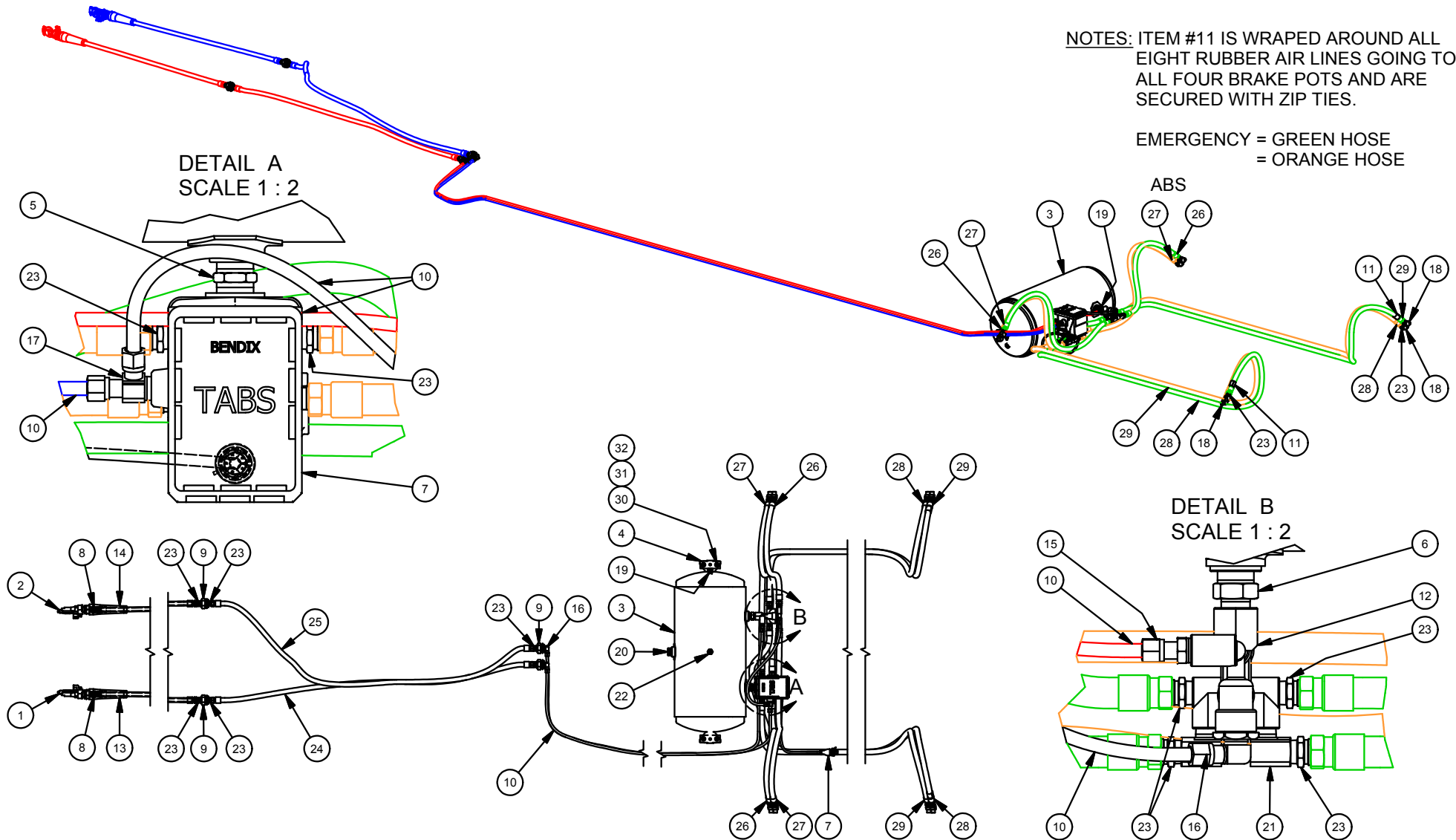


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## BI-DIRECTIONAL TOW PLOW ABS INSTALL ASSEMBLY PART NUMBER 42940125

**NOTES:** ITEM #11 IS WRAPED AROUND ALL EIGHT RUBBER AIR LINES GOING TO ALL FOUR BRAKE POTS AND ARE SECURED WITH ZIP TIES.

EMERGENCY = GREEN HOSE  
= ORANGE HOSE



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## BI-DIRECTIONAL TOW PLOW ABS INSTALL KIT

### PART NUMBER 42940125

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	46850041	TEC1011E	GLADHAND RED RETAINER	1
2	46850041-2	TEC1011S	GLADHAND BLUE RETAINER	1
3	51415065	HOSHT-1231	LARGE AIR TANK TOW PLOW	1
4	51415284	TEC2000 FB	RUBBER ISOLATOR MOUNTING PAD	2
5	51415285	TECS1022-E	FITTING HEX NIPPLE 3/4MP-3/4MP	1
6	51415286	TECS1022-ED	FITTING HEX NIPPLE 3/4MP-1/2MP	1
7	51415287	BND802997	BENDIX ABS REPLACEMENT KIT TABS-6	2
8	51415290	TEC161201-8	FITTING	2
9	51415291	IMP90641	BULK HEAD FITTING 3/8 FEMALE	4
10	51415292	TEC1926-01	TUBING A/B BLACK PER FT 3/8	30
11	51415293	GAT28405	THERMOID 3/4" HEATER HOSE PER FT	55
12	51415573	ATM170.110500	SPRING BRAKE CONTROLE VALVE	1
13	51415578	TEC1011FG	FLEX GRIP(RED)	1
14	51415579	TEC1011FG	FLEX GRIP (BLUE)	1
15	51415580	IMP90684	MALE CON NT 3/8 X 3/8	1
16	51415581	1369-6C	90 MALE ELBOW 3/8 X 3/8	3
17	51415582	TEC1371-6C	MALE RUN TEE 3/8	1
18	51415583	IMP90372	1/8 BRASS 45 DEG STREET ELBOW	8
19	51415584	IMP90314	PIPE HD PLUG 3152X6	1
20	51415585	TEC121-E	PLUG HEX HEAD 3/4	1
21	51415586	TEC115-C	STREET ELBOW 90 DEG 3/8	6
22	51415587	ATM177.4010	AIR TANK DRAIN VALVE W/ 60" WIRE ROPE	1
23	51415588	TEC161201-6	FITTING	22
24	51415597		RUBBER AIR LINE ASSEMBLY 64" LONG	1
25	51415600		RUBBER AIR LINE ASSEMBLY 71" LONG	3
26	51415624		RUBBER AIR LINE ASSEMBLY 36" LONG	2
27	51415626		RUBBER AIR LINE ASSEMBLY 48" LONG	2
28	51415630		RUBBER AIR LINE ASSEMBLY 109" LONG	2
29	51415632		RUBBER AIR LINE ASSEMBLY 96" LONG	2
30	HW14A-05	IMP76512	FLATWASHER SAE 5/16 ZINC	8
31	HW36D-05	IMP42308	NUT HEX ELASTIC 5/16 UNC ZINC	4
32	HW40A-0510	IMP16626	BOLT HEX 5/16 X 1 1/4 UNC ZINC	4

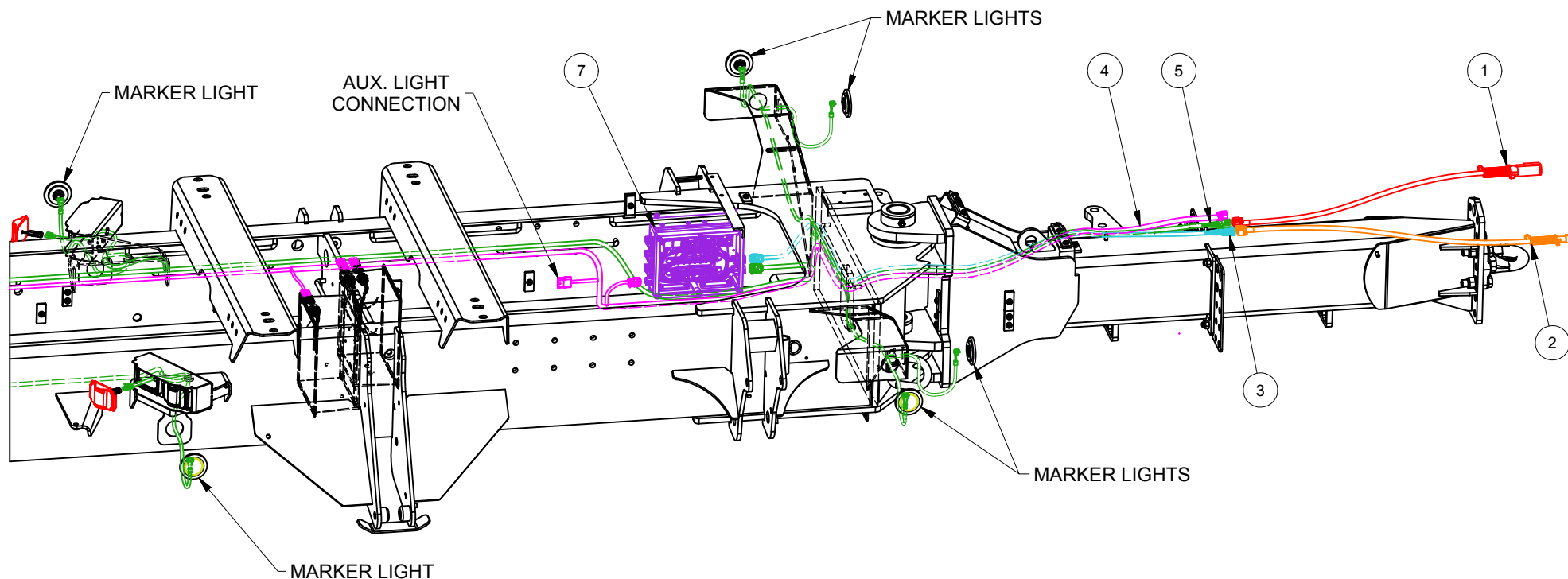
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## WIRING HARNESS ROUTING DIAGRAM

### WIRING HARNESS PART NUMBER: BSM-23182-020



ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	BSM-23182-020A		7 WAY TRAILER PLUG BRAKE AWAY STYLE HARNESS	1
2	BSM-23182-020B		6 WAY TRAILER PLUG BRAKE AWAY STYLE HARNESS	1
3	BSM-23182-020C		6 WAY TRAILER PLUG TO ELEC. DRY BOX HARNESS	1
4	BSM-23182-020D		SWITCH BOX CONNECTION TONGUE TO ELEC. DRY BOX HARNESS	1
5	BSM-23182-020E		7 WAY PLUG TO ELEC. DRY BOX/MARKER LIGHT/BRAKE/TAIL LIGHT HARNESS	1
7	BSM-23182-020G		BI-DIRECTIONAL ELECTRICAL DRY BOX	1

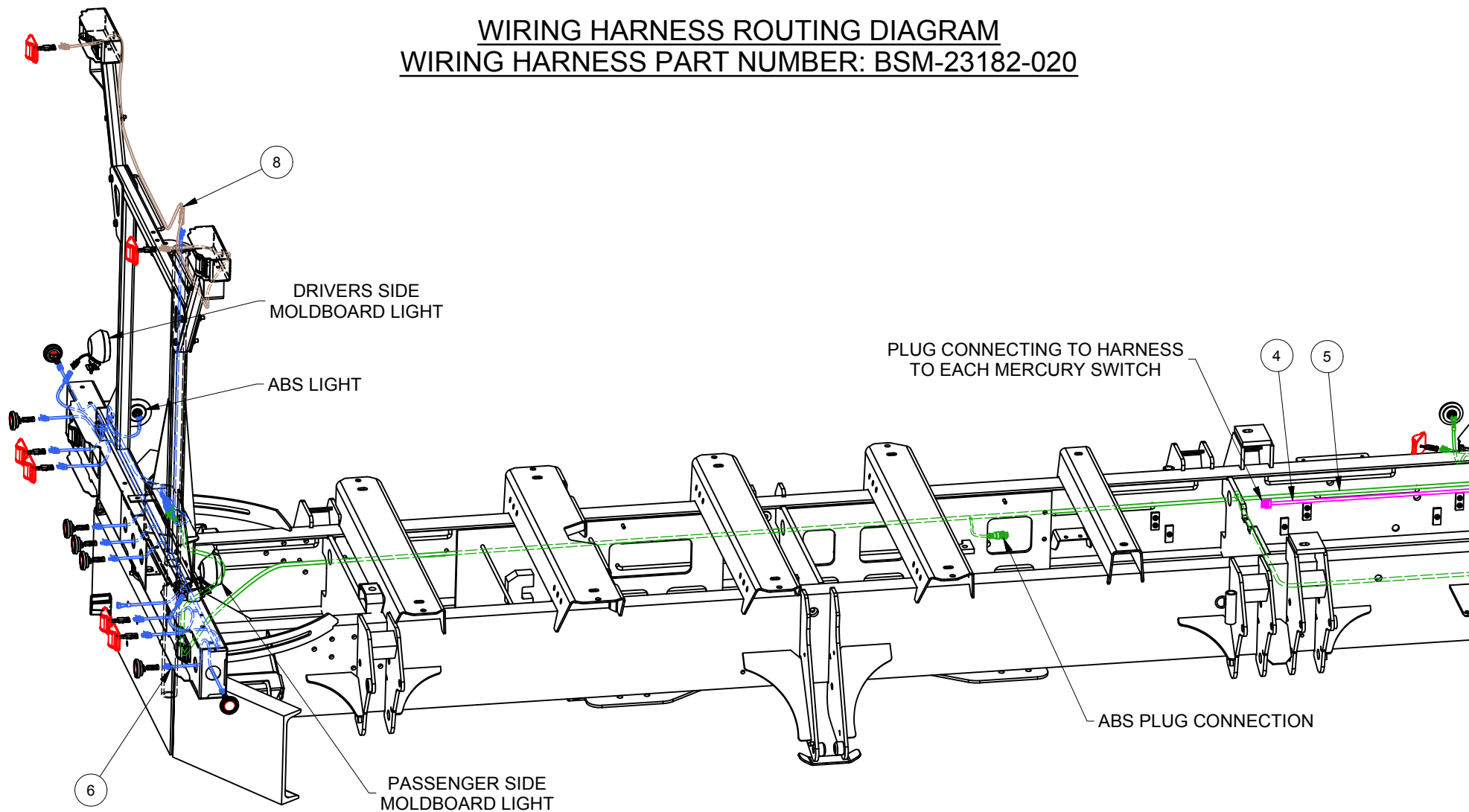
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## WIRING HARNESS ROUTING DIAGRAM

### WIRING HARNESS PART NUMBER: BSM-23182-020



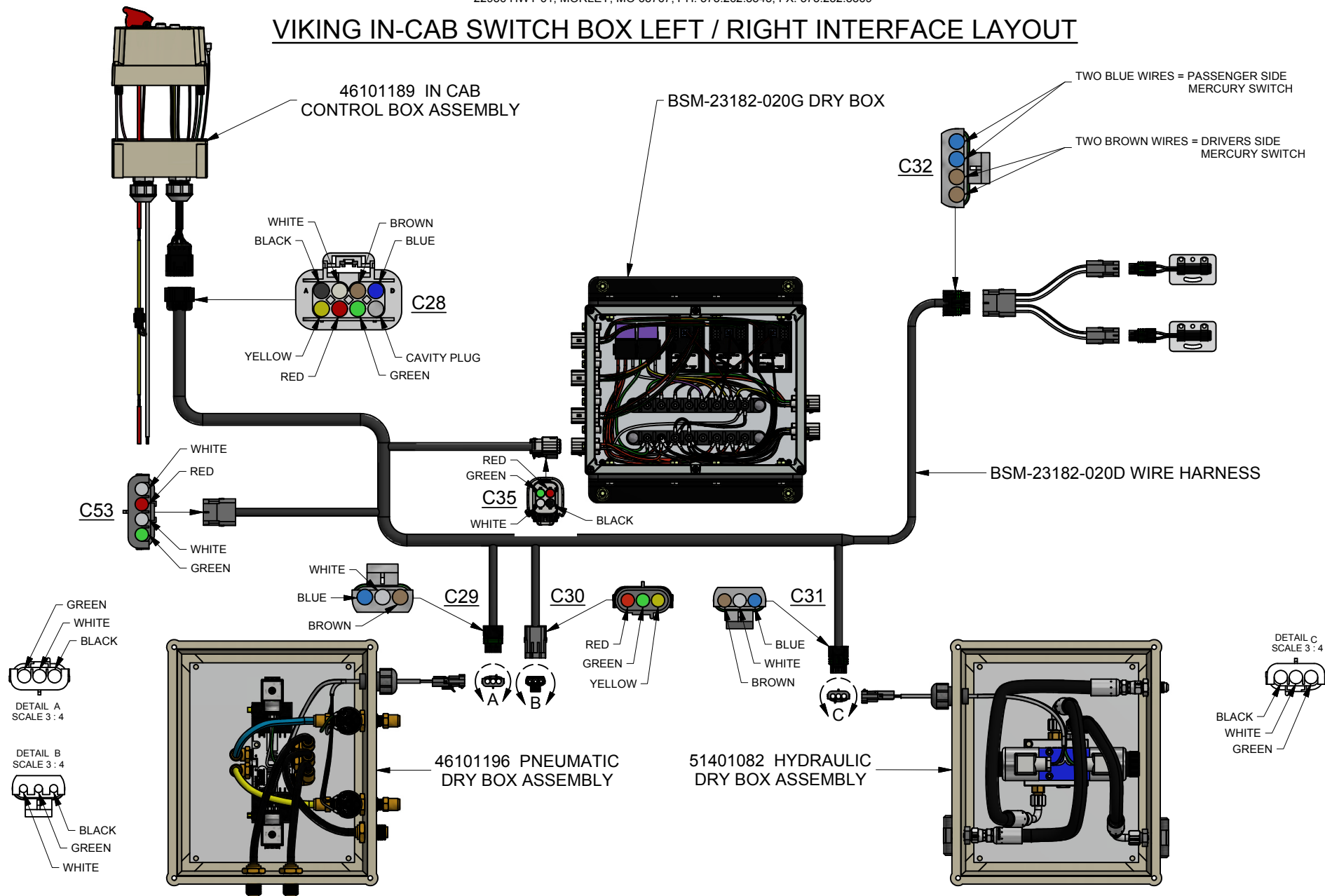
ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
4	BSM-23182-020D		SWITCH BOX CONNECTION TONGUE TO ELEC. DRY BOX HARNESS	1
5	BSM-23182-020E		7 WAY PLUG TO ELEC. DRY BOX/MARKER LIGHT/BRAKE/TAIL LIGHT HARNESS	1
6	BSM23182-020F		BI-DIRECTIONAL REAR LIGHT BAR HARNESS	1
8	BSM-23128-020H		HIGH VISABILITY LIGHT BAR UPPER "T" HARNESS	1

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## VIKING IN-CAB SWITCH BOX LEFT / RIGHT INTERFACE LAYOUT



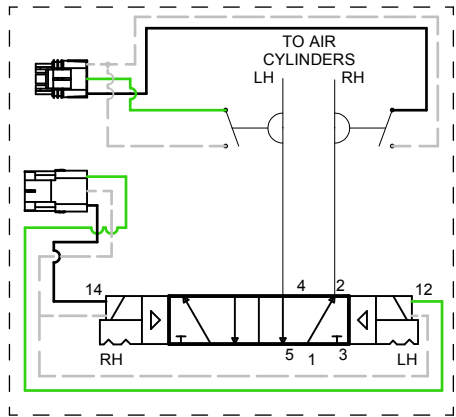
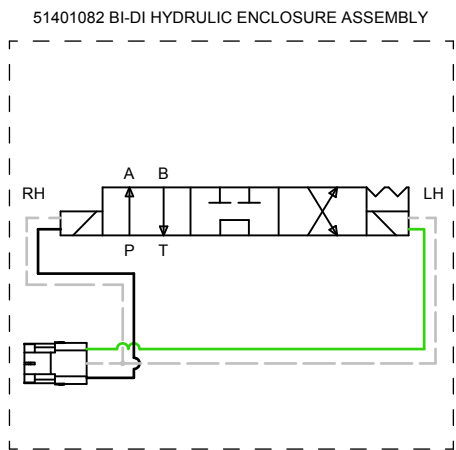
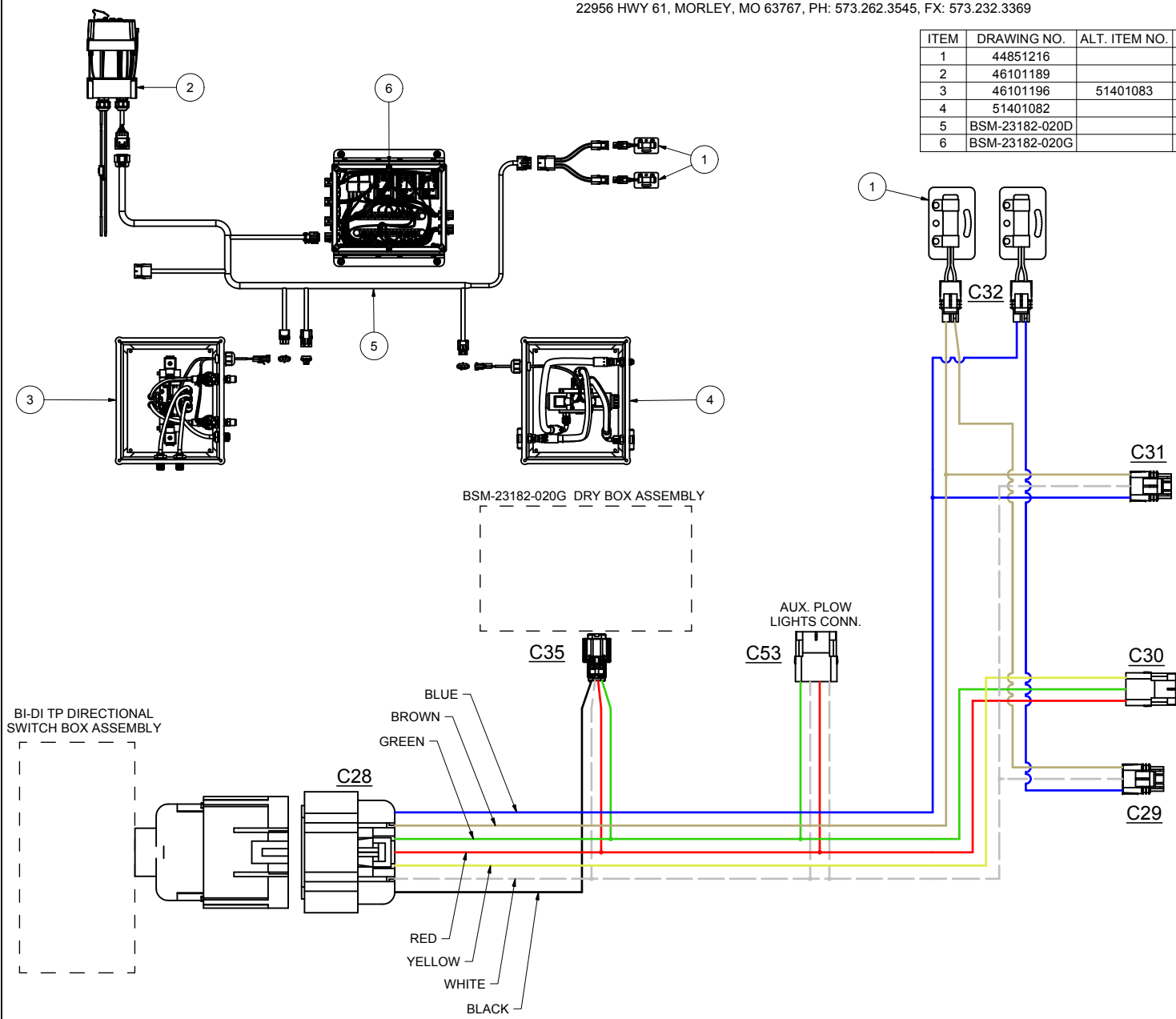
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ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	44851216		MS-100 MERCURY SWITCH	2
2	46101189		BI-DI DIRECTIONAL SWITCH BOX ASSEMBLY	1
3	46101196	51401083	BI-DI PNEUMATIC ENCLOSURE ASSEMBLY	1
4	51401082		BI-DI HYDRAULIC ENCLOSURE ASSEMBLY	1
5	BSM-23182-020D		WIRING HARNESS	1
6	BSM-23182-020G		BI-DIRECTIONAL ELECTRICAL DRY BOX	1

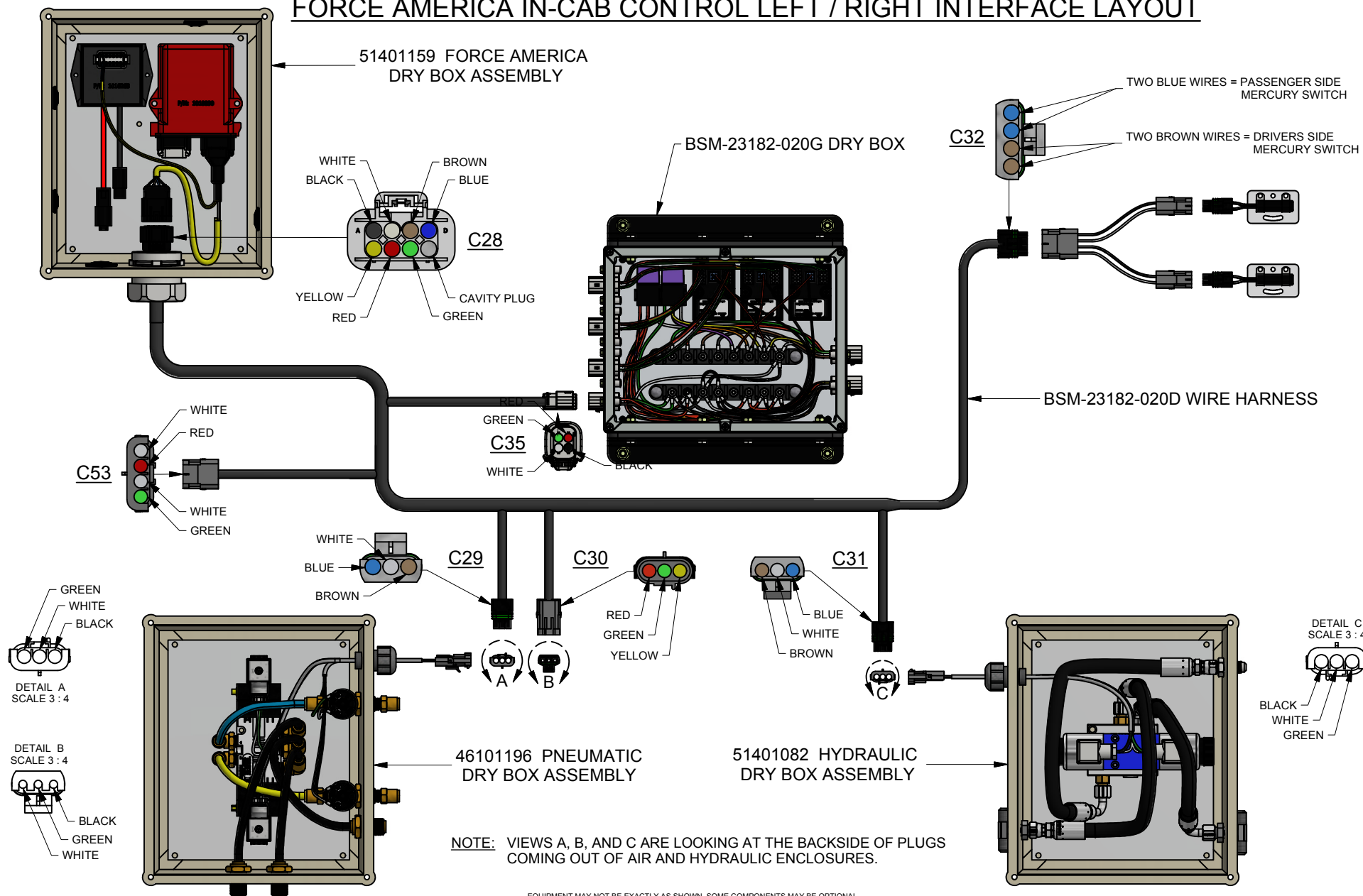


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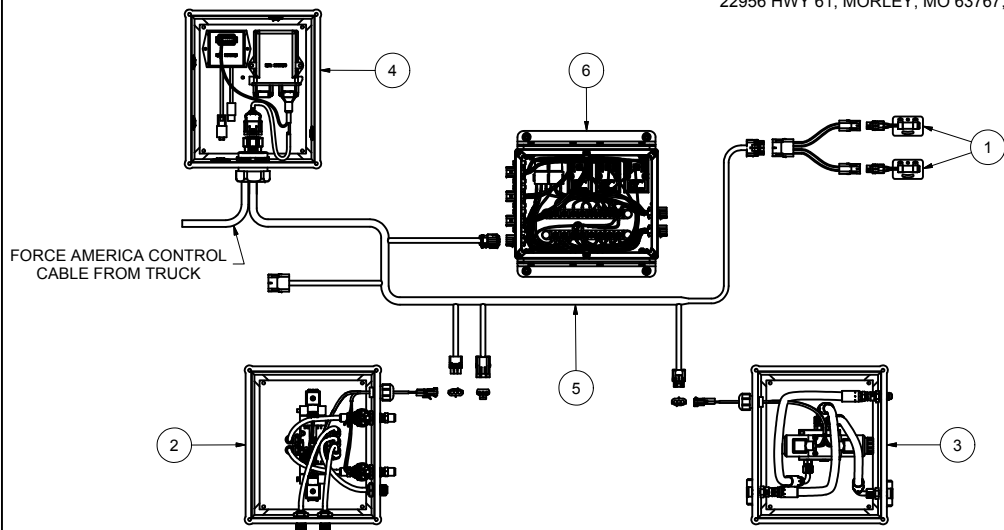
## FORCE AMERICA IN-CAB CONTROL LEFT / RIGHT INTERFACE LAYOUT



