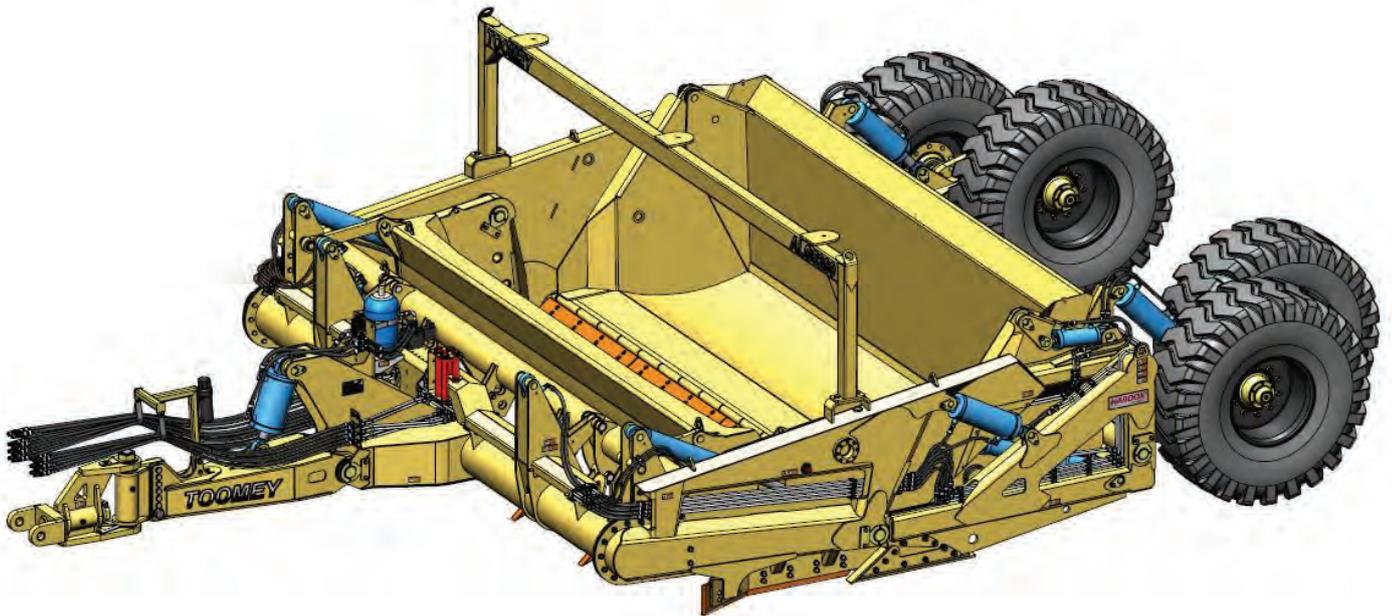


ISSUE A
JULY 2018

TOOMEY EARTHMOVERS

PROUD MANUFACTURERS OF THE TOOMEY SCRAPERS



TOOMEY 4500B

Original Instructions

USER HANDBOOK

SAFETY INFORMATION
SPECIFICATIONS
ASSEMBLY INSTRUCTIONS
MAINTENANCE REQUIREMENTS
SPARE PARTS

TOOMEY EARTHMOVERS

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1 Thank You

Thank you for purchasing a Toomey Scraper. Our products are a result of years of development and testing and driven by feedback received from our loyal customers. The care taken in the design and manufacturing quality provide a high performance product for your farm or job site.

Any Toomey Scraper operators must have read and understand this manual before connecting the scraper to the tractor allowing them to use the equipment effectively and safely. Failure to follow these instructions may result in damage to the scraper or tractor with the potential to cause serious personal injury. This manual must be kept with the machine at all times. If you have questions not answered in this manual or need additional copies please contact your distributor or Toomey Earthmovers for your country.

1.1 Manufacturer Information

Manufacturer Name: AG Laser & GPS Pty Ltd (Trading as Toomey Earthmovers)

Manufacturer Address: 2/168 Loves Road, Alberton, 4207, Queensland, Australia

1.2 Your Distributor

To ensure the best conditions for after sales support, we recommend you note the following information:

Product Designation	_____
Serial Number	_____
Distributor	_____
Address	_____
Address	_____
Post Code	_____
Telephone	_____
After Sale Support Agent	_____
Technician	_____
Mobile Number	_____
Notes	

1 Introduction

1.1 Overview

1.1.1 Description of the Scraper

The Toomey scrapers are earthmoving machines designed to be hitched to the back of a tractor corresponding to the size of the scraper. The scraper consists of 6 main sub-assemblies: The drawbar (connecting scraper to tractor) the front cross beam with ripper assembly, the two side walls, apron, the rear frame with bowl and ejector and the swing-arms with rockers and wheel assemblies. The drawbar is connected to the front cross beam with two pivot pins and a hydraulic cylinder connected to an accumulator to act as a form of suspension. Ripper legs are connected to a ripper bar which is connected to the front cross beam via 4 linkages. The ripper bar is raised and lowered via 2 hydraulic cylinders. The side walls are bolted to the flanges on each side of the front cross beam and connected to the rear frame via two pivot pins. The apron is connected to the side walls by pins and bearings and is activated by two hydraulic cylinders secured to the front cross beam. A cutting blade is attached to the mouldboard in the rear frame in front of the bowl. There are also side cutting blades mounted to the bottom of the side walls. There are two hydraulic cylinders which connect the rear frame and the side wall; these control the height of the cutting blade above the ground. The bowl hinges off the mouldboard and is lifted and lowered by two hydraulic cylinders mounted to the rear frame. In the bowl is a swing door ejector which is hinged at the top of the bowl and is operated by two hydraulic cylinders mounted to the bowl. The right and left swing-arms are connected to the rear frame by four pivot pins and their height is controlled by two hydraulic cylinders. The swing-arms mount the rocker assemblies and axles which rotate with use of spherical bearings and whose rotation is limited by stops on the swing-arms.

1.1.2 Utilisation

This design of the scraper makes it capable in a wide range of applications. The primary function of the scraper is to shift dirt, whether it is large loads to shift bulk dirt or final trimming to get flat paddocks or haul roads. The inclusion of rippers in the design allows the scraper to rip hard packed, difficult to load ground without having to utilise a separate machine. The design of the ejecting and tipping bowl allows the scraper to work in wet sticky environments and still be able to unload when required. The large tires reduce ground pressure and allow the scraper to roll across soft soils without leaving large trenches. The centre lift geometry and walking beam style wheel arrangement allows the scraper to trim at greater speeds and with a superior finish.

1.1.3 Only use Genuine Parts

Always use genuine part for all repairs. The use of non-genuine parts may adversely affect the operation of the scraper. It may also void the warranty and exclude the manufacturer of any liability in case of accidents.

Modifications not authorised in writing by the manufacturer or importer can harm operation or the safety of use.

1.2 Conventions Used

1.2.1 Directional Conventions

The directions of the machine are in accordance with those observed by the driver facing the forward direction. Reference to these conventions will be useful for understanding this manual and communications with your distributor or manufacturer.

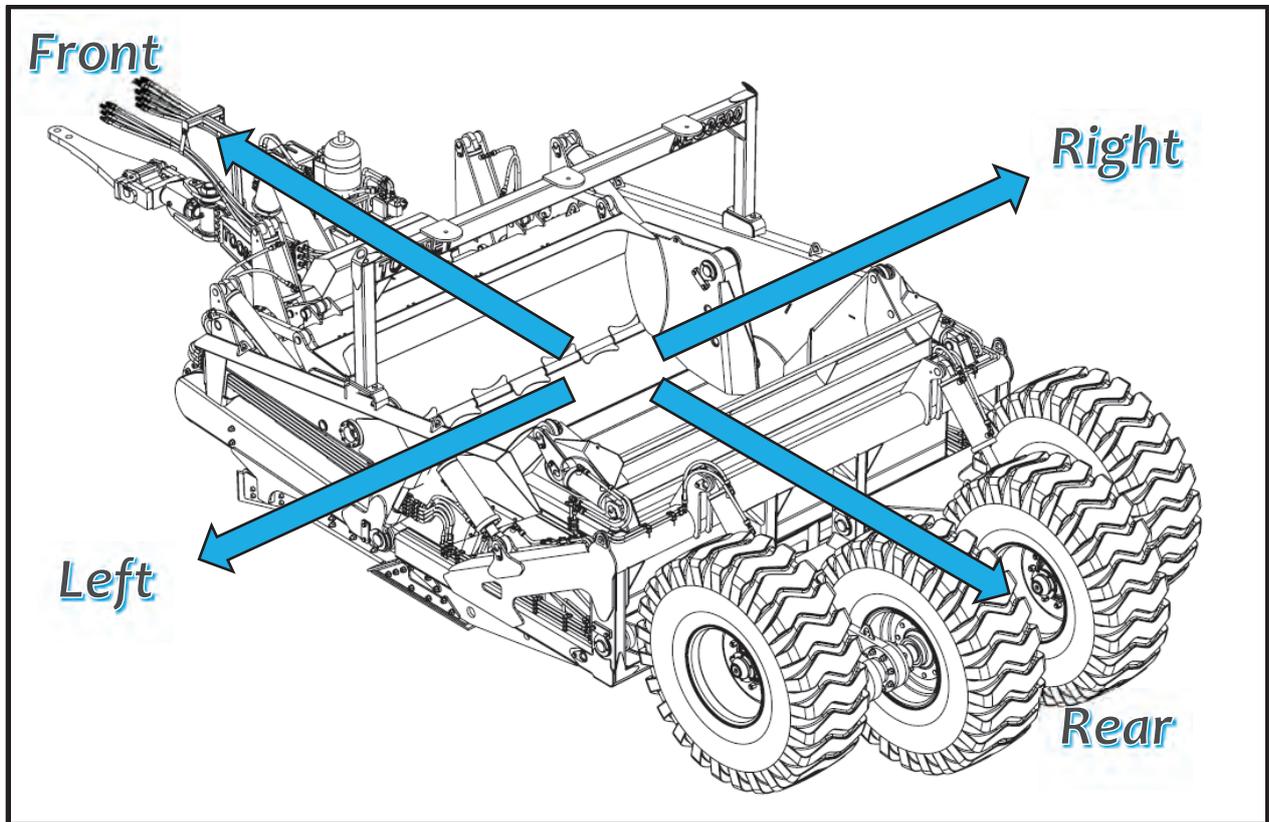


Figure 1.1 Direction Convention

1.2.2 Identification of Sub-Assemblies

Throughout this manual, reference is made to the subassemblies and components of the scraper by name. The reader is urged to familiarize themselves using the illustration below. Familiarity with the scraper sub-assemblies and their names will be beneficial when communicating with the manufacturer or importer.

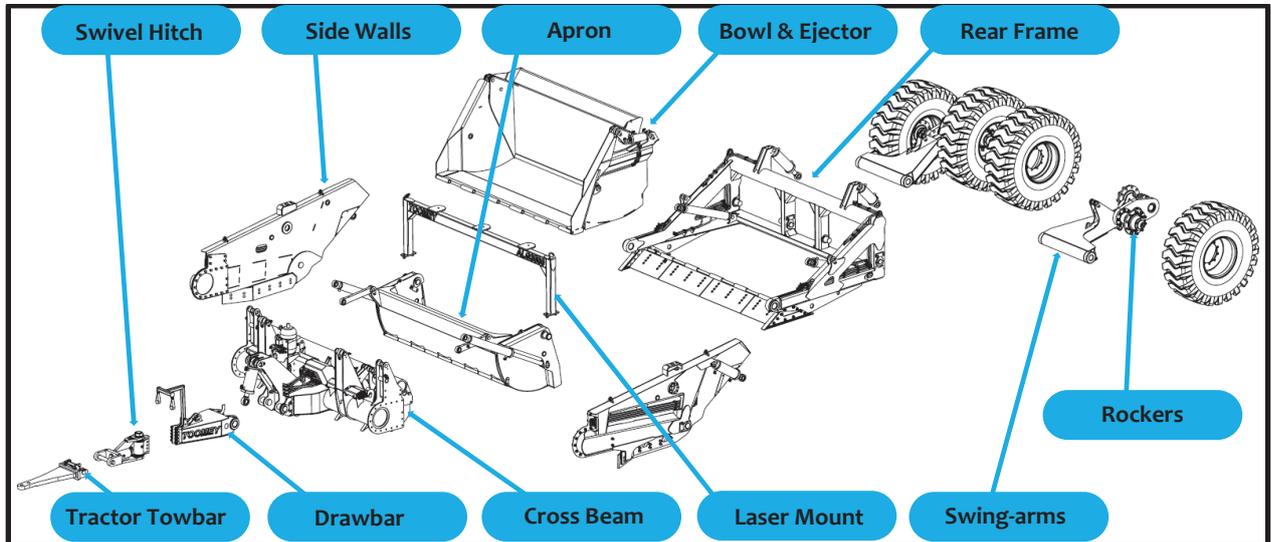


Figure 1.2 Sub-Assembly Identification

1.3 Serial Number

1.3.1 Identification Plate

The machine's identification plate, including the serial number, is attached to the cushion hitch cylinder mounting structure on the front cross beam on the left-hand side. It is important to provide the serial number when ordering parts. The manufacturer reserves the right to change the product for product improvement. The plate indicates the year of construction, the tare weight, as well as the volumetric and mass capacities of the scraper.

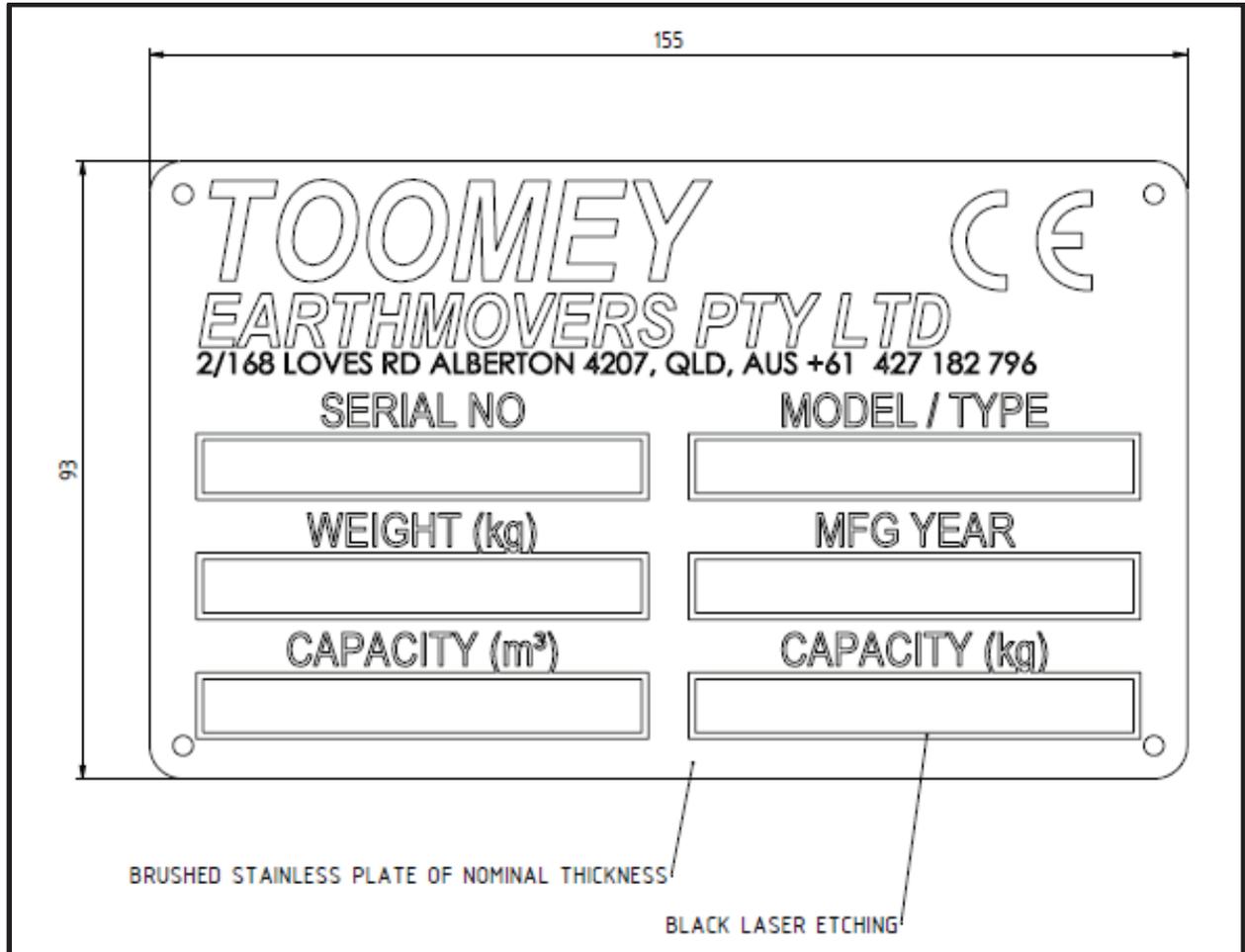


Figure 1.3 Name Plate

2 Safety

2.1 Overview

2.1.1 Warning

If not used correctly, this machine may result in serious injury or death. It is the responsibility of the owner and operator to read and familiarise themselves with the manual prior to commissioning the machine. The operator must obey all safety instructions in this manual and any workplace or government mandated safety regulations relevant to the region the machine is operating in.

An operator who has not read and understood this manual is not fit to operate this machine. It is essential to read the safety instructions and understand the safety symbols in the manual. The safety symbols on the machine must be kept in good condition and be replaced if they become damaged or hard to read. The operator and person providing training must ensure that the conditions the machine is to operate in and around are safe.

Additional copies of the manual can be obtained from your distributor or from Toomey Earthmovers directly.

2.1.2 Meaning of Signs

The operators attention is drawn to the decals applied to the machine. The symbols indicating a risk are shown inside a triangle. In addition to symbols which confirm to European standards, the words “DANGER”, “WARNING”, and “CAUTION” may appear on the machine.

“DANGER” and “WARNING” indicate the presence of an immediate danger nearby.

“CAUTION” indicates the need to take care when around the immediate area.

This manual is available to explain the risks associated with the parts of the machine which feature these decals.

2.1.3 Meaning of Symbols



In the manual, your attention will be drawn to this symbol. It means “be cautious, your safety and that of others around you is dependent on you following these instructions”. This symbol on the machine warns of danger and you should consult your manual for the recommended procedure in order to avoid an accident.

2.2 Securing the Machine

2.2.1 Lifting Points

For lifting the assembled machine, refer to the diagram below. For lifting individual-sub assemblies, refer to the assembly instructions and diagrams in Section 4.2 Assembly Procedure.

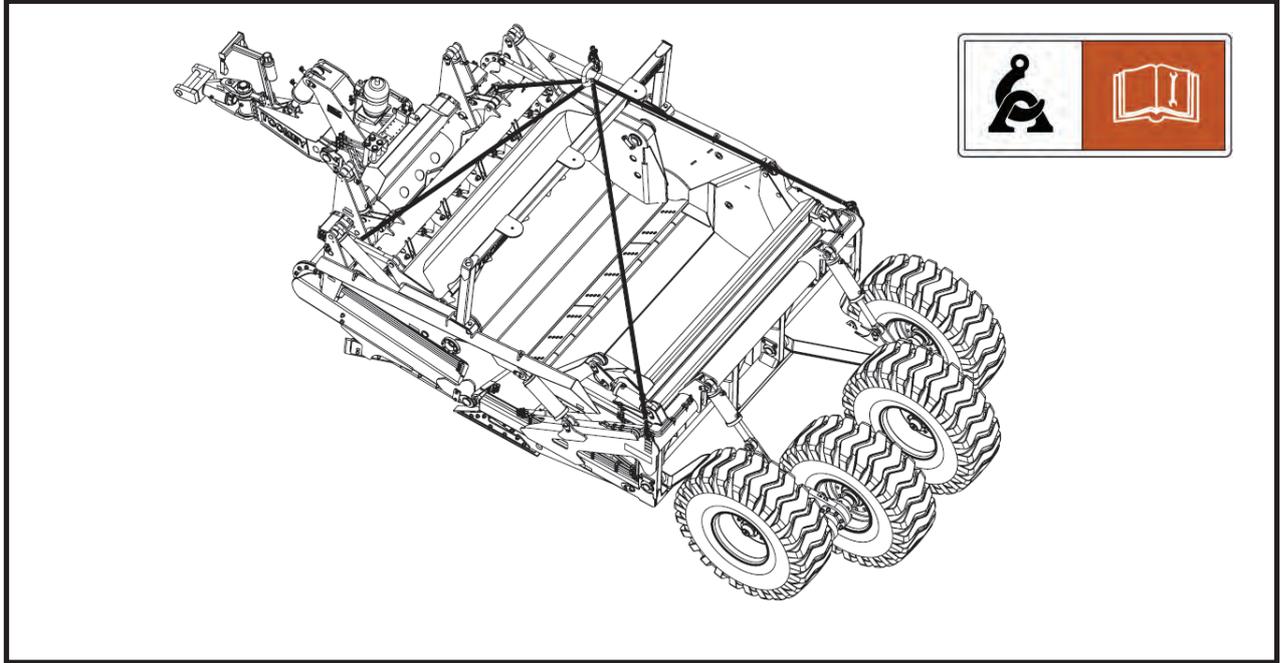


Figure 2.1 Lifting Configuration

2.2.2 Tie down Points

The Primary Tie Down points used for anchoring the Scraper onto low loader trailers or similar for transport are shown below.