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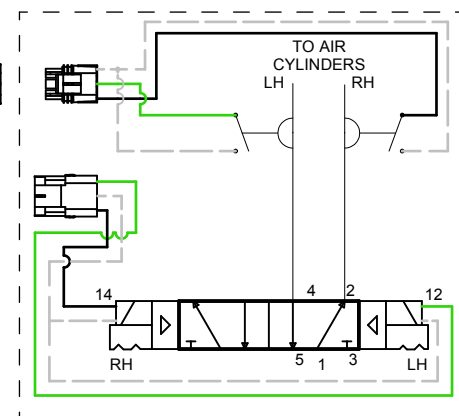
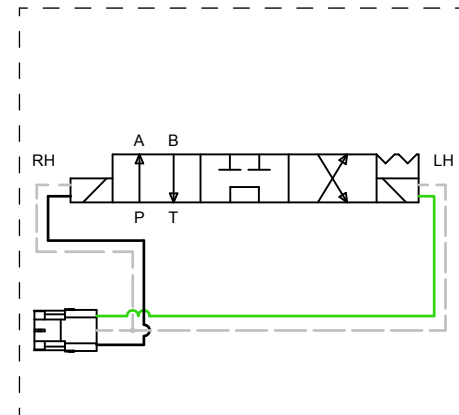


ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	44851216		MS-100 MERCURY SWITCH	2
2	46101196	51401083	BI-DI PNEUMATIC ENCLOSURE ASSEMBLY	1
3	51401082		BI-DI HYDRAULIC ENCLOSURE ASSEMBLY	1
4	51401159		DRY BOX ASSEMBLY FORCE AMERICA CONTROLS	1
5	BSM-23182-020D		WIRING HARNESS	1
6	BSM-23182-020G		BI-DIRECTIONAL ELECTRICAL DRY BOX	1

BSM-23182-020G DRY BOX ASSEMBLY

51401159 DRY BOX ASS'Y FA CONTROLS

51401082 BI-DI HYDRAULIC ENCLOSURE ASSEMBLY



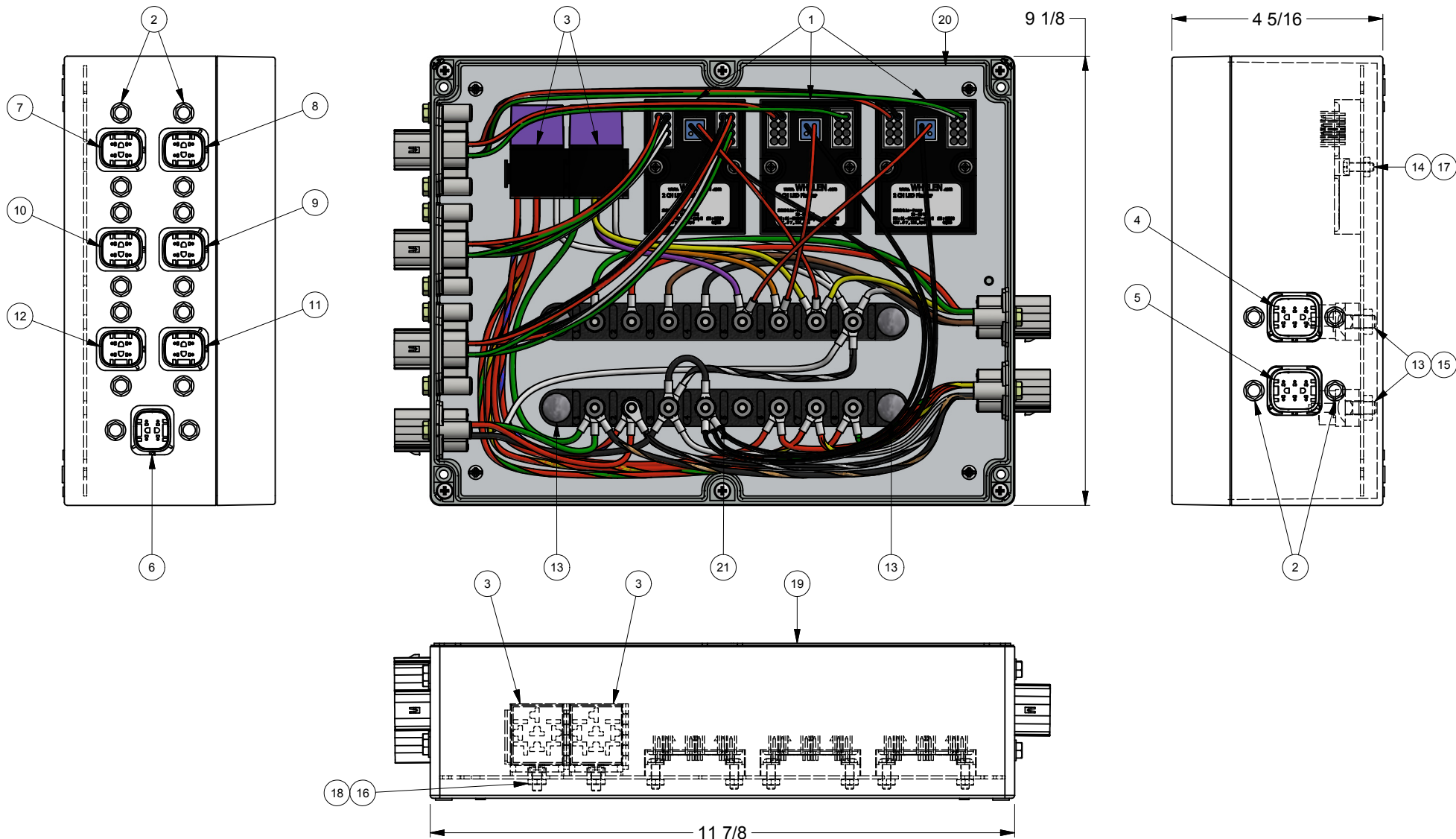
46101196 BI-DI PNEUMATIC ENCLOSURE ASSEMBLY

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## BI-DIRECTIONAL TOW PLOW ELECTRICAL DRY BOX ASSEMBLY PART NUMBER : BSM-23182-020G



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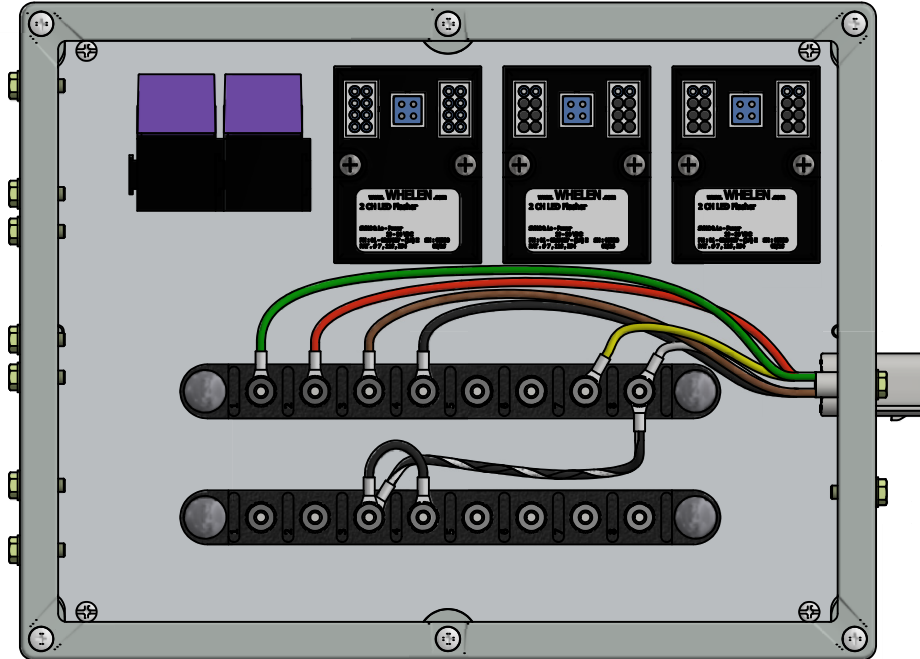
22956 HWY 61, MORLEY, MO 63767, PH: 573.262.3545, FX: 573.232.3369

**BI-DIRECTIONAL TOW PLOW ELECTRICAL DRY BOX ASSEMBLY**  
**PART NUMBER : BSM-23182-020G**

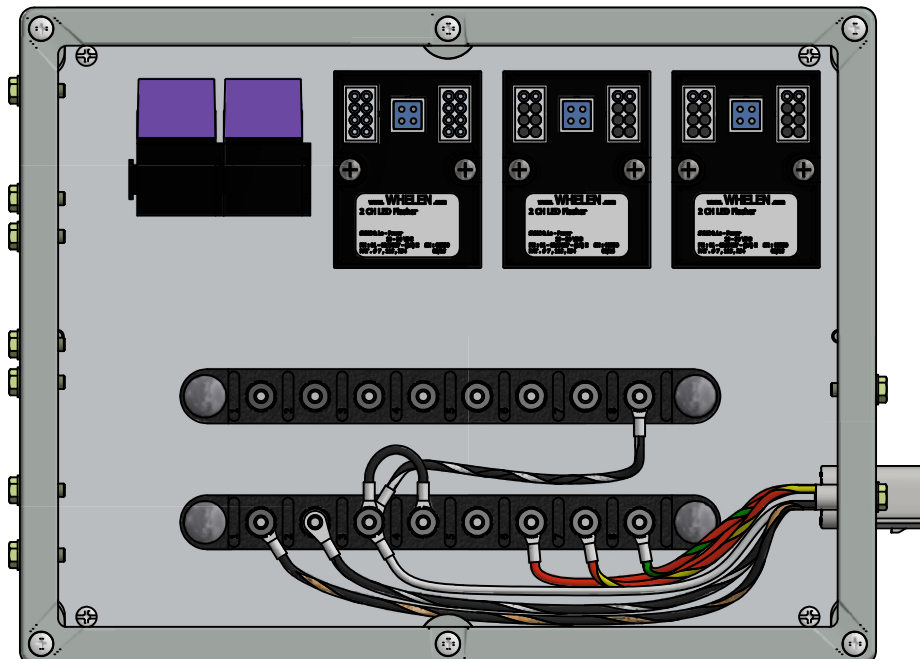
ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	01-0269857- (1A)E		WHELEN 2 CH LED FLASHER MODULE	3
2	0142914		#10-24 X 5/8 THREAD ROLLING SCREW HEX WASHER	18
3	334 485 008		RELAY	2
4	51415414		C38 SIX PIN CONNECTOR	1
5	51415415		C39 SIX PIN CONNECTOR	1
6	51415416		C40 FOUR PIN CONNECTOR	1
7	51415417		C41 MID LEFT STROBE FOUR PIN CONNECTOR	1
8	51415418		C42 MID RIGHT STROBE FOUR PIN CONNECTOR	1
9	51415419		C43 BOTTOM LEFT STROBE FOUR PIN CONNECTOR	1
10	51415420		C44 TOP RIGHT STROBE FOUR PIN CONNECTOR	1
11	51415421		C45 TOP LEFT STROBE FOUR PIN CONNECTOR	1
12	51415422		C46 BOTTOM RIGHT STROBE FOUR PIN CONNECTOR	1
13	HW40C-0404		BOLT CARRIAGE 1/4 X 5/8 UNC ZINC	4
14	HW52-0804		#8-32 X 1/2 MACHINE SCREW STAINLESS	6
15	KNC-0.25		1/4-20 KEP HEX NUT	4
16	KNC-10		#10-24 KEP HEX NUT	2
17	KNC-8		#8-32 KEP HEX NUT	6
18	MSCPP-1038		SCREW MACH PAN HD #10-32 X 1/2	2
19	SG-16-03-111412		CUSTOM 11.89 X 9.13 X 4.33 POLY ENCLOSURE	1
20	SG16P111413		CUSTOM 11.50 X 8.75 SG-16 PANEL	1
21	TB-8		BUSSMANN STUD TYPE JUCTION BLOCK (8 POST)	2

EQUIPMENT MAY NOT BE EXACTLY AS SHOWN. SOME COMPONENTS MAY BE OPTIONAL.  
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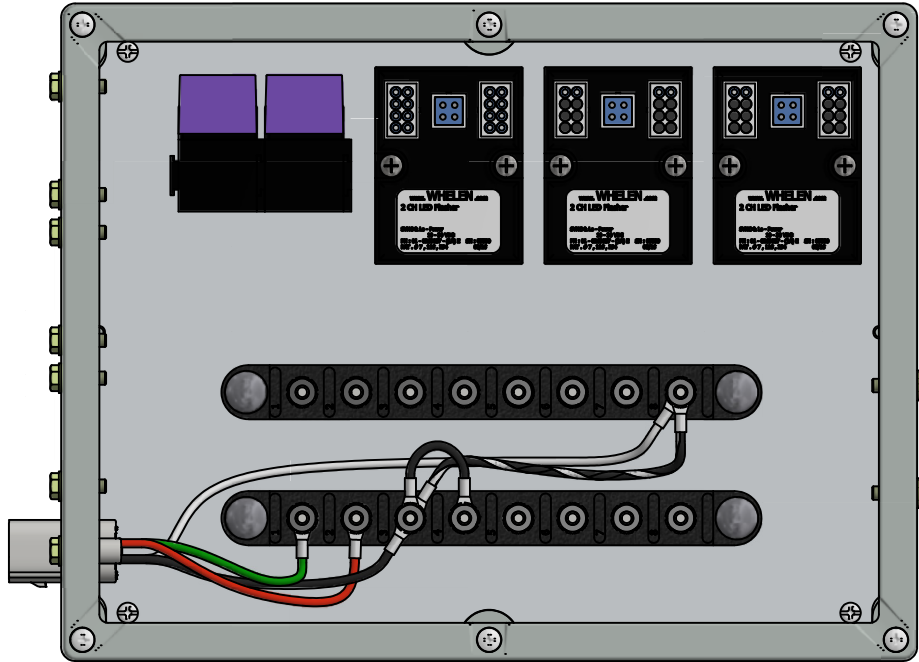
## VIEW #1 C38 SIX PIN CONNECTOR



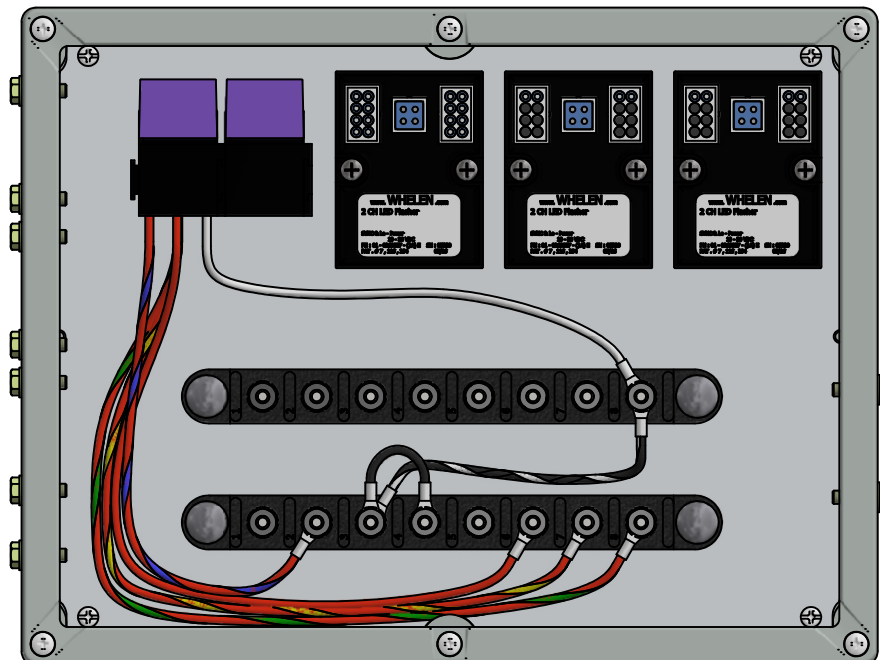
## VIEW #2 C39 SIX PIN CONNECTOR



## VIEW #3 C40 FOUR PIN CONNECTOR

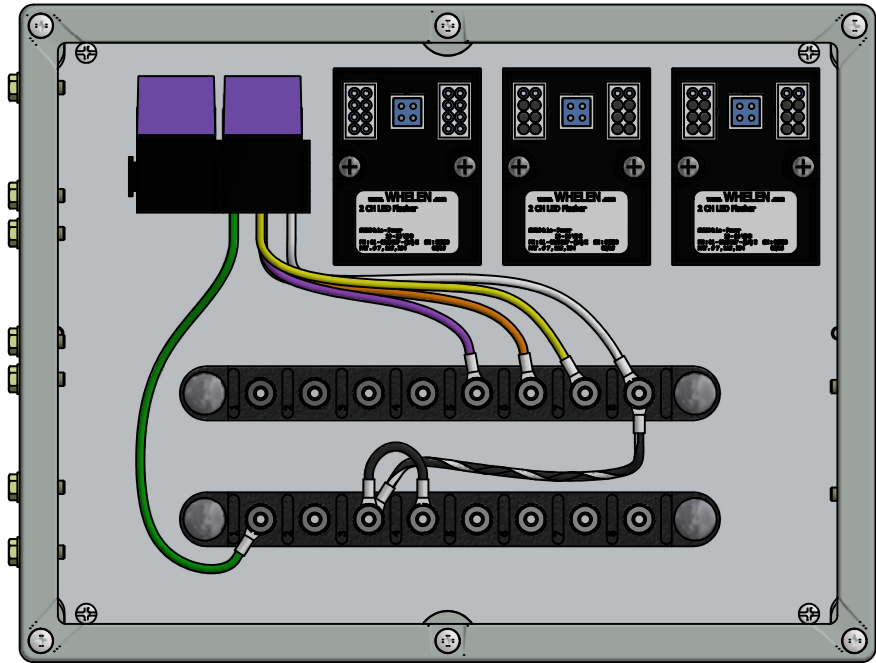


## VIEW #4 RELAY #1 FIVE WIRE LAYOUT

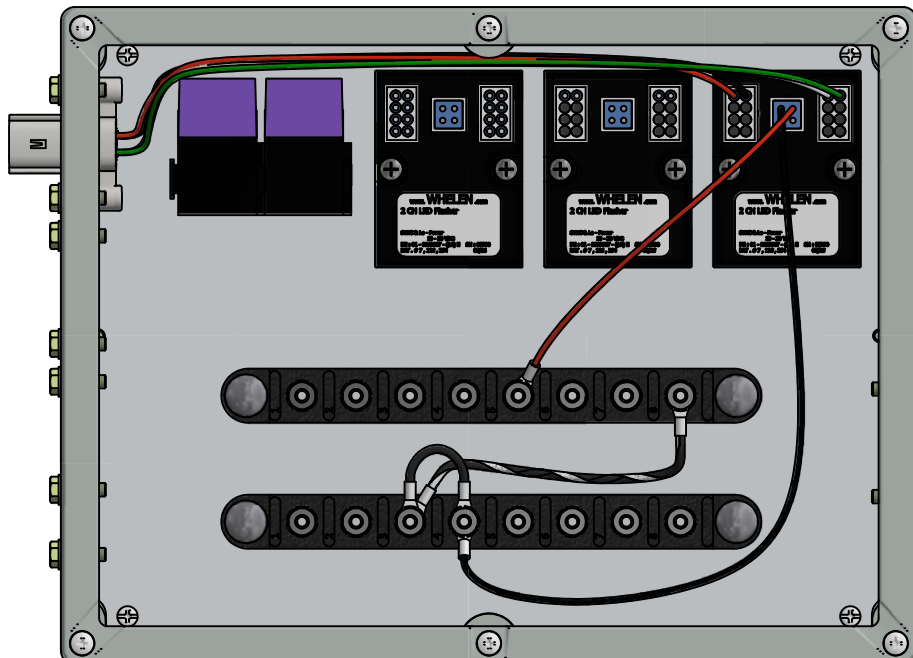




## VIEW #5 RELAY #2 FIVE WIRE LAYOUT

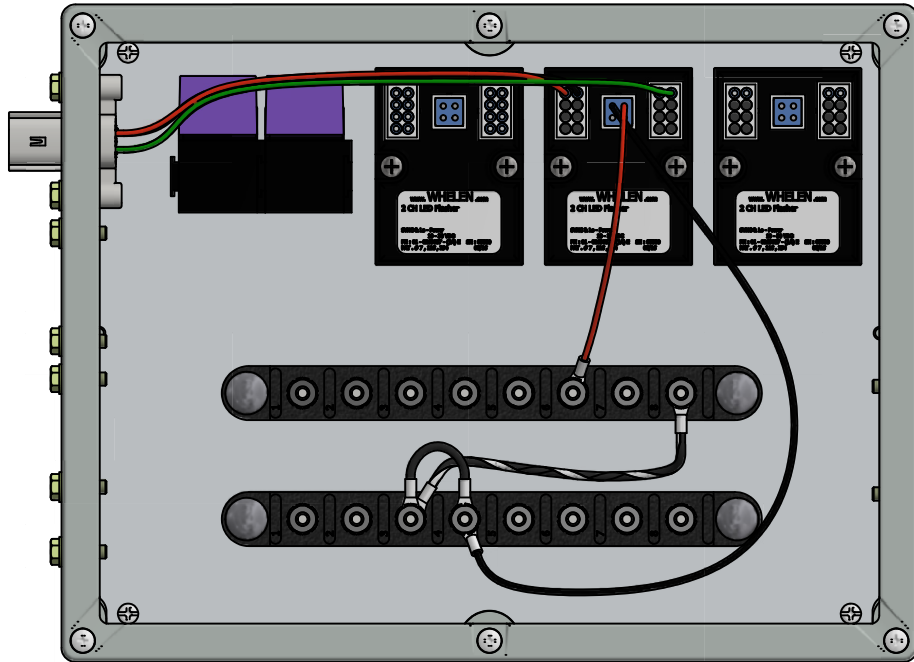


## VIEW #6 C41 FOUR PIN CONNECTOR MID LEFT FLASHER

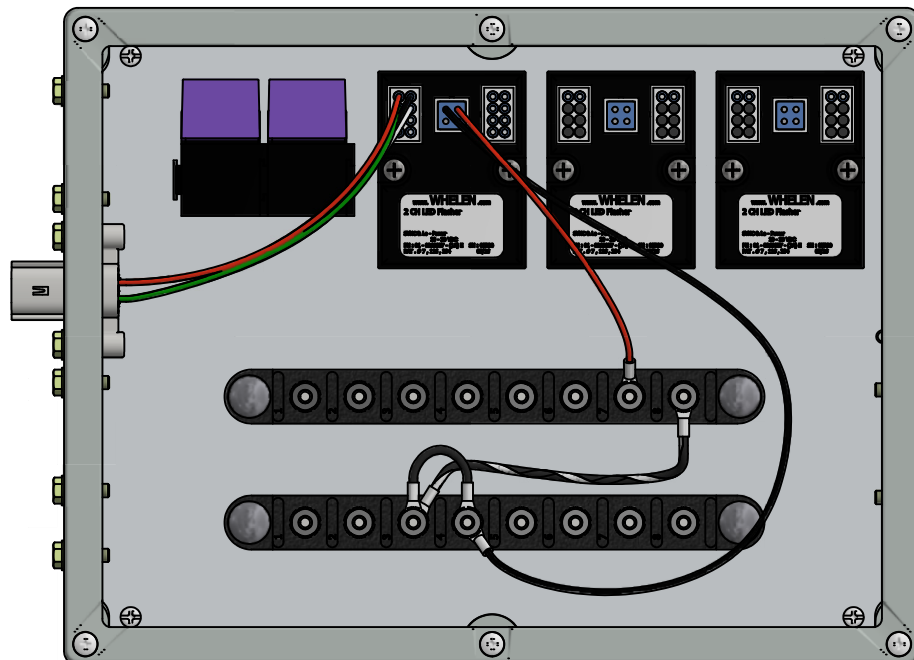




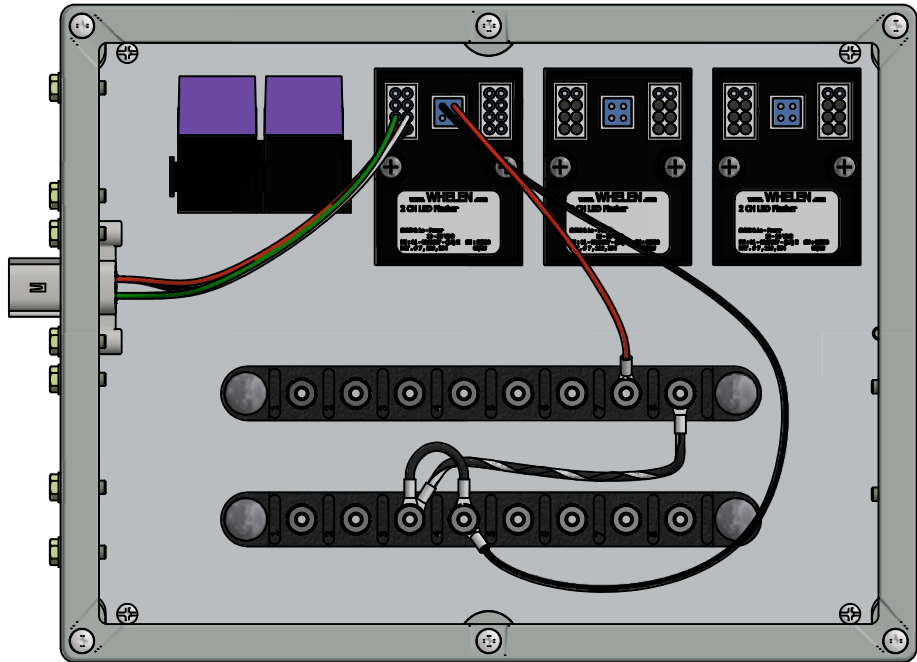
## VIEW #7 C42 FOUR PIN CONNECTOR MID RIGHT FLASHER



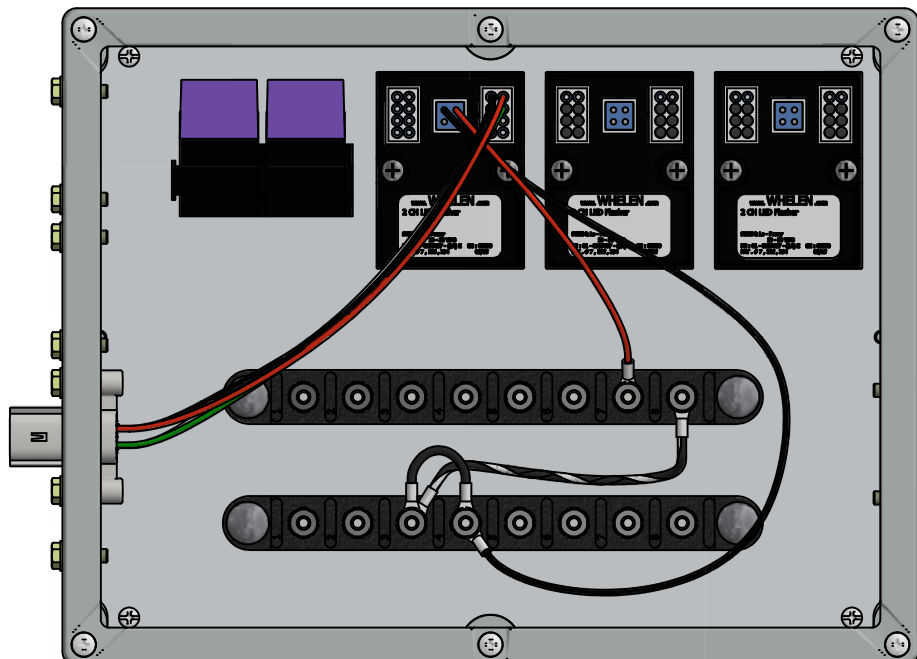
## VIEW #8 C43 FOUR PIN CONNECTOR BOTTOM LEFT FLASHER