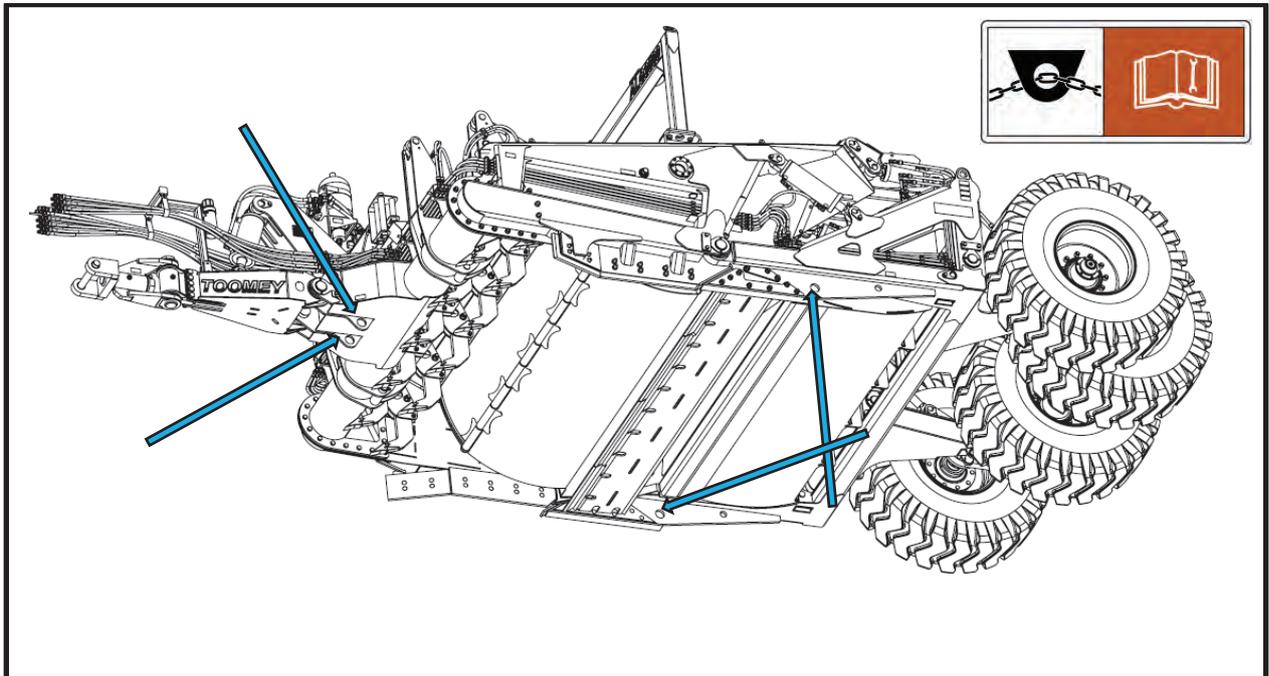


Figure 2.2 Tie down Configuration

2.3 Safe Operation

2.3.1 Rules for Safe Operation

Personnel safety is number one priority. You can replace a machine but you cannot replace a human life. Many accidents can be avoided by implementing better training or being more careful when operating the machine. Following the instructions in this handbook will help avoid accidents. Observe any site rules, Health and Safety rules or governing codes of practice of the regions which the machine is to operate. Please be aware of the following points:

- Immediately replace any safety symbols on the machine that are damaged, hard to read or possibly not present
- Do not allow the operator to drive this machine before they have read this operator's manual and understood the significance of safety and acquired any licenses required to do so.
- The tractor being used to tow the Scraper must have a ROPS (Roll Over Protection System) and a seat belt
- The operator must always wear a seat belt
- Under no circumstances shall a child drive this machine
- No passengers are permitted on the tractor unless it is fitted with a passenger seat and seat belt
- The safety instructions must be reviewed in a meeting with all operators at least yearly
- Never modify the machine without expressed agreement of the manufacturer or its importer
- Leave sufficient space when operating around other machines or equipment
- Never operate the machine under the influence of drugs or alcohol
- Keep guards attached to the machine in good condition and replace them if they become damaged
- It is important to have prior experience with the scraper (or equivalent scrapers) or be under instruction before operating the machine.
- Consult your doctor if taking medication that may affect your ability to drive heavy machinery
- Do not use a mobile phone while operating the machine. Park in an area away from activity before using your mobile phone.
- Be aware of the limitations of capacity and performance of the tractor and scraper and do not exceed them. In particular, pay attention to the stability of the tractor and scraper and how the centre of gravity is affected by the load. Be especially careful when operating on slopes, uphill and downhill, when the scraper is loaded and unloaded.
- When parking the machine, position tractor and scraper on firm level ground. Lower the scraper so it is resting on the ground. Position the tractor and scraper so that the tractor can easily drive forward and away from the scraper in the event that the scraper is to be disconnected.

2.3.2 Operator Training

Safety must be your priority for all staff working in and around the machine. There is only a certain amount that can be done when designing a machine to operate safely. The safety of the operators and those around them is heavily dependent on the behavior of the operators and maintenance crew. It is the responsibility of the machine owner or the head of the company who owns the machine to ensure that all the operators of the machine have read and understand the safety instructions outlined in this document.

Prior to training the instructor must locate the tractor and scraper safety devices. The machine must be parked in a secure location and using the manual, identify the hazards and risks to a person who would be in the danger zones.

The instructor must be familiar with the hydraulic controls in the tractor. The instructor should have knowledge of the site the machine is to be operating on and understand the difficulties likely to be encountered, ground conditions, slope, obstacles etc. The instructor will need to have work instructions or a plan to run through with the operator and demonstrate the functions of the machine and how they achieve the goals outlined in the work instructions.

Train all new operators and encourage them to converse with other machine operators about the safety of the machine. Only properly trained operators who have demonstrated competency in understanding the safety requirements and also the function of the machine may be allowed to operate the machine. Anyone who has not read and understood the safety and operating instructions shall not be able to operate the machine as they expose themselves and other to the risk of serious injury or death.

Make a list of all operators who have been trained to operate this machine. It is the responsibility of the owner to appoint a trainer who will train and approve all operators.

2.4 Dangerous Situations

Please find below a list of the most dangerous situations and the actions that must be taken upon identification of the situations



2.4.1 High Pressure Hydraulic Fluid Leak

Following the leak or rupture of a hose, a jet of hydraulic oil under pressure can penetrate the skin causing severe injuries. To avoid this risk, the operator must de-pressurise all circuits from the tractor. The tractor manual will instruct how to do this.

When working in close proximity to the machine, consider de-pressurising circuits unless it is necessary for them to remain pressurised.

If you suspect a leak, use a piece of cardboard to locate the leak. Always wear protective clothing (gloves, full length shirt etc) and eye protection.

If an accident occurs, call the local emergency services.



2.4.2 Accumulator

The hydraulic accumulator which powers the cushion hitch cylinder sustains pressure in the system even when the tractor hydraulics are disconnected. See the section in the manual covering maintenance and repair procedures.



2.4.3 Storage and disposal of waste

Be careful of the environment; consider using appropriate containers to recover the liquid and used materials. Make sure they are stored and removed in accordance with local laws and regulations.



2.4.4 Working near hydraulic circuits

Take extreme care when welding, brazing or using an open flame near hydraulic circuits. The pressurised fluid escaping through a leak can ignite and cause serious burns and potentially be fatal.

**2.4.5 Machine Startup**

Before you start the machine or activate the controls, make sure that nobody is near the tractor or scraper. Honk the horn before moving the machine.

**2.4.6 Falling Objects**

Regularly remove debris, clods and stones that can get stuck around the machine. This makes identifying oil leaks or structural damage easier to identify. Removing the debris around the hydraulic lines helps to increase their life by reducing the likely hood of corrosion and wear due to vibrations.

**2.4.7 Pinch or Crush**

The apron, bowl and ejector all pose a high thread of crushing or pinching. These risks could cause serious or even fatal injuries. For more information, refer to the section of the manual covering the implementation of the safety devices before starting work on the machine.

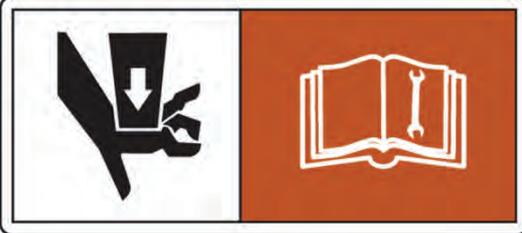
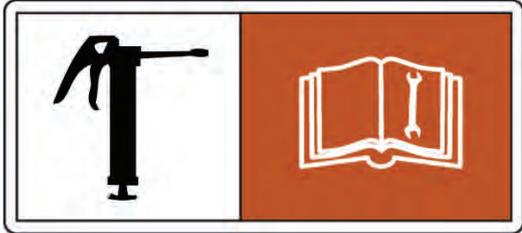
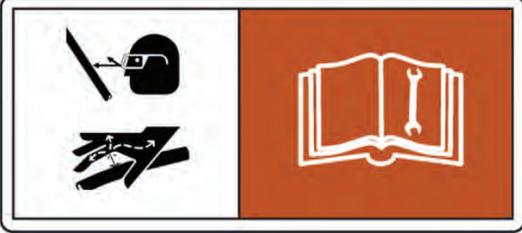
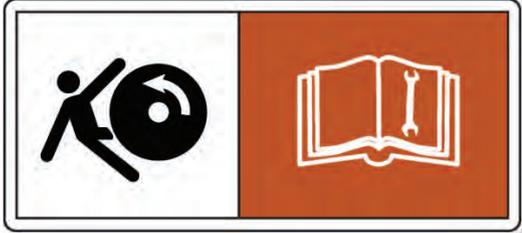
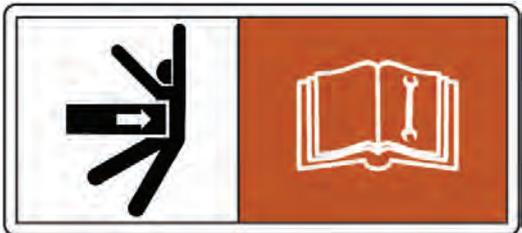
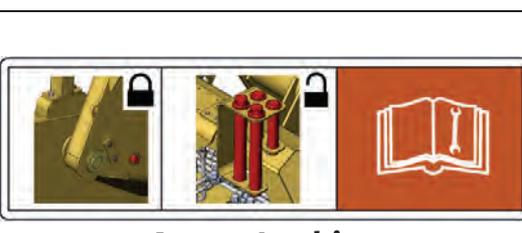
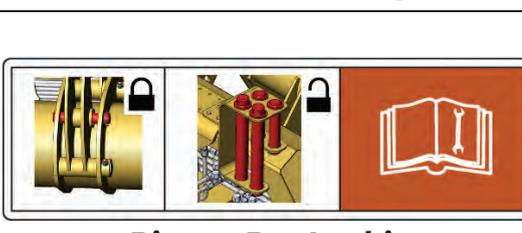
The connection of the tractor and scraper will typically require the presence of an assistant. Never allow them to be directly behind the tractor, always remain to the side and in view of the tractor operator so that they don't not have the ability to be run over by the tractor or crushed between the tractor and scraper. For more information refer to the section of the manual which covers the connection and disconnection of tractor and scraper.

2.5 Safety Equipment**2.5.1 Description of Safety Equipment**

When conducting operations and maintenance procedures of the tractor and scraper, always wear appropriate clothing and safety equipment:

- Do not wear loose clothing as they could get caught in the moving parts
- Wear a safety helmet
- Wear safety glasses (Maintenance)
- Wear steel capped footwear
- The operator must wear hearing protection according to the regulations according to the noise level generated by the tractor

2.6 Decals

1	 <p>Risk of Hand Crushing</p>	6	 <p>Grease Point</p>
2	 <p>Pressurised Hydraulic Fluid</p>	7	 <p>Run Over Risk</p>
3	 <p>Lifting Point</p>	8	 <p>Risk of Crushing</p>
4	 <p>Tie Down Point</p>	9	 <p>Risk of Crushing</p>
5	 <p>Apron Locking</p>	10	 <p>Ripper Bar Locking</p>

2.6.1

Prevention of Danger

This section presents the Decals and illustrates the safety information listed on them and their location on the machine. Operators must be familiar with the symbols and the instructions. Decals that are missing, damaged or covered in paint and unreadable must be immediately replaced. Please make reference to the decals found in the parts catalogue.

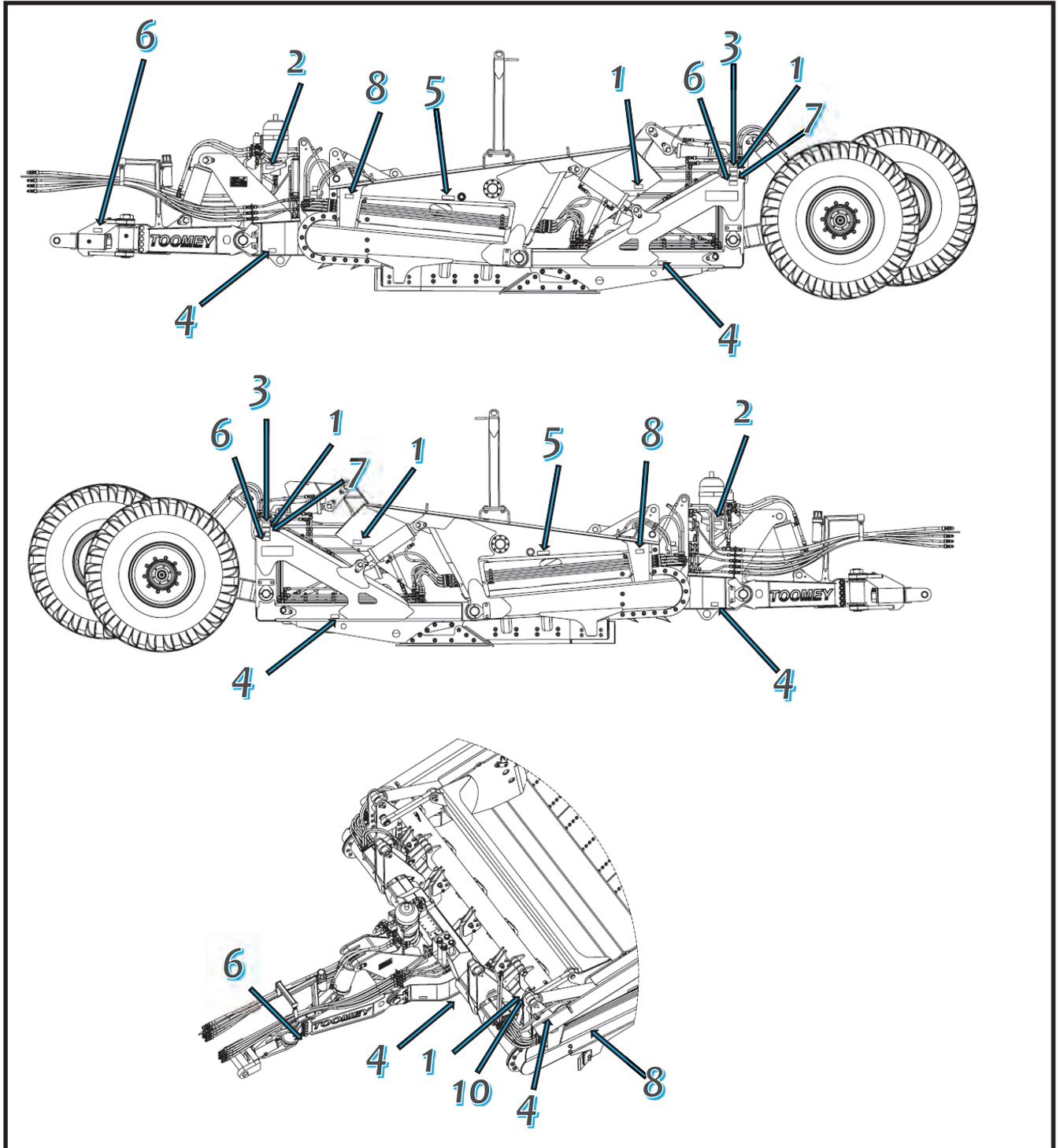


Figure 2.3 Decal Locations

2.7 Safety Locks

2.7.1 Safety during transport or Maintenance

The scraper is equipped with a safety lockout system to prevent movement of the apron or ripper bar during transport or maintenance operations. The lockout system secures the ripper bar and apron in their raised positions enabling the ground engaging wear parts to be safely replaced. The lockout system consists of 2 pins for the ripper bar and 2 pins for the apron. The pins must be stored in their holder during operation and any damaged pins must be replaced immediately.

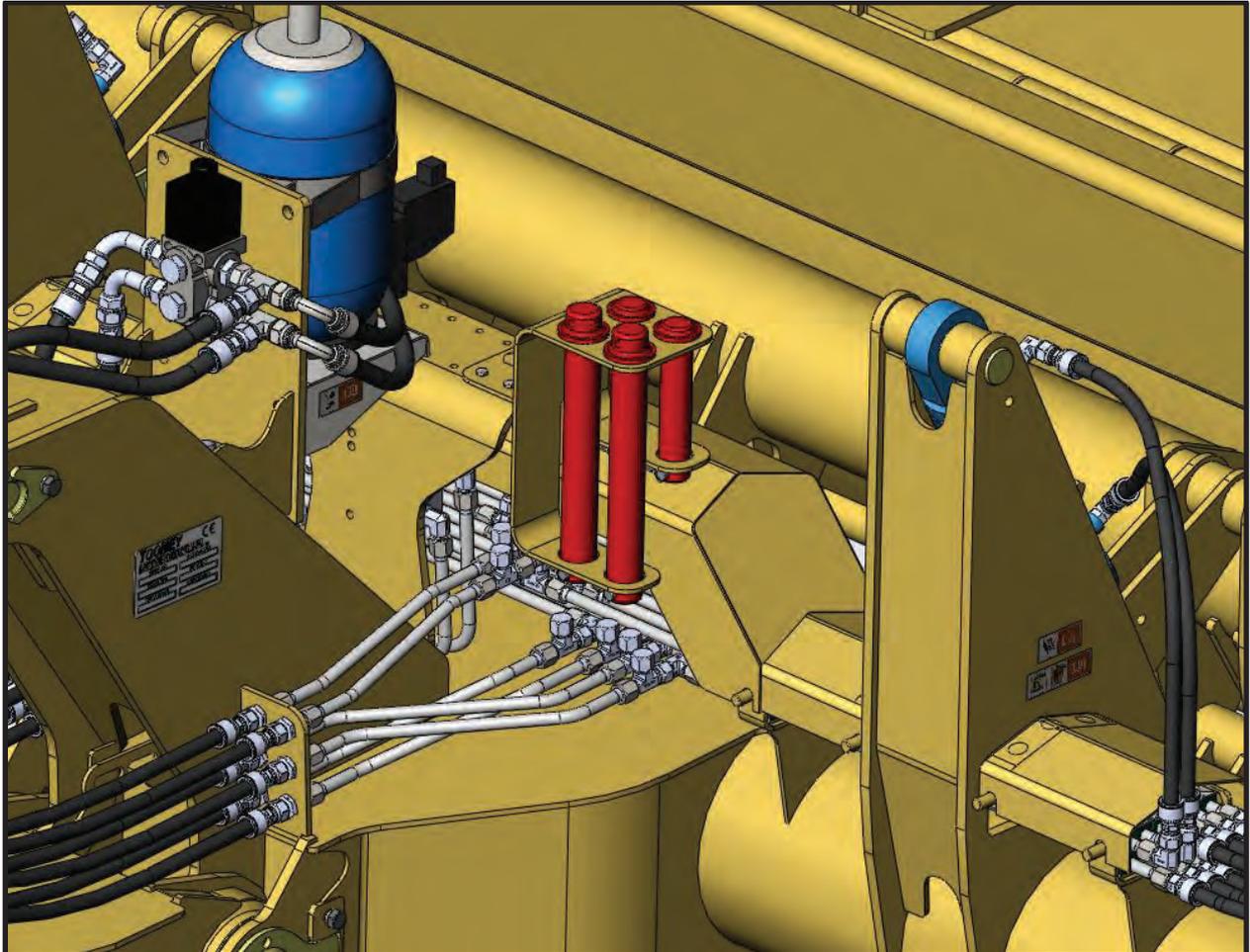


Figure 2.4 Safety Pin Stowed Location

2.7.2 Locking the ripper bar

To install the locking pins for the ripper bar first raise the machine with the main lift cylinders. Place rated workshop stands or blocks of hard timber under the mouldboard and lower the machine onto them. If the scraper is to be disconnected from the tractor, place stands or timber under the tie down lugs on the front cross beam and lower the machine onto them. Once the machine is secure, raise the ripper bar all the way up. Hold the controls in this position for a second or two. The holes in the lower ripper linkage and ripper cylinder mounts should be aligned now. Remove the lynch pin from the safety pin and insert into the locations as shown below. Re-fit the lynch pins into the safety pins after the safety pins have been inserted. Make sure both pins have been properly installed before undertaking maintenance on the rippers.



It is essential that the pins be positioned into their safety locations by reaching over the top of the front cross beam and not climbing underneath the cross beam. It is recommended that the installation of the lynch pins be done after the scraper hydraulic lines have been disconnected from the tractor and before any maintenance operations are conducted.

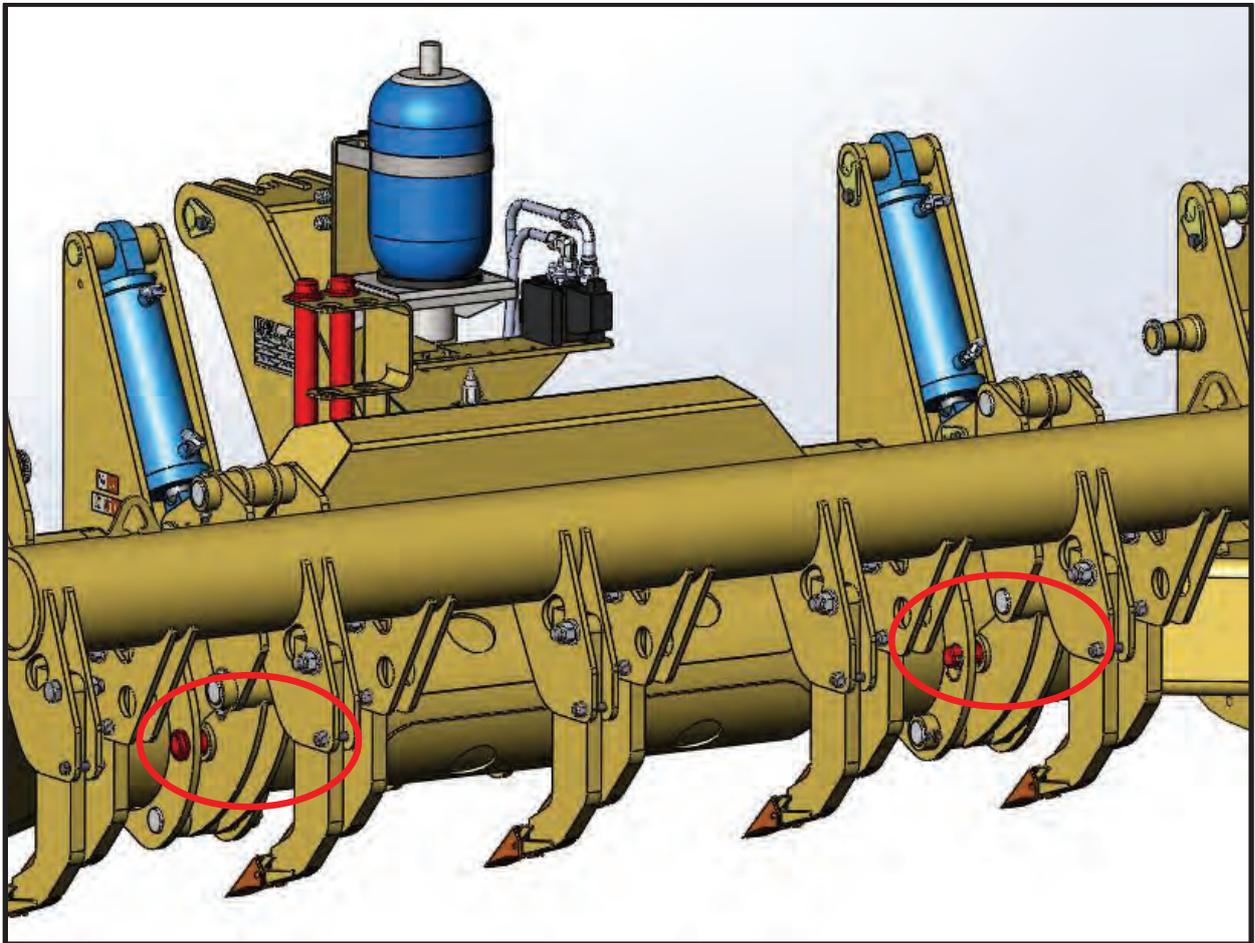


Figure 2.5 Ripper Safety Pin Location

2.7.3 Locking the Apron

To install the locking pins for the apron, first secure the machine as listed in the previous section. Once the machine is secure then raise the apron all the way. This will go past the locking position and the apron will need to be lowered slightly. It is advised to have an assistant indicate when the locking holes have come into alignment. Once the locking holes are in alignment the safety pin can be installed. Install the lynch pin on the inside of the bowl only after the rippers have been locked out.



To aid in exchanging cutting edges, it is recommended that the scrapers mouldboard be lifted up and then lowered on at least two heavy duty workshop stands of rating 10 tonne or greater to allow access to the nuts under the mouldboard. Stands or blocks should also be positioned under the back of the rear frame and under the front cross beam so that no part of the machine is supported by hydraulic cylinders. The hydraulic lines should be disconnected from the tractor and the tractor locked out so that it cannot be operated while maintenance staff are working on the scraper.

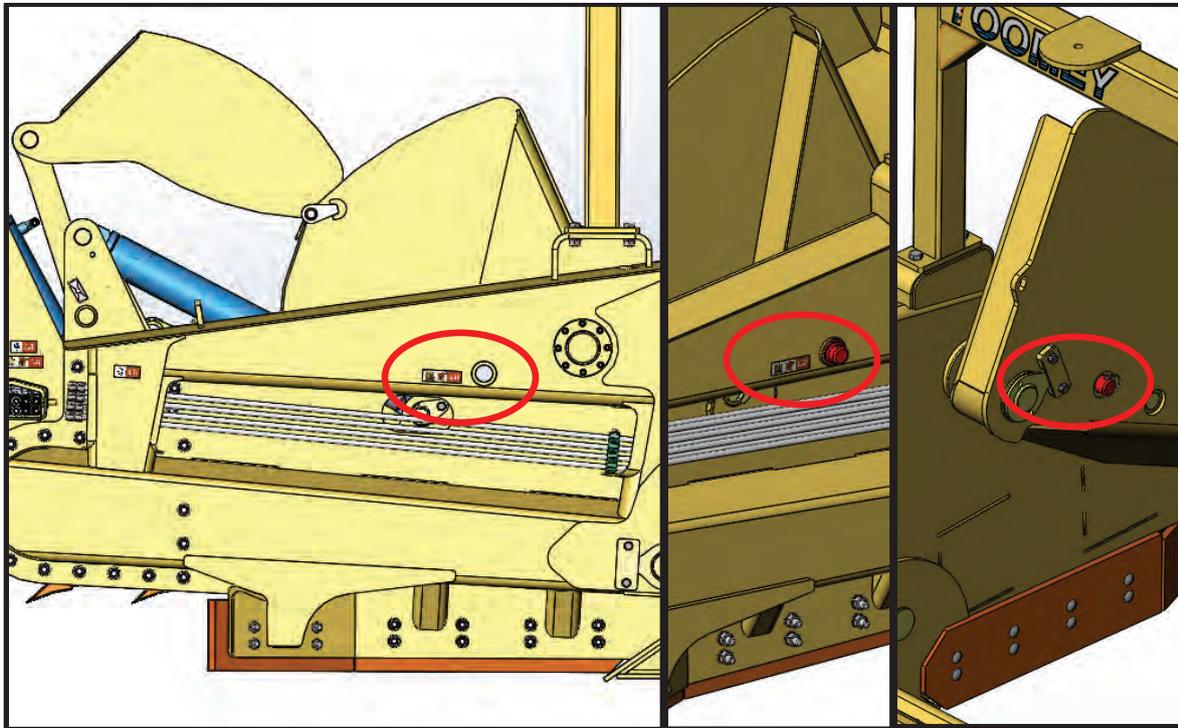


Figure 2.6 Apron Safety Pin Location

2.8 Pre Start Checklist

Below is the recommended list of items to be checked prior to operating the scraper. Consult your tractor manual for a similar check list. It is recommended that this checklist and the tractor check list be printed in copies and available for the operator prior to commencing operation.

1. Walk around the machine and remove any debris or large clods with a pick or shovel
2. Check scraper hitch is securely fastened to the tractor towbar and the quick release latch is locked in the closed position
3. Make sure the hoses connecting the tractor and scraper are sound and do not show signs of wear or entanglement
4. Inspect hydraulic hoses on the machine are free from damage or wear, replace if not
5. Inspect all the bolts holding the pin retainer plates and hydraulic cylinder pins to make sure they are present and tight
6. Check the bolts in the front cross beam are in place and secure
7. Check the cutting edge fasteners are in place and secure
8. Check that the cutting edge has sufficient material to undertake the planned work ahead and avoid damaging the structure of the machine
9. Check that all ripper tynes have the replaceable boot fitted securely with the pin and have sufficient material for the planned work ahead and avoid damaging the ripper leg
10. Check for broken ripper shear pins, replace as necessary
11. Check that there are no hydraulic oil leaks
12. Check the hydraulic cylinders are not leaking and that the shafts and barrel bodies are free from damage
13. Inspect the tyre pressures against the recommended pressures listed on the tyre
14. Check the wheel nuts are present and tightened correctly. Refer to the maintenance sections for torques to be observed
15. Ensure all safety labels and devices are present and free from damage. Replace worn or damaged safety labels immediately
16. Inspect the structure and ensure it is free from damage or cracks

3 Specifications

3.1 Scraper Specifications

The 4500B design specifications are listed in Table 3.1 below:

Table 3.1 - Specifications

Parameter	Design Value
Approximate Tare Mass	12,500 kg
Maximum Payload Mass	25,000 kg
Static Vertical Drawbar Load Fully Laden	13,125 kg
System Pressure	20.7 MPa (3000 psi)
Required Tractor oil Flow based on 165mm/s lift ¹	196L/min
Maximum Drawbar Pull (0-30°)	250kN
Minimum Tractor Power Requirements	298 kW (400 hp)
Recommended Tractor Power Requirements	373 kW (500 hp)

1. Cutting Edge Lift Speed based on 100mm/s lift cylinder extension and lift cylinder extension to cutting edge lift ratio of 1.65

3.2 Environmental Conditions

3.2.1 Temperature

The range of temperate the Scraper and its associated components are rated work within is:

-20°C to 50°C

Operating outside this range could potentially void warranties on the structure and components.

3.2.2 Humidity

There are no operational requirements for humidity.

3.2.3 Altitude

There are no operational requirements for altitude however, the operator is urged to consider the effect on the power output of the tractor when operating at higher altitudes.

3.3 Hydraulic Specifications

3.3.1 Fluid Working Temperature Range

The working range of the hydraulic fluid, as determined by the seals and wipers used in the hydraulic cylinders, is:

-20°C to 100°C

Operating outside this range could cause the hydraulic cylinders to fail and would void the warranty on the cylinders.

3.3.2 Fluid Type

The required fluid for the Toomey Scraper is a Hydraulic Oil, ISO 6743-4 (HL, MH or HV). Consult the tractor’s user manual and select a hydraulic fluid which meets the exact requirements of the tractor.

3.3.3 Protective Coatings

There are no special requirements for protective coatings on the hydraulic systems of a Toomey Scraper. The only consideration is to keep the steel hydraulic lines free from dirt and debris for extended periods of time as the moisture in the dirt and debris can promote accelerated corrosion of hydraulic lines.



If the hydraulic lines develop a red oxide layer as opposed to the white zinc oxide then the zinc layer has been eroded and the steel of the hydraulic line has been compromised. The hydraulic line affected must be replaced.

3.4 Tractor Specifications

The tractor manufacturer defines the maximum drawbar weight and permissible load on the tractor. Consult your tractor dealer to select the ideal tractor for your scraper which does not exceed the limits set by the tractor manufacturer. The information listed above can be used to check that the tractor is not overloaded and potentially void any warranties of the tractor. Also check that the tractor pulling capacity does not exceed the limits of the Scraper as this could void the warranty of the Scraper against structural defects and damage.

4 Equipment Assembly

4.1 Required Equipment

If your 4500B Scraper Grader was delivered unassembled you will be required to assemble the machine. In order to do that, the following tools and equipment are required, as a minimum, to complete assembly successfully:

- 4.5 tonne Crane (Gantry or Franna)
- ¾" rattle gun (air or electric)
- Solid wooden blocks to pack under rear frame and cross beam
- 2.0 tonne Bottle jacks to assist in adjust component heights
- Assortment of metric spanners for M20, M16 and M12 hex bolts
- Assortment of Imperial spanners for 1" & 1.5" bolts and hydraulic hose fittings
- Allen keys for M12 cap screws
- Soft hammers (rubber or nylon) for assembly of pins and shafts
- Larger hammers and mallets for persistent pins (last resort)
- Grease for assembling pins and priming hitch and axles

NOTE: Even if your machine was delivered assembled, becoming familiar with the assembly procedures will help give a greater understanding of the machine and assist in future maintenance operations.

4.2 Assembly Procedure

4.2.1 Rear Frame

Set the rear frame assembly in the centre of the working area with ample room surrounding it. Set wooden blocks or bottle jacks under the rear frame to keep the floor of the bowl level.

Do not lift by inserting chains or slings inside the main pivot bearing as this will damage the bearing and seals. If the sub assembly is to be lifted out of the shipping container, fit the 90 diameter pins into the pivot bearings and wrap slings around the pins.

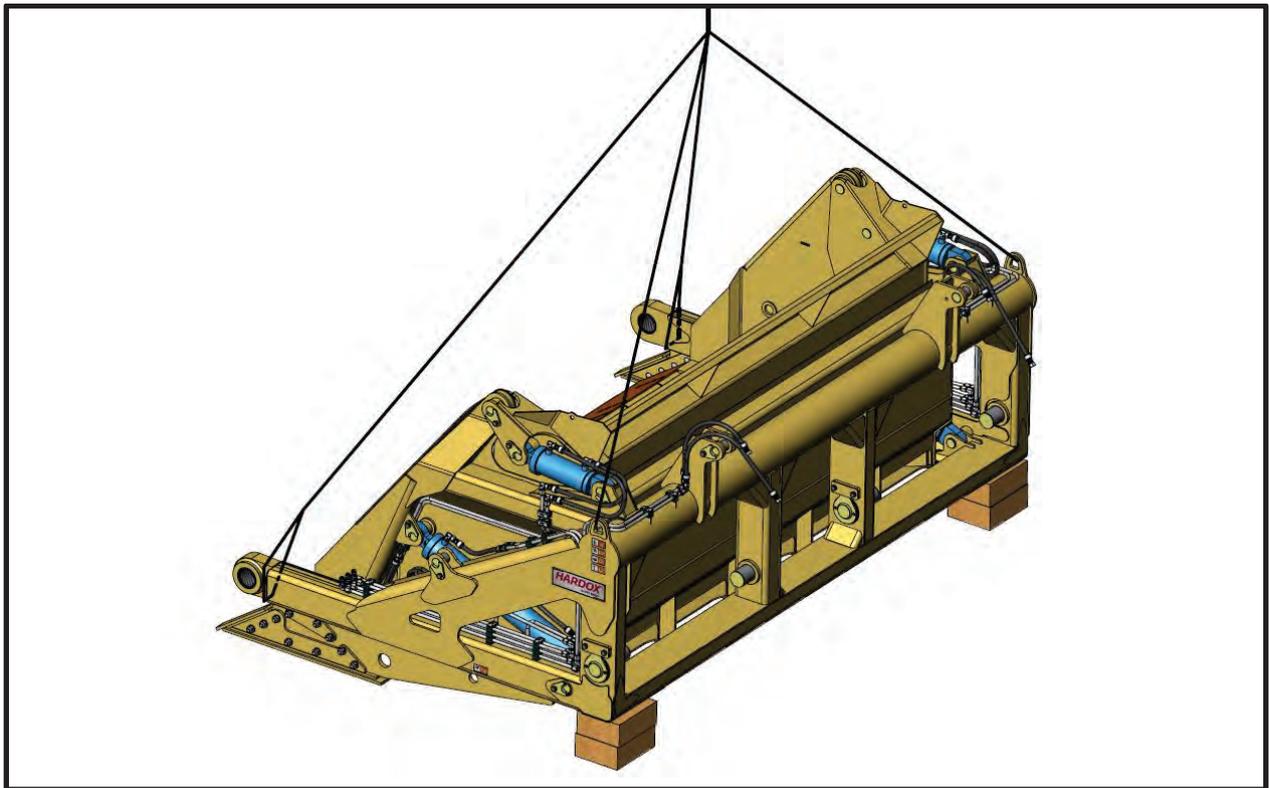


Figure 4.1 Assembly Step 1

4.2.2 Side Walls

Remove the 90mm pin and keeper plate from the side walls. Apply grease to the inside of the wiper seals in the main pivot bushes of the rear frame. Lift the side walls using chains attached to the lifting provisions provided (note: adjust chain lengths so cutting edge is horizontal). The side walls can either be lowered in place or brought in from the front. The side wings of the side wall fit between the bowl and the rear frame. Take care to ensure the pin hole in the side walls aligns with the bush so that the pin can be inserted without damaging the wiper seals.

NOTE: Damaging the wiper seals during assembly voids the warranty on that bush as it is critical that dirt and dust is kept out of the bush to maintain a full service life.

Once the side wall is in place and the pin keeper is bolted up tight the main lift cylinder pins can be removed and the main lift cylinders installed. Install the top pin first using an anti-seize compound on the pin. The cylinders are usually shipped fully retracted, to extend the cylinder to install the lower pin, remove the port plugs and, with a rag to reduce air leakage, blow compressed air into the top cylinder port. Once the bearing is close to aligning, a pry bar can be used to fine tune the alignment. Install the bottom pin as per the top pin.

NOTE: The pins consist of a hard chrome shaft and are zinc plated after the pin is machined and fabricated. There can be a lip where the zinc finishes and the chrome starts. This is typically filed down from the factory but if the pin fails to go into the cylinder clevis easily check this and file the zinc down to suit.

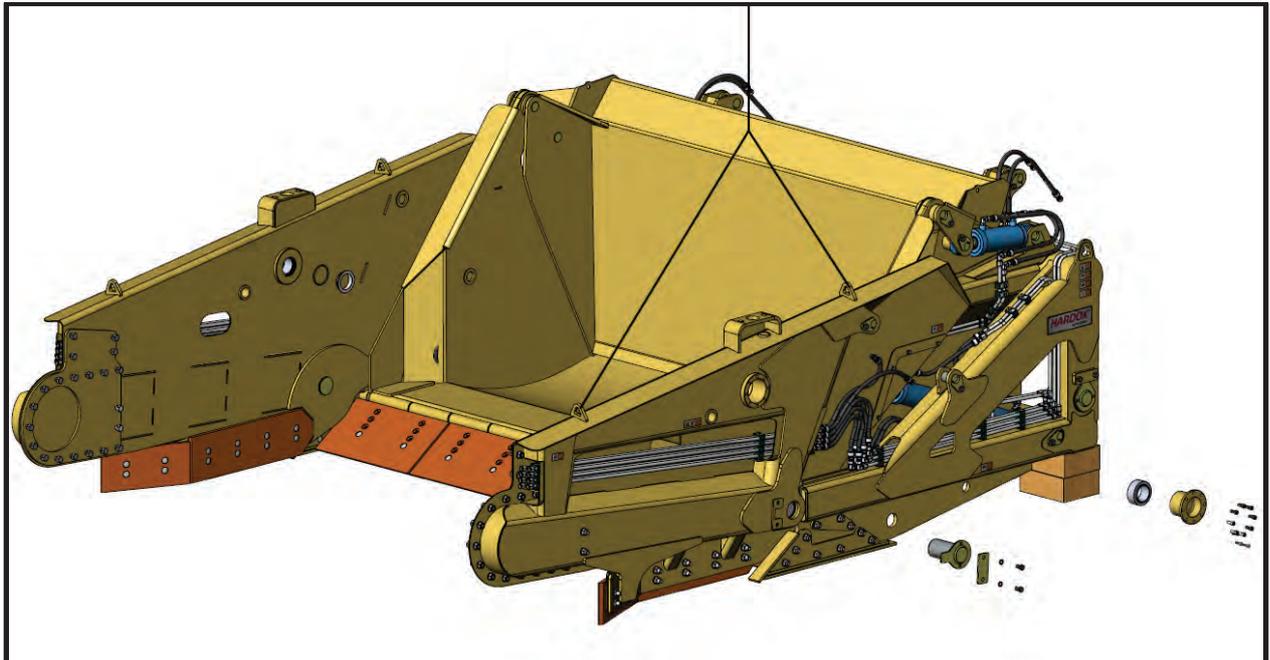


Figure 4.2 Assembly Step 2

4.2.3 Front Cross Beam

Remove the bolts from the side walls and store in a container for easy access when assembling. Lift the front cross beam assembly using slings around the top ripper cylinder pins and the cushion hitch cylinder pin. Move the cross beam assembly into place travelling rearward. The side walls may need to be moved outward to the maximum extent the play in the main pivot bushes will allow. Align a bolt hole on each side towards the top of the bolt group and insert the bolt. Lower or raise the cross beam to allow the remaining holes to align. Fit and tighten the M20 fasteners with a recommended assembly torque of 370N.m.

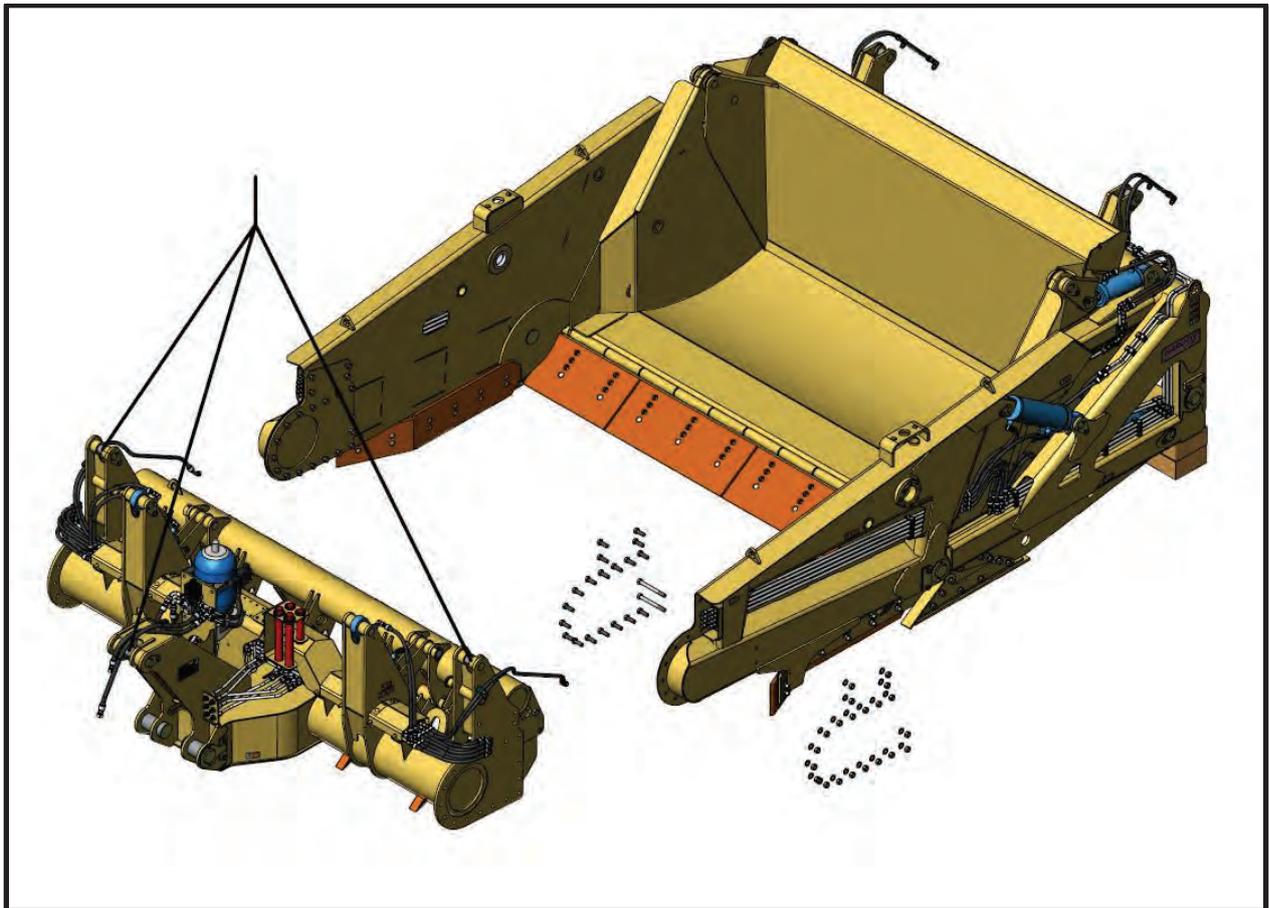


Figure 4.3 Assembly Step 3

4.2.4 Apron Assembly

Remove the bolts holding the main apron pivot pins and remove the pins, lock washers and nuts. Remove the bearing retainer cap, bearing and sleeve from the side walls. Apply grease to the o-ring in the side walls and insert the sleeve into the side wall.

Lift the apron assembly via the lifting provisions and carefully lower down between the side walls. Align the bearing hole in side walls with the pivot pin hole in the apron. Apply anti-seize to the apron bosses.

NOTE: Anti-seize compound should be applied to all pins which are to be installed into the hydraulic cylinder clevis bearings.

Insert the threaded pin into the apron boss and into the sleeve in the side walls stop short of pushing it in all the way so that when installing the GE 90 Bearing, the bearing enters the housing before the pin enters the bearing. Tap the bearing gently with a flat punch and small hammer to get it started then use the bearing retainer and bolts to push the bearing into place. Once the gap between the bearing retainer flange and boss in the side wall is around 20mm the threaded pin can be driven into the bearing using a large soft mallet or a sledge hammer and block of wood. Drive the pin in fully and secure the pin in place with the keeper plates and M16x30 hex screws. Continue to tighten the bearing retainer pushing the bearing all the way into plate. Remove the bearing retainer and install the lock washer and locking nuts. Tighten with Special Tool # 1.0 and bend over lock washer tab to secure in plate. Half fill the bearing retainer with grease and then install with the cap screws provided. Clean up any excess grease that escapes. The grease will help keep moisture from entering the housing.

Lift the apron up so that the cylinder pins are accessible through the access holes in the side walls. The top Stauff clamps may need to be unscrewed so the top hoses can be moved to allow the pin to be installed. Install the apron cylinder pins in the same manner as the other pins. Lower the apron and install the connecting linkages between the cross beam and apron.