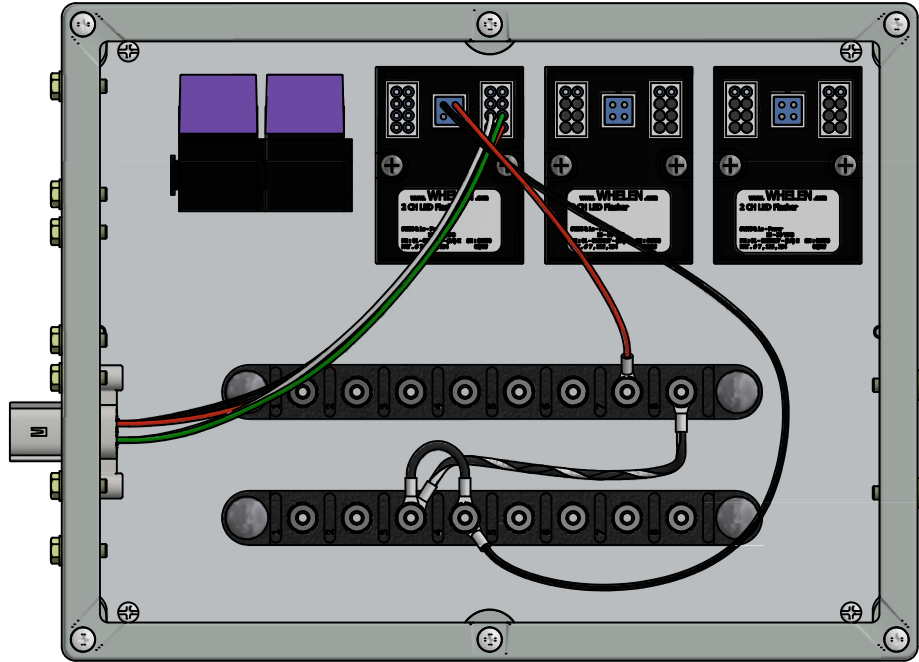
VIEW #9  
C44 FOUR PIN CONNECTOR TOP RIGHT FLASHER



VIEW #10  
C45 FOUR PIN CONNECTOR TOP LEFT FLASHER



## VIEW #11 C46 FOUR PIN CONNECTOR BOTTOM RIGHT FLASHER

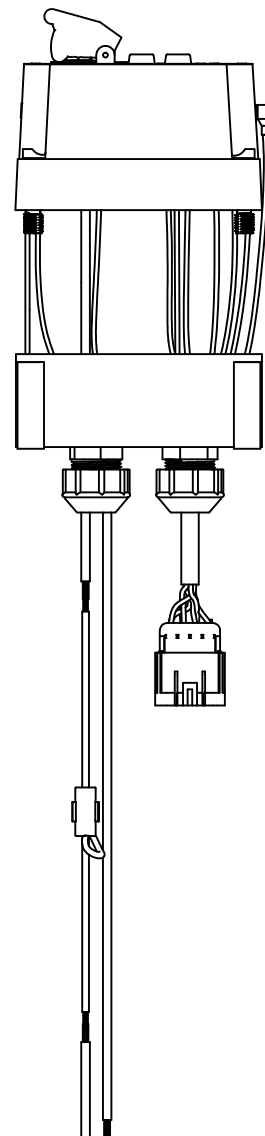
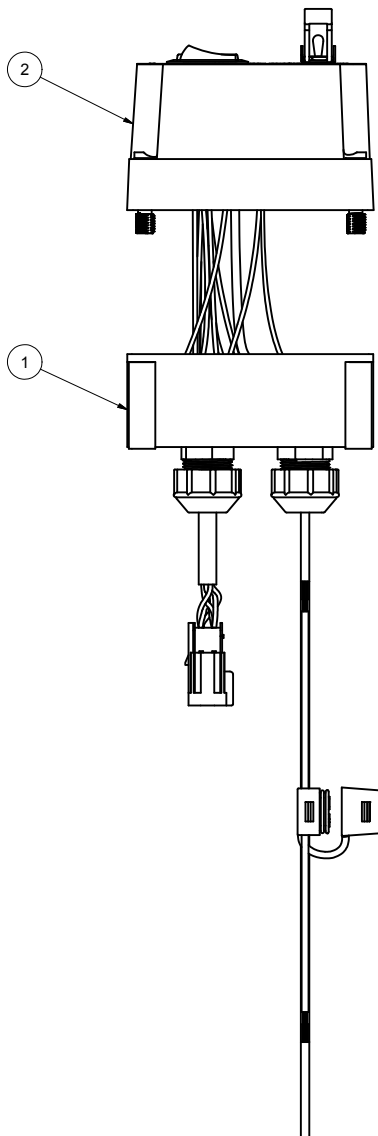




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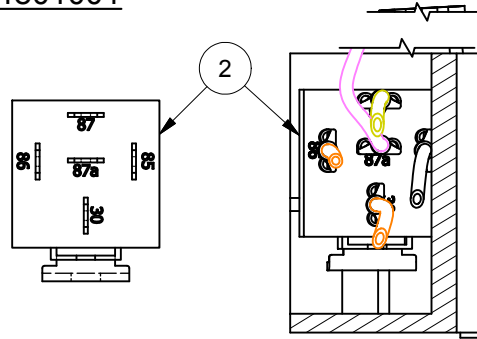
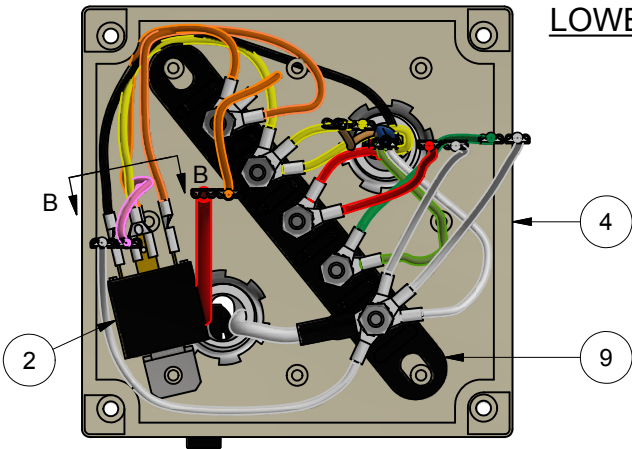
## BI-DIRECTIONAL TOW PLOW DIRECTION SWITCH BOX ASSEMBLY PART #46101189

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	44801001		LOWER HALF DRY BOX ASSEMBLY	1
2	44801002		UPPER HALF DRY BOX ASSEMBLY	1



EQUIPMENT MAY NOT BE EXACTLY AS SHOWN. SOME COMPONENTS MAY BE OPTIONAL.  
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## LOWER HALF DRY BOX ASSEMBLY PART #44801001



SECTION B-B  
SCALE 1.5 : 1

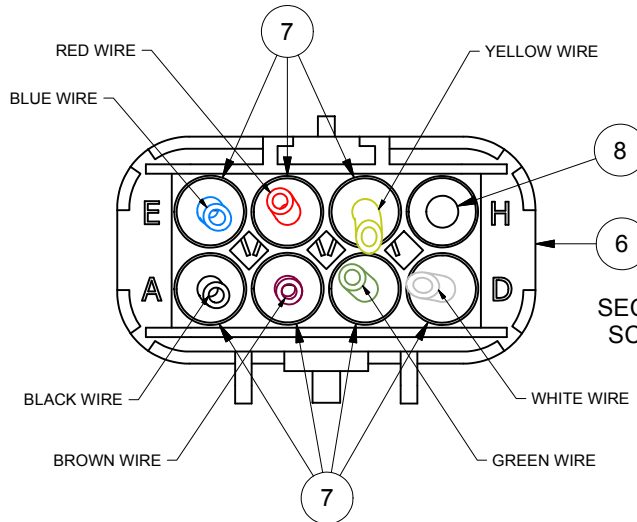
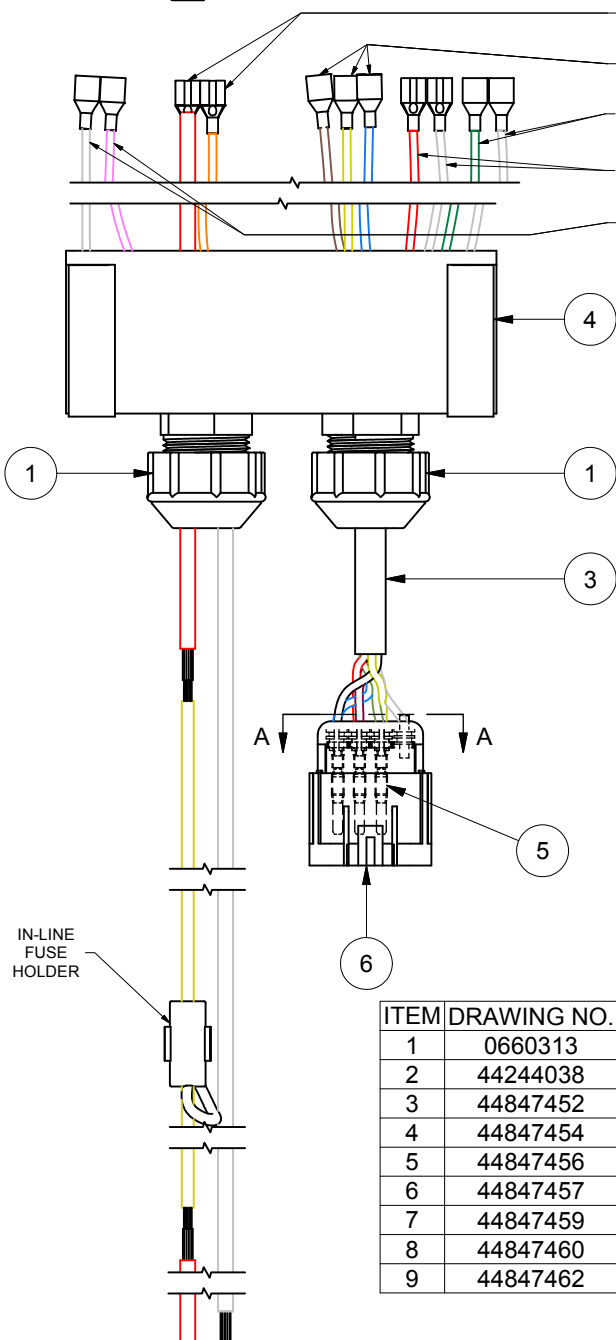
RED POWER / ORANGE WIRES = MASTER CONNECTION

BLUE / BROWN / YELLOW WIRES = DIRECTION SWITCH

GREEN / WHITE WIRES = RIGHT INDICATOR

RED / WHITE WIRES = LEFT INDICATOR

PINK / WHITE WIRES = CONNECTION INDICATOR



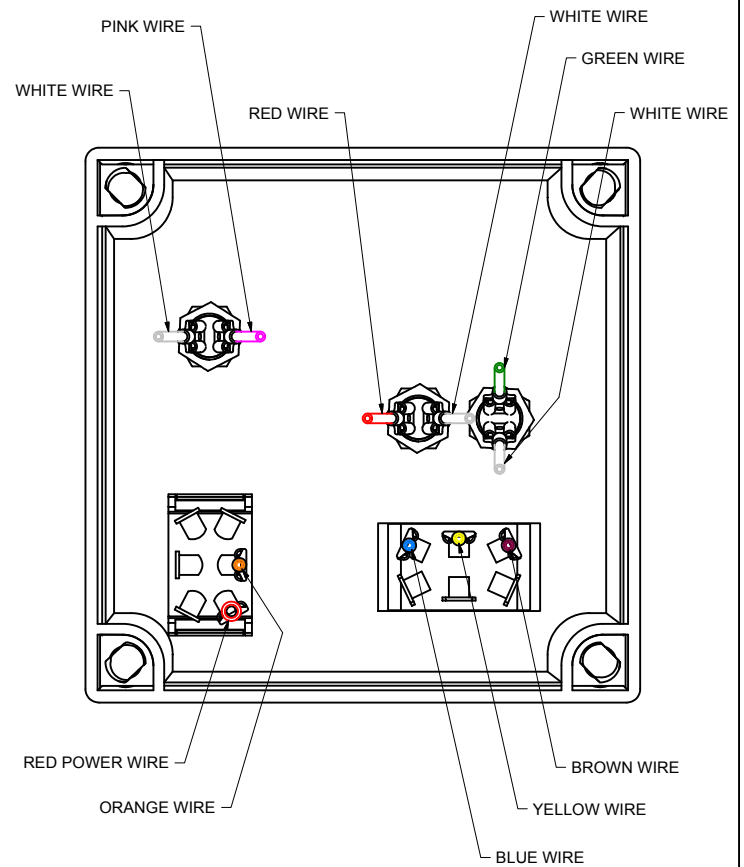
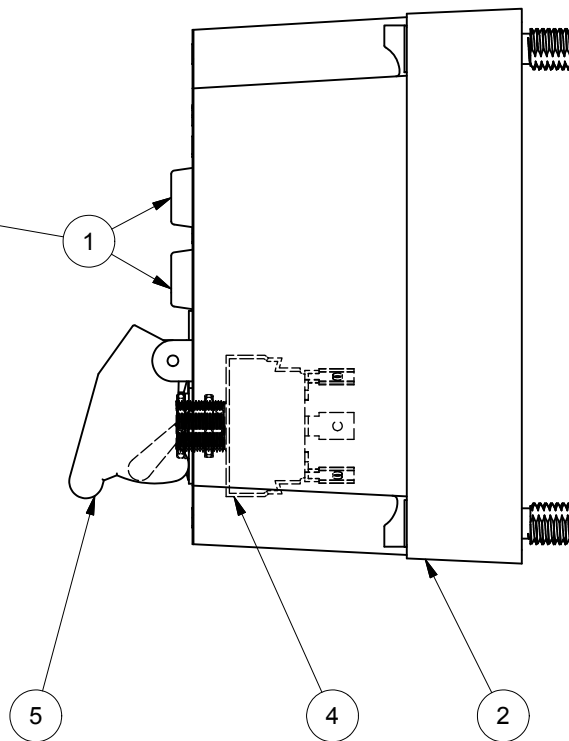
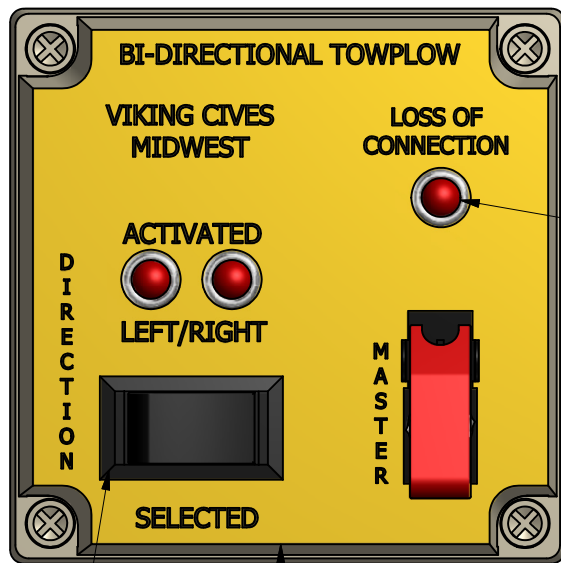
SECTION A-A  
SCALE 3 : 1

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	0660313		FITTING ENTRANCE 1/2 (T) SRC10	2
2	44244038		RELAY FORM A	1
3	44847452		18 GA. 7 WIRE TRAILER CONNECTION WIRE	1
4	44847454		BOTTOM HALF ENCLOSURE	1
5	44847456		16-18 GA MALE TERMINAL FOR GT-280 SERIES	7
6	44847457		16-18 GA FEMALE CONNECTOR	1
7	44847459		16-18 GA WIRE SEAL FOR GT-280 SERIES	7
8	44847460		CAVITY PLUG FOR GT-280 SERIES	1
9	44847462		TERMINAL BLOCK 5 POST	1



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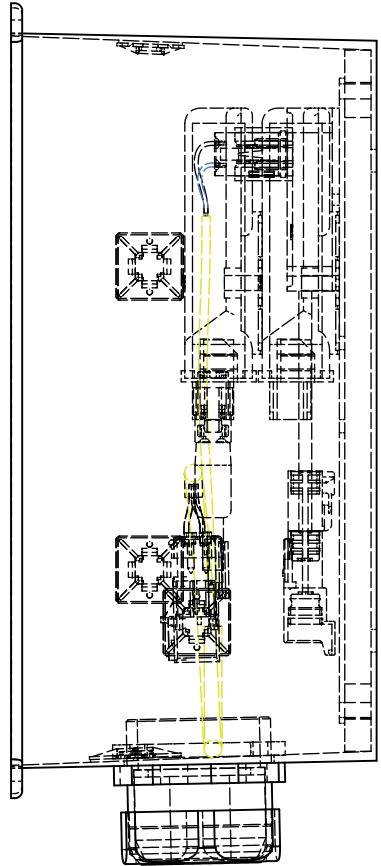
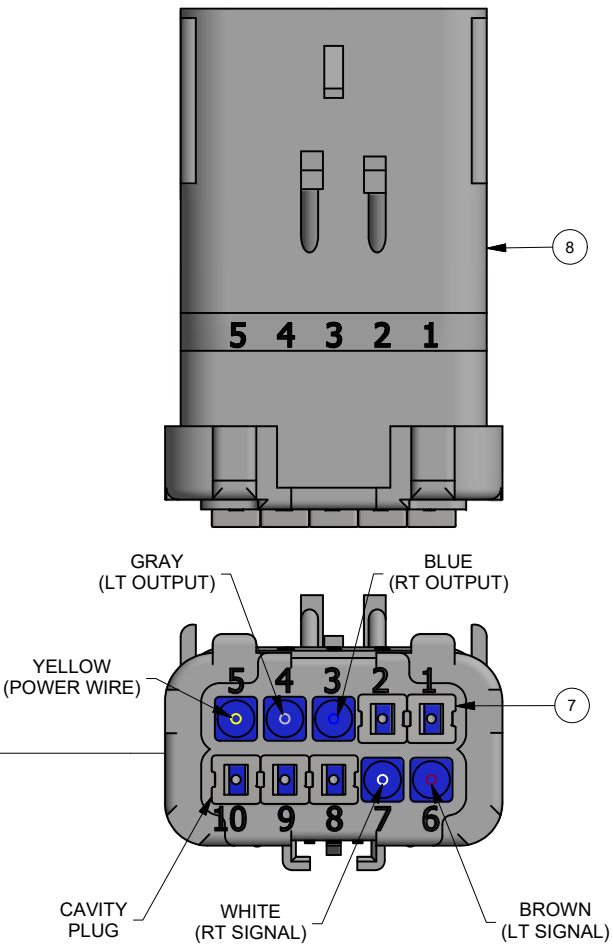
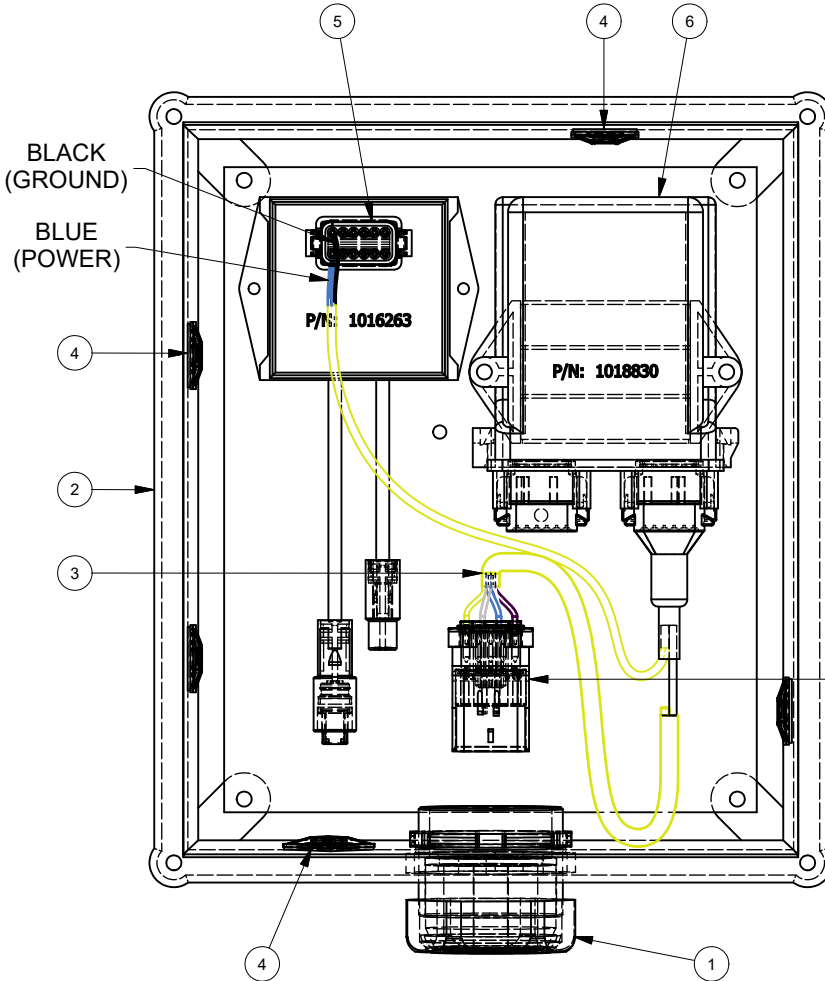
UPPER HALF DRY BOX ASSEMBLY  
PART #44801002



ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	44843434		RED LIGHT INDICATOR LIGHT W/TABS	3
2	44847454-TOP		IMPACT/CORROSION RESISTANT WASHDOWN ENCLOSURE	1
3	44847461		ON-ON ROCKER BLACK ACTUATOR 6 TERMINAL	1
4	44851012	7565K7	AC RATED 2 POLE/6 TERMINAL TOGGLE SWITCH	1
5	44851206		TS-CV-R TOGGLE SWITCH COVER	1
6	46873040		LABLE FOR BI-DI TOW PLOW SWITCH PACK	1

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ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	44847132		2" STRAIN RELIEF	1
2	51415372	AM1206RT	SEALED POLY ENCLOSURE PNEUMATIC BI-DI	1
3	51415433	1116655	HARNESS, TOW-PLOW, BI-DIRECTIONAL	1
4	51415446		1" BLACK CABLE TIE MOUNT	5
5	51415694		POWER DISTRIBUTION MODULE	1
6	51501071	1018830	6100 DIRECT CAN I/O MODULE	2
7	51415827	54200005	APEX CAVITY PLUG	5
8	51415828	54201016	APEX 2.8MM, 10WM SLD HSG BLACK	1



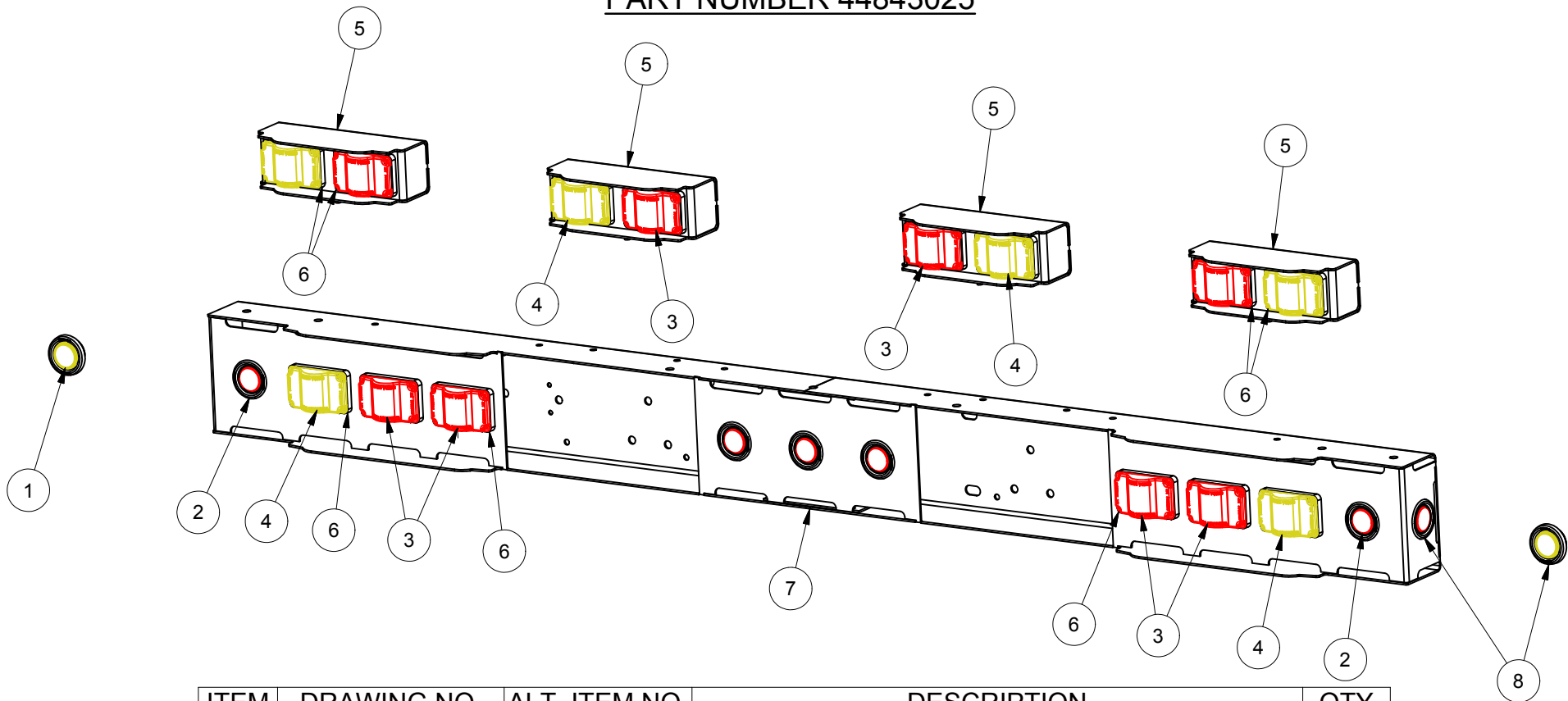
MATERIAL: ASSEMBLY		DO NOT SCALE THIS DRAWING				DRY BOX ASSEMBLY FORCE AMERICA CONTROLS		DWG NO. 51401159		REV NO. 1	
DRAWN BY: KMK DATE: 5/18/2017 CHECKED BY: DATE: DWG SIZE: ANSI C SCALE: 5 : 8 ALT. ITEM: EST. UNITS: EACH	THIRD-ANGLE PROJECTION	THIS DOCUMENT CONTAINS CONFIDENTIAL, PROPRIETARY INFORMATION AND IS THE EXCLUSIVE PROPERTY OF VIKING CIVES GROUP. NEITHER THE DOCUMENT NOR ITS CONTENTS ARE TO BE USED, REPRODUCED OR DISCLOSED IN WHOLE OR IN PART WITHOUT THE PRIOR WRITTEN PERMISSION OF VIKING CIVES GROUP.				UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES TOLERANCES ARE AS NOTED FRACTIONAL DECIMAL ANGLES		1 1 1			





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**STANDARD WHELEN LIGHT KIT BI-DIRECTIONAL TOW PLOW ASSEMBLY**  
**PART NUMBER 44843025**



ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	01-02634898A8		AMBER MARKER LED LIGHT	6
2	01-02634898R80		RED MARKER LED LIGHT	7
3	01-026E462-53A		STOP TAIL TURN	8
4	02-0418865-000		AMBER/AMBER WARNING STROBE	6
4	01-026F769-A0		AMBER/AMBER WARNING STROBE "V" SERIES	6
5	02-036G794-000		DUAL LIGHT HEAD WELDMENT SS	4
6	11-46E976-000		GROMET	14
7	11-488150-0000		REAR LIGHT BAR WELDMENT SS TOW PLOW	1
8	21-11017226-0B		GROMET MARKER	13

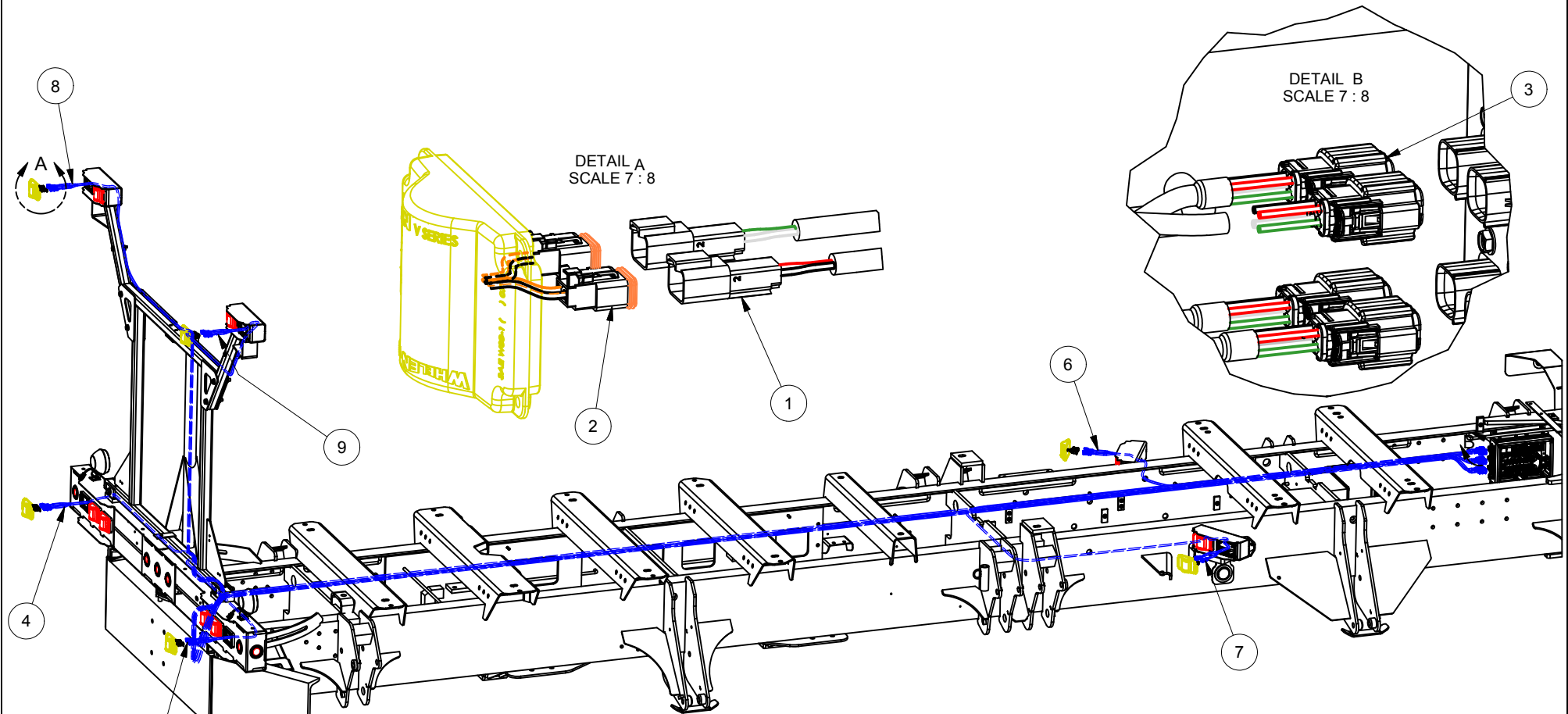
EQUIPMENT MAY NOT BE EXACTLY AS SHOWN. SOME COMPONENTS MAY BE OPTIONAL.  
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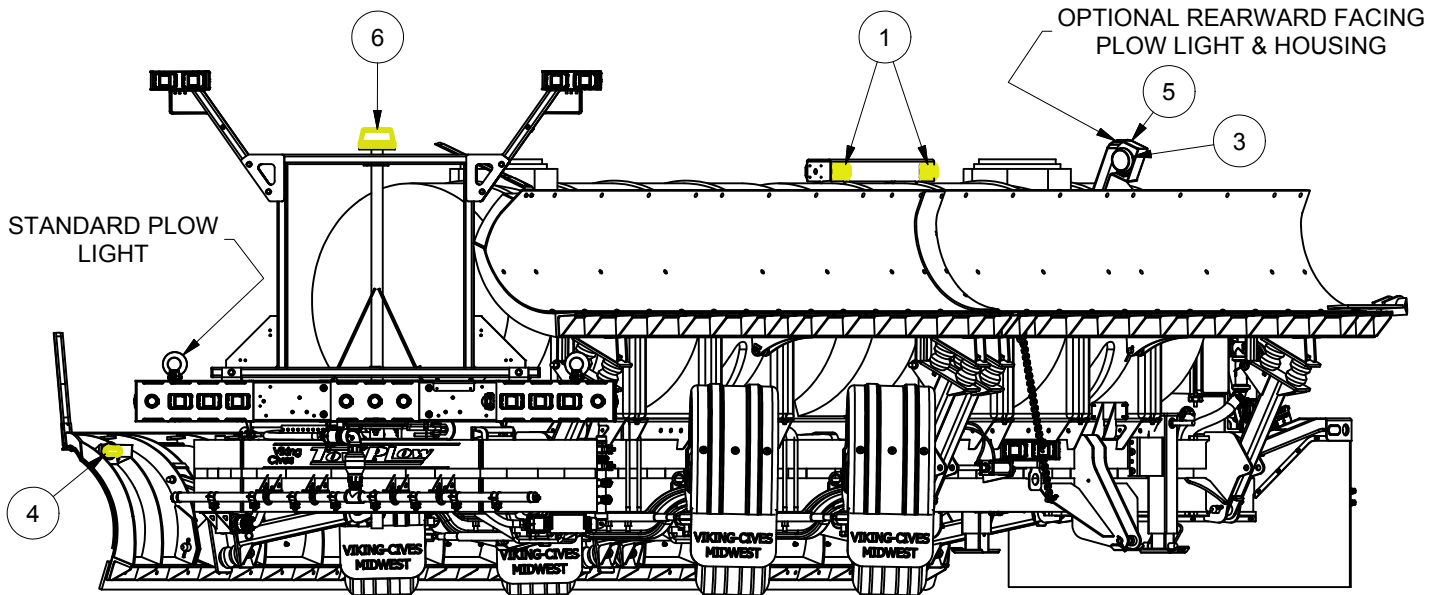
BI-DIRECTIONAL WARNING LIGHT HARNESS ROUTING DIAGRAM



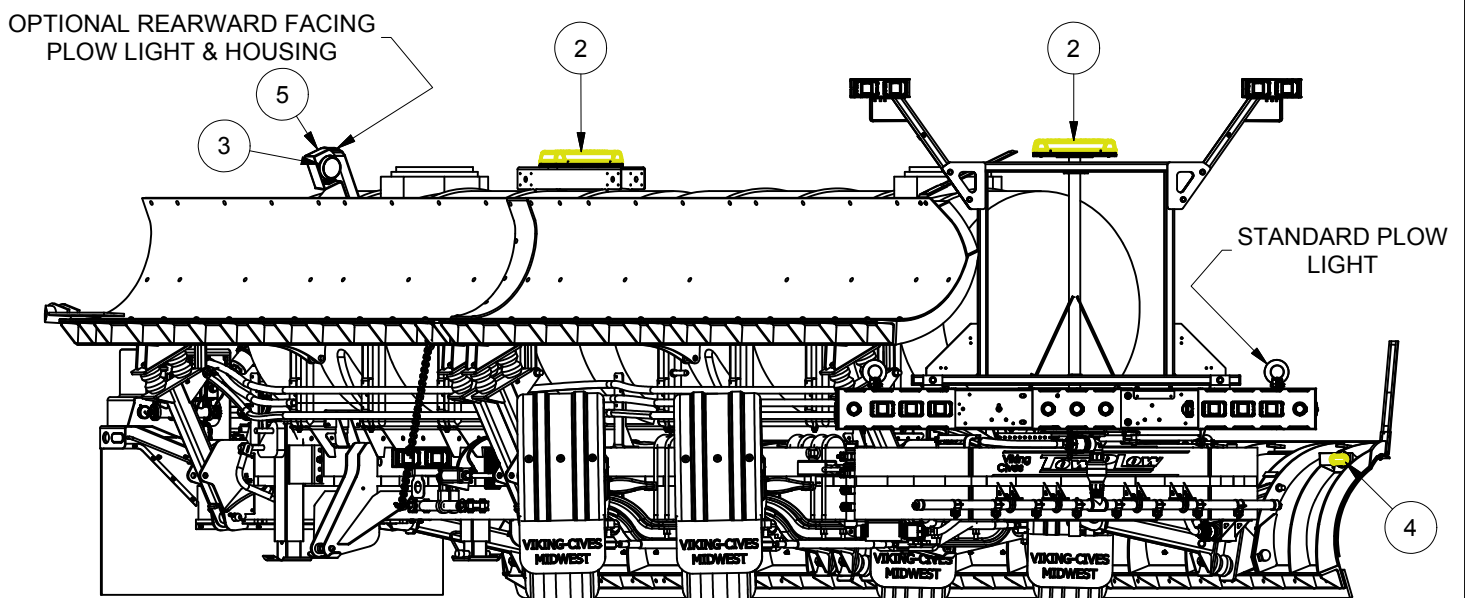
ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	44847136		DEUTSCH SEALED RECEPTICAL CONN. 2 CAVITY CONTACT SIZE 16	1
2	44847137		DEUTSCH SEALED PLUG CONN. 2 CAVITY CONTACT SIZE 16	1
3	44847138		MX150L 4 CIRCUIT RECEPTACLE FOR 18-22 AWG WIRE	1
4	51401328		C43 DRY BOX CONN TO BOTTOM LEFT WARN. LIGHT HARNESS	1
5	51401329		C46 DRY BOX CONN TO BOTTOM RIGHT WARN. LIGHT HARNESS	1
6	51401330		C41 DRY BOX CONN TO MIDDLE LEFT WARN. LIGHT HARNESS	1
7	51401331		C42 DRY BOX CONN TO MIDDLE RIGHT WARN. LIGHT HARNESS	1
8	51401332		C45 DRY BOX CONN TO TOP LEFT WARN. LIGHT HARNESS	1
9	51401333		C44 DRY BOX CONN TO TOP RIGHT WARN. LIGHT HARNESS	1

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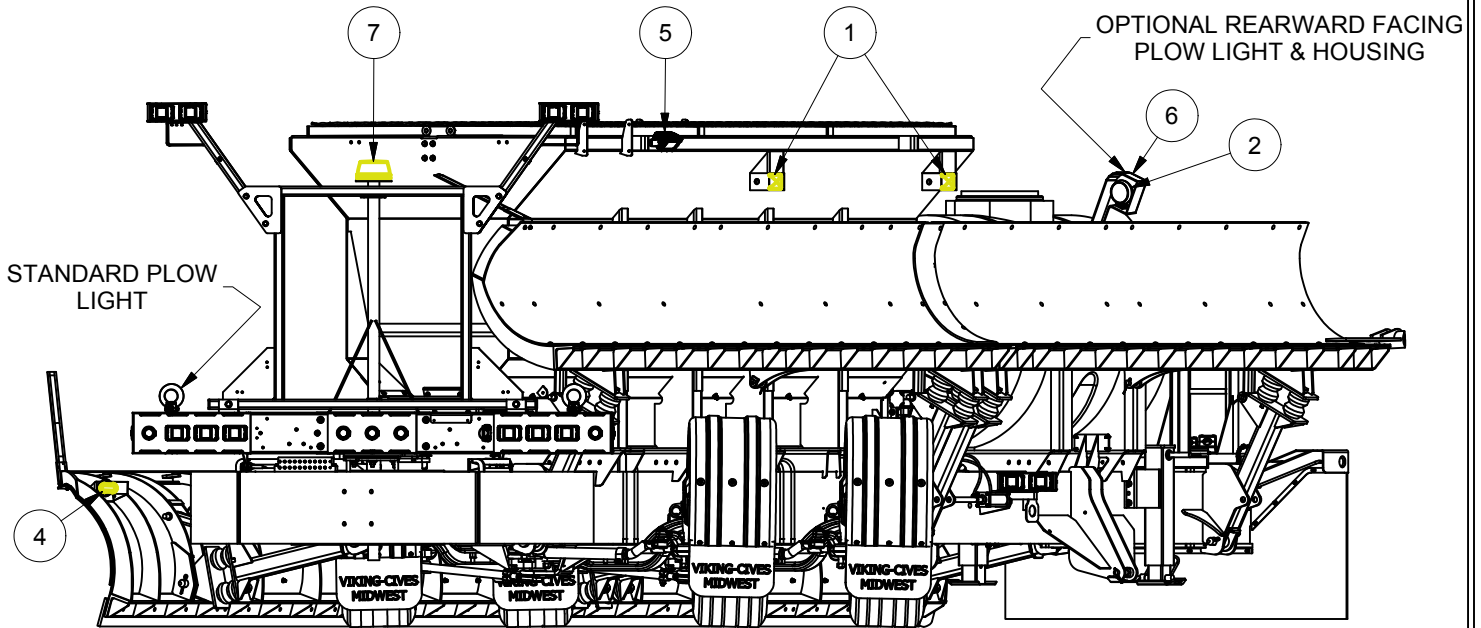
## OPTIONAL BI-DIRECTIONAL TOW PLOW LIGHTING TWO 1025 GALLON TANK CONFIGURATION



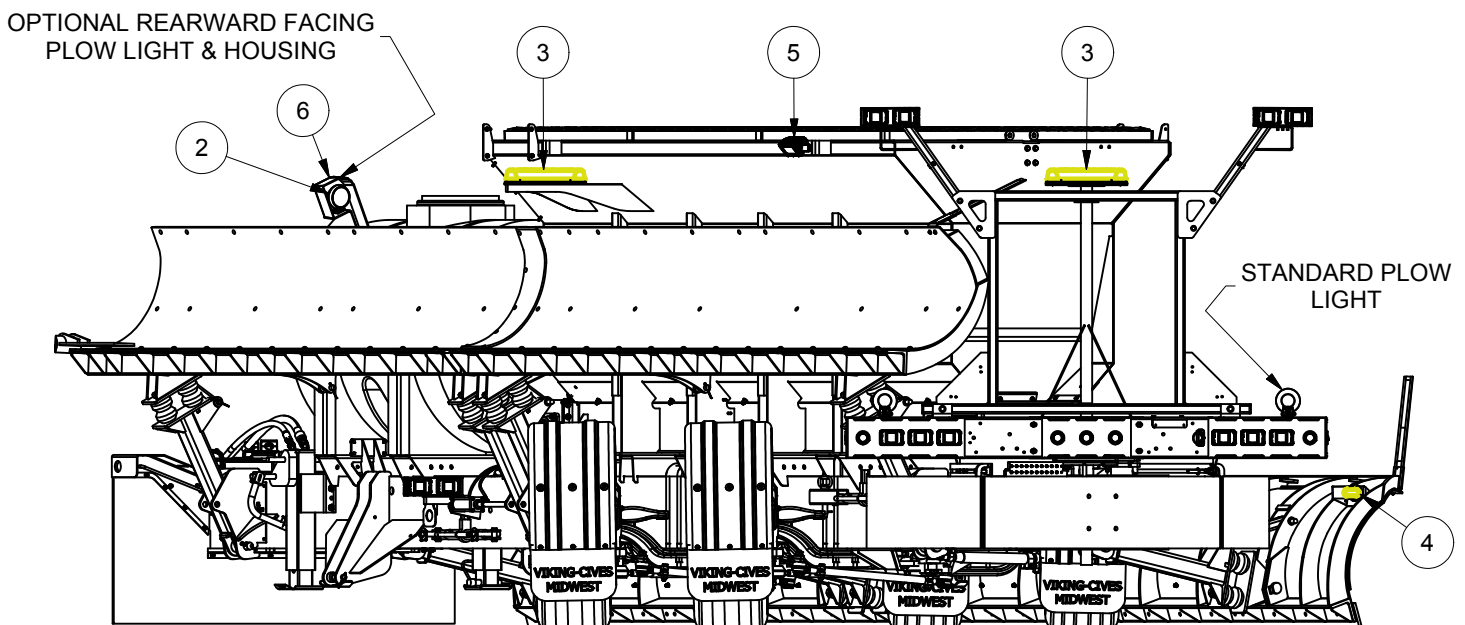
ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	01-026F769-A0		AMBER/AMBER WARNING STROBE "V" SERIES	4
1	02-0418865-000		AMBER/AMBER WARNING STROBE	4
2	44843051		RESPONDER LP 500 LIN6 AMB PERMINANT MOUNT	1
2	4484R2LLPA		SIX LIN 6 SUPER LED MODULES PERMINANT MOUNT	1
3	44843027		MPBB, MICRO PIONEER BAIL MT 12V BLK	2
3	44843417		SPREADER LIGHT (GROTE)	2
4	44843052		WING PLOW OPERATING LIGHT AMBER	2
5	51403118		TOW PLOW MLBD PLOW LIGHT BRACKET DS	1
5	51403072		TOW PLOW MLBD PLOW LIGHT BRACKET PS	1
6	51501168		WHELEN L31HAF AMBER BEACON LIGHT	1



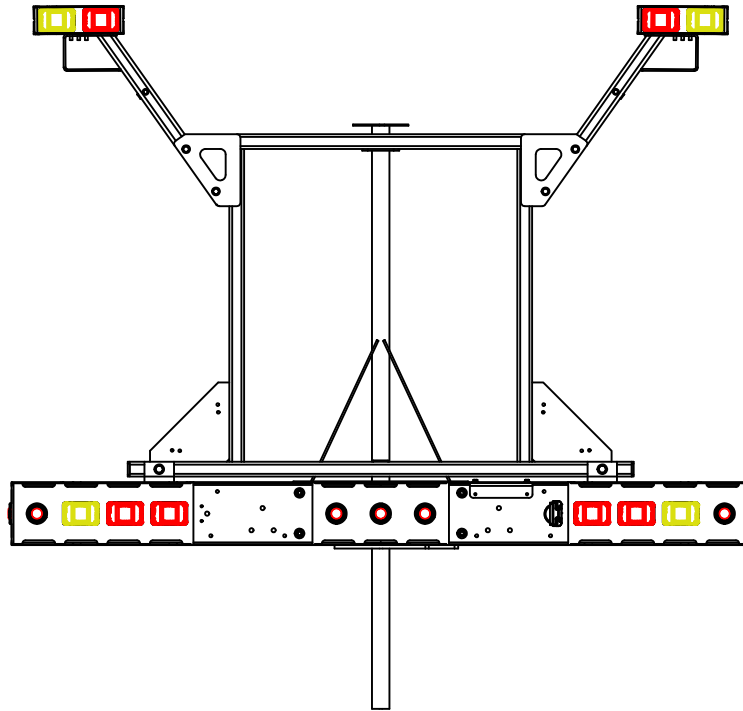
## OPTIONAL BI-DIRECTIONAL TOW PLOW LIGHTING SPREADER AND 525 OR 325 GALLON TANK CONFIGURATION



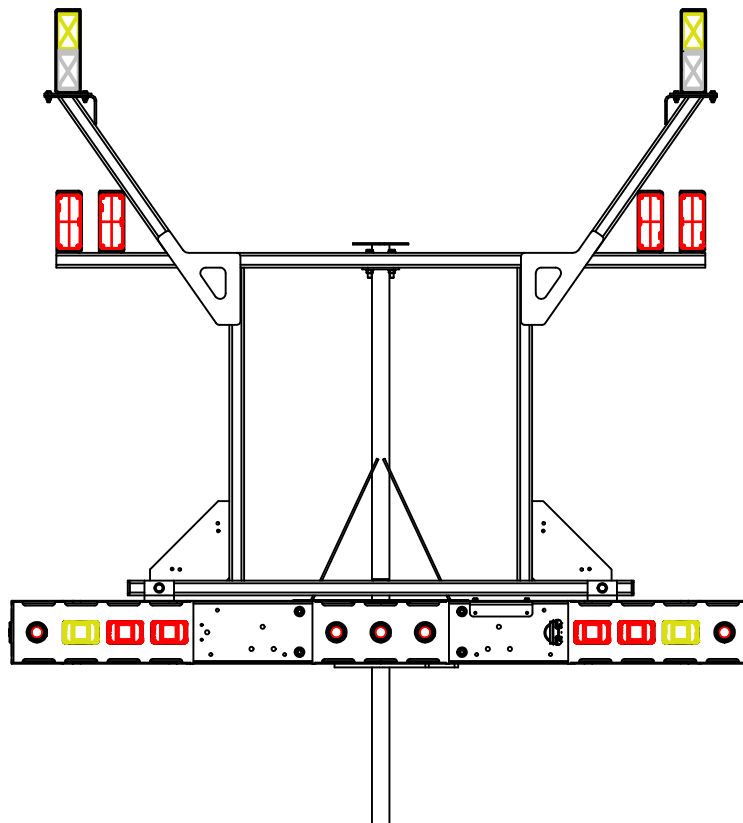
ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	44845004		WHELEN 400 SERIES LED STROBE GEN3	4
2	44843027		MPBB, MICRO PIONEER BAIL MT 12V BLK	2
2	44843417		SPREADER LIGHT (GROTE)	2
3	44843051		RESPONDER LP 500 LIN6 AMB PERMINANT MOUNT	2
3	4484R2LLPA		SIX LIN 6 SUPER LED MODULES PERMINANT MOUNT	2
4	44843052		WING PLOW OPERATING LIGHT AMBER	2
5	44843053		RIGID 4\" E-SERIES LED LIGHT BAR	2
6	51403118		TOW PLOW MLBD PLOW LIGHT BRACKET DS	1
6	51403072		TOW PLOW MLBD PLOW LIGHT BRACKET PS	1
7	51501168		WHELEN L31HAF AMBER BEACON LIGHT	1



## STANDARD REAR HIGH VISABILITY LIGHT BAR



## OPTIONAL REAR HIGH VISABILITY LIGHT BAR WITH EXTRA STOP/TAIL/TURN AND VERTICAL WARNING LIGHTS



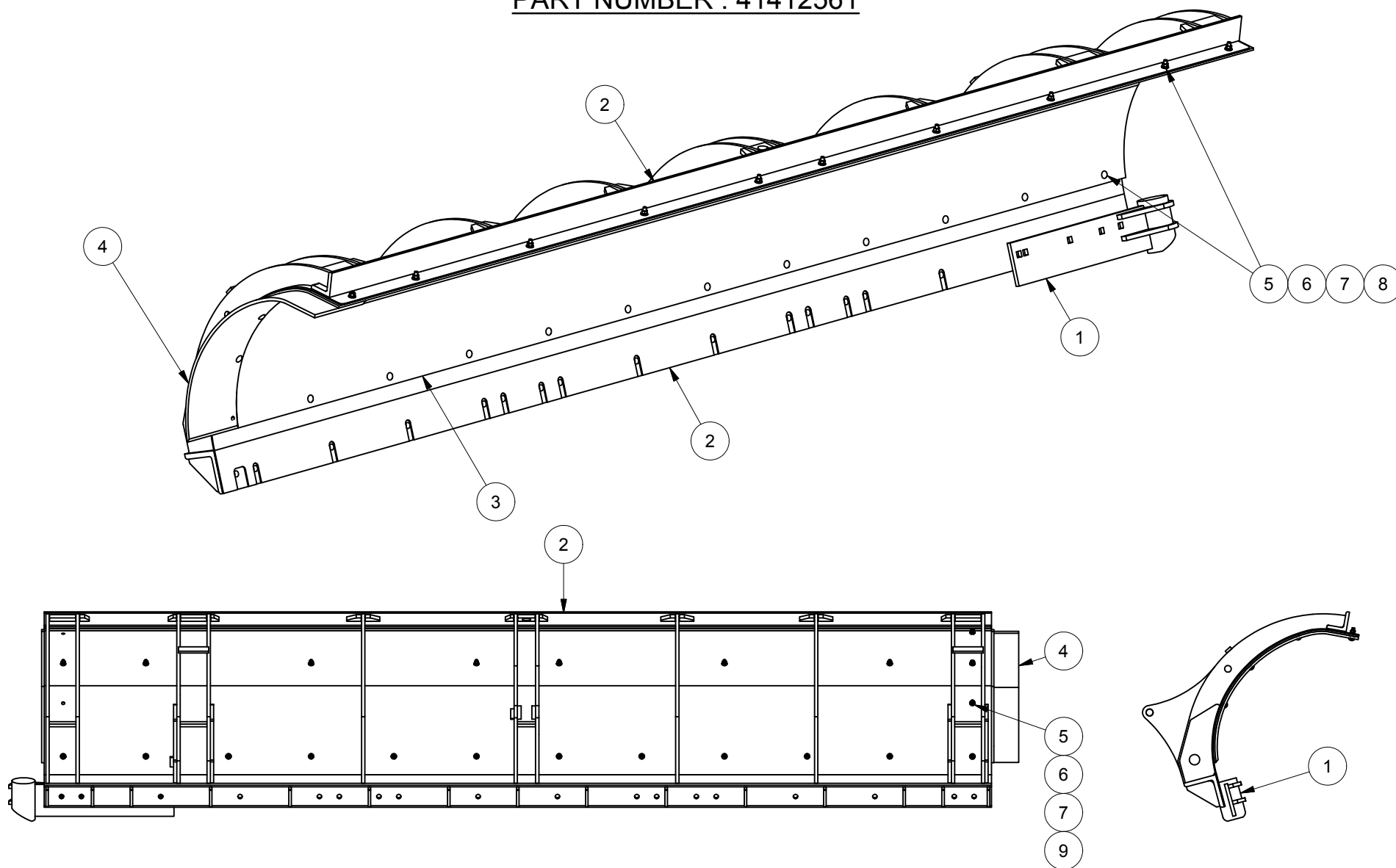


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## TOW PLOW 12 FT RIGHT HAND WING ASSEMBLY PART NUMBER : 41412561



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**TOW PLOW 12 FT RIGHT HAND WING ASSEMBLY**  
**PART NUMBER : 41412561**

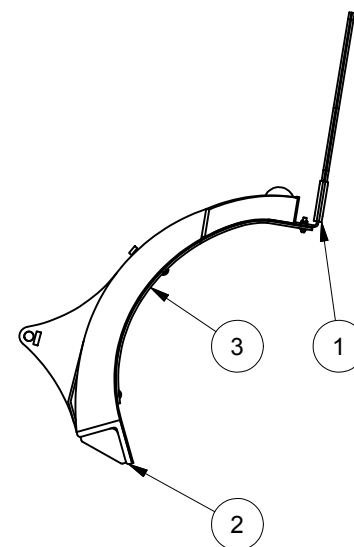
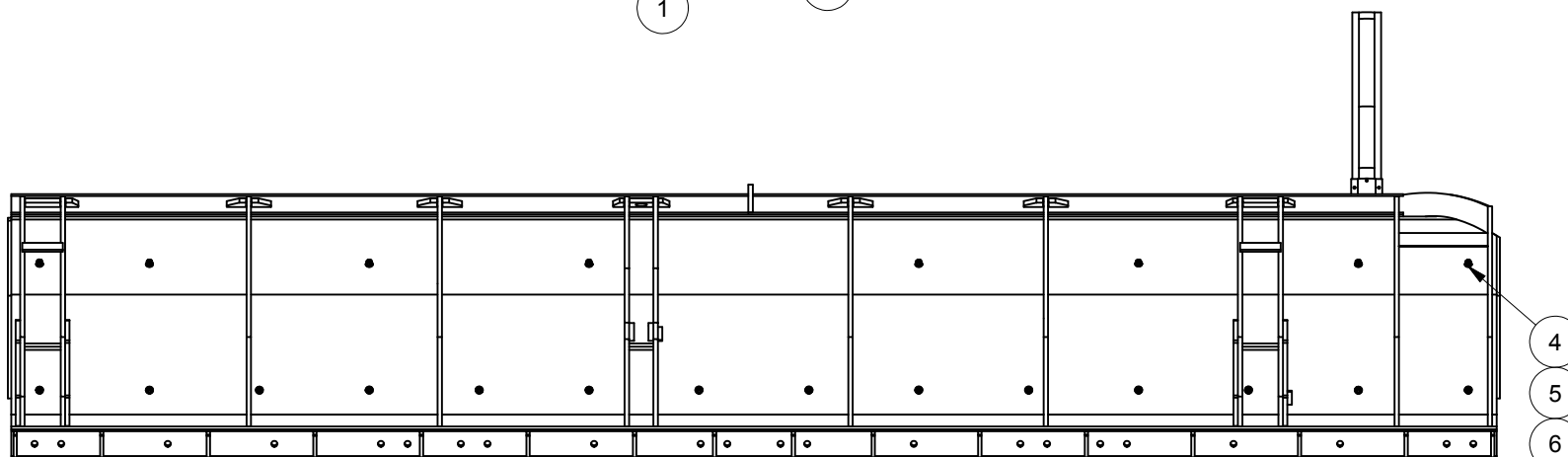
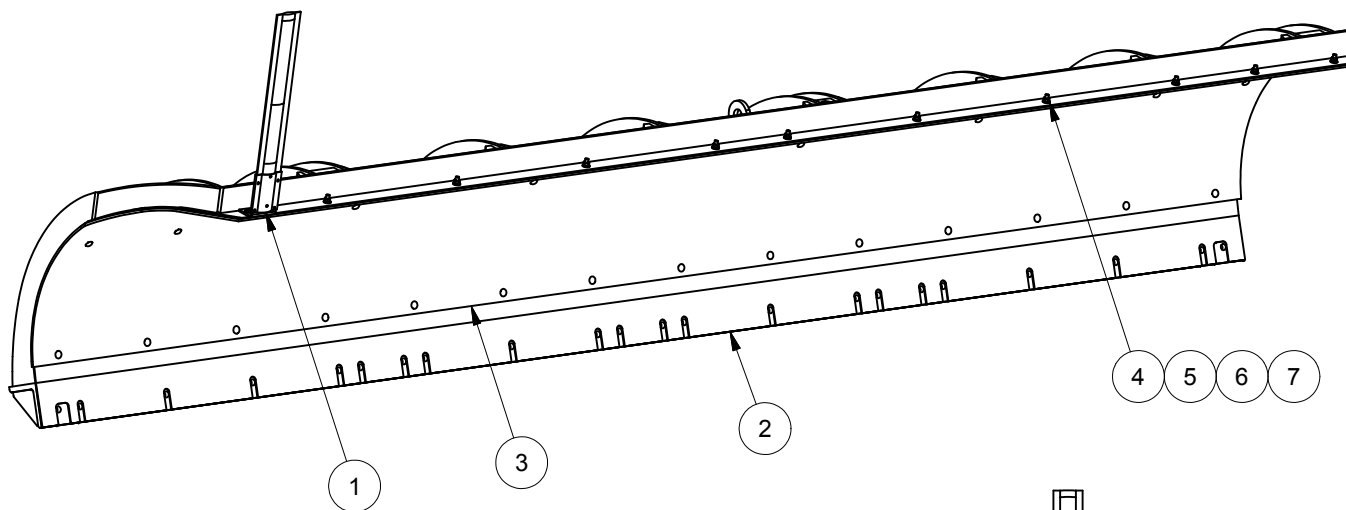
ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	41412092		PLOW SHOE WELD'T TOW PLOW	1
2	41412553		FRONT PLOW WELD'T 12 FT WITH SKIN	1
3	41412562		TOW PLOW POLY SKIN 12 FOOT	1
4	41412569		TOW PLOW OVERLAPPING POLY	1
5	HW14A-06		FLATWASHER SAE 3/8 ZINC	32
6	HW14C-06		LOCKWASHER SPLIT 3/8" ZINC	32
7	HW30A-06		NUT HEX 3/8 UNC ZINC	32
8	HW40C-0610		BOLT CARRIAGE 3/8 X 1 1/4 UNC ZINC	27
9	HW40C-0612	81104A	BOLT CARRIAGE 3/8 X 1 1/2 UNC ZINC	5

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## TOW PLOW 14 FT RIGHT HAND WING ASSEMBLY PART NUMBER : 41412564



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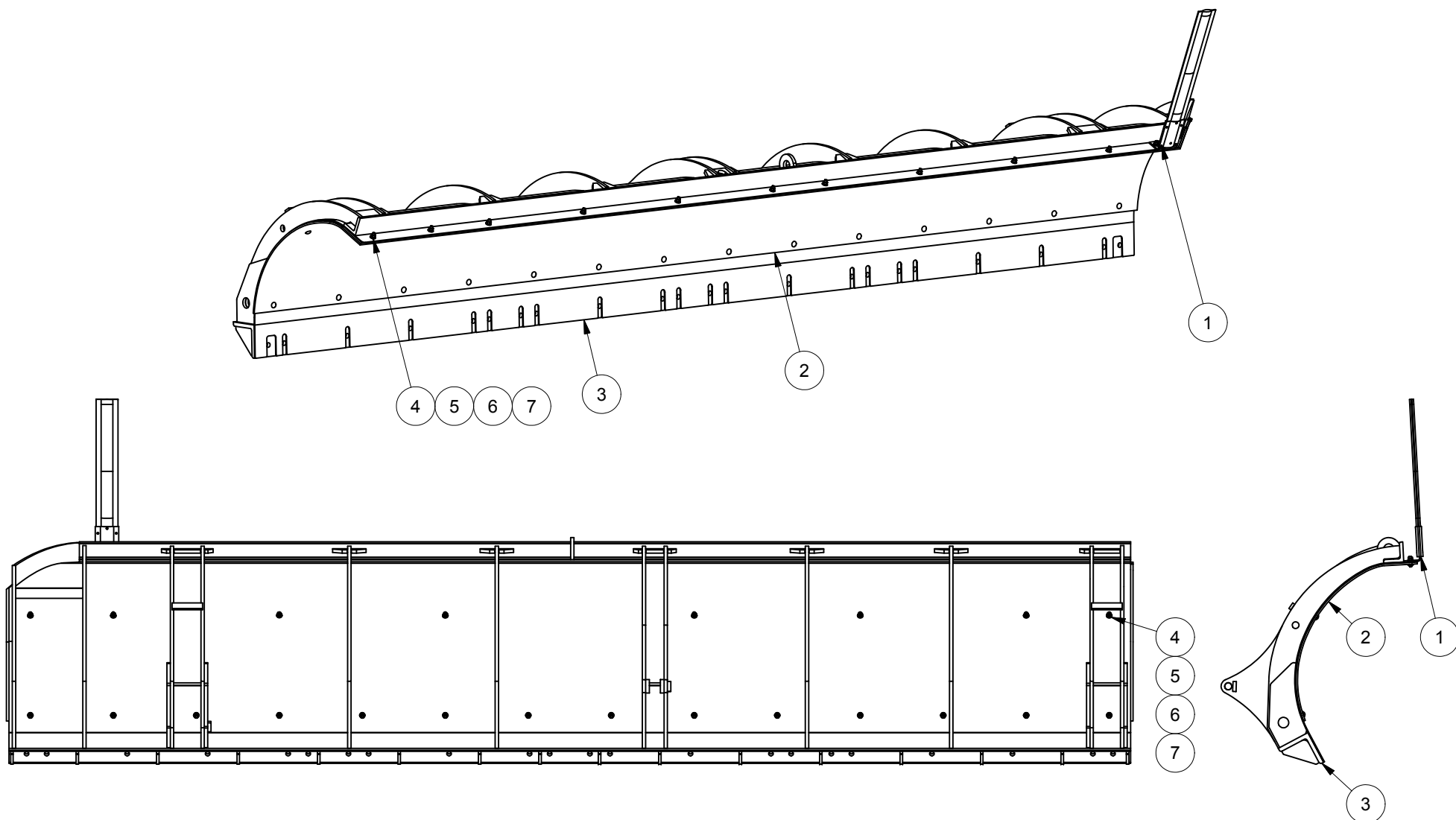
**TOW PLOW 14 FT RIGHT HAND WING ASSEMBLY**  
**PART NUMBER : 41412564**

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	0820051		MTO MARKER STICK	1
2	41412556		REAR PLOW WELD'T 14 FT WITH SKIN & CROP	1
3	41412563		TOW PLOW POLY SKIN 14 FOOT	1
4	HW14A-06		FLATWASHER SAE 3/8 ZINC	34
5	HW14C-06		LOCKWASHER SPLIT 3/8" ZINC	34
6	HW30A-06		NUT HEX 3/8 UNC ZINC	35
7	HW40C-0610		BOLT CARRIAGE 3/8 X 1 1/4 UNC ZINC	34



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## TOW PLOW 14 FT LEFT HAND WING ASSEMBLY PART NUMBER : 51401064



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**TOW PLOW 14 FT LEFT HAND WING ASSEMBLY**  
**PART NUMBER : 51401064**

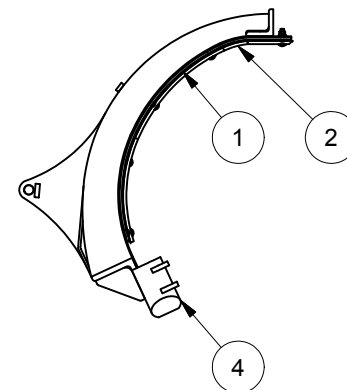
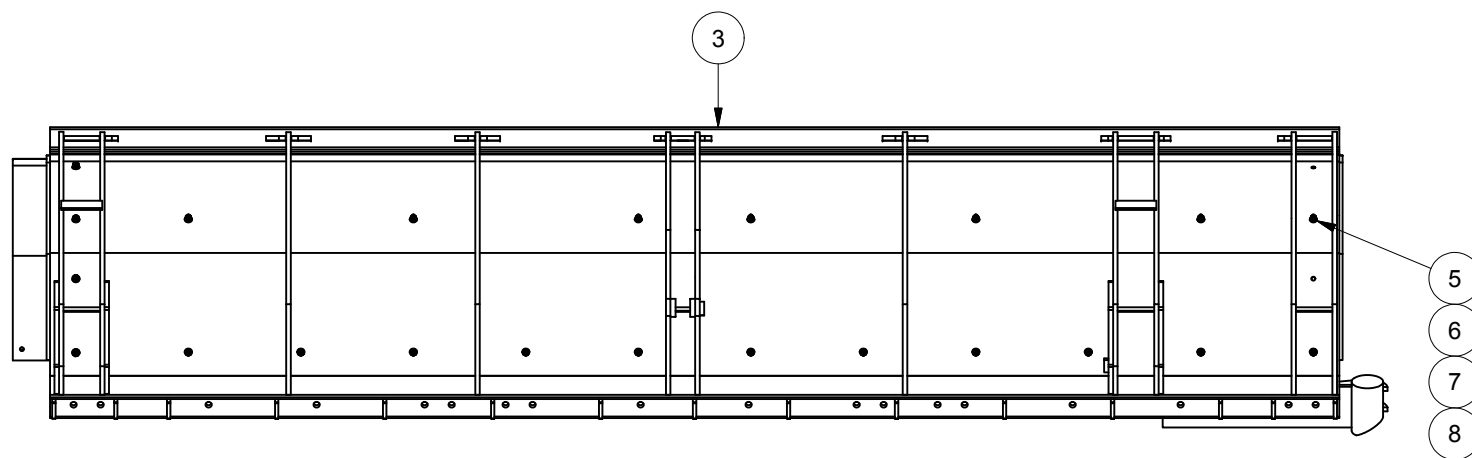
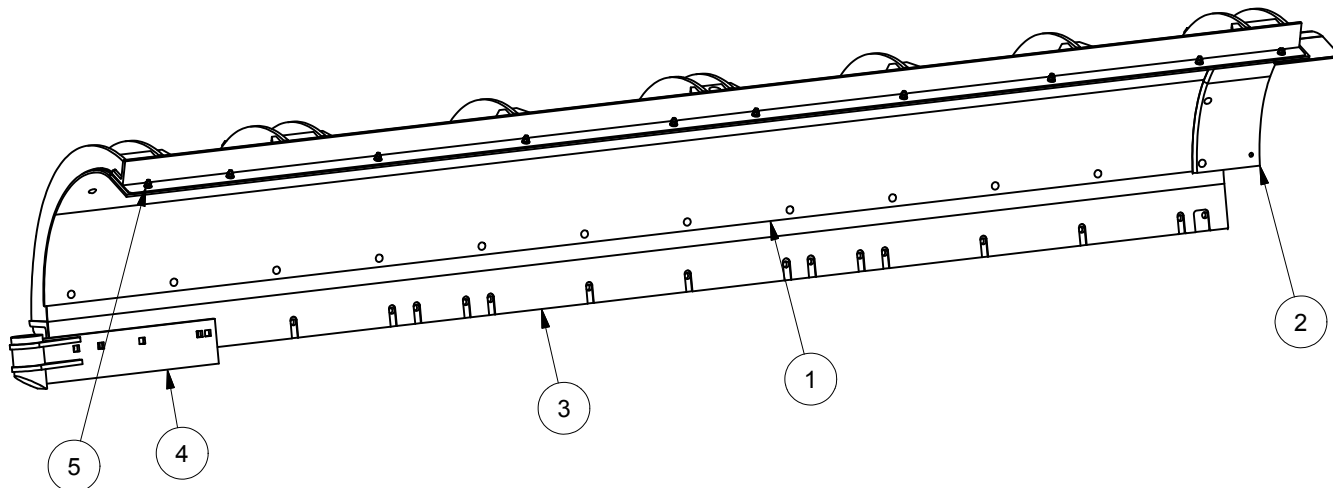
ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	0820051		MTO MARKER STICK	1
2	41412563		TOW PLOW POLY SKIN 14 FOOT	1
3	51403092		REAR PLOW WELD'T 14 FT W/SKIN & CROP LH	1
4	HW14A-06		FLATWASHER SAE 3/8 ZINC	34
5	HW14C-06		LOCKWASHER SPLIT 3/8" ZINC	34
6	HW30A-06		NUT HEX 3/8 UNC ZINC	34
7	HW40C-0610		BOLT CARRIAGE 3/8 X 1 1/4 UNC ZINC	34

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## TOW PLOW 12 FT LEFT HAND WING ASSEMBLY PART NUMBER : 51401065



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TOW PLOW 12 FT LEFT HAND WING ASSEMBLY  
PART NUMBER : 51401065

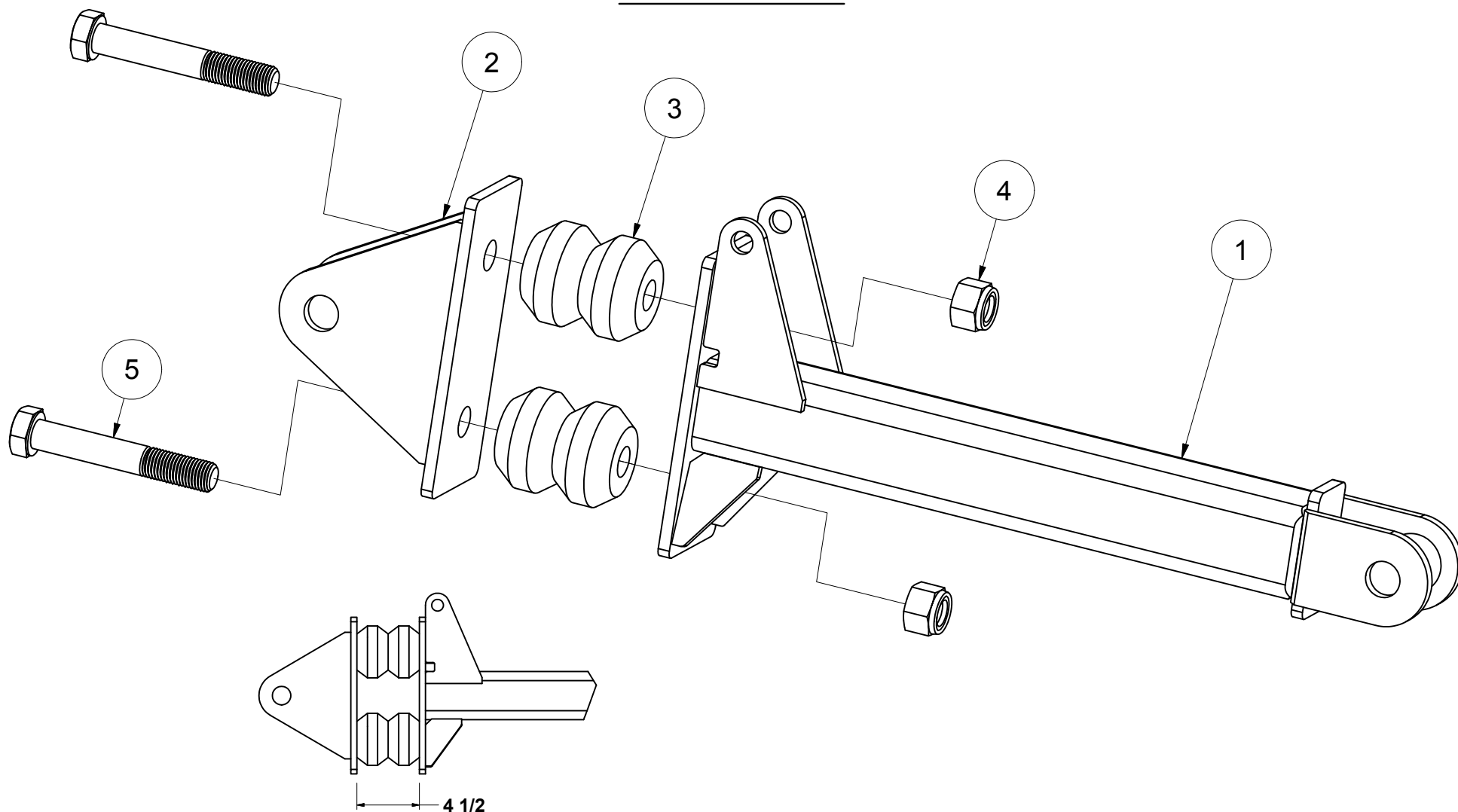
ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	41412562		TOW PLOW POLY SKIN 12 FOOT	1
2	41412569		TOW PLOW OVERLAPPING POLY	1
3	51403091		FRONT PLOW WELD'T 12 FT WITH SKIN LH	1
4	51403093		LTH PLOW SHOE WELD'T TOW PLOW	1
5	HW14A-06		FLATWASHER SAE 3/8 ZINC	32
6	HW14C-06		LOCKWASHER SPLIT 3/8" ZINC	32
7	HW30A-06		NUT HEX 3/8 UNC ZINC	33
8	HW40C-0610		BOLT CARRIAGE 3/8 X 1 1/4 UNC ZINC	27
9	HW40C-0612	81104A	BOLT CARRIAGE 3/8 X 1 1/2 UNC ZINC	5

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## TOW PLOW LIFT ARM ASSEMBLY PART# 41412030



**NOTE:**  
THE TIMBREN SPRINGS SHOULD BE TORQUED DOWN UNTILL THE  
TWO PLATES COMPRESSING THEM ARE 4.5" APART.

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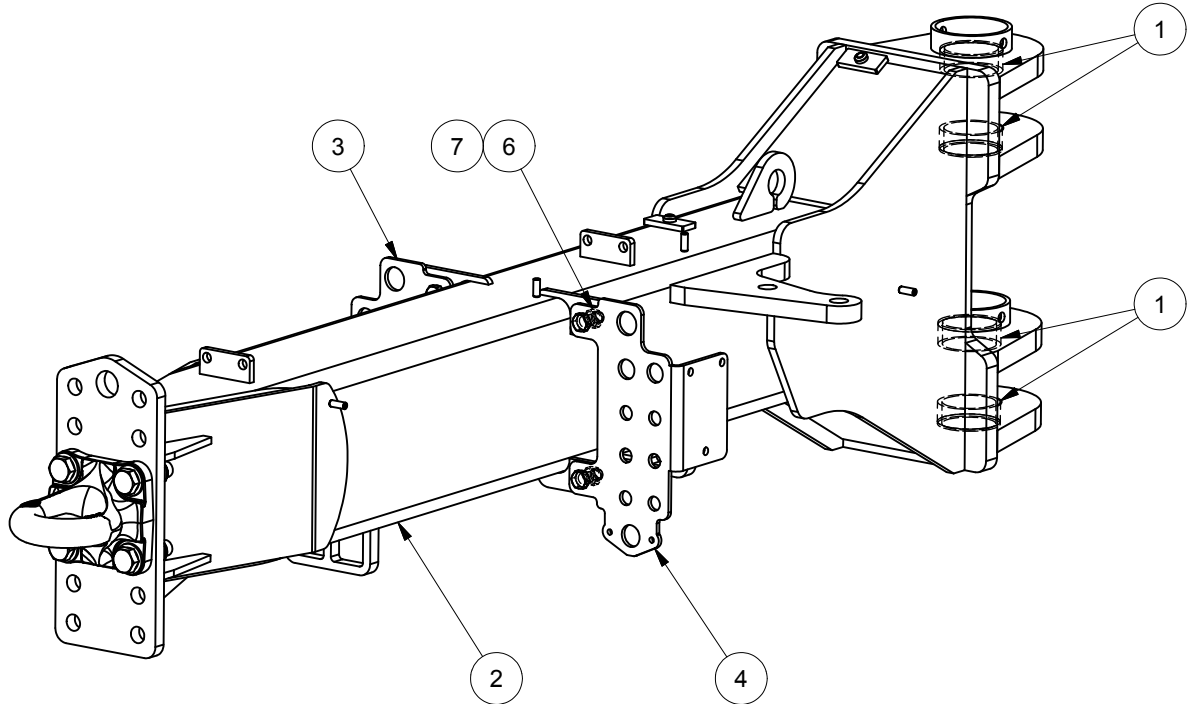


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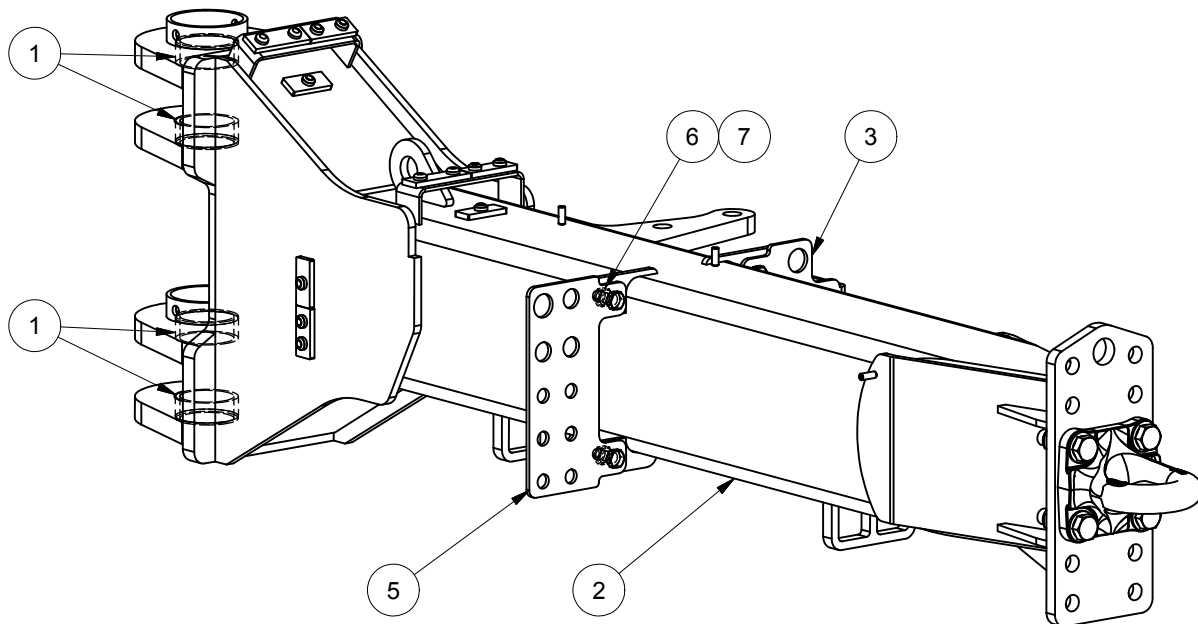
**TOW PLOW LIFT ARM ASSEMBLY**  
**PART# 41412030**

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	41412020		PLOW LIFT ARM WELD'T	1
2	41412031		LUG WELD'T	1
3	0720029	01200120	HELPER RUBBER TIMBREN A540-7500D	2
4	HW36D-20	80999D	NUT HEX ELASTIC 1 1/4 UNC ZINC	2
5	HW40A-2064		BOLT HEX 1 1/4 X 8 UNC ZINC	2

## BI-DIRECTIONAL TOW PLOW TWO 1025 GALLON TANK TONGUE ASSEMBLY PART NUMBER : 41413025



## BI-DIRECTIONAL TOW PLOW SPREADER WITH TANK TONGUE ASSEMBLY PART NUMBER : 51401169







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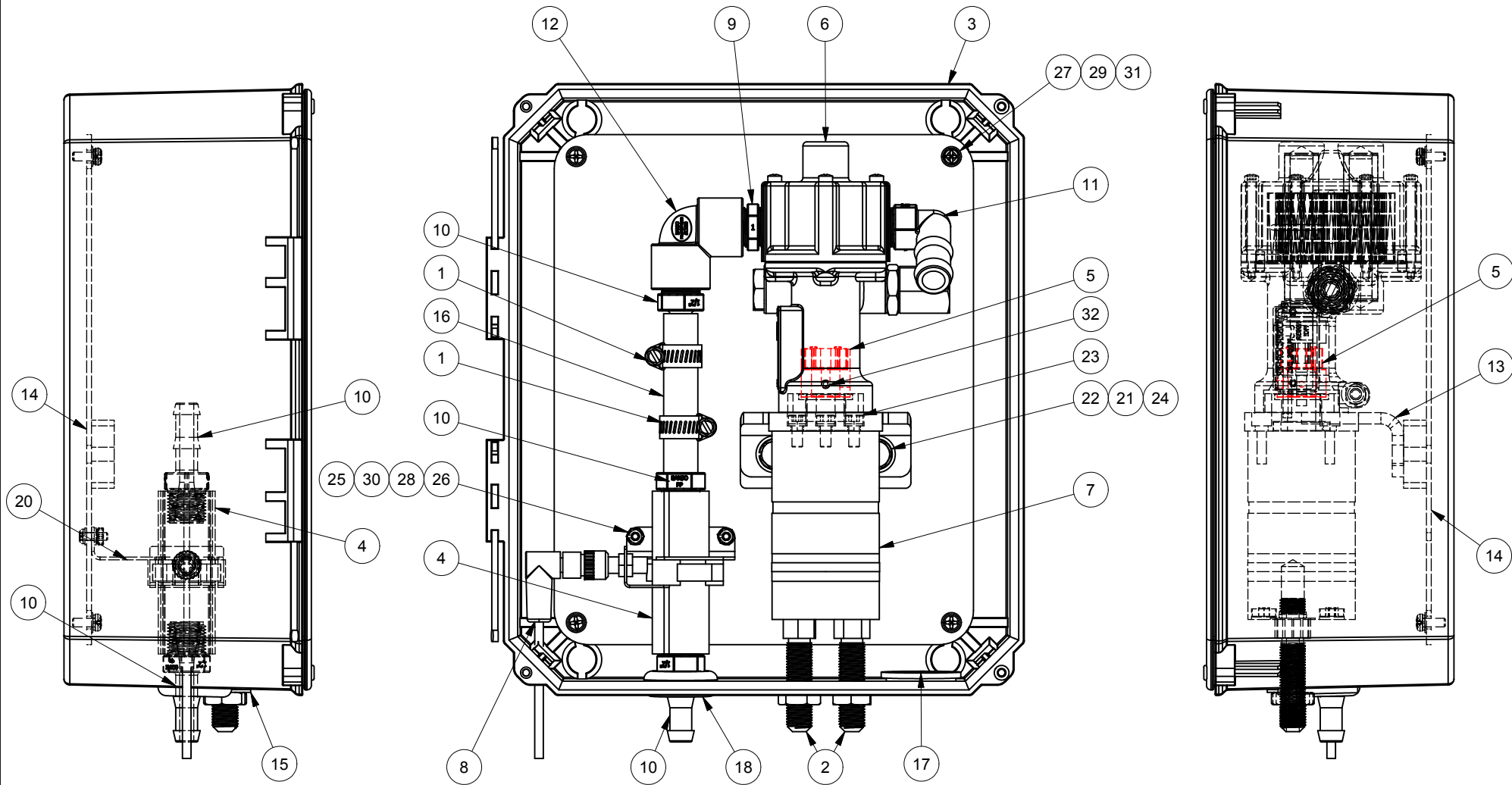
## BI-DIRECTIONAL TOW PLOW TONGUE PARTS LIST