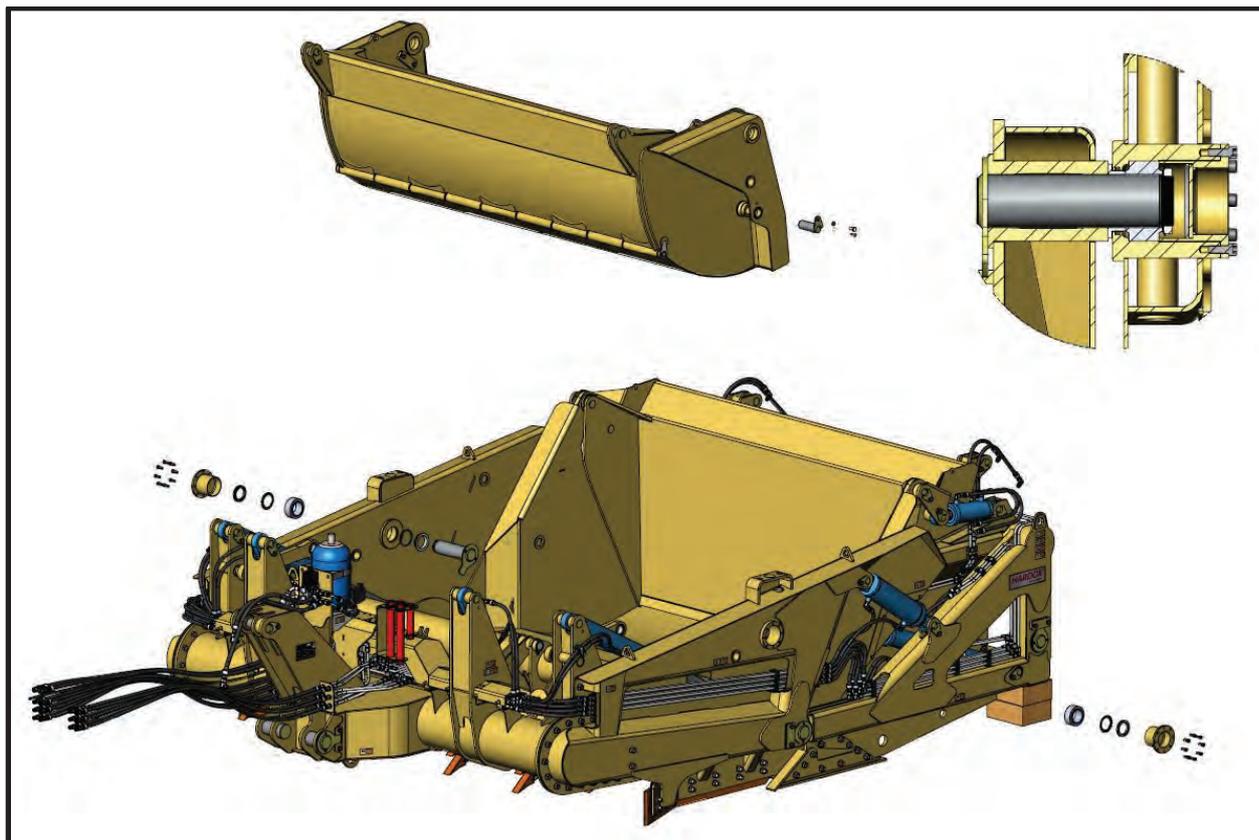


Figure 4.4 Assembly Step 4

4.2.5 Laser Mount Assembly

Remove the bolts in the mounting flange of the laser mounting frame. Lift the laser mounting frame using the lifting provisions and lower onto the mating flanges on the side walls. Position the laser mast bracket toward the rear of the machine. Assemble and tighten the bolts.

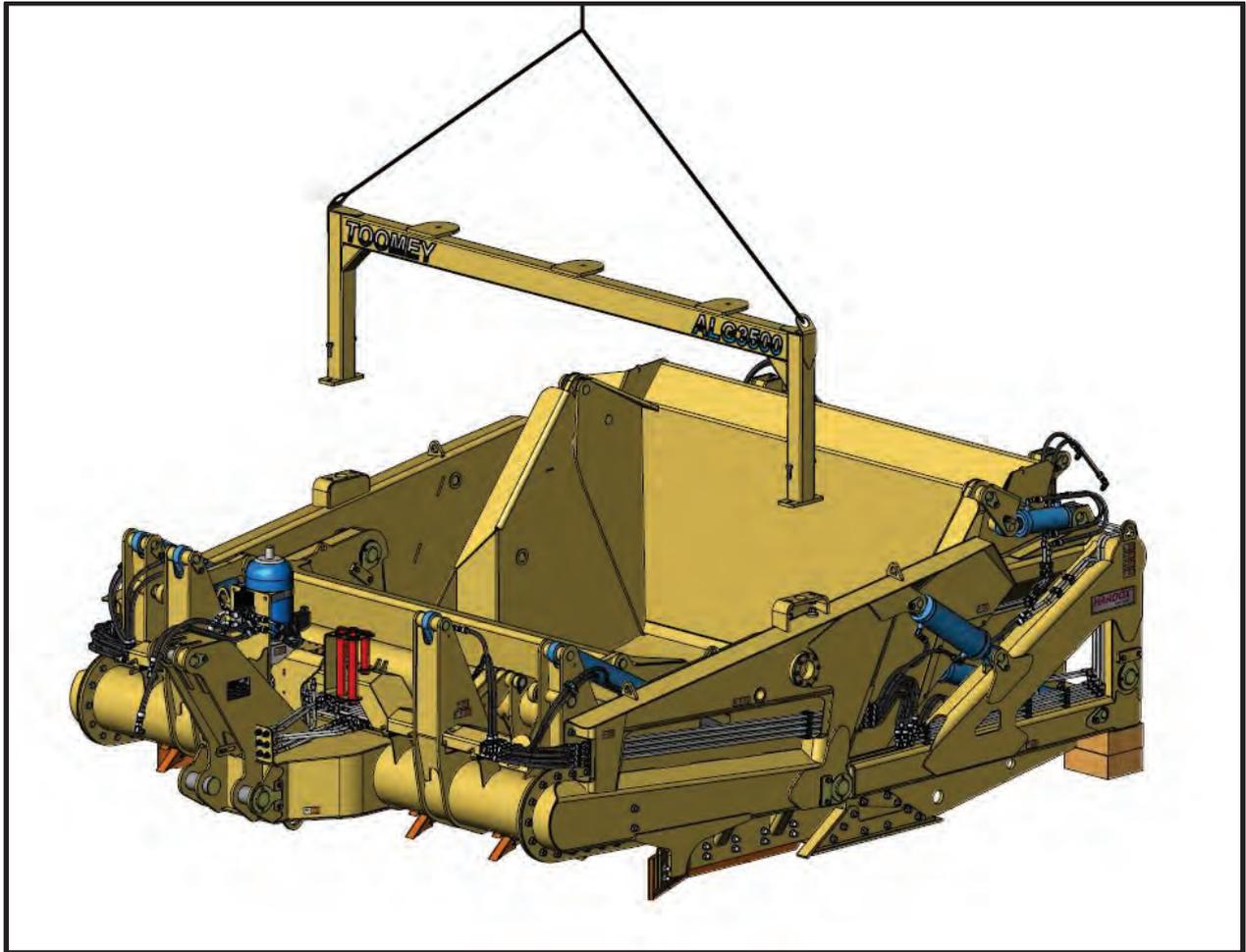


Figure 4.5 Assembly Step 5

4.2.6 Drawbar & Hitch Assembly

Remove the drawbar pivot pins from the front cross member as well as the top cylinder pin. Remove the cylinder pin from the drawbar and the hitch mounting bolts. Apply grease to the inside of the seals in the drawbar. Lift the drawbar into place and align the main pivot bushes with the pivot pin holes. Take care to ensure the pin hole in the cross beam aligns to the bush so that the pin can be inserted without damaging the wiper seals.

NOTE: Damaging the wiper seals during assembly voids the warranty on that bush as it is critical that dirt and dust is kept out of the bush to maintain a full service life.

NOTE: Anti-sieze compound should be applied to all pins which are to be installed into the hydraulic cylinder clevis bearings.

Insert the pin with the use of a soft hammer or mallet until the pin is mostly through the bush. It is recommended to get both pins mostly through the bush before completely inserting. This gives more adjustment in getting the second bush aligned.

If the pin becomes difficult to drive all the way, a larger hammer and block of wood can be used however this should only be done once the pin is all the way through both seals and the bush. Install the keeper plates and M16x30 hex screws with spring washers.

Lift the cushion hitch cylinder in place using a sling and crane and align the top clevis and housing holes. Insert the pin and retaining bolt. Lift the drawbar up so that the lower clevis aligns with the pin mounting holes in the drawbar. Insert the pin and retaining bolt.

Install the hydraulic hoses to the cushion hitch cylinder and the hoses which connect the bulkhead fittings on the front cross beam and tractor.

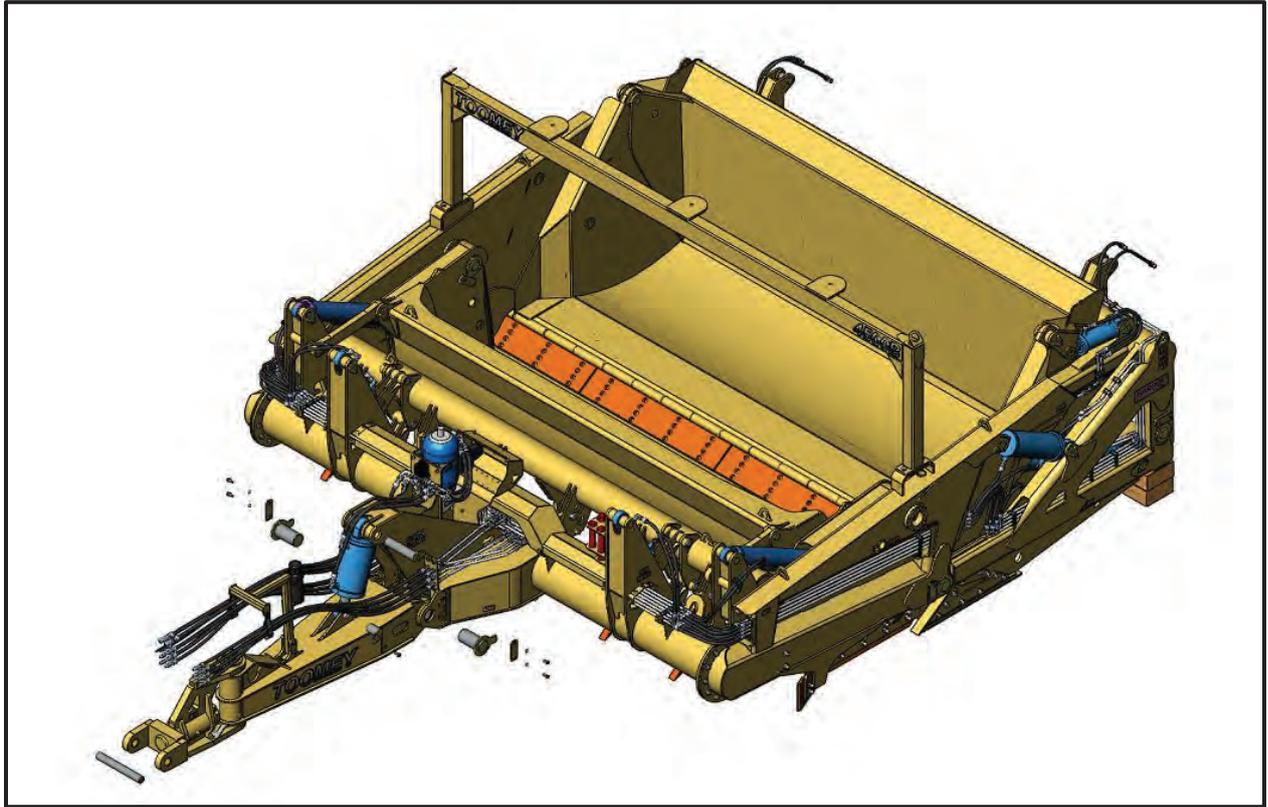


Figure 4.6 Assembly Step 6

4.2.7 Swingarm & Rocker Assembly

Remove the swingarm pivot pins from the rear frame as well as the top cylinder pins. Remove the cylinder pins from the swingarms. Apply grease to the inside of the seals in the swingarms.

NOTE: Anti-seize compound should be applied to all pins which are to be installed into the hydraulic cylinder clevis bearings.

Lift the swing arms up and align the bush and the pin boss in the rear frame. Take care to ensure the pin hole in the rear frame aligns with the bush so that the pin can be inserted without damaging the wiper seals.

NOTE: Damaging the wiper seals during assembly voids the warranty on that bush as it is critical that dirt and dust is kept out of the bush to maintain a full service life.

Insert the first pivot pin partially. It should insert by hand. Align and insert the second pivot pin before inserting the pins all the way home. Assemble the keeper plates with the M16x30 hex screws. Lower the swingarm onto a block of timber or adjustable stand set to a height of approx. 600 mm.

Lift the hydraulic cylinders and align the top clevis bearing with the pin mounting hole. Insert the pin as per the procedure used on previous cylinders. Use compressed air to extend the cylinders so that the lower clevis bearing aligns with the pin mounting holes. Insert the pins and retaining bolts. Connect the hydraulic lines to the cylinders.

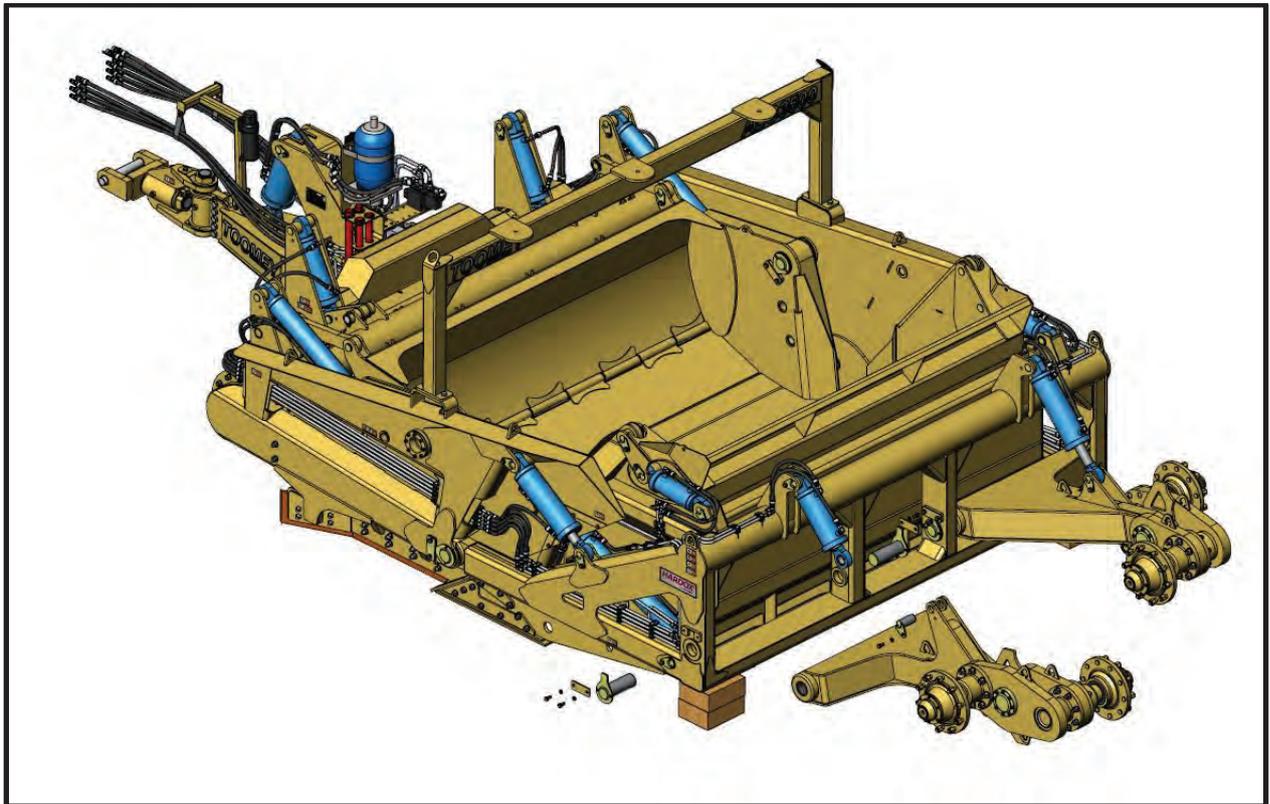


Figure 4.7 Assembly Step 7

4.2.8 Wheels and Tires Assembly

Remove the wheel nuts from the hubs and fit the wheels and tires to the hubs. Once wheels are assembled, the hydraulics can be connected up to the tractor and the machine lifted up so the blocks can be removed.



Figure 4.8 Assembly Step 8

5 Using the Scraper

5.1 Coupling/Uncoupling Scraper Hitch

The hitching and unhitching operations should be done on flat firm level ground in a well-lit place with no other vehicles or people around. It is important that anybody connecting or disconnecting the scraper is familiar with the tractor controls. Improper operations could cause damage to the equipment or injury to themselves or others.

If the operator needs an assistant to couple and uncouple the scraper, both people must wear appropriate safety equipment, safety glasses, safety boots, high visibility clothing etc. The operator must be aware of the whereabouts of the assistant at all times.

Before commencing connection, make sure all tools required and positioned handy. Remove the locking pin from the quick release latch and put with the tools. Before starting the engine, make sure no one is close and sound the horn. Start the engine and allow it to idle. With the help of the assistant position the tractor close enough to the scraper hitch so that the hoses can be connected.

Warning, at no time should the assistant be between the tractor and the scraper. Make sure to align the tractor straight onto the scraper otherwise it makes it difficult and dangerous to connect.

Connect the hydraulic lines to the tractor so that the controls match the functions on the scraper. Using coloured cable ties, or a common quantity of cable ties on hose ends and valve fittings to identify where hoses go is common practice. Remember to clean the connectors with a clean rag before connecting to the tractor.

When connecting for the first time, consult the hydraulic diagrams to identify which hoses on the scraper control which functions and connect those to the valves on the tractor as desired. If automation control systems are installed then this would dictate how the valves and functions on the bucket would interact. The Scraper can also be optioned with electronically controlled valves fitted and in this instances, electrical cables would be used to activate the functions of the bucket. Consult your automation systems provider for advice with regard to the setup of these.

With timber dunnage under the cross beam tie down lugs lift the drawbar with the cushion hitch cylinder until the pin in the swivel hitch is above the tags on the tractor drawbar. If the scraper is being connected for the first time it may take some time for the hydraulic circuits to fill up with oil and respond. Also keep in mind that the cylinders and hydraulic lines will hold approximately 100L of oil and the tractors hydraulic oil tank may need to be topped up during the initial connection process.

With the assistant guiding the operator from a safe distance, back the tractor into the scraper hitch. Once the hitch has engaged with the tractor towbar, the drawbar can be lowered, pressing the hitch pin into place on the tractor towbar. The tractor should then be shut down while the quick release latch is lowered and the pin and “R” clip assembled. Once the hitch is safely engaged and tools removed and assistant clear, the tractor can be started up using the same starting procedure previously mentioned. The scraper can now be raised and any support timbers or stand can be removed.

Reverse this procedure to uncouple the scraper from the tractor. Note that there may be residual pressure in the hydraulic circuits when uncoupling and to have an approved container handy to capture any hydraulic oil which may spill during this process.

5.2 Loading

The method for loading a towed scraper is rather different from that of a self-propelled scraper. The operator takes shallower cuts (10-15cm) over a greater distance. Thanks to the cutting edge angle and greater loading speed an optimum mound profile develops allowing a greater carrying capacity.

Two important factors in efficient loading of a towed scraper are:

1. Loading Speed
2. Cutting depth

When the scraper loads the material forms a mound in the bowl. This mound builds until it reaches the angle of repose for that material (red lines). Once the mound exceeds this height the material starts to roll down the mound (yellow lines). The side walls have wear skids attached with enough free board that this behavior is considered. It will allow the material to mound up and fill the scraper. Once the scraper is full the apron can be closed and the scraper lifted trapping the material in the scraper.

A coordination between raising the cutting edges and closing the apron will result in a minimum amount of material left from being drawn into the scraper. This takes practice and the operators will gain a feel for this as their experience grows.

The diagram below shows and approximation of the material flow.

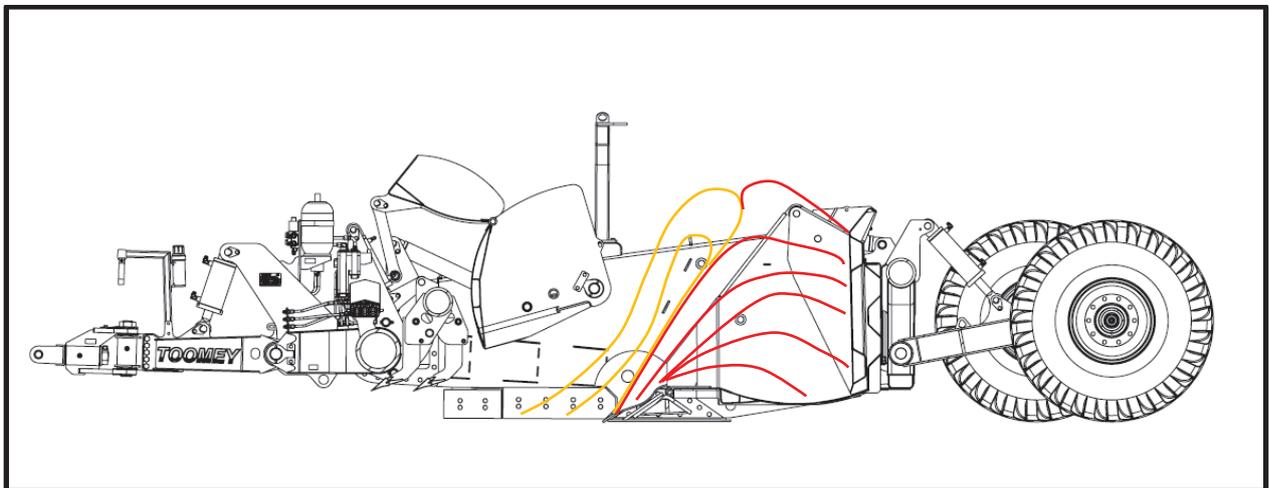


Figure 5.1 Loading Material Flow

5.3 Unloading

The Toomey scraper incorporates a dual action ejection method. This is controlled hydraulically by a sequencing valve which means only a single operator control is required to control the ejection of material from the bowl.

To commence unloading, open the apron. This will allow material to start falling out of the machine. The stickiness of the material will determine how much the machine empties. After the material has fallen out due to opening the apron, the bowl tipping can be activated. The tipping action will eject more material as the bowl inclines past the angle of repose until it reaches the limit of tipping. Once this limit has been reached the ejector will activate and positively eject any product still remaining in the bowl. This is ideal for sticky clays as it leaves very little material left in the bowl which increases efficiency.

Once the product has been emptied from the machine, return the bowl to its lowered position by activating the control lever in the opposite direction. The ejector will retract and the bowl will lower in sequence automatically. Always travel with the bowl in the lowered position to reduce wear on the bowl cylinders and pins. It is recommended to also travel with the apron in the closed or partially closed position.

The diagram below shows the material contact faces in the ejected position. As you can see there are minimal surfaces for sticky material to cling.

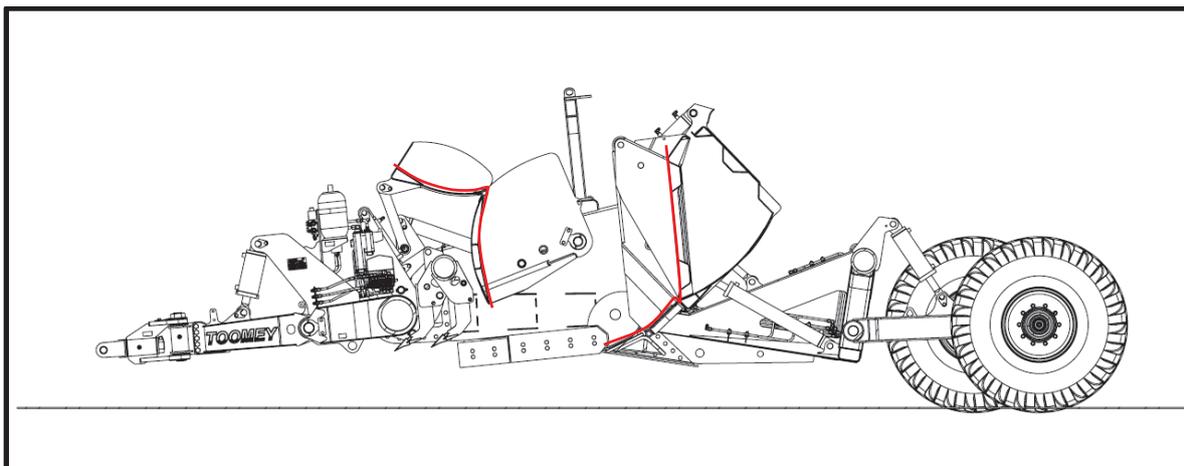


Figure 5.2 Material Contact Surface

5.4 Operating Conditions

Avoid operating the machine on slopes exceeding 20%. If operating on sloping ground keep the scraper as low to the ground as possible to keep the centre of gravity low and avoid tipping.