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	41412319		JOURNAL BEARING 3.5 OD X 3.0 ID X 1.25 LENGTH	4
2	41413025-U		TONGUE WELD'T VCM BI-DI	1
2	51403229		TONGUE WELD'T SPREADER / TANK	1
3	51404000		TOW PLOW BULKHEAD MTG PLATE	1
4	51404041		TOW PLOW BULKHEAD / HOSE CADDY PLATE	1
5	51404096		SPREADER TANK COMBO BULKHEAD PLATE	1
6	HW30E-10		NUT HEX 5/8 UNC TOPLOCK ZINC	4
7	HW40A-1012	81072	BOLT HEX 5/8 X 1 1/2 UNC ZINC	4



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## PRE-WET CLOSED LOOP ENCLOSURE ASSEMBLY PART NUMBER : 51401104



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## PRE-WET CLOSED LOOP ENCLOSURE ASSEMBLY

### PART NUMBER : 51401104

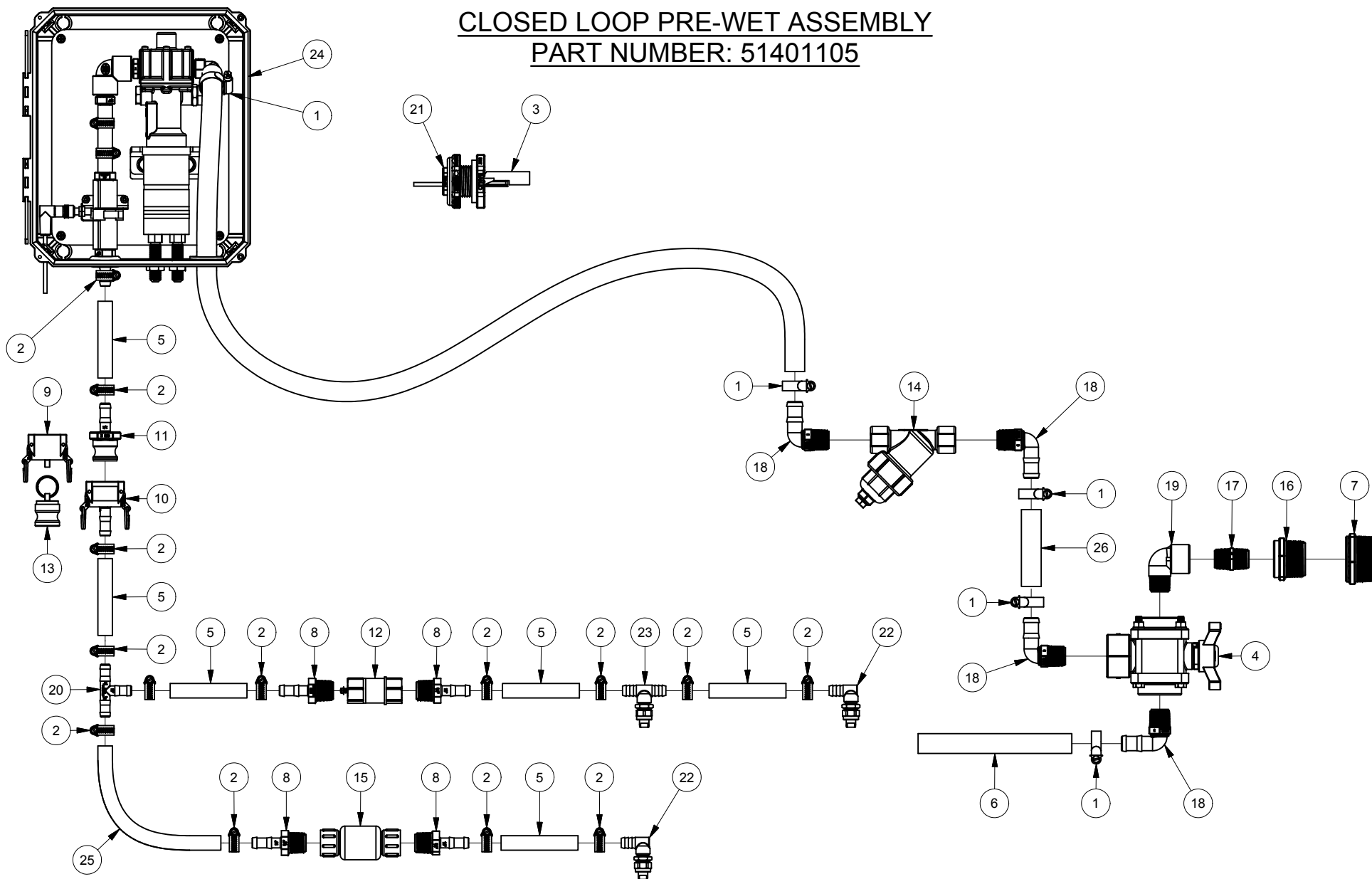
ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	280818AS		3/4" STAINLESS WORM GEAR CLAMP	2
2	44140960062LN-06-06		6ORB-6MJ BULKHEAD FITTING (LONG 3")	2
3	44240147	DS121006HPL	STAHLIN DIAMONDSHIELD JUNCTION ENCLOSURE	1
4	44240148	FM500	INLINE FLOW METER	1
5	44240157		MOTOR TO PUMP COUPLER & SPIDER (LOVEJOY)	1
6	44254209		OBERDORFER BRONZE CLOSE COUPLED ROTARY GEAR PUMP	1
7	44254210		DANFOSS OMM 12.5 HYD MOTOR 5/8",0.79 CU IN SAE END PORT	1
8	44847466		M12 JUMPER HARNESS FOR PRE-WET BOX	1
9	46842184	NIP050-SH	1/2 IN POLY NIPPLE, SHORT	1
10	46842200	HB050	MALE THREAD 1/2 X 1/2 HOSE BARB	3
11	46842201	HB050-075-90	3/4" BARB X 1/2" MALE NPT 90	1
12	46842423		1/2" 90 DEG. ELBOW	1
13	51403131		PRE-WET MOTOR TO PUMP MOUNTING WELD'T	1
14	51403132		PRE-WET MOUNTING PLATE WELDMENT 10/1/15	1
15	51404040		OUTSIDE BOX HYDRAULIC FITTING DOUBLE WASHER	1
16	51415263	H20108BK	1/2" WATER HOSE BLACK (PER FOOT)	1
17	51415265		1 3/4" X 1 3/16" RUBBER GROMET	1
18	51415266		1 9/16" X 7/8" RUBBER GROMET	1
19	51415272		OUTSIDE PRE-WET ENCLOSURE VIKING STICKER	1
20	51422156		FORMED MOUNTING BRACKET FLOW METER	1
22	HW14CS-06		LOCKWASHER SPLIT 3/8 STAINLESS	2
21	HW14AS-06		FLATWASHER SAE 3/8 STAINLESS	2
23	HW400ES-0612		M6-1 X 12MM HEX HEAD CAP SCREW SS	3
24	HW40AS-0608		BOLT HEX 3/8 X 1 UNC STAINLESS	2
25			#8-32 X 1/2 MACHINE SCREW STAINLESS	2
26			#8 FLAT WASHER STAINLESS	4
27			#10 FLAT WASHER STAINLESS	4
28			#8 SPLIT LOCK WASHER STAINLESS	2
29			#10 SPLIT LOCK WASHER STAINLESS	4
30			#8-32 MACHINE HEX NUT STAINLESS	2
31			#10-32 X 1/2 MACHINE SCREW STAINLESS	4
32			#10-32 X 0.188 SET SCREW	1

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## CLOSED LOOP PRE-WET ASSEMBLY PART NUMBER: 51401105



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## CLOSED LOOP PRE-WET ASSEMBLY

### PART NUMBER: 51401105

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	280817AS		1 1/4" STAINLESS WORM GEAR CLAMP	5
2	280818AS		3/4" STAINLESS WORM GEAR CLAMP	14
3	44240023		POLY FLOAT W/BH CORDED PLUG	1
4	44253076	V075BL	3/4" NPT 3-WAY BALL VALVE, POLY	1
5	46841999	H20108BK	1/2" WATER HOSE BLACK (PER FOOT)	25
6	46842003	H20112BK-250R	3/4" WATER HOSE BLACK (PER FOOT)	6
7	46842108	RB200-150	REDUCER BUSHING 1 1/2 X 2 MPT	1
8	46842111	HB075-050	MALE THREAD 0.75 IN X 0.50 IN HOSE BARB	4
9	46842120	075CAP	3/4" CAP FOR MALE COUPLING ADAPTER	1
10	46842122	050C	FEMALE COUPLER 0.75 IN X 0.50 IN HOSE BARB	1
11	46842123	050E	MALE ADAPTER 0.75 IN X 0.50 IN HOSE BARB	1
12	46842131		3/4" INLINE CHECK 5 PSI ADJ GRAY VALVE (PREWET)	1
13	46842133	075PL	3/4" PLUG FOR FEMALE COUPLING ADAPTER	1
14	46842134	LS075-20	3/4" STRAINER 20 MESH S.S.	1
15	46842136		3/4" FNPT PVC CHECK VALVE 20 PSI (WHITE)	1
16	46842137	RB150-075	REDUCER BUSHING 3/4 X 1 1/2 MPT	1
17	46842146	NIP075-SH	SHORT 3/4 IN NIPPLE	1
18	46842155	HB075-90	3/4 MPT X 3/4 HOSE BARB 90 DEGREE	4
19	46842156	SL075-90	3/4 IN 90 DEGREE STREET ELBOW	1
20	46842207	HBT050	HOSE BARB TEE 0.50 IN	1
21	46842209	TF050	BULKHEAD TANK FITTINGS EPDM: POLY 0.50 IN	1
22	51401088		TEEJET BULKHEAD 90 DEG NOZZLE ASSEMBLY	2
23	51401089		TEEJET BULKHEAD TEE NOZZLE ASSEMBLY	1
24	51401104		CLOSED LOOP PRE-WET BOX ASSEMBLY	1

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**PRE-WET OPEN LOOP ENCLOSURE ASSEMBLY**  
**PART NUMBER : 51401106**

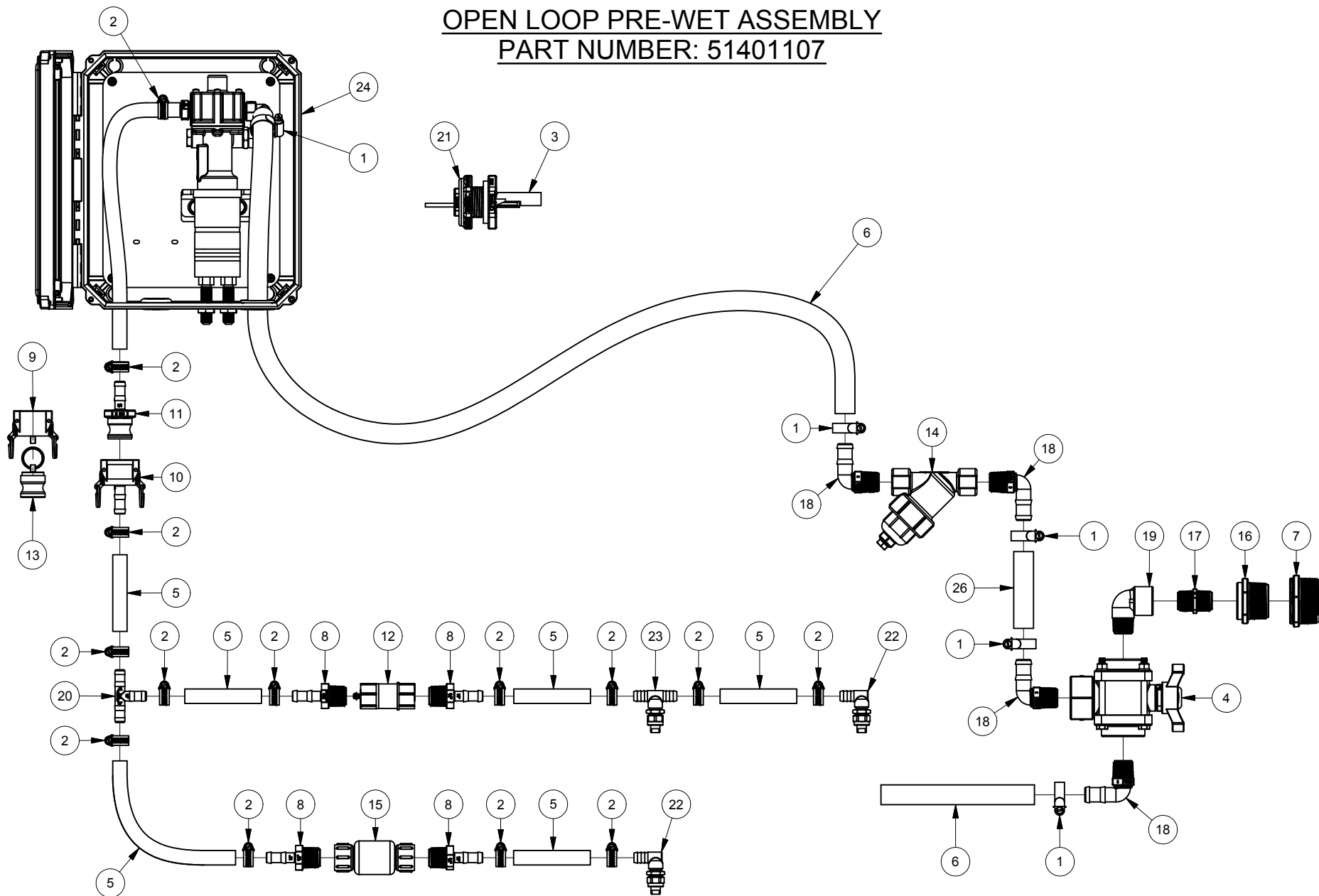
ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	44140960062LN-06-06		6ORB-6MJ BULKHEAD FITTING (LONG)	2
2	44240147	DS121006HPL	STAHLIN DIAMONDSHIELD JUNCTION ENCLOSURE	1
3	44240157		MOTOR TO PUMP COUPLER & SPIDER (LOVEJOY)	1
4	44254209		OBERDORFER BRONZE CLOSE COUPLED ROTARY GEAR PUMP	1
5	44254210		DANFOSS OMM 12.5 HYD MOTOR 5/8",0.79 CU IN SAE END PORT	1
6	46842200	HB050	MALE THREAD 1/2 X 1/2 HOSE BARB	1
7	46842201	HB050-075-90	3/4" BARB X 1/2" MALE NPT 90	1
8	51403131		PRE-WET MOTOR TO PUMP MOUNTING WELD'T	1
9	51403132		PRE-WET MOUNTING PLATE WELDMENT 10/1/15	1
10	51404040		OUTSIDE BOX HYDRAULIC FITTING DOUBLE WASHER	1
11	51415265		1 3/4" X 1 3/16" RUBBER GROMET	1
12	51415266		1 9/16" X 7/8" RUBBER GROMET	1
13	51415272		OUTSIDE PRE-WET ENCLOSURE VIKING STICKER	1
14	HW14CS-06		LOCKWASHER SPLIT 3/8 STAINLESS	2
15	HW14AS-06		FLATWASHER SAE 3/8 STAINLESS	2
16	HW400ES-0612		M6-1 X 12MM HEX HEAD CAP SCREW SS	3
17	HW40AS-0608		BOLT HEX 3/8 X 1 UNC STAINLESS	2
18			#10 FLAT WASHER STAINLESS	4
19			10-32 X 0.188 SET SCREW	1
20			#10-32 X 1/2 MACHINE SCREW STAINLESS	4

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## OPEN LOOP PRE-WET ASSEMBLY PART NUMBER: 51401107



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**OPEN LOOP PRE-WET ASSEMBLY**  
**PART NUMBER: 51401107**

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	280817AS		1 1/4" STAINLESS WORM GEAR CLAMP	5
2	280818AS		3/4" STAINLESS WORM GEAR CLAMP	14
3	44240023		POLY FLOAT W/BH CORDED PLUG	1
4	44253076	V075BL	3/4" NPT 3-WAY BALL VALVE, POLY	1
5	46841999	H20108BK	1/2" WATER HOSE BLACK (PER FOOT)	25
6	46842003	H20112BK-250R	3/4" WATER HOSE BLACK (PER FOOT)	6
7	46842108	RB200-150	REDUCER BUSHING 1 1/2 X 2 MPT	1
8	46842111	HB075-050	MALE THREAD 0.75 IN X 0.50 IN HOSE BARB	4
9	46842120	075CAP	3/4" CAP FOR MALE COUPLING ADAPTER	1
10	46842122	050C	FEMALE COUPLER 0.75 IN X 0.50 IN HOSE BARB	1
11	46842123	050E	MALE ADAPTER 0.75 IN X 0.50 IN HOSE BARB	1
12	46842131		3/4" INLINE CHECK 5 PSI ADJ GRAY VALVE (PREWET)	1
13	46842133	075PL	3/4" PLUG FOR FEMALE COUPLING ADAPTER	1
14	46842134	LS075-20	3/4" STRAINER 20 MESH S.S.	1
15	46842136		3/4" FNPT PVC CHECK VALVE 20 PSI (WHITE)	1
16	46842137	RB150-075	REDUCER BUSHING 3/4 X 1 1/2 MPT	1
17	46842146	NIP075-SH	SHORT 3/4 IN NIPPLE	1
18	46842155	HB075-90	3/4 MPT X 3/4 HOSE BARB 90 DEGREE	4
19	46842156	SL075-90	3/4 IN 90 DEGREE STREET ELBOW	1
20	46842207	HBT050	HOSE BARB TEE 0.50 IN	1
21	46842209	TF050	BULKHEAD TANK FITTINGS EPDM: POLY 0.50 IN	1
22	51401088		TEEJET BULKHEAD 90 DEG NOZZLE ASSEMBLY	2
23	51401089		TEEJET BULKHEAD TEE NOZZLE ASSEMBLY	1
24	51401106		OPEN LOOP PRE-WET BOX ASSEMBLY	1

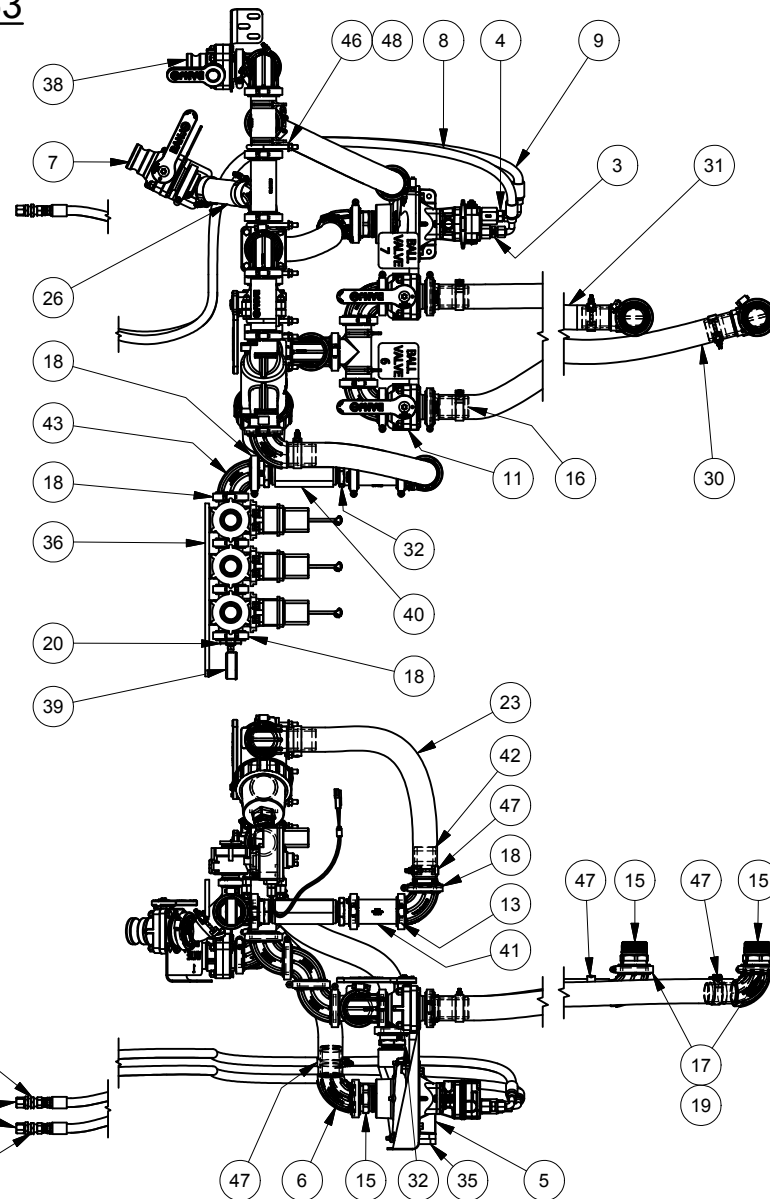
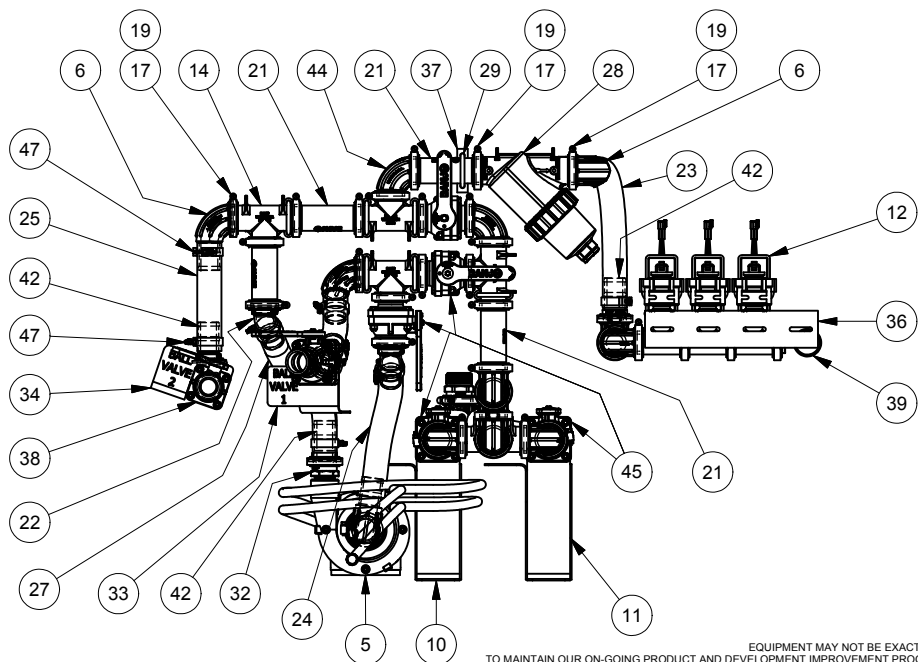
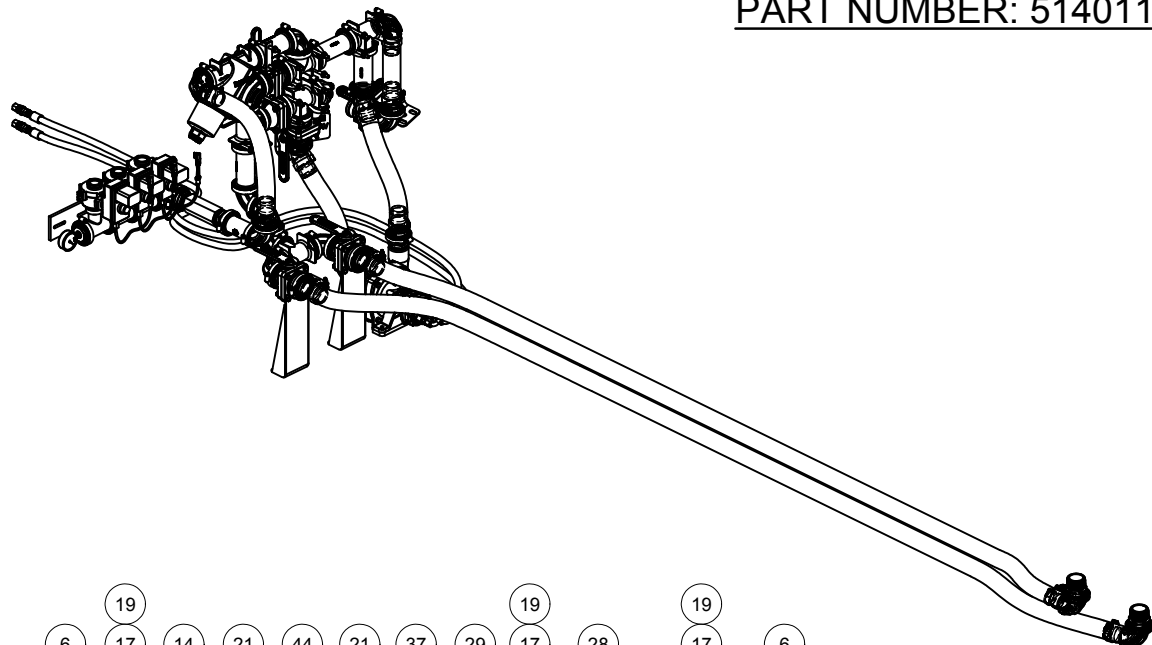
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## BI-DIRECTIONAL ANTI-ICE FRONT HALF ASSEMBLY

PART NUMBER: 51401153



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## BI-DIRECTIONAL ANTI-ICE FRONT HALF ASSEMBLY

### PART NUMBER: 51401153

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY	ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	441402700LN-8-8		8MJ-8MJ MALE BULKHEAD W/LOCK NUT	2	25	51415165		2" RUBBER HOSE OFFLOAD COUPLER	1
2	44140304C-8		8FJIC HEX CAP	2	26	51415166		2" RUBBER HOSE TO FILL TANK COUPLER	1
3	441406400-8		8MJ-8MB O-RING CONNECTOR	1	27	51415167		2" RUBBER HOSE PUMP OUTLET	1
4	441406400-8-10	C5315X8X10	8MJ - 10MB O-RING CONNECTOR	1	28	51415172		2" FP "Y" LINE STRAINER 16 MESH SS	1
5	44254608		CAST IRON DIRECT LIQUID CENTRIFUGAL PUMP W/MOTOR	1	29	51415173		3/8 X 2 1/2 X 4 1/2 LONG U-BOLT STAINLESS STEEL	7
6	46854040	M220BRBSWP90	2" FULL PORT SWEEP 90 DEG HOSE BARB	6	30	51415178	51415094	T202AA 200 X 100, 2" SUCTION HOSE	1
7	51401069	MVSF220FP	STUBBY VALVE FULL PORT 2" MALE ADAPTOR	1	31	51415179	51415094	T202AA 200 X 100, 2" SUCTION HOSE	1
8	51401297		1/2" HYD HOSE BH PLATE TO ANTI-ICE PUMP INLET	1	32	51415193	M200150MPT	2" STANDARD PORT X 1 1/2" MPT	3
9	51401298		1/2" HYD HOSE BH PLATE TO ANTI-ICE PUMP RETURN	1	33	51422129		FORMED BALL VALVE BRACKET #1	1
10	51403099		LOWER BALL VALVE MTG BRACKET #7 WELD'T	1	34	51422130		FORMED BALL VALVE BRACKET #2	1
11	51403100		LOWER BALL VALVE MTG BRACKET #6 WELD'T	1	35	51430014		ANTI-ICE PUMP POLY SPACER	1
12	51415067	453BEC-2F-C15	TeeJet 200 SERIES 3 VALVE/MANIFOLD ASS'Y	1	36	51430015		VALVE MTG BRACKET RUBBER DAMPENER BI-DI	1
13	51415079	M201G	GASKET WITH RIB EPDM 2" STANDARD PORT	8	37	51430025		1/4 RUBBER SPACER/CUSHION ANTI-ICE BI-DI	1
14	51415083	M220TEE	2" FULL PORT TEE	5	38	51501184		STD SHORT VALVE FLANGE CONNECTOR 2 INCH POLY	1
15	51415084	M220MPT	FP MANIFOLD FITTING: 2 IN MALE MPT	3	39	51515173	47149068	2 1/2" 200 PSI GAUGE 1/2" BOTTOM BRASS STEM	1
16	51415085	M220BRB	2" FULL PORT HOSE BARB	2	40	51515175		MT FLOW METER #1500 / SENSOR INCLUDED	1
17	51415086	FC220	2" FULL PORT MANIFOLD CLAMP	32	41	51515176	M200CPG	STANDARD PORT FLANGE 2 X 2 X 4	1
18	51415087	FC200	2" STANDARD PORT MANIFOLD CLAMP	9	42	51515180	M200BRB	2" HOSE BARB STANDARD PORT	3
19	51415088	M221G	2 INCH FULL PORT EPDM MANIFOLD GASKET	31	43	51515183	M200SWP90	2" STANDARD PORT SWEEP 90 DEG	3
20	51415096	M200PLG025	MANIFOLD FITTING 2" X 1/4" NPT PLUG	1	44	51515301	M220SWP90	MANIFOLD SWEEP FLANGE 2 FULL PORT FLANGE	7
21	51415156	M220CPG6	2" FULL PORT 6" EXTENSION	4	45	54301036	*Varies*	FULL PORT 2" X 2" BOLTED STUBBY	5
22	51415157	M220BRB45	2" FULL PORT 45 DEG HOSE BARB	3	46	HW14AS-06		FLATWASHER SAE 3/8 STAINLESS	14
23	51415163		2" RUBBER HOSE STRAINER TO FLOW METER	1	47	HW23C-40		2 1/2" T-BOLT HOSE CLAMP	14
24	51415164		2" RUBBER HOSE TANK TO PUMP INLET	1	48	HW30ES-06		NUT HEX TOPLOCK 3/8 UNC STAINLESS	14

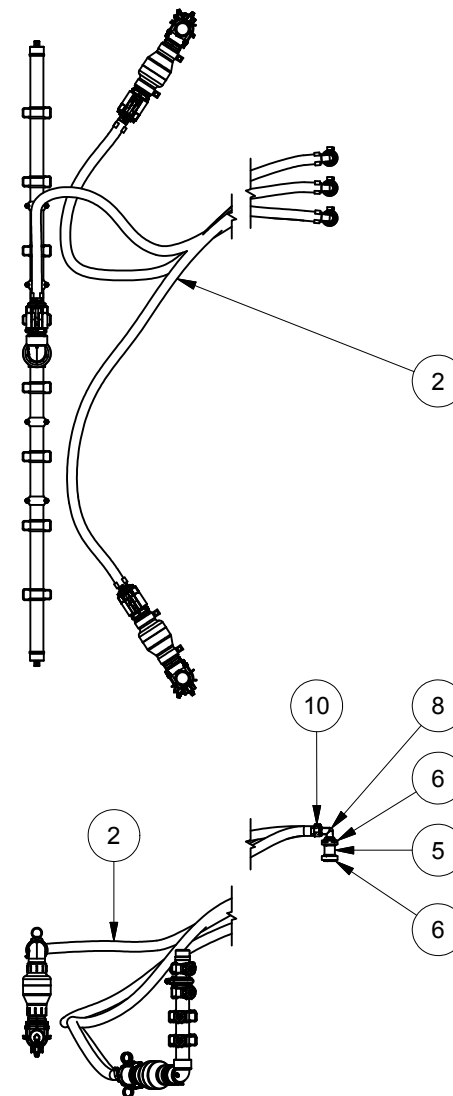
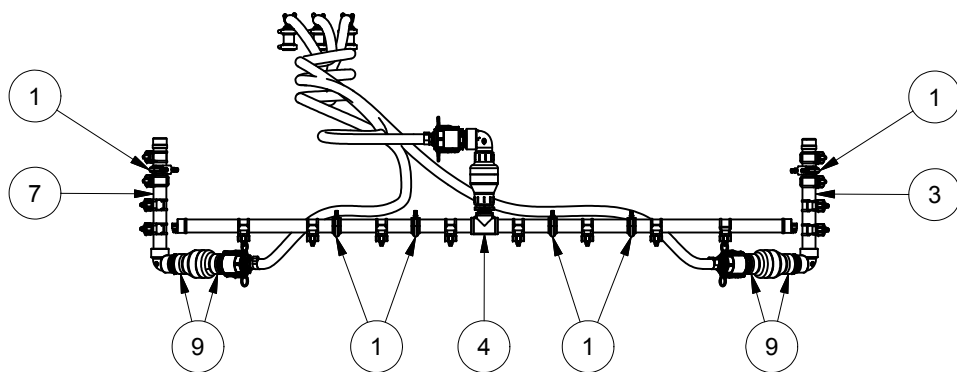
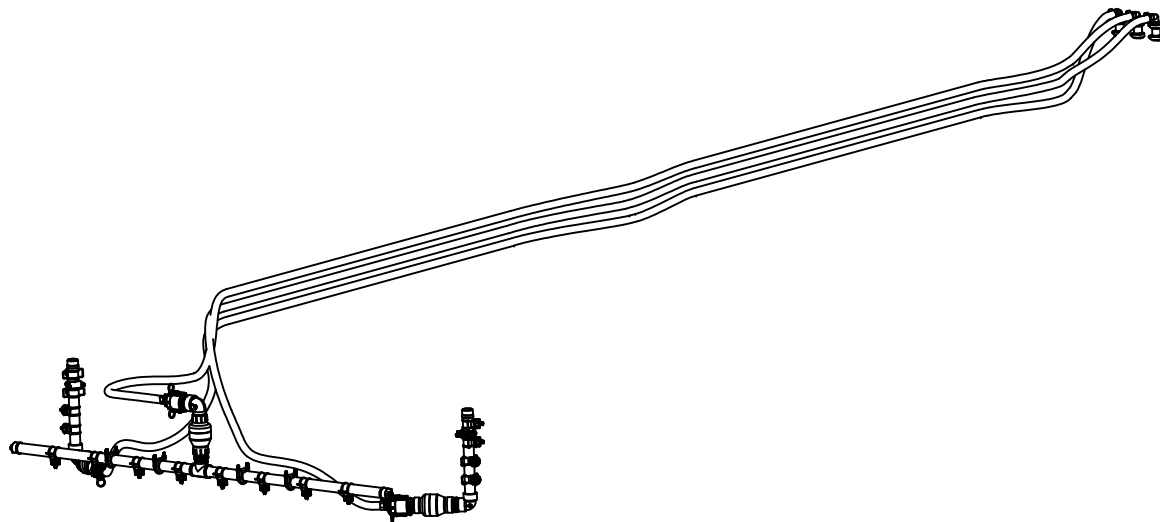
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## BI-DIRECTIONAL ANTI-ICE REAR HALF ASSEMBLY

PART NUMBER: 51401155



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**BI-DIRECTIONAL ANTI-ICE REAR HALF ASSEMBLY**  
**PART NUMBER: 51401155**

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	3176T35	42913001	VIBRATION-DAMPENING U-BOLT CLAMP	6
2	44040016S		1" GENERAL PURPOSE BLACK HOSE (PER FOOT)	100
3	51401239		SIDE SPRAY BAR SUB-ASSY PASS SIDE BI-DI	1
4	51401240		REAR CROSS SPRAY BAR SUB-ASSEMBLY BI-DI	1
5	51415075	M100CPG	1 INCH MANIFOLD COUPLER M100	3
6	51415077	FC100M100G	1" CLAMP AND GASKET 1" MANIFOLD FITTINGS	6
7	51501188		SIDE SPRAY BAR SUB-ASSEMBLY DRVS SIDE	1
8	51515166	M100BRB90	90 DEG 1" HOSE BARB X 1" MNFLD FLG	3
9	HW23A-48		3" HOSE P-CLAMP	4
10	HW23C-16		1" T-BOLT CLAMP	6

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## STAINLESS TOW PLOW SPREADER ASSEMBLY

### PART NUMBER : 01326689

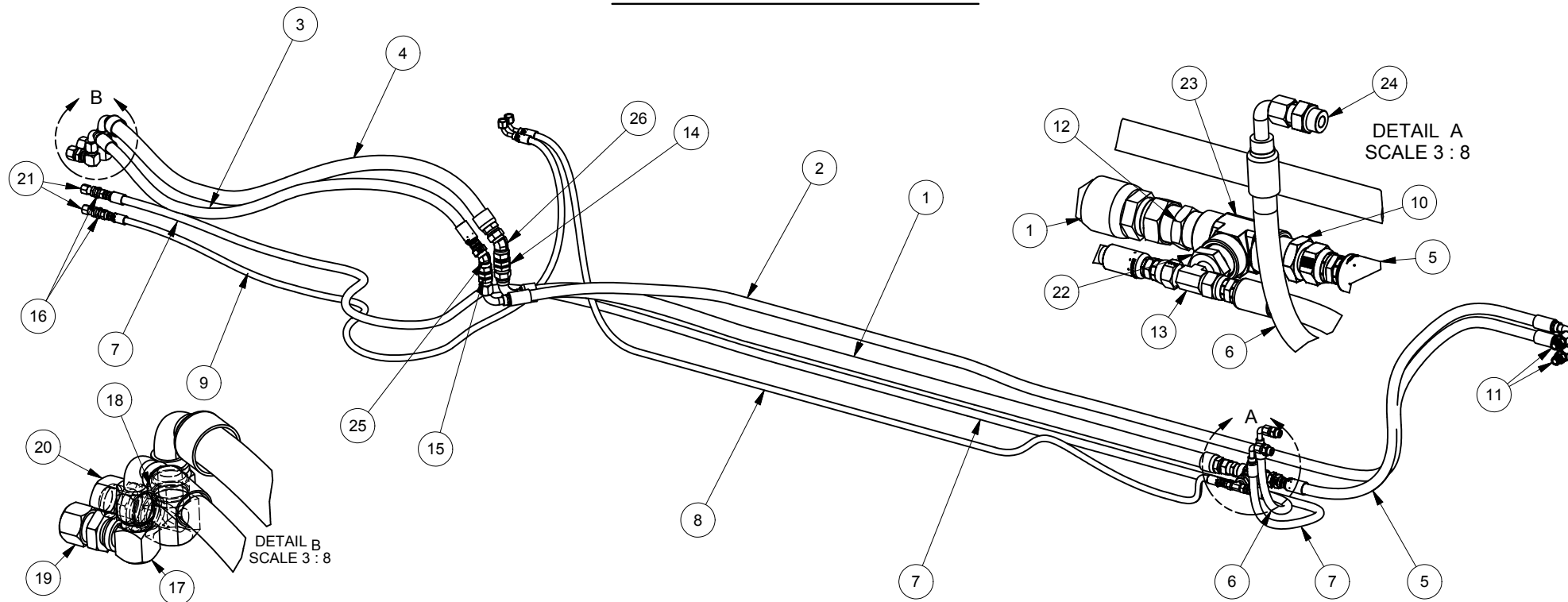
ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY	ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	00401519		CHAIN 3/16 GR 30 X 14.000 LG	1	39	0730068		GEAR REDUCER HOPPER US 50 : 1	1
2	00900290		PIN 0.750 DIA X 2.500 WELD'T	8	39	0730069		GEAR REDUCER HOPPER US 25 : 1	1
3	01302097		SCREWJACK P-LINE LW	1	40	0750001		U JOINT 1/2 BORE JACK HANDLE	1
4	01303467		SPINNER DISC ASS'Y 22 IN	1	41	DB-37196		SPINNER ASS'Y COMPLETE (LESS DISC)	1
5	01305053		FRONT DOOR SPACER 5/16 X 3/8 XH ZINC	2	42	HH-01251-003		COLD SHUT 5/16" DIA, PLATED	1
6	01313333		JACK MOUNTING WELD'T VBS (SSTL)	1	43	HW13AS-0632		COTTER PIN 3/16 X 2 STAINLESS	10
7	01324690		HANDLE 45 3/8 IN CRANK (SSTL)	1	44	HW13P-7GA56	80536	COTTER HAIRPIN 3/16" X 3 3/4" ZINC	1
8	01326048		RUBBER PLT BODY VBS (SSTL)	2	45	HW14A-05	IMP76512	FLATWASHER SAE 5/16 ZINC	2
9	01326052		RUBBER REAR BODY VBS	2	46	HW14AS-04	81062Z	FLATWASHER SAE 1/4 SS	8
10	01326053		DOOR ASS'Y BODY VBS (SSTL)	1	47	HW14AS-06		FLATWASHER SAE 3/8 STAINLESS	38
11	01326058		GEARBOX MTG BRACKET BODY VBS (SSTL)	2	48	HW14AS-08		FLATWASHER SAE 1/2 STAINLESS	76
12	01326059		CHAIN SHIELD EXTENSION BODY VBS (SSTL)	2	49	HW14AS-16		FLATWASHER SAE 1 STAINLESS	4
13	01326285		CONVEYOR FLOOR WELD'T VBS13	1	50	HW14C-08	81080	LOCKWASHER SPLIT 1/2 ZINC	4
14	01326354		IDLER SHAFT WELD'T VBS	1	51	HW14CS-05		LOCKWASHER SPLIT 5/16 STAINLESS	1
15	01326371		THREADED ROD ASS'Y VBS	2	52	HW14CS-06		LOCKWASHER SPLIT 3/8 STAINLESS	8
16	01326384		GEARBOX SHAFT COVER WELD'T VBS	1	53	HW14D-08		FLATWASHER HARDENED 1/2 ZINC	24
17	01326472		SCREEN WELD'T TOW PLOW HOPPER	6	54	HW14D-10	81070E	FLATWASHER HARDENED 5/8 ZINC	4
18	01326507		POLYMER RETURN COVER - TOW PLOW HOPPER	1	55	HW30AS-05		NUT HEX 5/16 UNC STAINLESS	1
19	01326690		TOW PLOW HOPPER WELDMENT (SSTL)	1	56	HW30AS-06		NUT HEX 3/8 UNC STAINLESS	4
20	01326709		TOW PLOW HOPPER BOLT IN SCREEN WELD'T	1	57	HW30AS-16	81001	NUT HEX 1 UNC STAINLESS	6
21	01326713		REAR CHAIN GUARD (SSTL)	1	58	HW36D-08		NUT HEX TOPLOCK 1/2" UNC ZINC	12
22	01326714		SAND CHUTE WELD'T - TOW PLOW (SSTL)	1	59	HW36D-10		NUT HEX NYLON 5/8" UNC ZINC	4
23	01326716		CHUTE PIN WELDMENT (SSTL)	1	60	HW36DS-04		NUT HEX ELASTIC 1/4 UNC STAINLESS	4
24	01326718		DISCHARGE MOUNT SIDE PLATE WELDT DS (SSTL)	1	61	HW36DS-06		NUT HEX ELASTIC 3/8 UNC STAINLESS	22
25	01326721		DISCHARGE MOUNT SIDE PLATE WELD'T CS (SSTL)	1	62	HW36DS-08		NUT HEX ELASTIC 1/2 UNC STAINLESS	50
26	01326723		SPINNER SUPPORT PLATE (SSTL)	1	63	HW40A-0808		BOLT HEX 1/2 X 1 UNC ZINC	4
27	01326724		BRIDGE INVERTED V VBS (SSTL)	6	64	HW40A-0812		BOLT HEX 1/2" X 1 1/2" UNC ZINC	8
28	01326738		PLATE GUARD IDLE END HOPPER (SSTL)	1	65	HW40AS-0408		BOLT HEX 1/4 X 1 UNC STAINLESS	4
29	01326739		GUARD DRIVE END HOPPER CONV (SSTL)	1	66	HW40AS-0510		BOLT HEX 5/16 X 1 1/4 UNC STAINLESS	1
30	01326745		INVERTED V WELD'T 6 X 70 IN VBS-13 SS	2	67	HW40AS-0610		BOLT HEX 3/8 X 1 1/4 UNC STAINLESS	19
31	0580037		SPRING COMP 1.625 X 0.281 X 3.500	2	68	HW40AS-0628		BOLT HEX 3/8 X 3 1/2 UNC STAINLESS	1
32	0600048		SPROCKET 8 TOOTH 667X 2IN BORE	2	69	HW40AS-0812		BOLT HEX 1/2 X 1 1/2 UNC STAINLESS	26
33	0600056		CHAIN 667X 21 146 ES 3/8X1-1/4 1415LW-II	1	70	HW40C-0812		BOLT CARRIAGE 1/2 X 1 1/2 UNC ZINC	4
34	0610004		BEARING TAKE UP 1 1/2 SHAFT	2	71	HW40C-1016		BOLT CARRIAGE 5/8 X 2 UNC ZINC	4
35	0610042		BEARING 4 BOLT FLANGE MED DUTY 2 IN	1	72	HW40CS-0608		BOLT CARRIAGE 3/8 X 1 UNC STAINLESS	7
36	0650001	41033	REFLECTOR AMBER SELF ADHEV OVAL	4	73	HW40CS-0610		BOLT CARRIAGE 3/8 X 1 1/4 UNC STAINLESS	3
37	0650002	80582C	REFLECTOR RED SELF ADHEV OVAL	4	74	HW40CS-0812		BOLT CARRIAGE 1/2 X 1 1/2 UNC STAINLESS	24
38	0650058		TAPE REFLECTIVE RED/WHITE 2 INCH	15	75	HW70E-0608		SET SCREW HS 3/8 X 1/2 CUP PNT PLN	4

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## BI-DIRECTIONAL SPREADER / PRE-WET HYDRAULIC KIT PART NUMBER: 51401170



ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY	ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	51401322		BH PLATE TO TEE 1" HOSE ASSEMBLY	1	14	441402700-16		16MJ BULKHEAD UNION W/LOCKNUT	1
2	51401327		BH PLATE #2 TO CONVEYOR MOTOR 3/4" HOSE ASS'Y	1	15	441402700LN-12		12MJ BULKHEAD UNION W/LOCKNUT	1
3	51401334		BH PLATE #1 TO BH PLATE #2 3/4" HOSE ASSEMBLY	1	16	441402700LN-8-8		8MJ-8MJ MALE BULKHEAD W/LOCK NUT	2
4	51401335		BH PLATE #1 TO BH PLATE #2 1" HOSE ASSEMBLY	1	17	441402701-12		12MJ 90 BULKHEAD ELBOW	1
5	51401336		SPRD CONVEYOR RETURN 3/4" HOSE ASSEMBLY	1	18	441402701-16		16MJ 90 BULKHEAD ELBOW	1
6	51401337		BI-DI SPINNER TO RETURN JUNC. HOSE ASSEMBLY	1	19	44140304C-12		12FJIC HEX CAP	1
7	51401338		BH PLATE #1 TO SPINNER 1/2" SUPPLY HOSE ASS'Y	1	20	44140304C-16		16FJIC HEX CAP	1
8	51401339		PRE-WET BOX TO 1" MAIN RETURN HOSE ASSEMBLY	1	21	44140304C-8		8FJIC HEX CAP	2
9	51401340		BH PLATE #1 TO PRE-WET SUPPLY HOSE ASS'Y	1	22	441405406-16-8	C3109X16X8	16MP - 8FP HEX REDUCER BUSHING	1
10	441402404-12-16		12MJ-16MP MALE CONNECTOR	1	23	441405605-16		16FP - 16FP - 16FP FEMALE PIPE TEE	1
11	441402404-12-8		12MJ - 8MP MALE CONNECTOR	2	24	441406400-8-10	C5315X8X10	8MJ - 10MB O-RING CONNECTOR	2
12	441402404-16-16		16MJ - 16MP MALE CONNECTOR	1	25	6502-12-12		12FJ 12 MJ 45 DEGREE	1
13	441402603-8		8MJ - 8MJ - 8MJ UNION TEE	1	26	6502-16-16		16FJ 16MJ 45 DEGREE	1

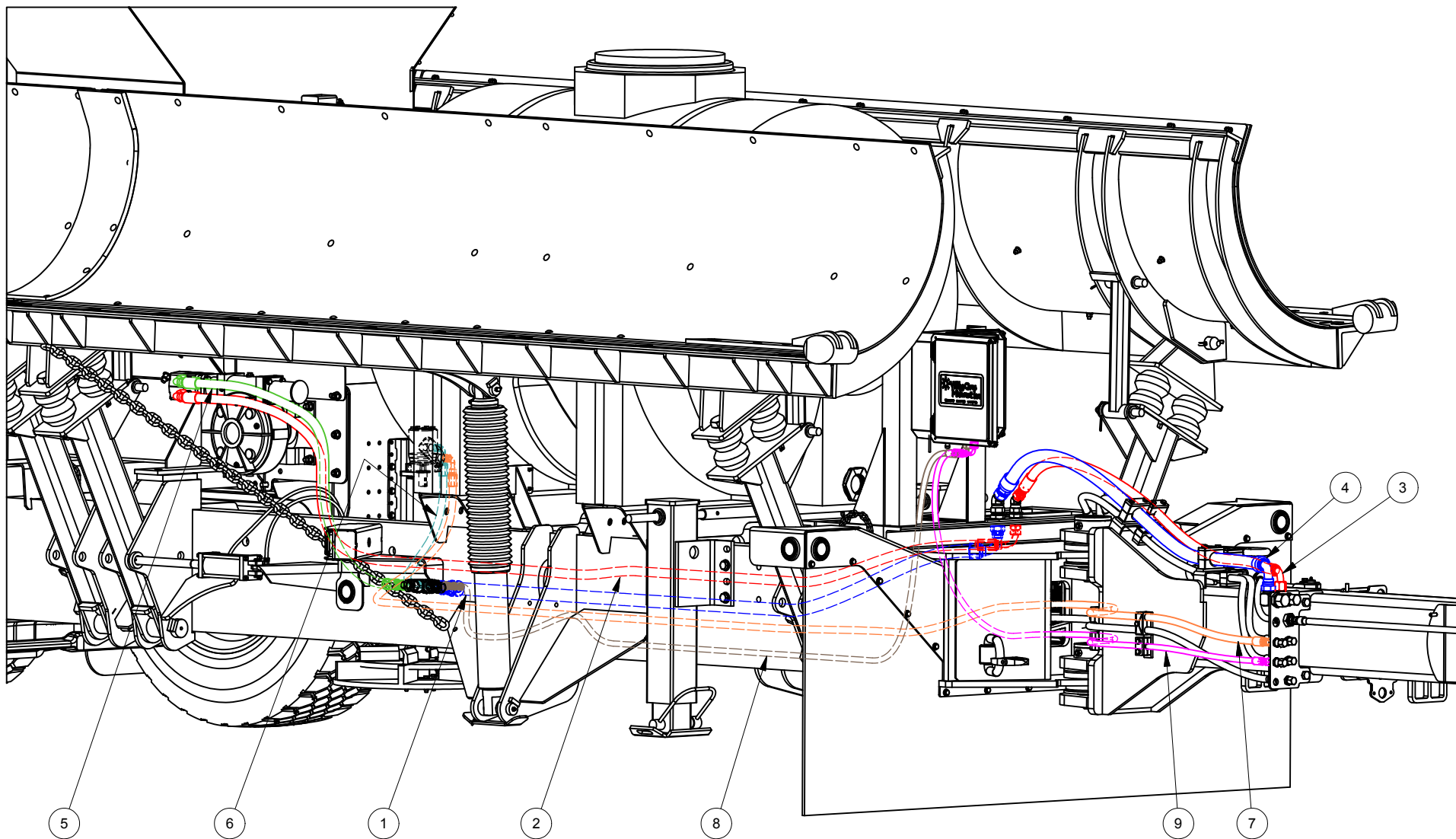
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## BI-DIRECTIONAL SPREADER / PRE-WET HYDRAULIC KIT ROUTING DIAGRAM

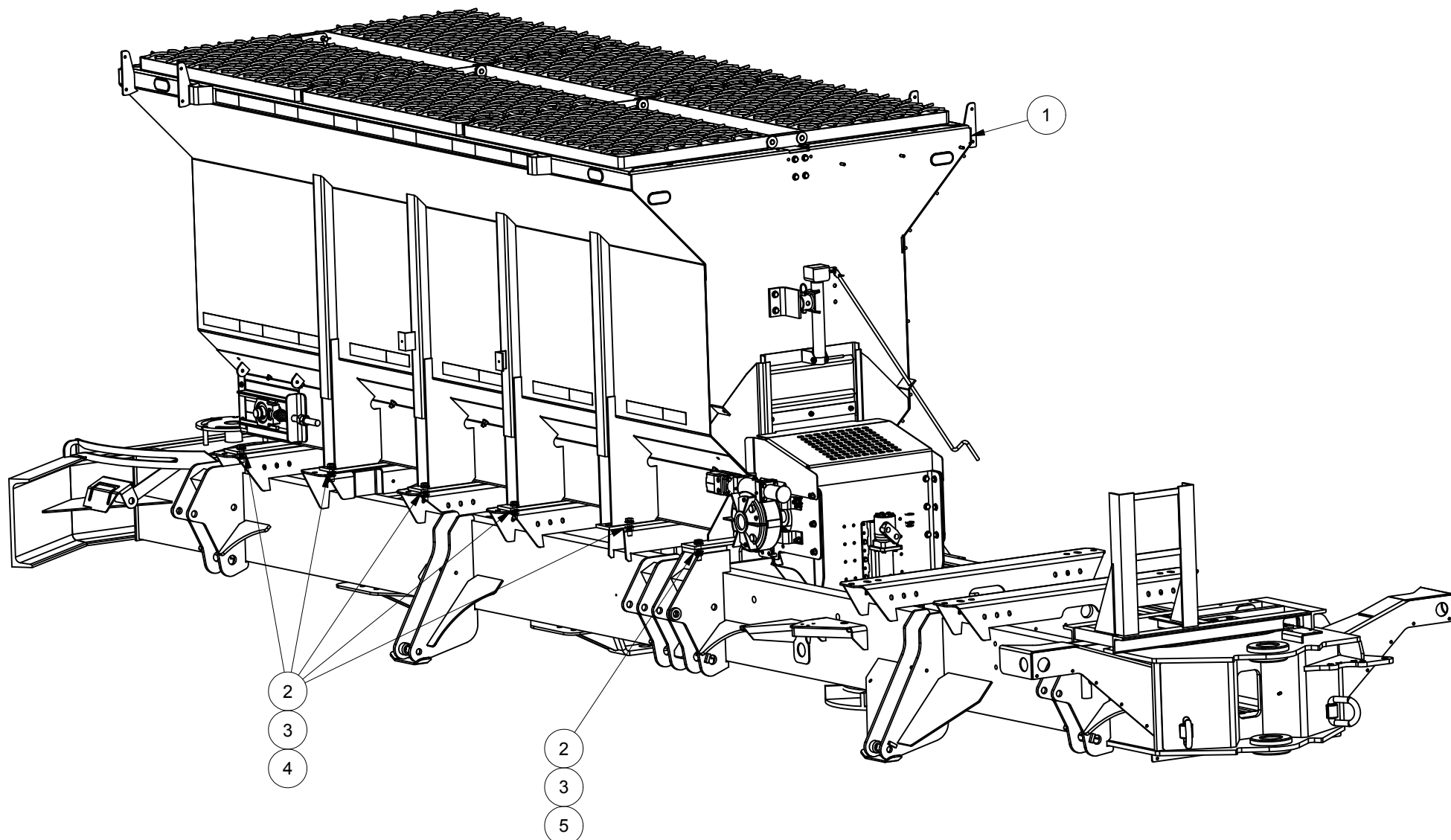


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## BI-DIRECTIONAL TOW PLOW HOPPER SANDER INSTALLATION



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## BI-DIRECTIONAL TOW PLOW HOPPER SANDER INSTALLATION

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	01326689		TOW PLOW HOPPER ASSEMBLY (SSTL)	1
2	HW16A-12		FLATWASHER HARDENED 3/4 ZINC	24
3	HW30E-12		NUT HEX 3/4 UNC TOPLOCK ZINC	12
4	HW40A-1220		BOLT HEX 3/4" X 2 1/2" UNC ZINC	10
5	HW40A-1224		BOLT HEX 3/4 X 3 UNC ZINC	2