The operator should be ready at all times to lower the scraper to the ground to slow or stop the tractor in case of emergency.

5.5 Transporting the Scraper

If using a vehicle to transport the scraper first remove debris and material from the scraper. Make sure the scraper is empty. Check that the tie down points and lifting points are free from damage and all safety labels are present. If lifting the scraper with a crane, ensure it has sufficient capacity to handle the scraper safely. Refer to section “Specifications” for the scraper mass and the section “Securing the Machine” for the lifting and tie down arrangements.

If loading only the scraper, uncouple the scraper as per the procedure listed in the coupling/uncoupling section.

Refer to the lifting standards or codes of practice required of the region when undertaking the lifting operation.

The lifting points on the machine should only ever be used to lift the scraper when loading and unloading the scraper. They are not recovery points and should not be used when the scraper is stuck.

When loading the scraper, the safest way is to lift the machine vertically and reverse the trailer underneath.

When lashing the scraper to the transport vehicle always use the primary tie down points. The rear tie down points will typically be tied inwards to the vehicle and the front tie down points will be tied outwards. Multiple chains or straps should be used facing forwards and backwards to resist movement in the forward and rearward directions as well as the lateral directions.

Supplemental restraints can be added to other parts of the scraper like over the side walls and around the rear frame however protection will be required to prevent damage to the machines paint and also the straps themselves. Refer to a typical lashing arrangement below.



Figure 5.3 Tie Down Example

6 Maintenance Requirements

6.1 Summary

The ALG graders have been designed predominantly utilising grease free SKF bearings and bushes. This removes the requirement for regular greasing of the main pivots and cylinder clevises. Regular greasing is required for the Axle Hubs and Swivel Hitch.

Although regular greasing is not required, regular inspections **are** required. These help to detect early signs of wear or failure. Without regular cleaning and inspections, wear or minor structural or non-structural defects could be allowed to increase or spread and could result in catastrophic failure or injury.

6.2 Initial Maintenance Requirement

When the ALG graders are assembled, the hitch and hubs are already primed with grease however it is the owner's responsibility to check this prior to use.

6.2.1 Wheel Hubs

To ensure the hubs have sufficient grease to ensure long life, remove the inner grease nipple and pump grease into the outer nipple. Continue to do so until grease comes out of the inner hole. Fit the grease nipple back into the hub. Continue to do this for all hubs.

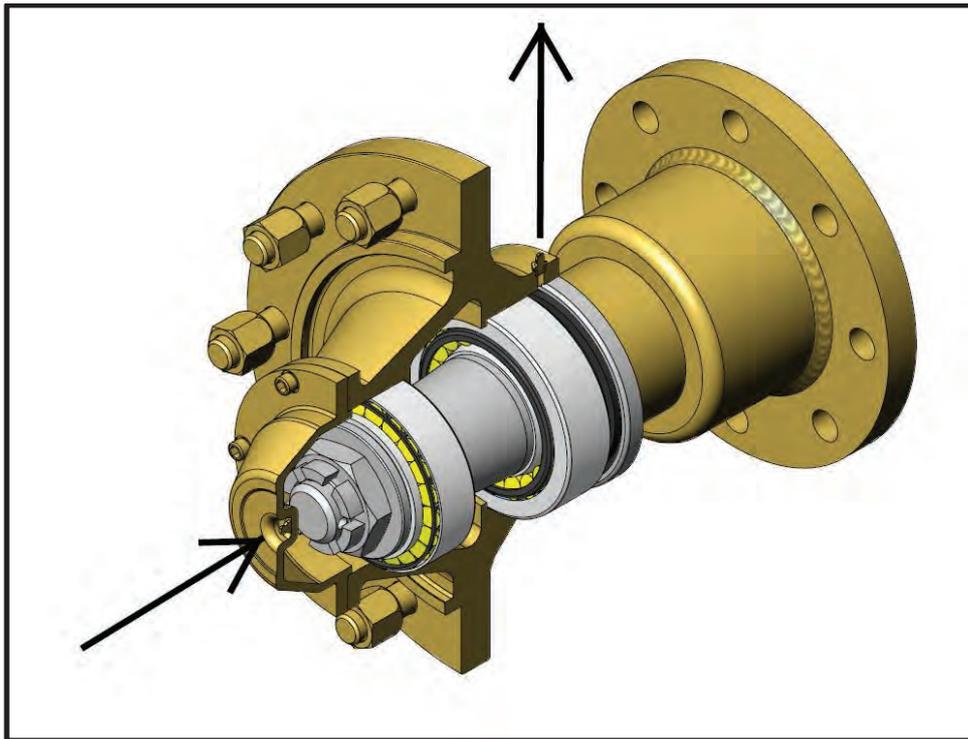


Figure 6.1 Wheel Bearings

6.2.2 Swivel Hitch

If a TOOMEY swivel hitch has been supplied follow the instructions below. If an alternate brand hitch has been supplied, consult the maintenance documentation from that manufacturer.

Pump grease into each of the three grease ports located on the left side of the hitch. Pump grease until grease starts to appear between the thrust washers either top of bottom.

NOTE: For the first 24 hours of operation, add a pump or two of grease every 3 hours to ensure grease is worked into all the thrust discs. You will get best results if you alternate load on the hitch each time grease is added i.e. reverse tractor, lift hitch cylinder, lower hitch cylinder etc.

After the initial bedding-in period the nut on the horizontal shaft may need tightening to remove any play that has developed.

The shorter the intervals between application of grease the longer the bushes and thrust washers will last. For maximum life it is recommended that the swivel hitch be greased using an automated system using smaller dosage more frequently.

NOTE: Ensure the 3" locking nut on the horizontal shaft remains tight to inhibit movement between it and the shaft. Movement between the nut and the shaft will result in damage to the thread and will not be covered under warranty.

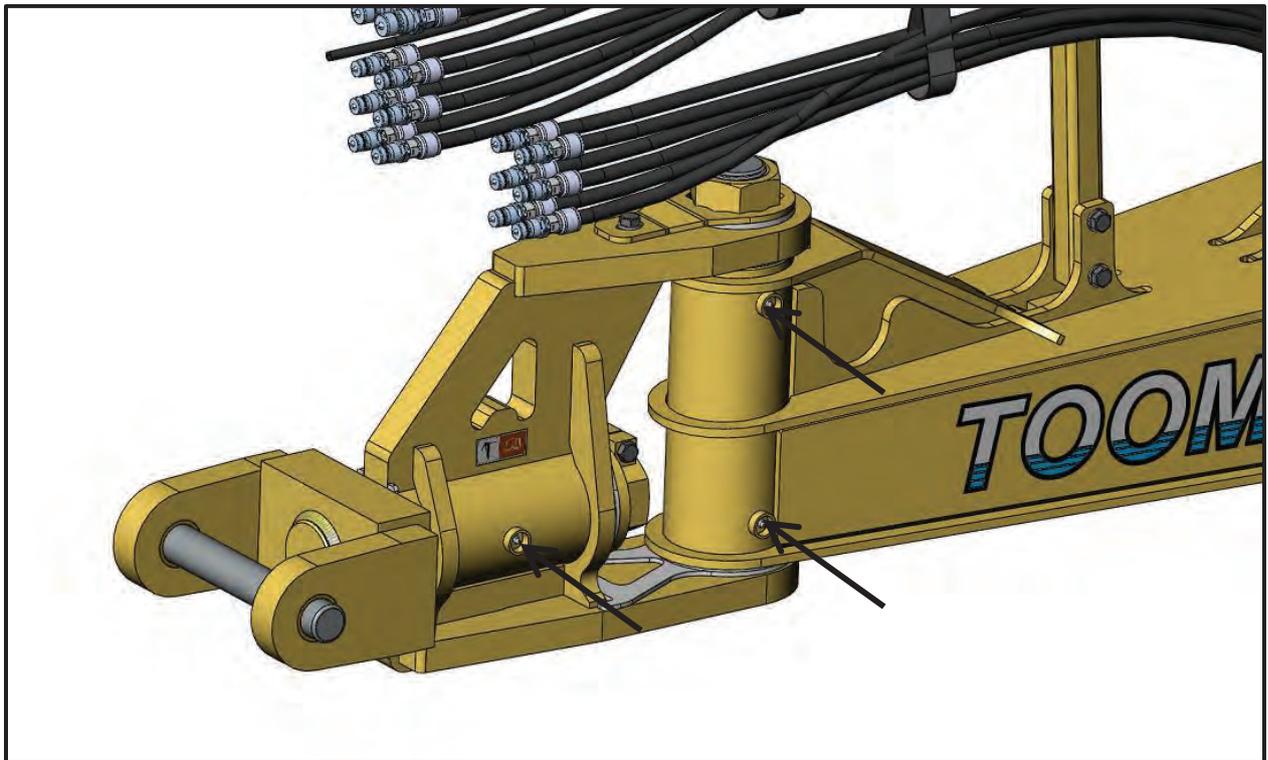


Figure 6.2 Hitch Grease Points

6.2.3 Rocker Bearing Lock Nuts

After the first 40 hours of operation the rocker bearing lock nuts must to inspected and tightened. To do this, put blocks of wood under the rear frame and raise the swingarms to lift the wheels slightly off the ground. Remove the wheels and tires to gain access to the bearing retainer caps.

Fold back the tag locking the nut and try to tighten the nut further. If the nut won't tighten then fold the tag back down and the nut does not need any further inspecting. If the nut tightens, tighten it until the next tab and notch line up and fold the tab down. The nut will need another inspection in another 40 hours of operation. Continue this pattern of inspection until the nut is no longer able to be tightened. If after 3 inspections the nut is still found to require tightening contact TOOMEY Earthmovers for advice.

NOTE: Failing to check that the nut is sufficiently tight will result in the inner part of the bearing moving on the shaft and causing wear and damage. Damage which occurs as a result of not following these guidelines will not be covered under warranty.

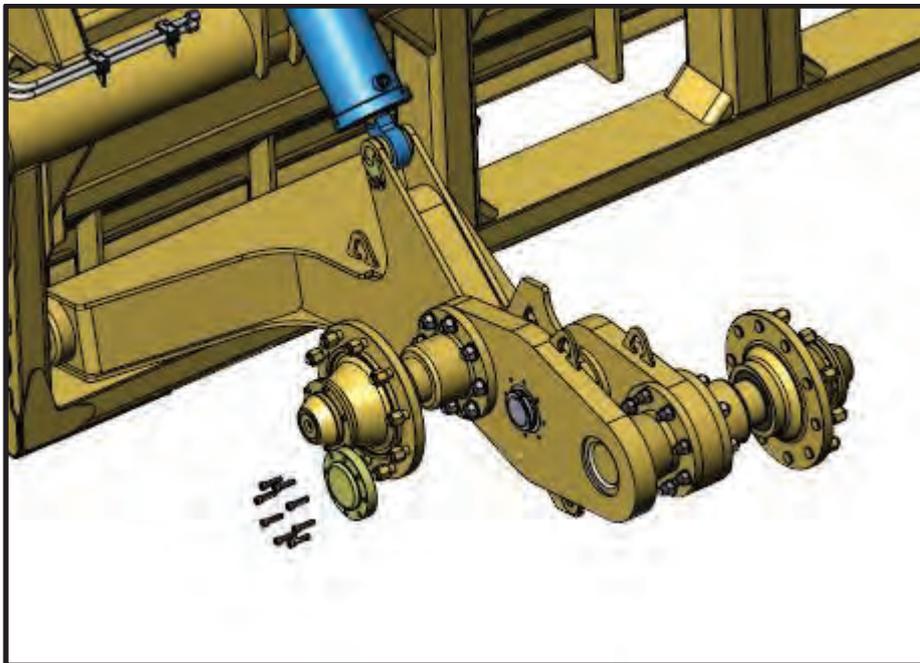


Figure 6.3 Locking Nut Tension

6.3 Maintenance Intervals

6.3.1 Greasing

Once the initial bedding period has passed the hitch will require a minimum application of grease at the start of each shift. The grease should be applied until new grease can be seen coming from the thrust washers. The amount of grease required to achieve this will vary depending on the type of use the scraper sees. It is highly recommended that grease be applied at shorter intervals with as little as 3 hourly intervals being shown to provide sufficient grease for maximum life.

The wheel hubs only require two pumps of grease every 50 hours into each grease nipple.

6.4 Inspection Intervals

6.4.1 Main Pivot Inspections

It is recommended that the main pivot pins (Drawbar, Centre Pivot & Swingarms) used with the PWM fiber wound bushes and wiper seals be removed for inspection every 1000 hours. Once the pins are removed, inspect the surface of the pin, the inner surface of the bearing and also the condition of the seals for wear or damage. Check that the seals are still soft and flexible and there is no visible wear on the seal lips. If there is visible wear or the seals or there are contaminants in the bearing then replace the seals before assembly. It is recommended to carry spare seals as this is not a costly exercise and will be far economical as opposed to having to change the PWM bush and pins more frequently.

NOTE: The life of the PWM bush is expected to far exceed these inspection intervals, however guaranteeing the bush is free from contamination is critical in maintaining a long life.

NOTE: More frequent removal of the pins for inspection will also make it easier to remove the pins as opposed to prolonged time left untouched. If the pins are left for a prolonged period of time without inspection they may be damaged during removal and will need to be replaced.

6.4.2 Cylinder Bearing Inspections

The hydraulic cylinders are fitted with greaseless SKF TXE spherical bearings. It is recommended that at least one pin from each cylinder be removed so that the clevis bearings can be inspected every 1000 hours. To do this, support the cylinder and then remove the pin opposite to how it was installed. The pin and bearing may need to be soaked in a thin penetrating oil leading up to their removal. Once the pin has been removed, rotate the inner part of the bearing. Check that the green seals are not damaged and that there is no contamination in the bearing. If the seals appear in good condition and the Teflon lining appears in good condition yet there is contamination then cleaning the contamination out and re-assembling will be sufficient. If the seals are damaged or the Teflon is damaged the bearing will need to be replaced.

NOTE: Failing to replace a damaged bearing can lead to damage to the pin and potentially hydraulic cylinder or structural failure.

NOTE: As the bearings are not greased prolonged periods between removal of the pins can result in the anti-sieze fitted in the factory being washed away and result in the pins being very difficult to remove from the bearings. In extreme cases the pins would need to be lanced and replaced with new ones.

7 Appendix

7.1 Screw Fastener Torques

Metric Fastener Torque Values			
Thread Size	Hex Size AF (mm)	Torque (N.m)	Torque (ft.lb)
M10	16	44	32
M12	18	77	57
M16	24	190	140
M20	30	370	270

Imperial Fastener Torque Values			
Thread Size	Hex Size AF (in)	Torque (N.m)	Torque (ft.lb)
5/8"	1	248	183
7/8"	1 1/4	710	523
1"	1 1/2	1065	785

7.2 Tightening Torque for Hydraulic Components

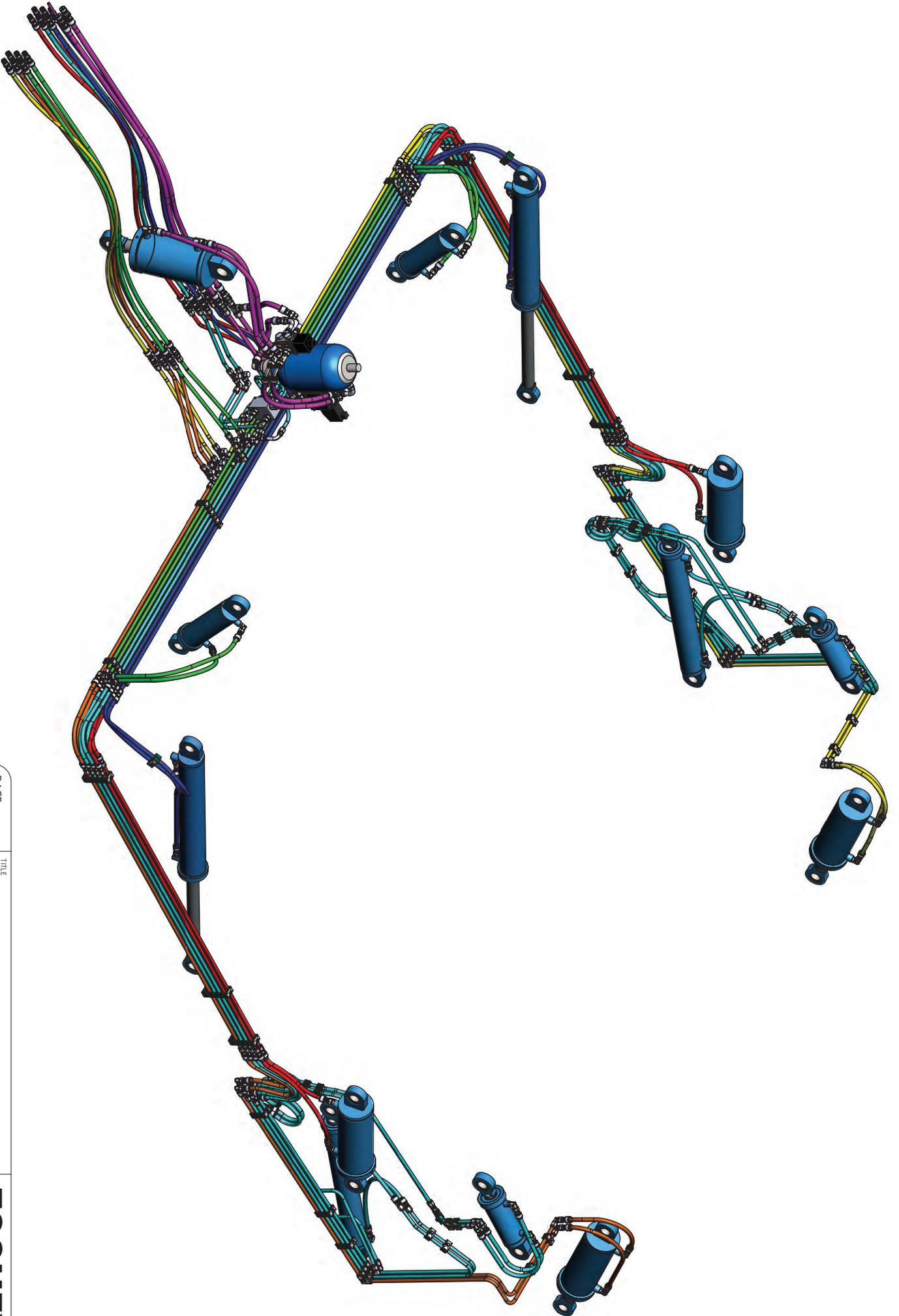
JIC Flare Torque Values				
SAE	Thread Size	Nut Size AF	Torque (N.m)	Torque (ft.lb)
-09	9/16-18	11/16"	24-28	18-20
-12	3/4-16	7/8"	49-53	36-39
-14	7/8-14	1"	77-85	57-63
-17	1.1/16-12	1 1/4"	107-119	79-88

UNO Torque Values				
SAE	Thread Size	Nut Size AF	Torque (N.m)	Torque (ft.lb)
-09	9/16-18	3/4"	33-35	24-26
-12	3/4-16	15/16"	68-78	50-60
-14	7/8-14	1"	98-110	72-82
-17	1.1/16-12	1 1/4"	170-183	125-135

7.3 Spare parts

7.3.1 Hydraulic Systems

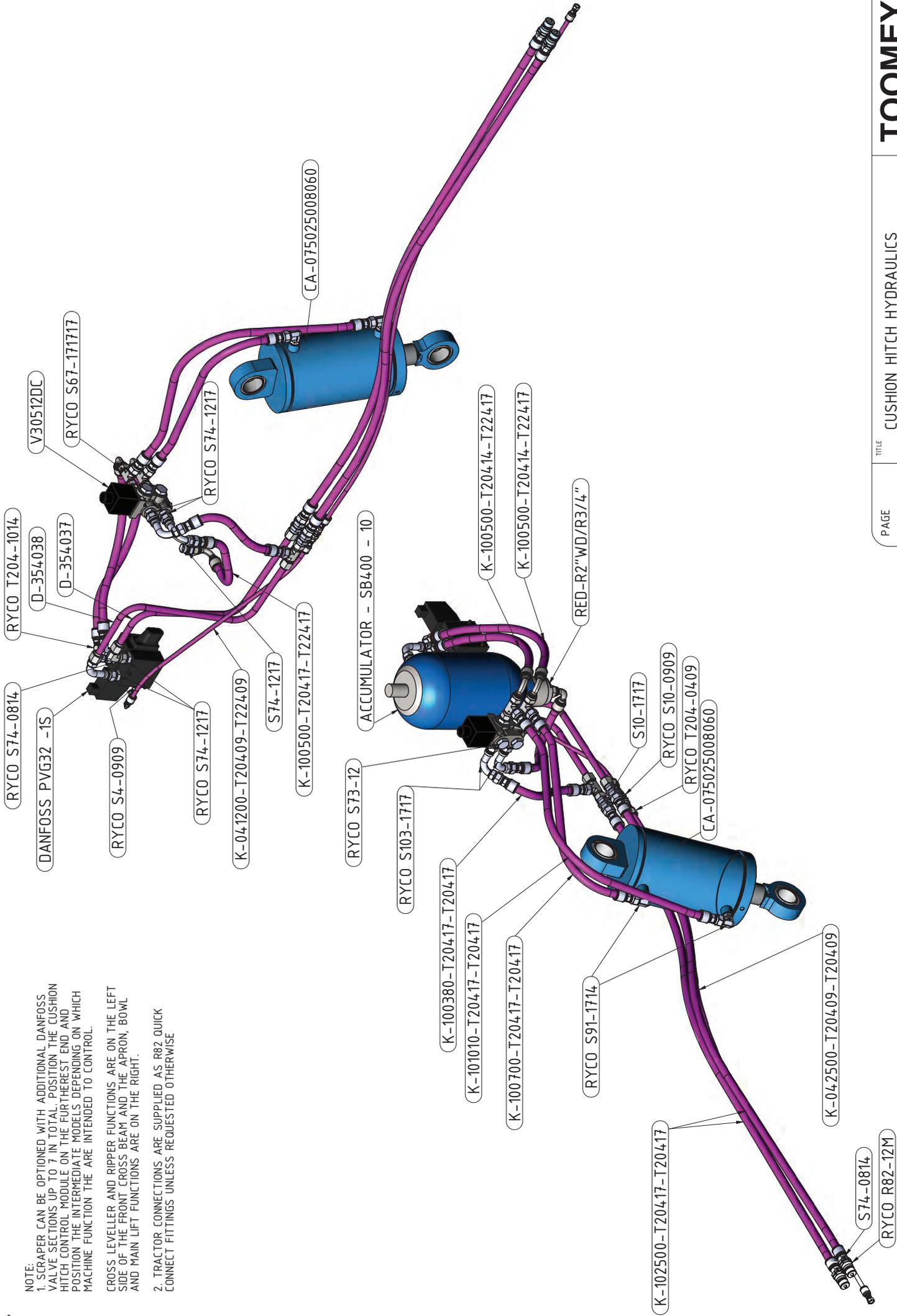
The spares and replacement components for the hydraulic systems available for the 4500B are shown in the following drawings:



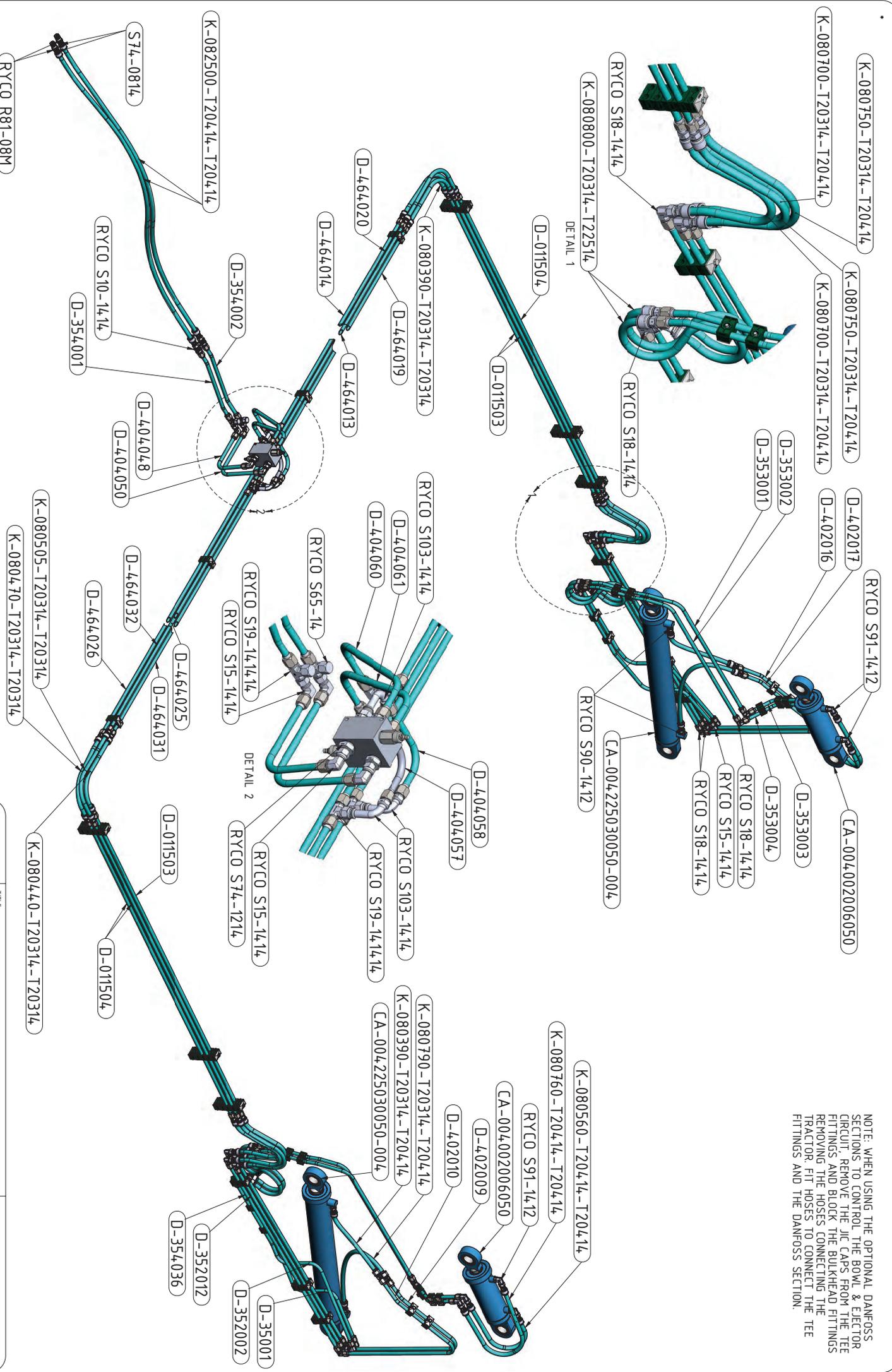
NOTE:
 1. SCRAPER CAN BE OPTIONED WITH ADDITIONAL DANFOSS VALVE SECTIONS UP TO 7 IN TOTAL. POSITION THE CUSHION HITCH CONTROL MODULE ON THE FURTHEREST END AND POSITION THE INTERMEDIATE MODELS DEPENDING ON WHICH MACHINE FUNCTION THE ARE INTENDED TO CONTROL.

CROSS LEVELLER AND RIPPER FUNCTIONS ARE ON THE LEFT SIDE OF THE FRONT CROSS BEAM AND THE APRON, BOWL AND MAIN LIFT FUNCTIONS ARE ON THE RIGHT.

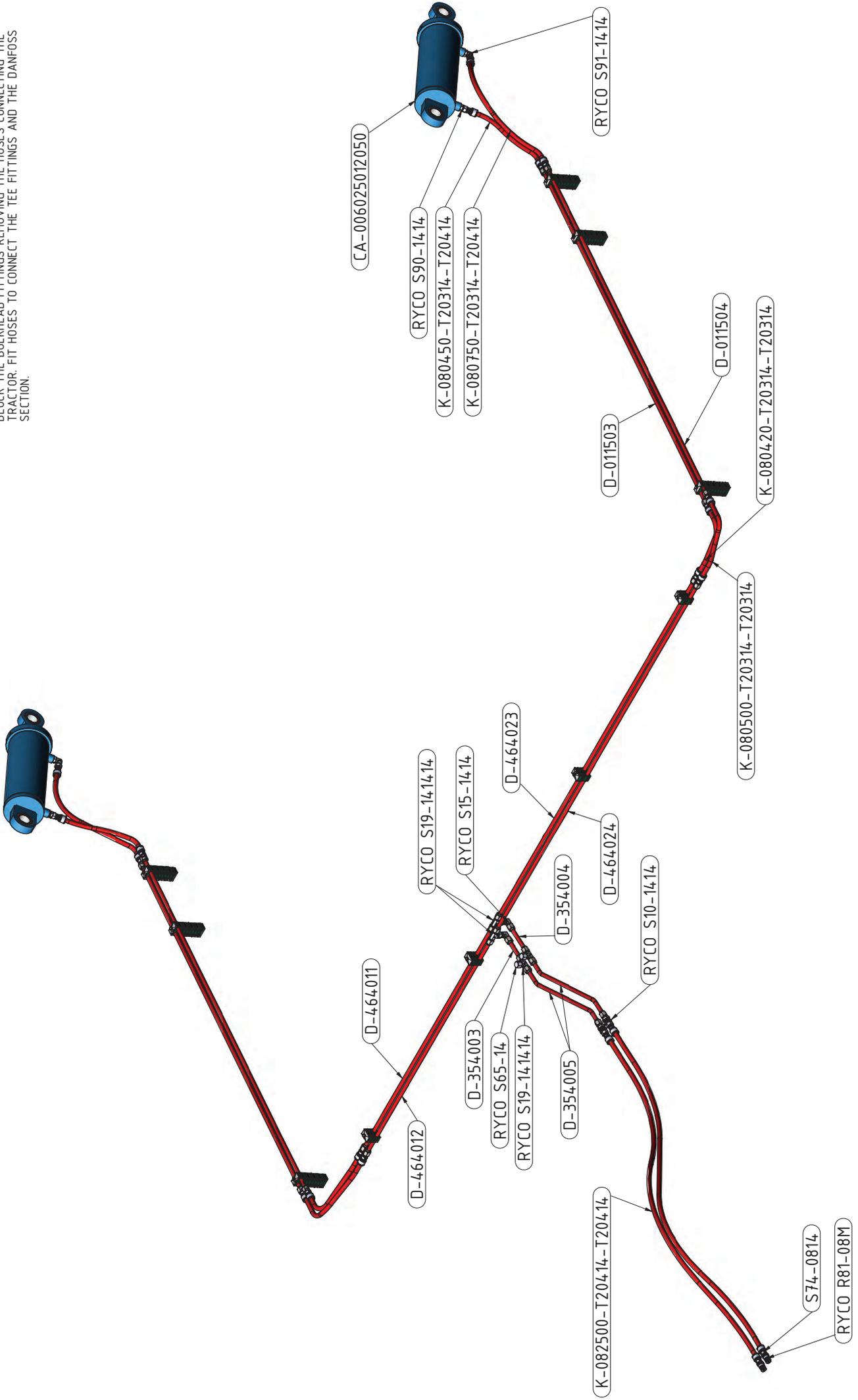
2. TRACTOR CONNECTIONS ARE SUPPLIED AS R82 QUICK CONNECT FITTINGS UNLESS REQUESTED OTHERWISE



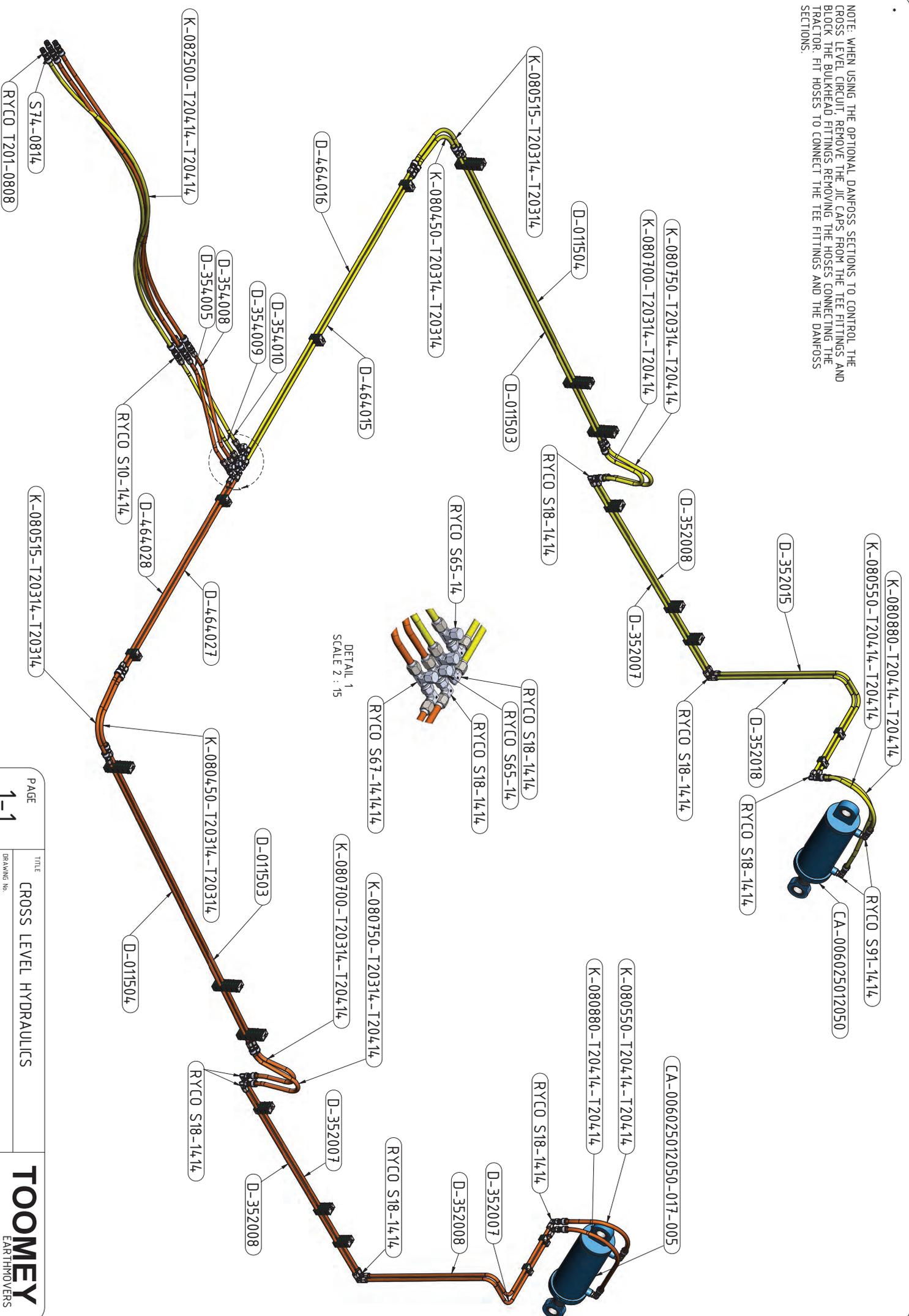
NOTE: WHEN USING THE OPTIONAL DANFOSS SECTIONS TO CONTROL THE BOWL & EJECTOR CIRCUIT, REMOVE THE JIC CAPS FROM THE TEE FITTINGS AND BLOCK THE BULKHEAD FITTINGS REMOVING THE HOSES CONNECTING THE TRACTOR. FIT HOSES TO CONNECT THE TEE FITTINGS AND THE DANFOSS SECTION.



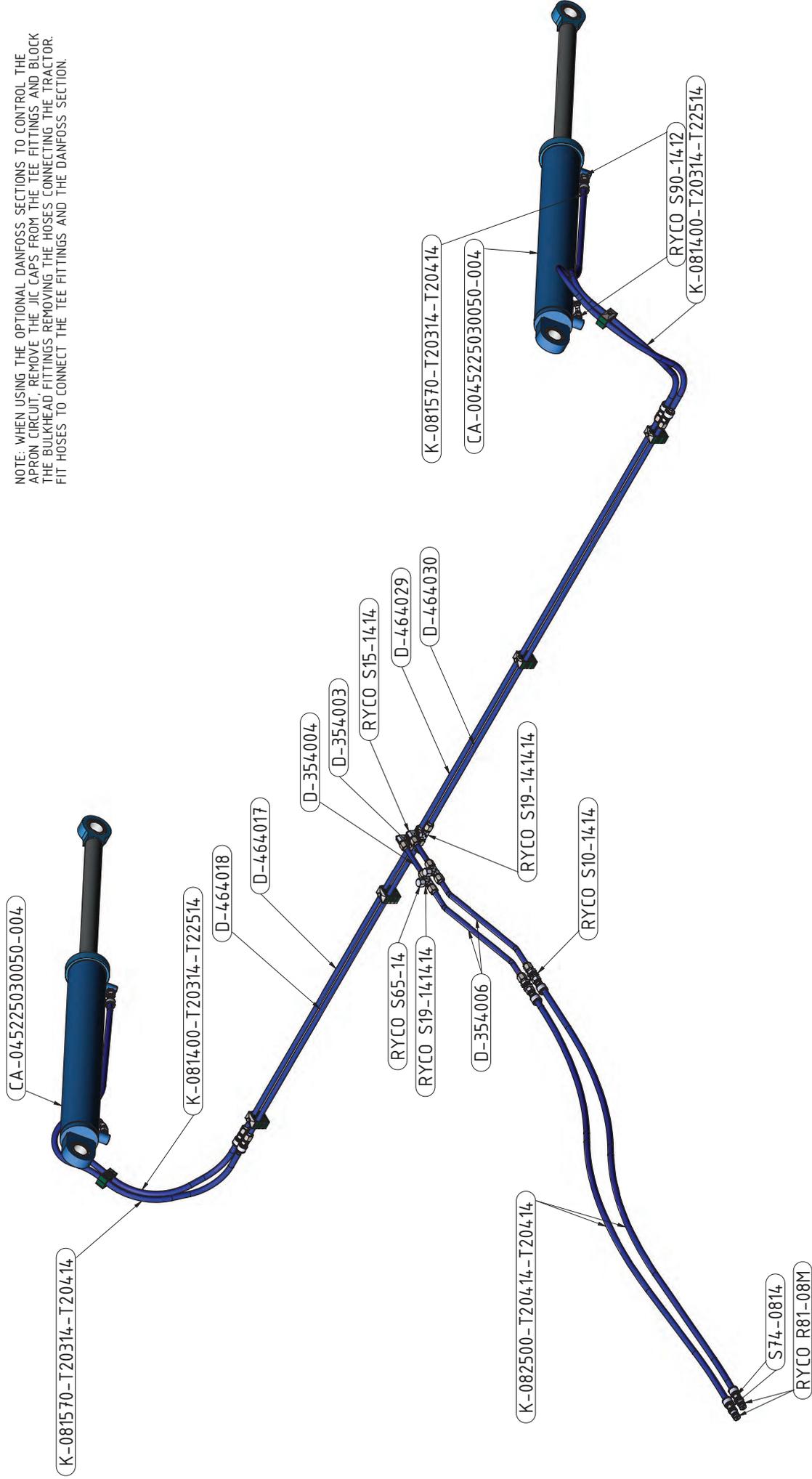
NOTE: WHEN USING THE OPTIONAL DANFOSS SECTIONS TO CONTROL THE MAIN LIFT CIRCUIT, REMOVE THE JIC CAPS FROM THE TEE FITTINGS AND BLOCK THE BULKHEAD FITTINGS. REMOVING THE HOSES CONNECTING THE TRACTOR. FIT HOSES TO CONNECT THE TEE FITTINGS AND THE DANFOSS SECTION.



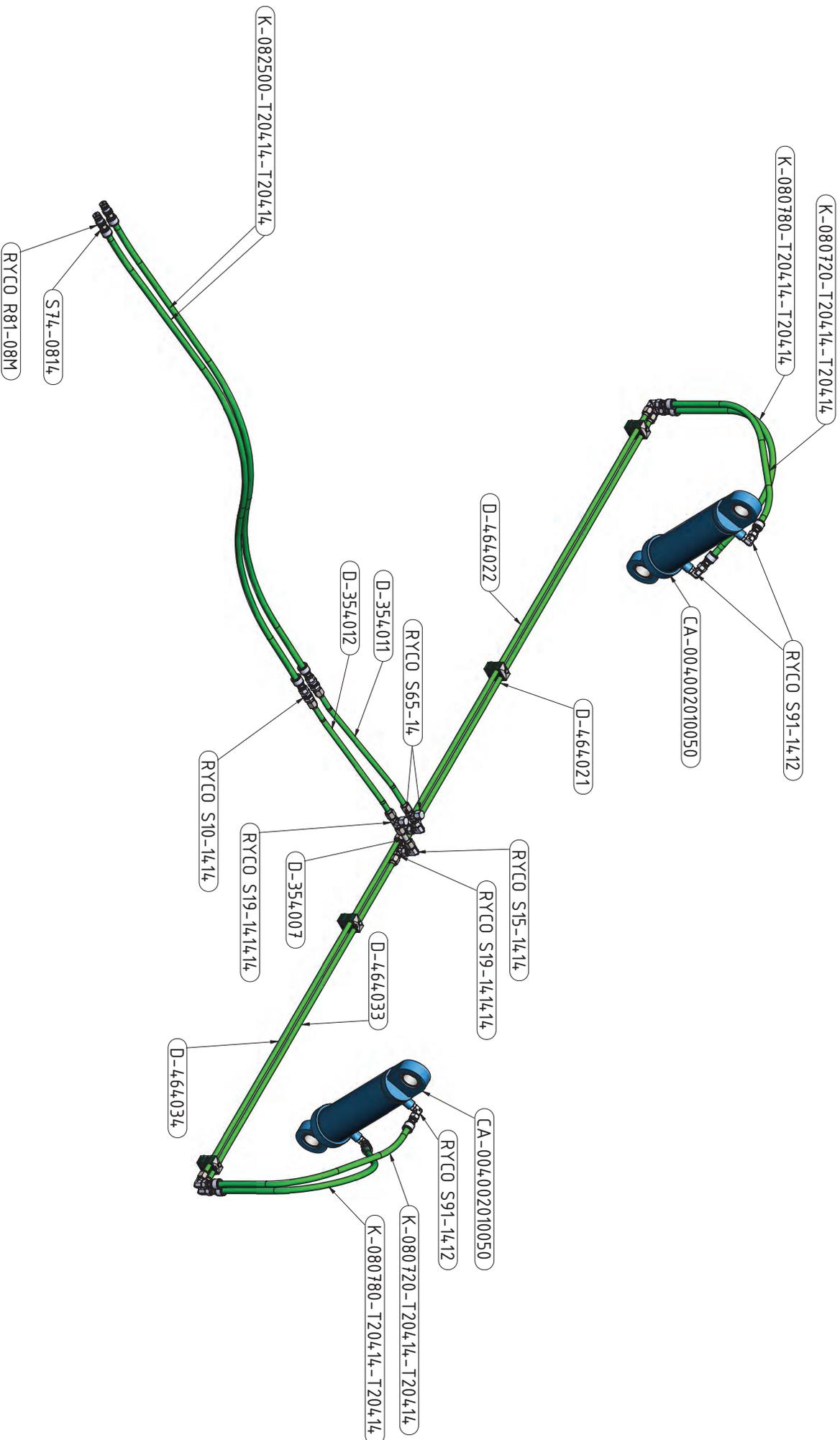
NOTE: WHEN USING THE OPTIONAL DANFOSS SECTIONS TO CONTROL THE CROSS LEVEL CIRCUIT, REMOVE THE JIC CAPS FROM THE TEE FITTINGS AND BLOCK THE BULKHEAD FITTINGS REMOVING THE HOSES CONNECTING THE TRACTOR, FIT HOSES TO CONNECT THE TEE FITTINGS AND THE DANFOSS SECTIONS.



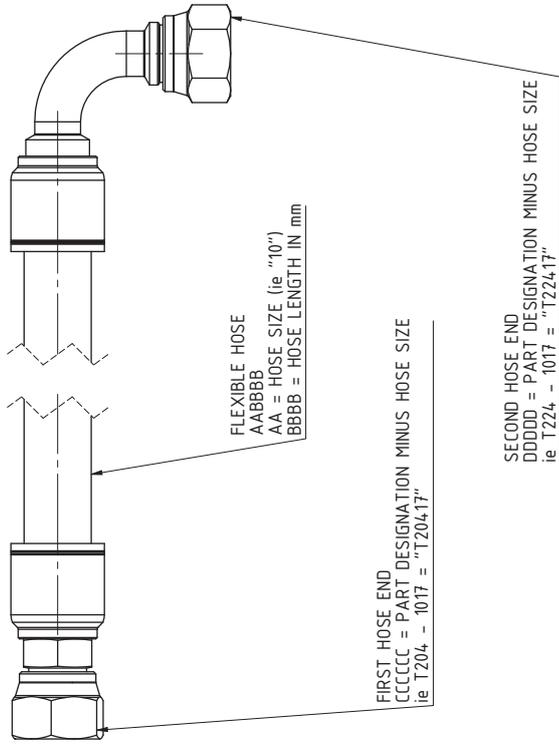
NOTE: WHEN USING THE OPTIONAL DANFOSS SECTIONS TO CONTROL THE APRON CIRCUIT, REMOVE THE JIC CAPS FROM THE TEE FITTINGS AND BLOCK THE BULKHEAD FITTINGS REMOVING THE HOSES CONNECTING THE TRACTOR FIT HOSES TO CONNECT THE TEE FITTINGS AND THE DANFOSS SECTION.



NOTE: WHEN USING THE OPTIONAL DANFOSS SECTIONS TO CONTROL THE RIPPER CIRCUIT, REMOVE THE JIC CAPS FROM THE TEE FITTINGS AND BLOCK THE BULKHEAD FITTINGS REMOVING THE HOSES CONNECTING THE TRACTOR FIT HOSES TO CONNECT THE TEE FITTINGS AND THE DANFOSS SECTION.