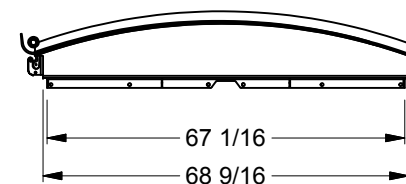
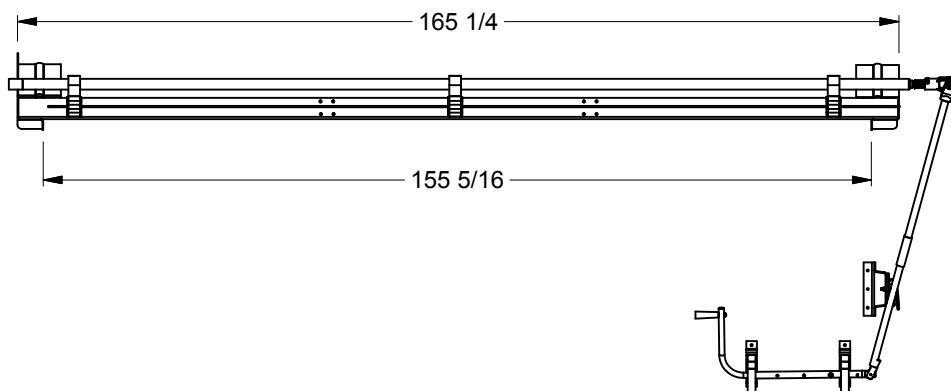
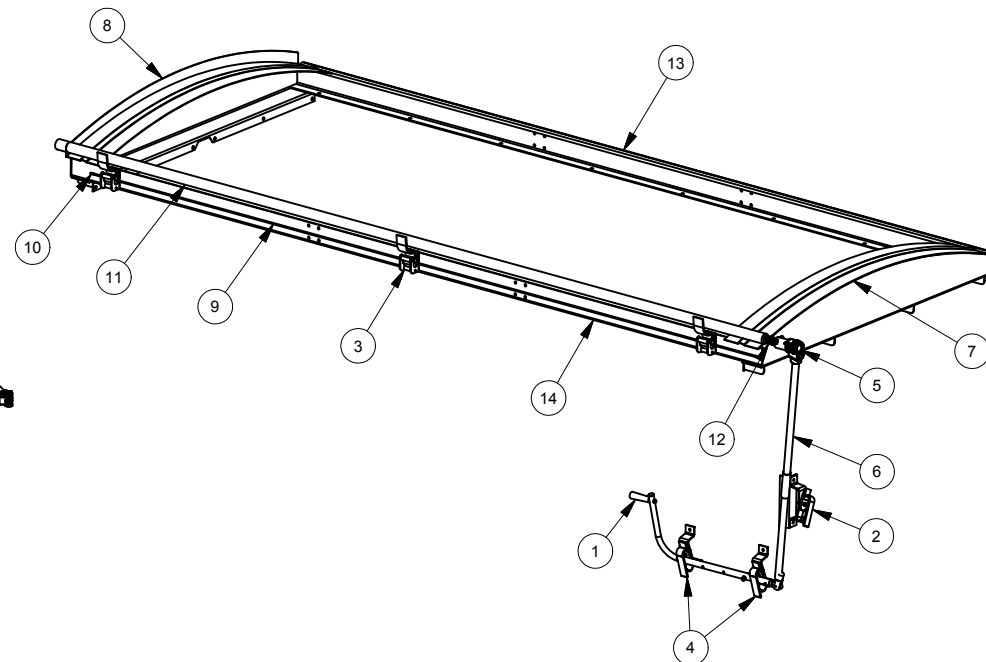
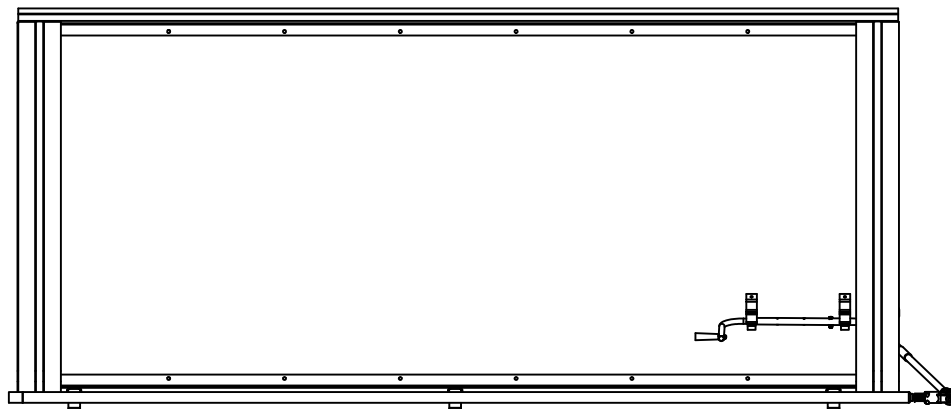
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## TOW PLOW SPREADER LOAD COVER ASSEMBLY

### PART NUMBER : 51401032



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**TOW PLOW SPREADER LOAD COVER ASSEMBLY**  
**PART NUMBER : 51401032**

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	42940045	1100171	CRANK ARM ASSEMBLY_SLK_STD	1
2	51401010		CRANK HANDLE RETAINER ASSEMBLY	1
3	51401011	1100834	TARP STOP UPRIGHT_EOF_AL	3
4	51401014		CRANK HANDLE RETAINER ASSEMBLY SIDE	2
5	51401341	1701243-90DEG	U-JOINT FLEXIBLE	1
6	51401342	1105048	CRANK EXTENSION_54_SHUR FLEX_SLK	1
7	51403047	1122369	BCAP_6 RISE_70_VKC	1
8	51403048	1122371	FCAP_6 RISE_70_VKC	1
9	51415013	1700051	TUBING_CS_1 1/8 OD_16GA X 16FT3_SWGD_GTR	1
10	51415021	1700212	PROTECTIVE CAP_1 1/2 ID X 7 7/8 LG_BLK	2
11	51415022	1701204	MECH TUBING_CS_SWGD_16FT3 X 1 1/2 X 14 GA	1
12	51415491	1107057	ROLL TUBE W/SPLINE_SWGD_SLK_16FT X 2	1
13	51422018	1122364	EXTENSION WELDMENT_LP SIDE_VKC	1
14	51422021	1122358	FIXED TUBE EXT WELDMENT_TOW PLOW_VKC	1

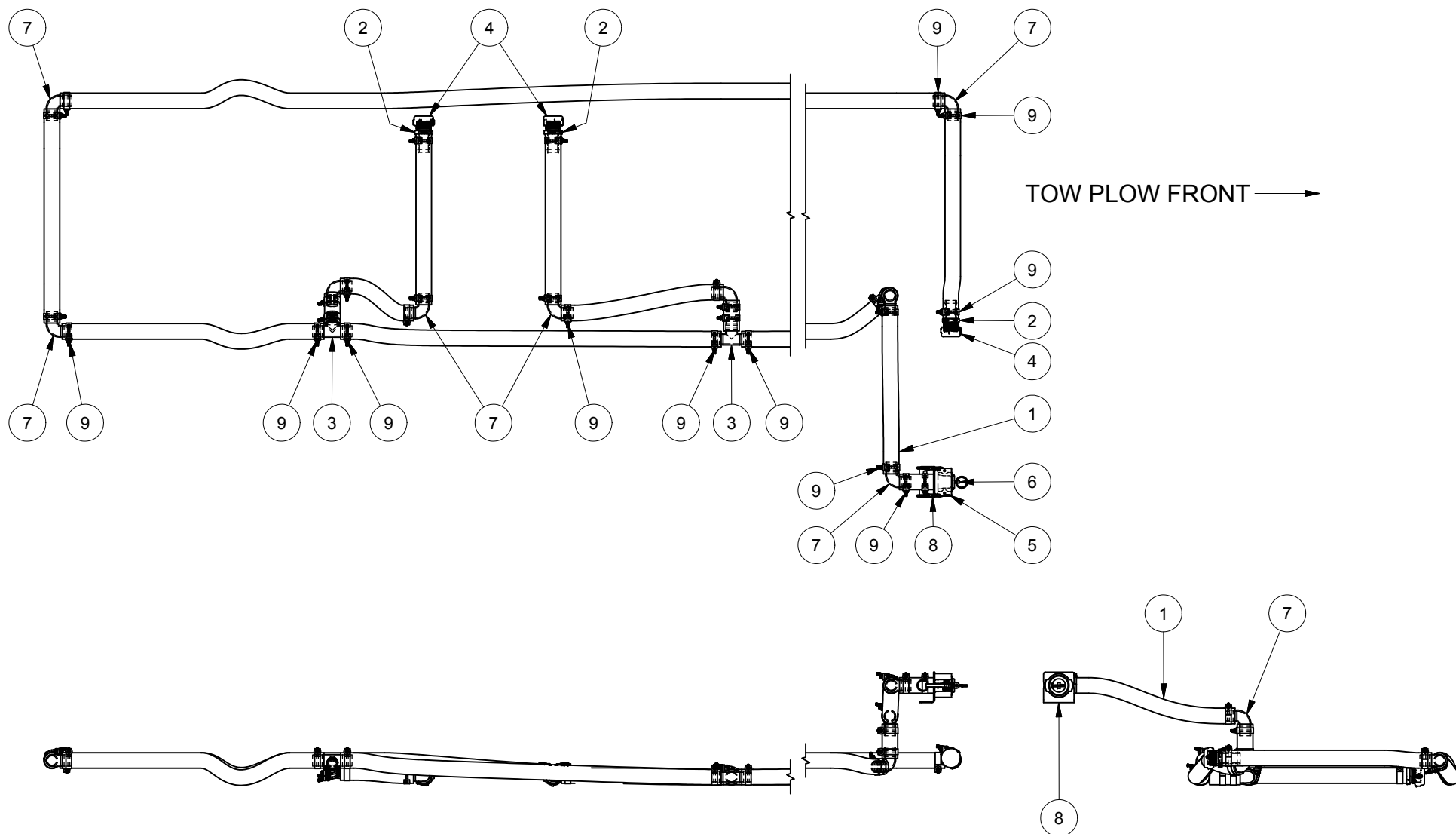
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## BI-DIRECTION TOW PLOW INSIDE FRAME WASH KIT ASSEMBLY

### PART NUMBER : 51401162



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**BI-DIRECTION TOW PLOW INSIDE FRAME WASH KIT ASSEMBLY**  
**PART NUMBER : 51401162**

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	46842016		1 1/2" RIBBED BLACK HOSE PER FT.	66.5
2	46842126		MPT 1.5 X 1.5 INCH HOSE SHANK	3
3	46842219		1 1/2" HOSE BARB TEE	2
4	46842220		1 1/2" CAP MPT	3
5	46842221		2" FML CPLG X 1 1/2" HOSEBARB	1
6	46842223		2" POLY PLUG FOR CAM LEVER COUPLING	1
7	46842999		1 1/2" HOSE BARB 90 DEG	10
8	51422246		FLUSHER LOADING COUPLER MNT BRKT	1
9	51515216		1 1/2" T-BOLT HOSE CLAMP	30

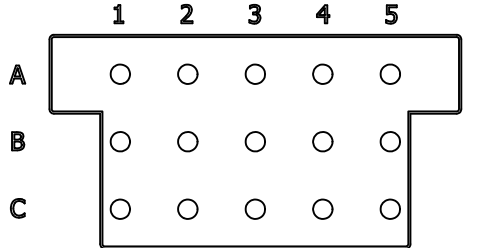
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## BI-DIRECTIONAL TOW PLOW REMOTE GREASE LINE KIT

### PART NUMBER : 46101198

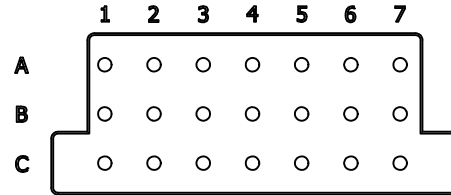


#### FRONT GREASE BLOCK ROUTING DIAGRAM

- 1) A: TOP TONGUE PIVOT PIN (51401225)  
B: TONGUE CYLINDER BASE END (51401224)  
C: FRONT PASSENGER SIDE PUSH ARM (51401227)
- 2) A: BOTTOM TONGUE PIVOT PIN (51401226)  
B: TONGUE CYLINDER ROD END (51401223)  
C: FRONT DRIVERS SIDE PUSH ARM (51401227)
- 3) A: FRONT PASSENGER SIDE PLOW CYLINDER (51401228)  
B: PASSENGER SIDE LANDING GEAR TOP (51401229)  
C: DRIVERS SIDE LANDING GEAR TOP (51401229)
- 4) A: FRONT DRIVERS SIDE PLOW CYLINDER (51401228)  
B: PASSENGER SIDE LANDING GEAR BOTTOM (51401230)  
C: DRIVERS SIDE LANDING GEAR BOTTOM (51401230)
- 5) C: DRIVERS SIDE LANDING GEAR (GEAR BOX) (51401231)

51415277

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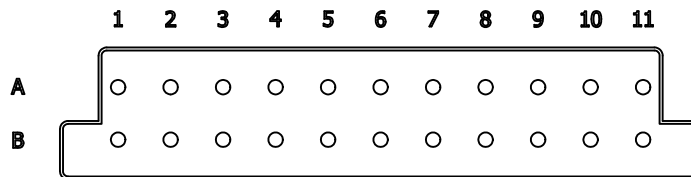


#### SIDE GREASE BLOCK ROUTING DIAGRAM

- 1) A: PASSENGER SIDE FRONT AXLE OUTER TIE ROD (51401210)  
B: PASSENGER SIDE FRONT AXLE SLACK ADJ. (51401208)  
C: PASSENGER SIDE FRONT AXLE BOTTOM KING PIN (51401209)
- 2) A: PASSENGER SIDE FRONT AXLE INNER TIE ROD (51401206)  
B: PASSENGER SIDE FRONT AXLE SLACK ADJ. (51401208)  
C: PASSENGER SIDE FRONT AXLE TOP KING PIN (51401207)
- 3) A: DRIVERS SIDE FRONT PLOW REAR PUSH ARM (51401201)  
B: PASSENGER SIDE FRONT PLOW REAR PUSH ARM (51401211)  
C: PASSENGER SIDE REAR PLOW LIFT CYLINDER (51401212)
- 4) A: DRIVERS SIDE REAR PLOW FRONT PUSH ARM (51401200)  
B: PASSENGER SIDE REAR PLOW FRONT PUSH ARM (51401211)  
C: DRIVERS SIDE REAR PLOW LIFT CYLINDER (51401213)
- 5) A: DRIVERS SIDE FRONT AXLE INNER TIE ROD (51401206)  
B: DRIVERS SIDE FRONT AXLE SLACK ADJ. (51401203)  
C: DRIVERS SIDE FRONT AXLE TOP KING PIN (51401202)
- 6) A: DRIVERS SIDE FRONT AXLE OUTER TIE ROD (51401205)  
B: DRIVERS SIDE FRONT AXLE SLACK ADJ. (51401203)  
C: DRIVERS SIDE FRONT AXLE BOTTOM KING PIN (51401204)
- 7) A: FRONT AXLE IDLING ASSEMBLY MIDDLE OF TUBE (51401211)  
B: REAR AXLE DRIVING ASSEMBLY MIDDLE OF TUBE (51401308)

51415278

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#### REAR GREASE BLOCK ROUTING DIAGRAM

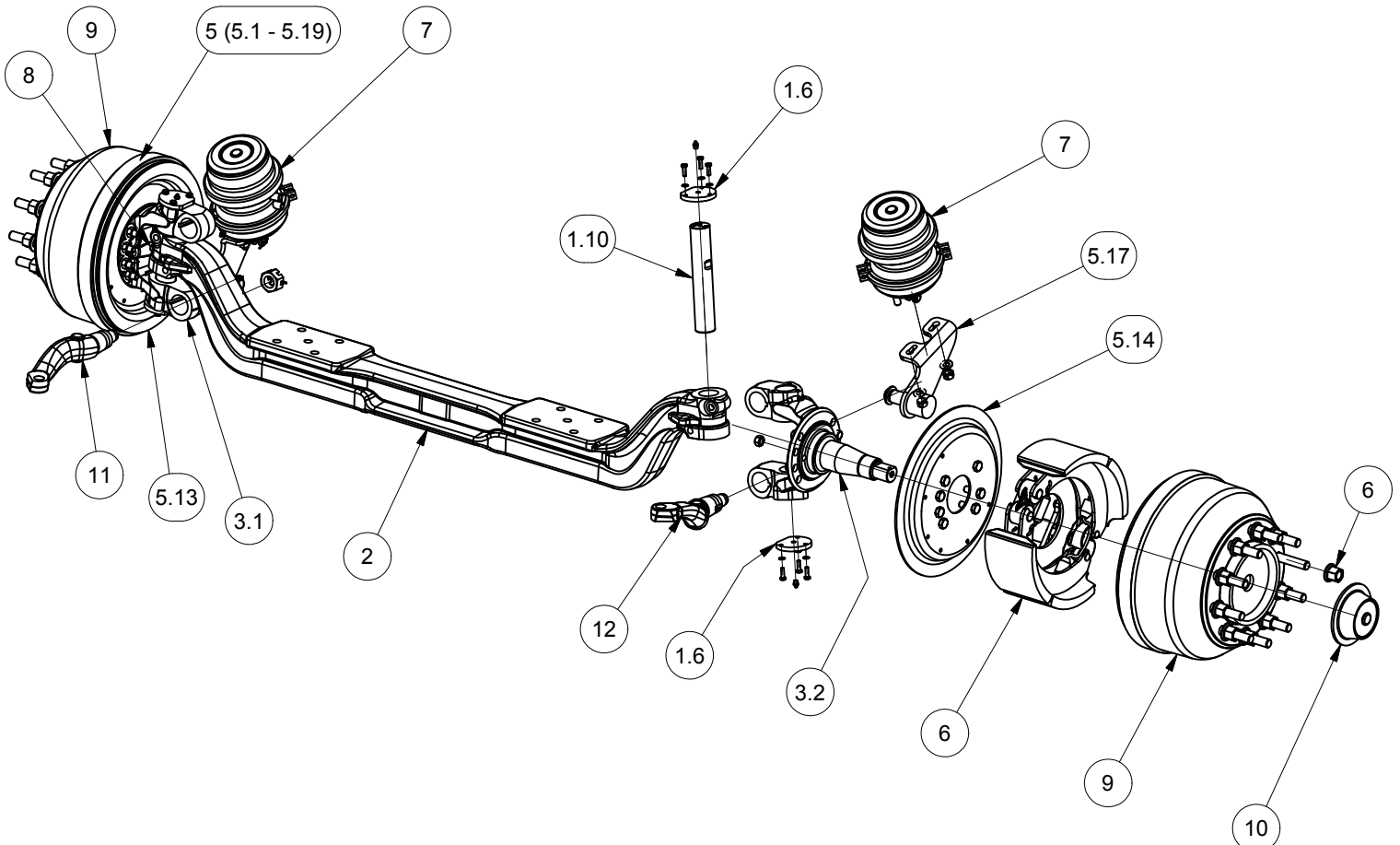
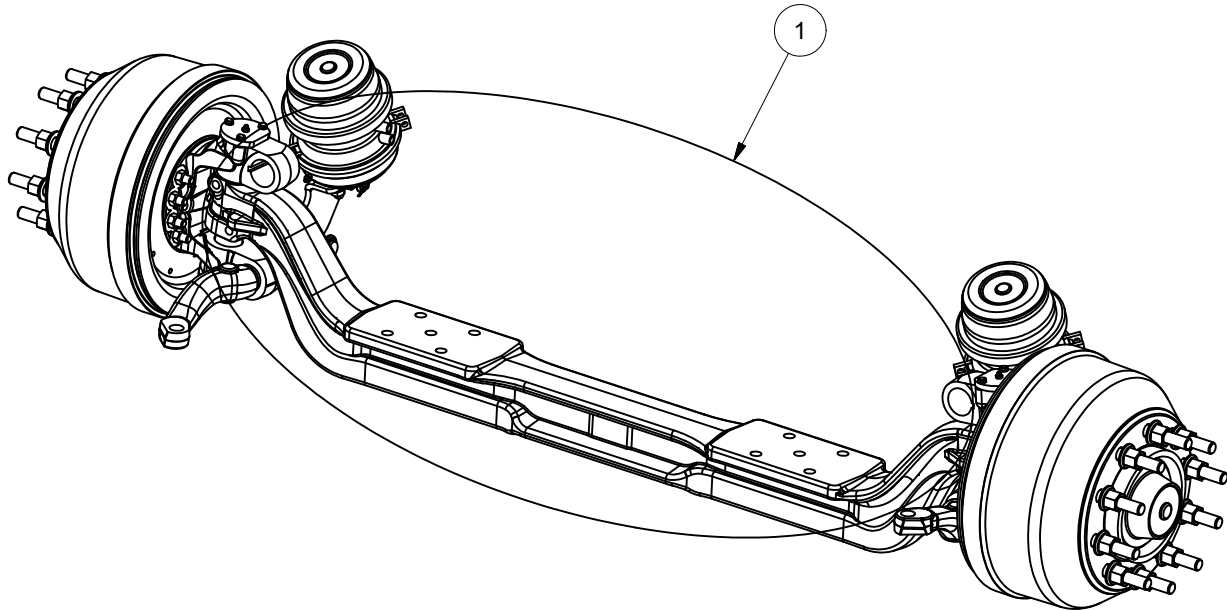
- 1) A: STEERING CYLINDER BASE END (51401232)  
B: STEERING CYLINDER ROD END (51401233)
- 2) A: PASSENGER SIDE REAR PLOW REAR PUSH ARM (51401238)  
B: DRIVERS SIDE REAR PLOW REAR PUSH ARM (51401238)
- 3) A: PASSENGER SIDE REAR AXLE TOP KING PIN (51401219)  
B: PASSENGER SIDE REAR AXLE BOTTOM KING PIN (51401221)
- 4) A: PASSENGER SIDE REAR AXLE SLACK ADJ (51401220)  
B: PASSENGER SIDE REAR AXLE SLACK ADJ (51401220)
- 5) A: PASSENGER SIDE REAR AXLE OUTER TIE ROD (51401222)  
B: PASSENGER SIDE REAR AXLE INNER TIE ROD (51401236)
- 6) A: DRIVERS SIDE REAR AXLE OUTER TIE ROD (51401218)  
B: DRIVERS SIDE REAR AXLE INNER TIE ROD (51401236)
- 7) A: DRIVERS SIDE REAR AXLE SLACK ADJ (51401216)  
B: DRIVERS SIDE REAR AXLE SLACK ADJ (51401216)
- 8) A: DRIVERS SIDE REAR AXLE TOP KING PIN (51401215)  
B: DRIVERS SIDE REAR AXLE BOTTOM KING PIN (51401217)
- 9) A: PIVOT PIN PITMAN DRIVING ASSEMBLY (51401235)  
B: STEERING GATE PIVOT PIN (51401234)
- 10) A: LIGHT BAR CYLINDER ROD END (51401237)  
B: PIVOT PIN PITMAN IDLING ASSEMBLY (51401214)
- 11) A: REAR LIGHT BAR CYLINDER BASE (51401309)

51415279

VIKING-CIVES MIDWEST INC.



## BI-DIRECTIONAL AXLE ASSEMBLY PART NUMBER : 41412818



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## BI-DIRECTIONAL AXLE ASSEMBLY

### PART NUMBER : 41412818

ARM Newark IO  
444 Hebron Road  
Heath, OH 43056-1440  
United States of America

Assembly Item Number: 41412815  
Description: AXLE ASSY-STEER

For further breakdown of parts, refer to the Meritor Axle Manual at <http://xpcatalogna.meritor.com/PartNumberLookup.aspx>

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
1	BP FL 943 2		BASE MODULE	1
1.1	BP 2974835 2		NAMEPLATE	1
1.1.2	2297P7452		NAMEPLATE	1
1.1.3	9X16		RIVET	2
1.2	9P 2051429 1		SEAL ASSY	4
1.2.3	A 1205Y1429		SEAL ASSY	1
1.3	26X134		SCREW-STOP	2
1.4	N 110 1		NUT	2
1.5	3208N1028		GASKET	4
1.6	1199M3237		CAP - KING PIN	4
1.7	1229E1669P		WASHER - FLAT	12
1.8	S 258P 2		BOLT/CAPSCREW	12
1.9	1199N1860		FITTING - GREASE	4
1.10	3101V178		PIN - KNUCKLE	2
1.11	A 1228D1382		BEARING ASSY	2
1.12	2203N3004		SHIM-0.005-USE AS REQD	2
1.13	2203M3003		SHIM-0.010-USE AS REQD	2
1.14	2203A2835		SHIM-0.015-USE AS REQD	2
1.15	2203B2836		SHIM-0.030-USE AS REQD	2
1.16	7X113		KEY-USE AS REQD (UPPER)	2
1.17	7X1003		KEY-USE AS REQD (UPPER)	2
1.18	7X114		KEY-USE AS REQD (LOWER)	2
1.19	1227Z780		NUT	4
1.20	1227S1527		NUT - WHEEL BRG,FIN. INNER	2
1.21	1229H476		RING - LOCK	2
1.22	1229J478		WASHER - LOCK	2
1.23	1227D108		NUT - WHEEL BRG,FIN. OUTER	2
2	3100S7923		CENTER - AXLE,FIN.	1
2.1	3100W6419		CENTER - AXLE, SEMI FIN.	1
3	BP 1113193 2		STEERING KNUCKLE MODULE	1
3.1	A 3111U3193		KNUCKLE ASSY - STEERING (L.H.)	1
3.2	A 3111S3191		KNUCKLE ASSY - STEERING (R.H.)	1
3.3	1225S1189		BUSHING (L.H.)	2
4	QP6 1656 797		BRAKE ASSY (L.H.)	1
5	QP6 1656 798		BRAKE ASSY (R.H.)	1
5.1	1199N1860		LUBE FITTING	1
5.2	1229D2942		SNAP RING	1
5.3	1229E4685		WASHER	1

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## BI-DIRECTIONAL AXLE ASSEMBLY

### PART NUMBER : 41412818

ITEM	DRAWING NO.	ALT. ITEM NO.	DESCRIPTION	QTY
5.4	1229J3130		WASHER	2
5.5	1229N4590		WASHER	2
5.6	1229S2697		WASHER	1
5.7	1259N274		ANCHOR PIN	2
5.8	1779W283		GREASE - USE AS REQUIRED	2
5.9	2210F7468		CAMSHAFT, FIN.	1
5.10	2258H1230		RETAINER SPRING	2
5.11	2258Y1273		RETURN SPRING	1
5.12	2297J6588		TAG/SHEET - INSTRUCTIONS	1
5.13	3264S227		DUST SHIELD	1
5.14	3264T228		DUST SHIELD	1
5.15	A23222P2200		SHOE - BRAKE, LINING & ROLLER ASSY	2
5.16	A3211C5385		SPIDER ASSY - BRAKE	1
5.17	D73299E3047		BRKT ASSY - BRAKE CHAMBER	1
5.18	S264B		BOLT/CAPSCREW	6
5.19	S2810B2		BOLT/CAPSCREW	4
6	BP 222L 8		HARDWARE MODULE	1
6.1	15X1795		BOLT/CAPSCREW	14
6.2	1229V1556		WASHER - FLAT	28
6.3	NL 112 1		NUT - LOCK, FIN.	14
7	BP 276 30 86		AIR CHAMBER MODULE	1
7.1	A64 3275Z1144S		AUTO ADJ SLACK - ROCKWELL (L.H.)	1
7.2	A64 3275A1145S		AUTO ADJ SLACK - ROCKWELL (R.H.)	1
7.3	U68 3276D30		SPRING CHAMBER - MGM - SQ IN. (AVAIL./ASSY ONLY/LH)	1
7.4	1229N1626		WASHER - FLAT	4
7.5	N 310 1		NUT	4
8	9ABSWABCOFS		AUTOMOTIVE ELECTRONICS	2
8.1	2237Q1005		CLIP	1
8.2	A 2237G1073		SENSOR ASSY	1
8.3	3237H294		TIE - CABLE, SENSOR	2
9	HFLF 66TK 34 Z 1		HUB & DRUM ASSY (L.H.)	1
9.1	15160261007MTB		HUB & DRUM ASSY (R.H.)	1
9.2	BP 2051108 2		OIL SEAL MODULE	1
9.2.1	6461A		CONE - BEARING (INNER)	1
9.2.2	A 1205P1108		WHEEL SEALS - OIL, CHICO RAWHIDE (INNER)	1
10	BP 2621252 1		HUB CAP MODULE	1
10.1	555S		CONE - BEARING (OUTER)	2
10.2	A 3262D1252		CAP ASSY - HUB	2
10.3	WA 15P		WASHER - LOCK	12
10.4	S 258P 2		BOLT/CAPSCREW	12
11	3133K9371	0720325	STEERING ARM BI-DI LTH	1
11.1	16X1035		KEY	1
11.2	1227Y1715		NUT - SLOTTED	1
11.3	K 2618		COTTER	1
12	3133L9372	0720326	STEERING ARM BI-DI RTH	1
12.1	16X1035		KEY	1
12.2	1227Y1715		NUT - SLOTTED	1
12.3	K 2618		COTTER	1

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