HOSE PART NUMBERING K-AABBBB-CCCCC-DDDDD



HOSE END PART NUMBERS	
DESCRIPTION	PART NUMBER
STRAIGHT BSP MALE	T2010-XXXX
STRAIGHT BSP FEMALE	T2020-XXXX
STRAIGHT JIC MALE	T2030-XXXX
STRAIGHT JIC FEMALE	T2040-XXXX
90° JIC FEMALE	T2250-XXXX
45° JIC FEMALE	T2240-XXXX

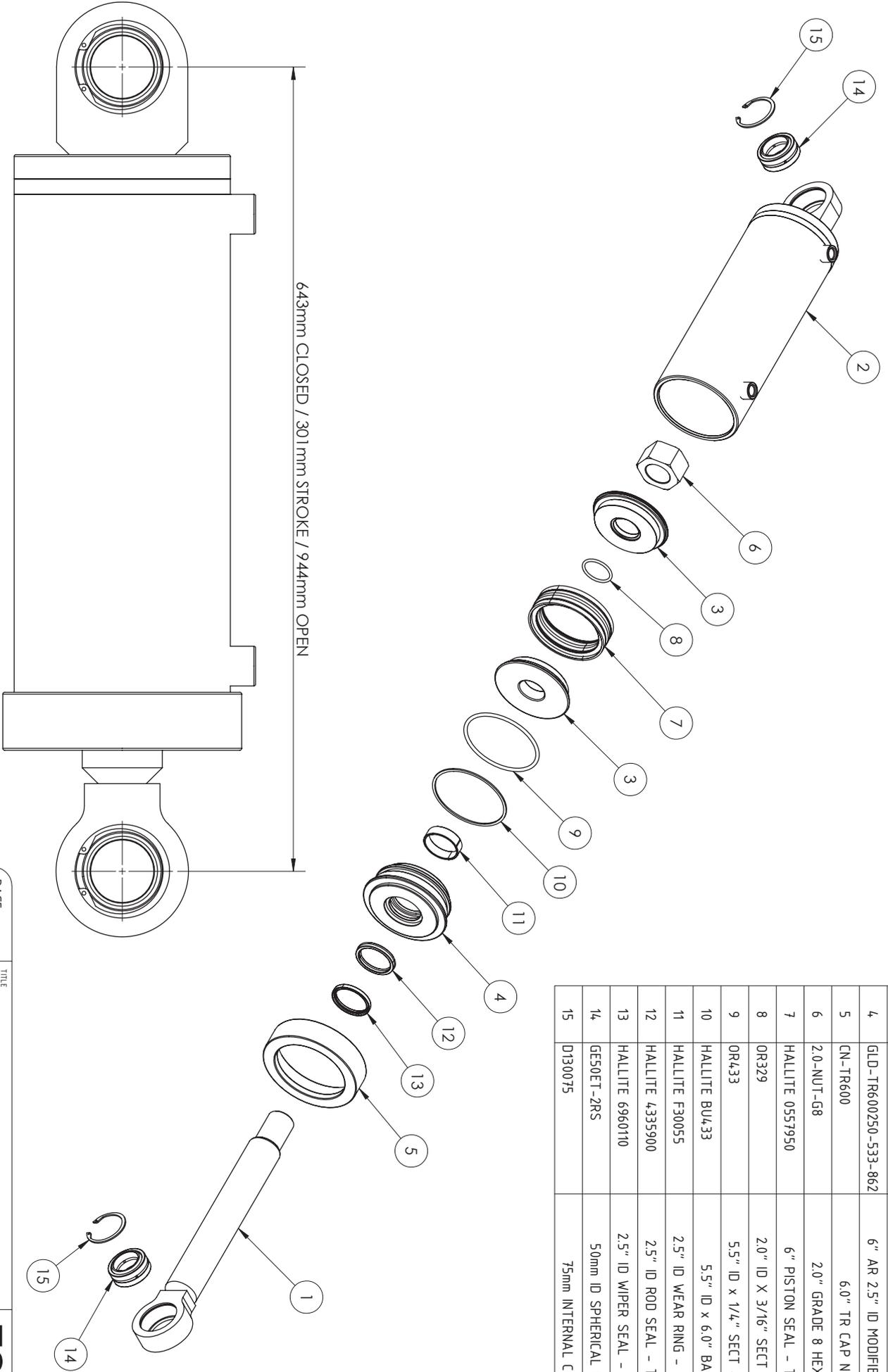
HYDRAULIC HOSE (215 BAR / 3100 PSI MIN.)			
PART NO	HOSE SIZE (DASH)	NOMINAL HOSE ID (MM)	NOMINAL HOSE OD (MM)
T3004A	-04	6.3	11.8
T3008A	-08	12.7	18.7
T3010A	-10	15.9	23.4
T3012A	-12	19.1	27.6

EXAMPLE FOR HOSE DRAWN ABOVE:
K-100900-T20417-T22417

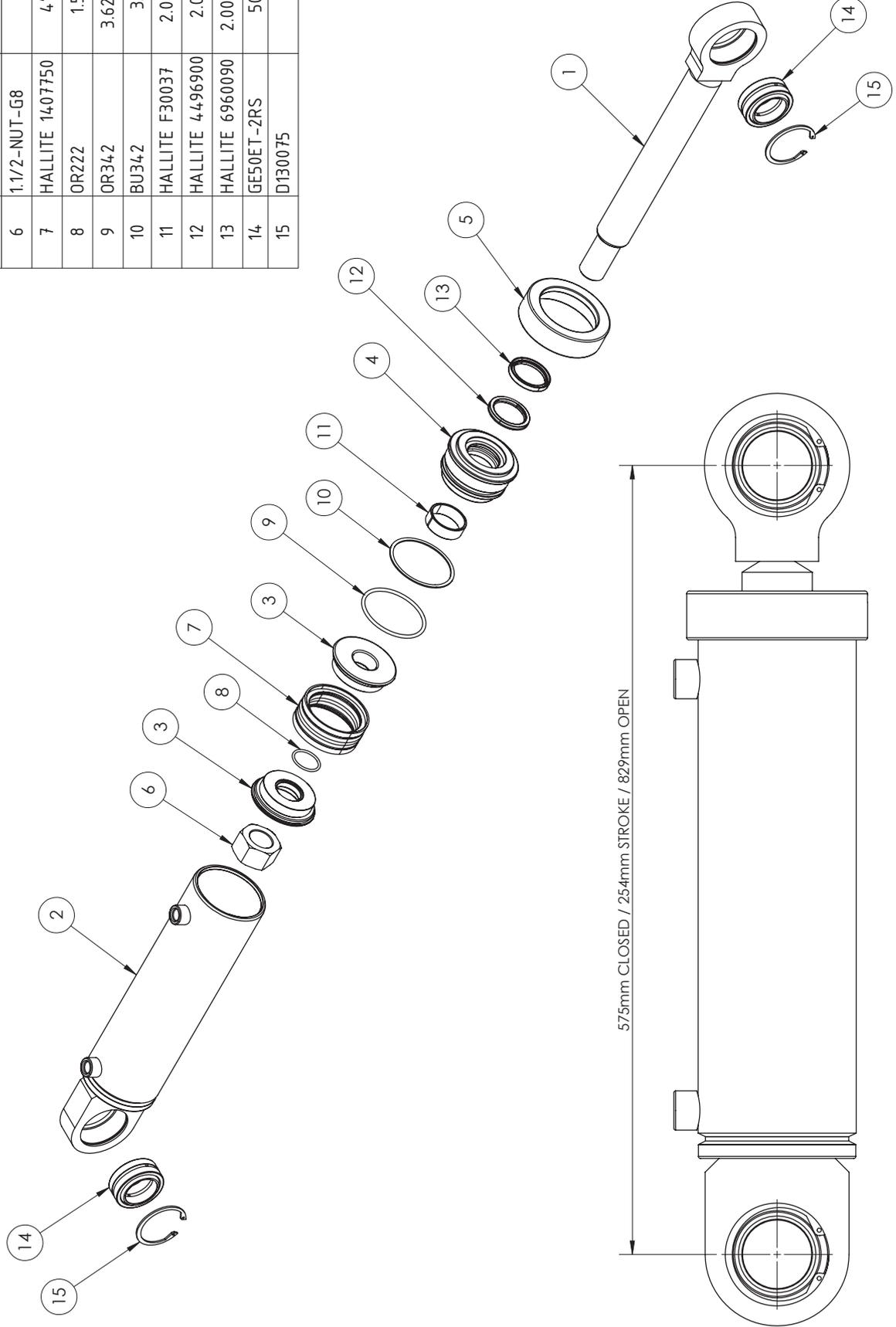
7.3.2 Hydraulic Cylinder Components

The following drawings show the part numbers of the Hydraulic Cylinder internal components available:

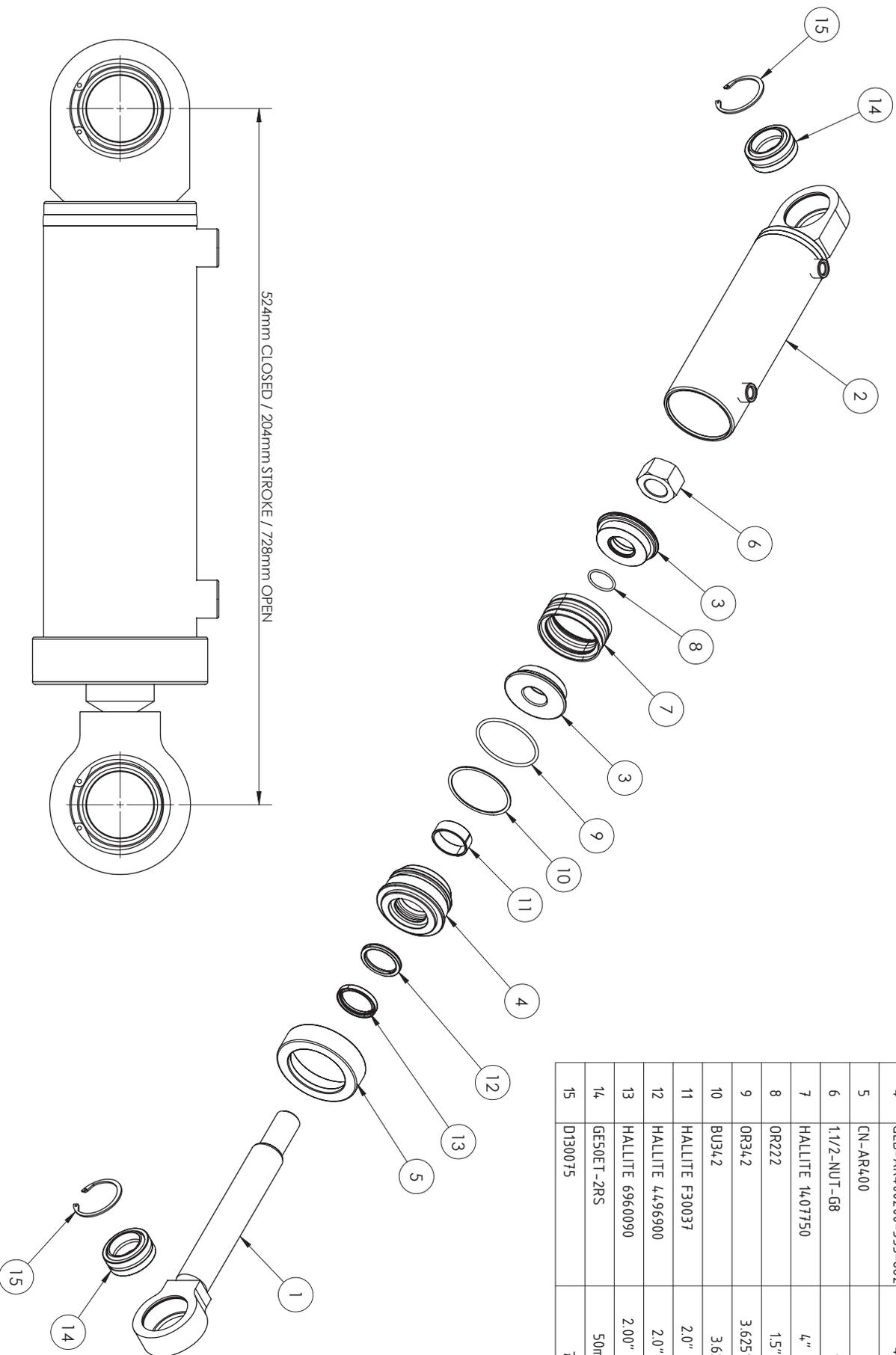
ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	ROD-9617	2.5" ROD 12" STROKE - 50mm BRG	1
2	T-9617	6.0" ID TUBE 12" STROKE - 50mm BRG	1
3	P-AR600-2000CBF-N	6" AR PISTON WITH NARROW SEAL - SUIT 2.0" SPIGOT (PART 1)	1
4	GLD-TR600250-533-862	6" AR 2.5" ID MODIFIED GLAND	1
5	CN-TR600	6.0" TR CAP NUT	1
6	2.0-NUT-G8	2.0" GRADE 8 HEX NUT	1
7	HALLITE 0557950	6" PISTON SEAL - TYPE 58	1
8	OR329	2.0" ID X 3/16" SECT - O-RING	1
9	OR433	5.5" ID x 1/4" SECT - O-RING	1
10	HALLITE BU433	5.5" ID x 6.0" BACKUP	1
11	HALLITE F30055	2.5" ID WEAR RING - TYPE 533	1
12	HALLITE 4335900	2.5" ID ROD SEAL - TYPE 605	1
13	HALLITE 6960110	2.5" ID WIPER SEAL - TYPE 862	1
14	GESOET-2RS	50mm ID SPHERICAL BEARING	2
15	D130075	75mm INTERNAL CIRCLIP	2



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	ROD-9590	2.0" ROD 10" STROKE - 50mm BRG	1
2	T-9590	4.0" ID TUBE 10" STROKE - 50mm BRG	1
3	P-AR4-00-1500	4.0" AR PISTON	1
4	GLD-AR4-00200-533-862	4.0" AR MODIFIED GLAND	1
5	CN-AR4-00	4" AR CAP NUT	1
6	1.1/2-NUT-G8	1.5" GRADE 8 HEX NUT	1
7	HALLITE 14-07750	4" PISTON SEAL - TYPE 58	1
8	OR222	1.5" ID x 1/8" SECT - O-RING	1
9	OR342	3.625" ID x 3/16" SECT - O-RING	1
10	BU342	3.625" ID x 4.0" OD BACKUP	1
11	HALLITE F30037	2.0" ID WEAR RING - TYPE 533	1
12	HALLITE 44-96900	2.0" ID ROD SEAL - TYPE 605	1
13	HALLITE 6960090	2.00" ID WIPER SEAL - TYPE 862	1
14	GE50ET-2RS	50mm ID SPHERICAL BEARING	2
15	D130075	75mm INTERNAL CIRCLIP	2

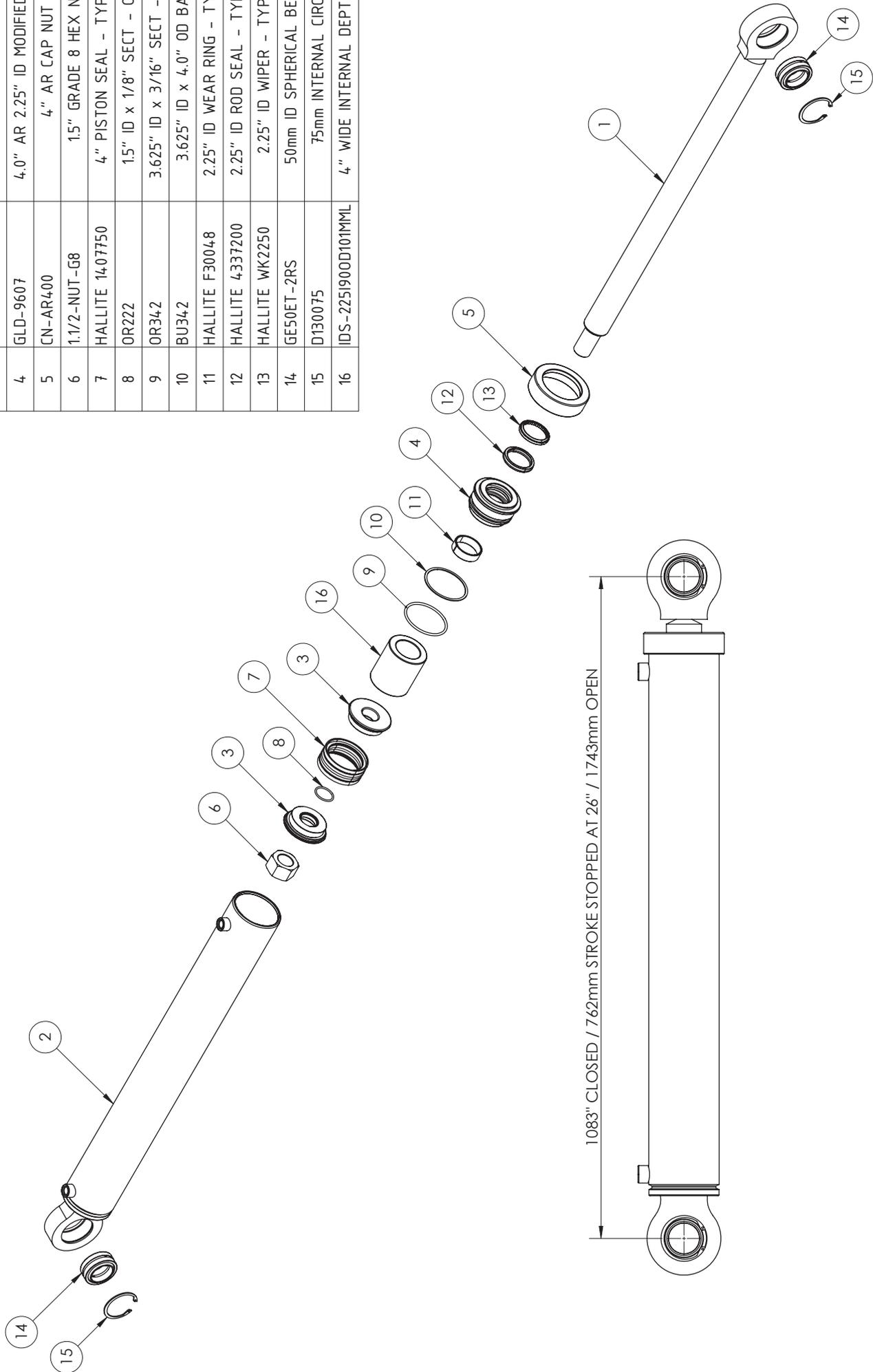


ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	ROD_9592	2.0" ROD 8" STROKE - 50mm BRG LUG	1
2	T-9592	4.0" ID TUBE 8" STROKE - 50mm BRG LUG	1
3	P-AR400-1500	4.0" AR PISTON	1
4	GLD-AR400200-533-862	4.0" AR MODIFIED GLAND	1
5	CN-AR400	4" AR CAP NUT	1
6	1.1/2-NUT-G8	1.5" GRADE 8 HEX NUT	1
7	HALLITE 1407750	4" PISTON SEAL - TYPE 58	1
8	OR222	1.5" ID x 1/8" SECT - O-RING	1
9	OR342	3.625" ID x 3/16" SECT - O-RING	1
10	BU342	3.625" ID x 4.0" OD BACKUP	1
11	HALLITE F30037	2.0" ID WEAR RING - TYPE 533	1
12	HALLITE 4496900	2.0" ID ROD SEAL - TYPE 605	1
13	HALLITE 6960090	2.00" ID WIPER SEAL - TYPE 862	1
14	GE50ET-2RS	50mm ID SPHERICAL BEARING	2
15	D130075	75mm INTERNAL CIRCLIP	2

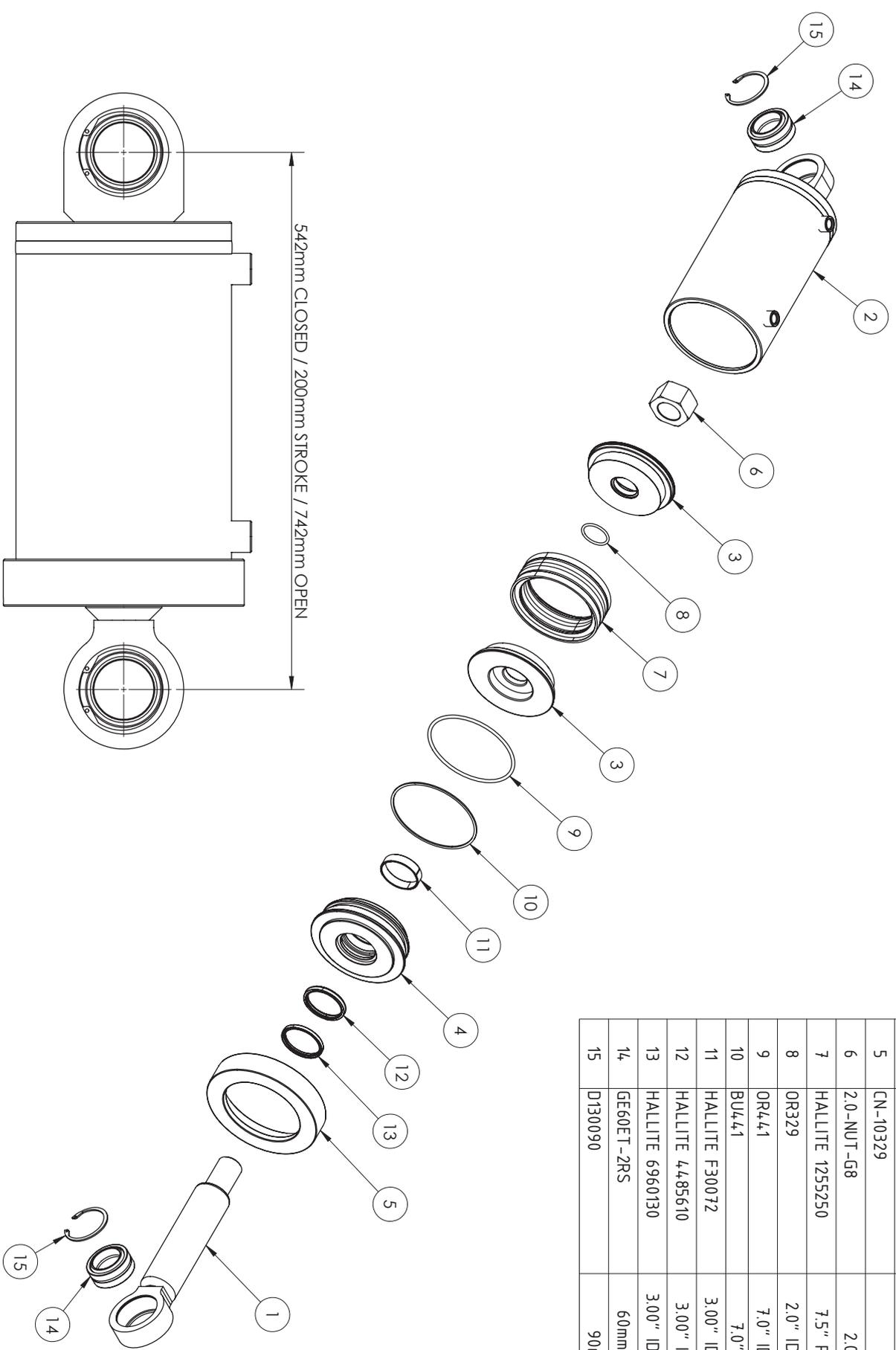


524mm CLOSED / 204mm STROKE / 728mm OPEN

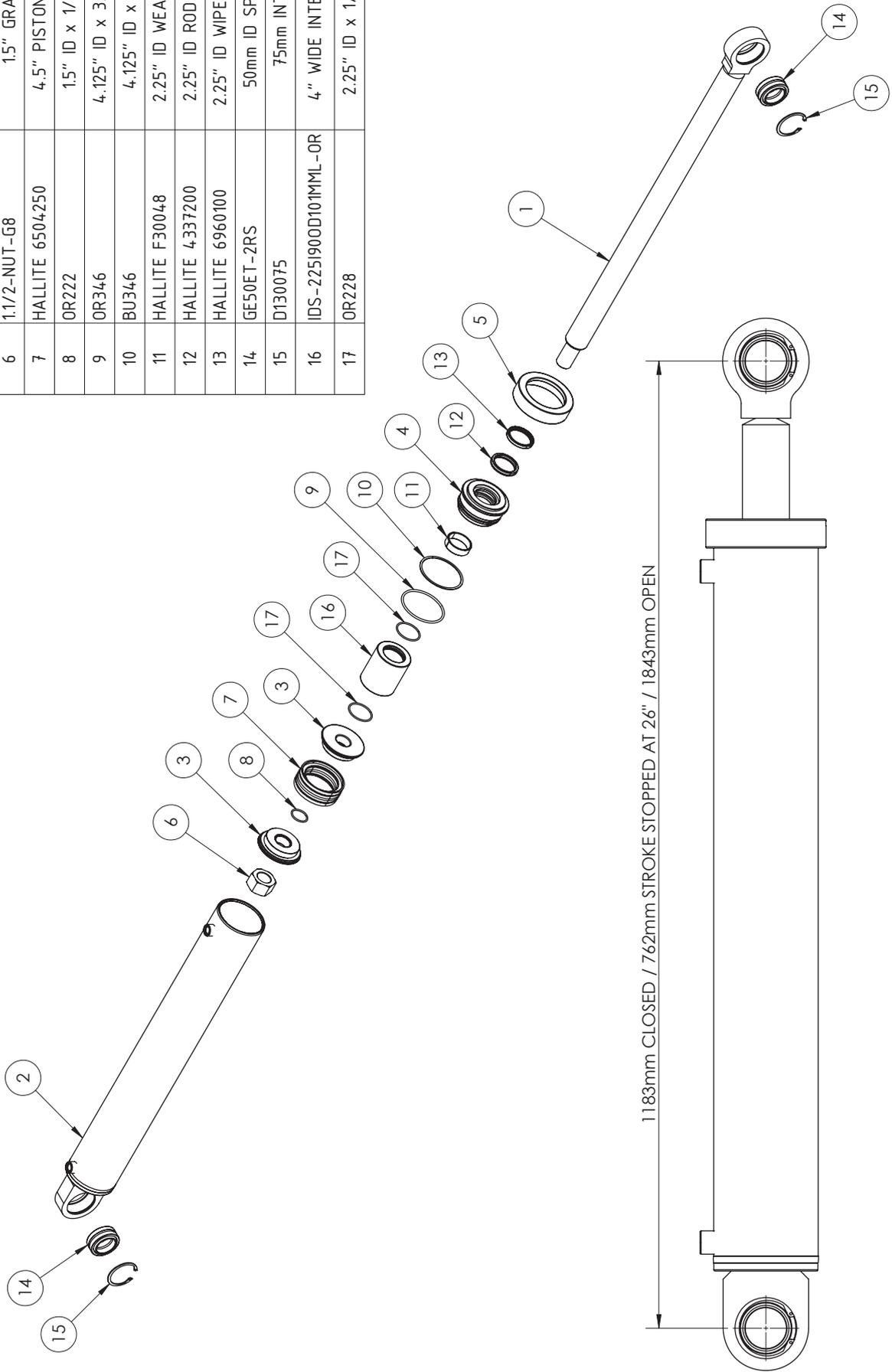
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	ROD-9607	2.25" ROD 30" STROKE - 50mm BRG	1
2	T-9607	4.0" ID TUBE 30" STROKE - 50mm BRG	1
3	P-AR400-1500	4.0" AR PISTON	1
4	GLD-9607	4.0" AR 2.25" ID MODIFIED GLAND	1
5	CN-AR400	4" AR CAP NUT	1
6	1.1/2-NUT-G8	1.5" GRADE 8 HEX NUT	1
7	HALLITE 14.07750	4" PISTON SEAL - TYPE 58	1
8	OR222	1.5" ID x 1/8" SECT - O-RING	1
9	OR342	3.625" ID x 3/16" SECT - O-RING	1
10	BU342	3.625" ID x 4.0" OD BACKUP	1
11	HALLITE F30048	2.25" ID WEAR RING - TYPE 533	1
12	HALLITE 4337200	2.25" ID ROD SEAL - TYPE 605	1
13	HALLITE WK2250	2.25" ID WIPER - TYPE 41	1
14	GE50ET-2RS	50mm ID SPHERICAL BEARING	2
15	D130075	75mm INTERNAL CIRCLIP	2
16	IDS-2251900D101MML	4" WIDE INTERNAL DEPTH STOP	1



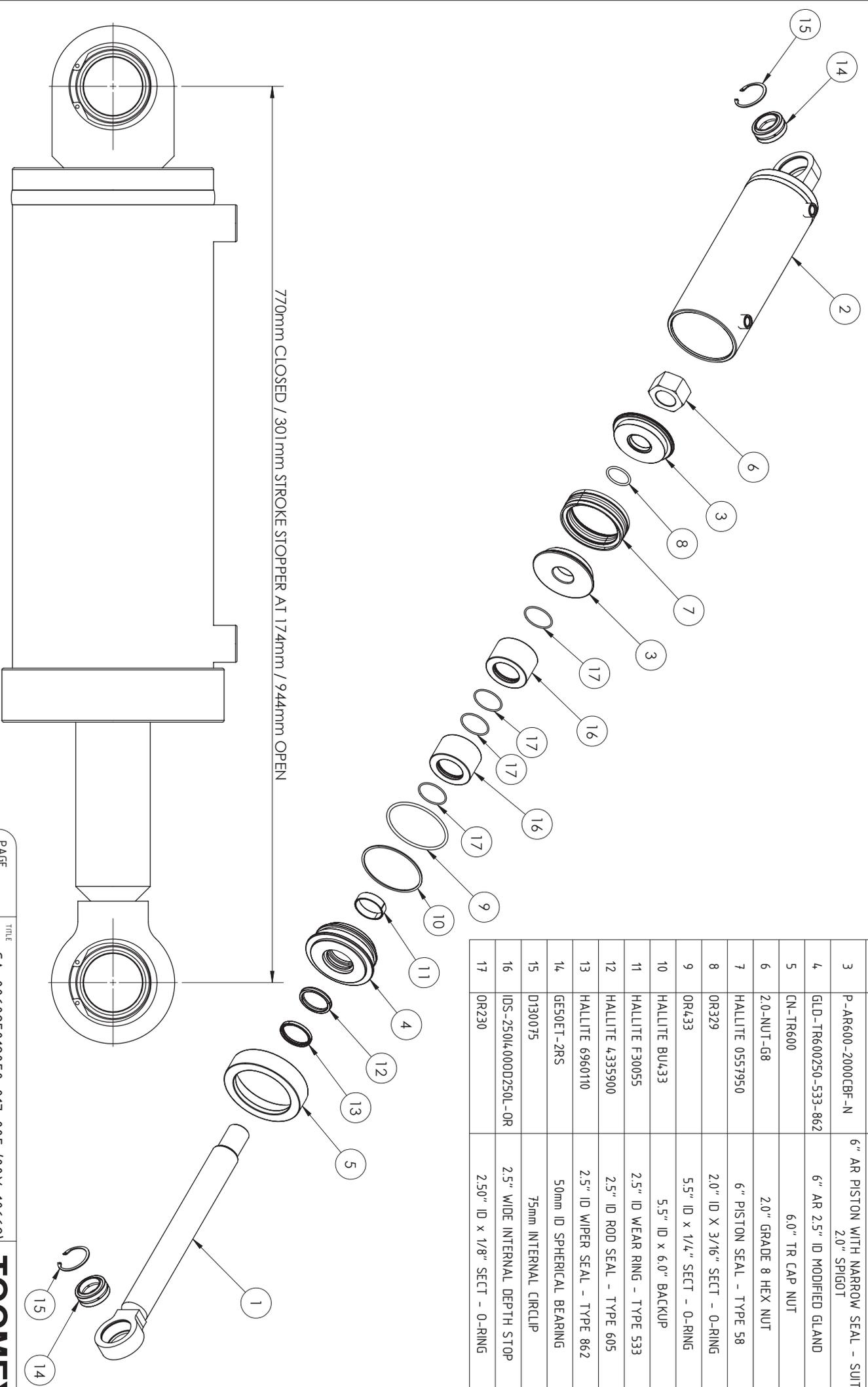
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	ROD-10329	3.0" ROD 8" STROKE - 60mm BRG	1
2	T-10329	7.5" ID TUBE 8" STROKE - 60mm BRG	1
3	P-AR750-2000CBF	7.5" AR PISTON - 2.0" SPIGOT	2
4	GLD-TR750300-533-862	7.5" AR 3.0" ID MODIFIED GLAND	1
5	CN-10329	7.5" CAP NUT	1
6	2.0-NUT-G8	2.0" GRADE 8 HEX NUT	1
7	HALLITE 1255250	7.5" PISTON SEAL - TYPE 58	1
8	OR329	2.0" ID X 3/16" SECT - O-RING	1
9	OR441	7.0" ID x 1/4" SECT - O-RING	1
10	BU441	7.0" ID x 7.5" OD BACKUP	1
11	HALLITE F30072	3.00" ID WEAR RING - TYPE 533	1
12	HALLITE 4485610	3.00" ID ROD SEAL - TYPE 621	1
13	HALLITE 6960130	3.00" ID WIPER SEAL - TYPE 862	1
14	GE60ET-2RS	60mm ID SPHERICAL BEARING	2
15	D130090	90mm INTERNAL CIRCLIP	2



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	ROD-10511	2.25" ROD 34" STROKE - 50mm BRG	1
2	T-9612	4.5" ID TUBE 30" STROKE - 50mm BRG	1
3	P-AR450-1500CBF	4.50" AR PISTON - 150" SPIGOT	2
4	GLD-AR450225-533-862	4.5" AR 2.25" ID MODIFIED GLAND	1
5	CN-AR450	4.5" AR CAP NUT	1
6	1.1/2-NUT-G8	1.5" GRADE 8 HEX NUT	1
7	HALLITE 6504250	4.5" PISTON SEAL - TYPE 58	1
8	OR222	1.5" ID x 1/8" SECT - O-RING	1
9	OR346	4.125" ID x 3/16" SECT - O-RING	1
10	BU346	4.125" ID x 4.50" OD BACKUP	1
11	HALLITE F30048	2.25" ID WEAR RING - TYPE 533	1
12	HALLITE 4337200	2.25" ID ROD SEAL - TYPE 605	1
13	HALLITE 6960100	2.25" ID WIPER SEAL - TYPE 862	1
14	GE50ET-2RS	50mm ID SPHERICAL BEARING	2
15	D130075	75mm INTERNAL CIRCLIP	2
16	IDS-2251900D101MML-OR	4" WIDE INTERNAL DEPTH STOP	1
17	OR228	2.25" ID x 1/8" SECT - O-RING	2

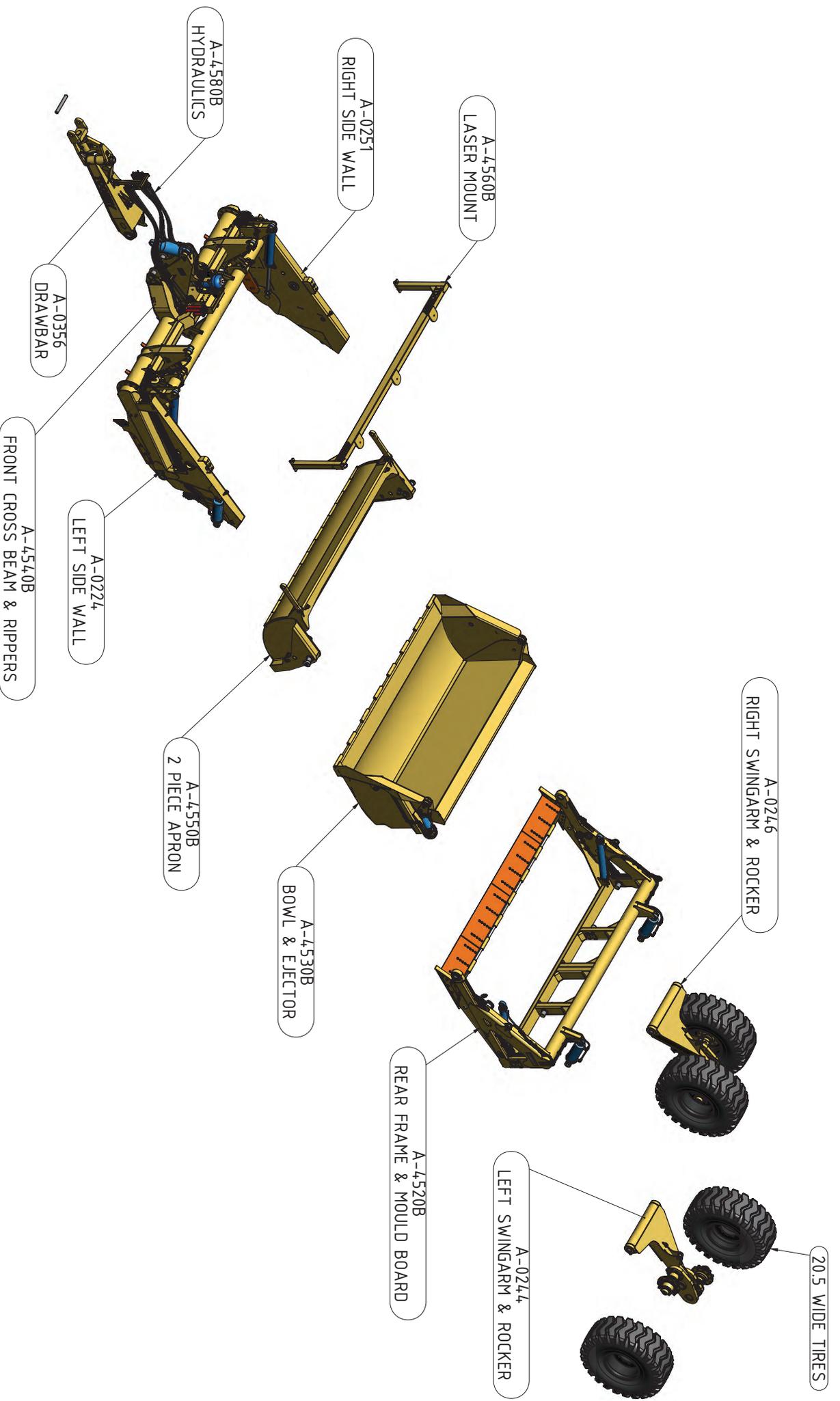


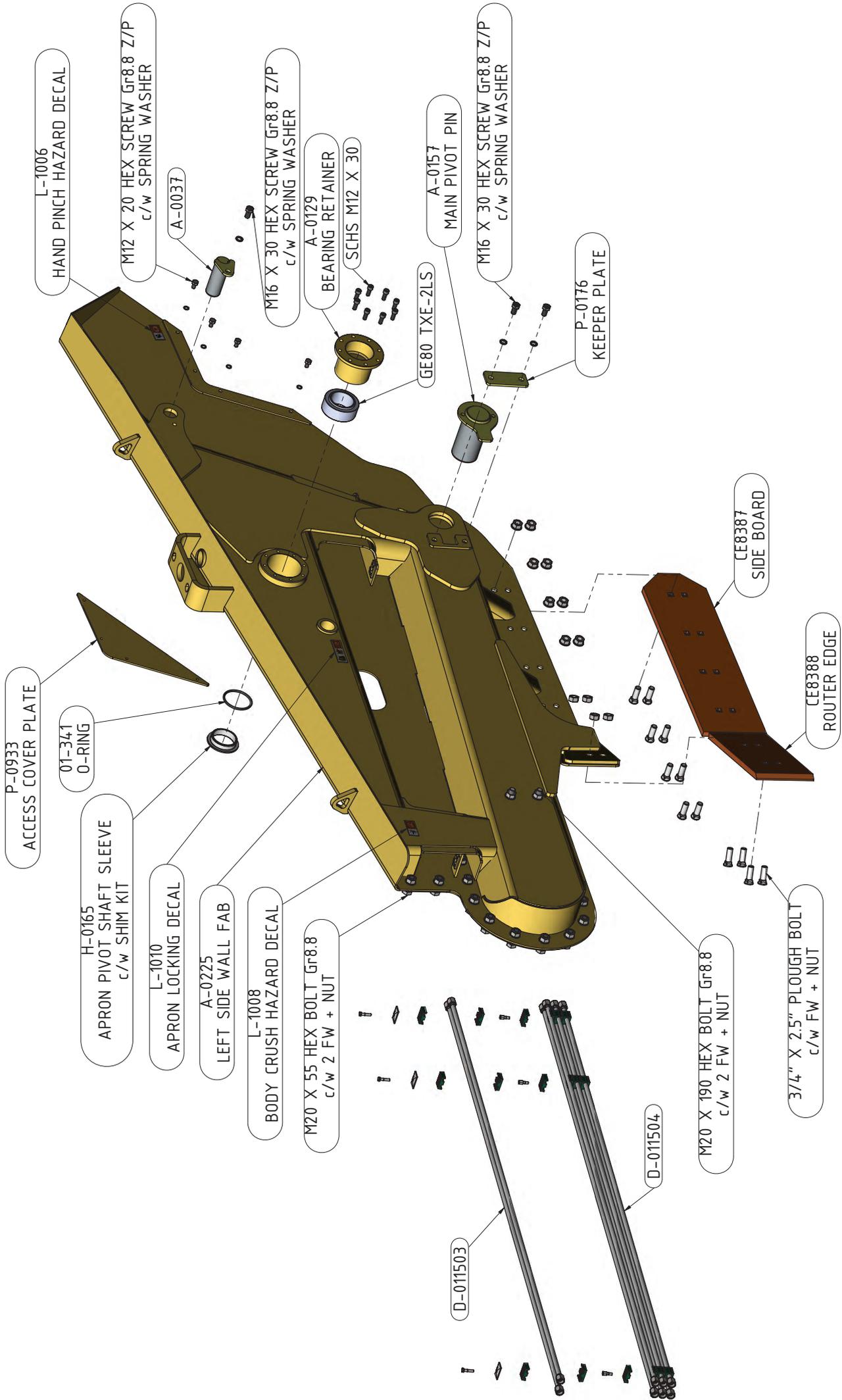
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	ROD-10662	2.5" ROD 12" STROKE - 50mm BRG	1
2	T-9617	6.0" ID TUBE 12" STROKE - 50mm BRG	1
3	P-AR600-2000CBF-N	6" AR PISTON WITH NARROW SEAL - SUIT 2.0" SPG0T	1
4	GLD-TR600250-533-862	6" AR 2.5" ID MODIFIED GLAND	1
5	CN-TR600	6.0" TR CAP NUT	1
6	2.0-NUT-G8	2.0" GRADE 8 HEX NUT	1
7	HALLITE 0557950	6" PISTON SEAL - TYPE 58	1
8	OR329	2.0" ID X 3/16" SECT - O-RING	1
9	OR433	5.5" ID x 1/4" SECT - O-RING	1
10	HALLITE BU433	5.5" ID x 6.0" BACKUP	1
11	HALLITE F30055	2.5" ID WEAR RING - TYPE 533	1
12	HALLITE 4335900	2.5" ID ROD SEAL - TYPE 605	1
13	HALLITE 6960110	2.5" ID WIPER SEAL - TYPE 862	1
14	GESOET-2RS	50mm ID SPHERICAL BEARING	2
15	D130075	75mm INTERNAL CIRCLIP	2
16	IDS-25014,000D250L-OR	2.5" WIDE INTERNAL DEPTH STOP	2
17	OR230	2.50" ID x 1/8" SECT - O-RING	4

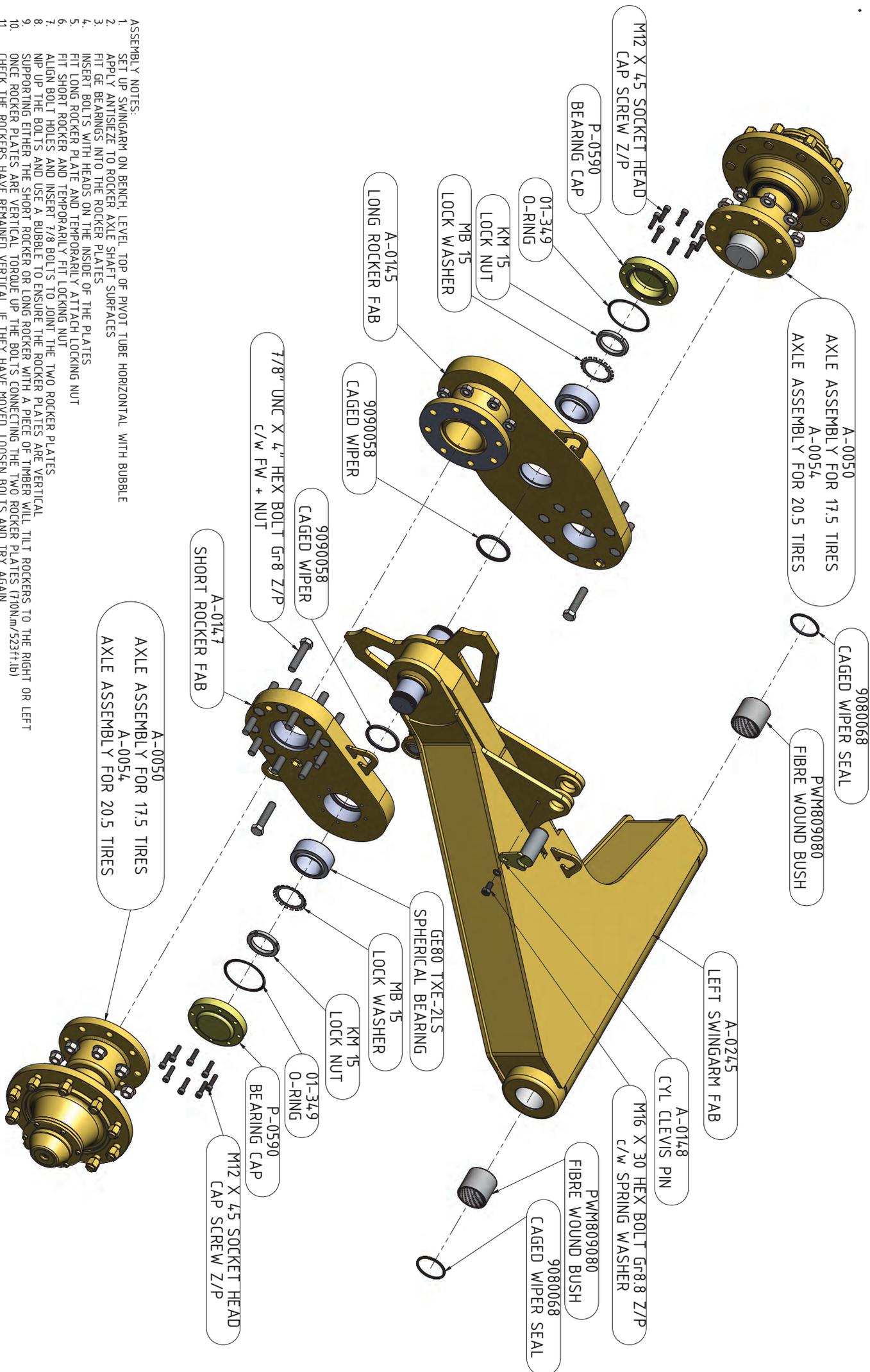


7.3.3 Scraper Sub-Assemblies

The following diagrams show the components for the Scraper sub-assemblies:

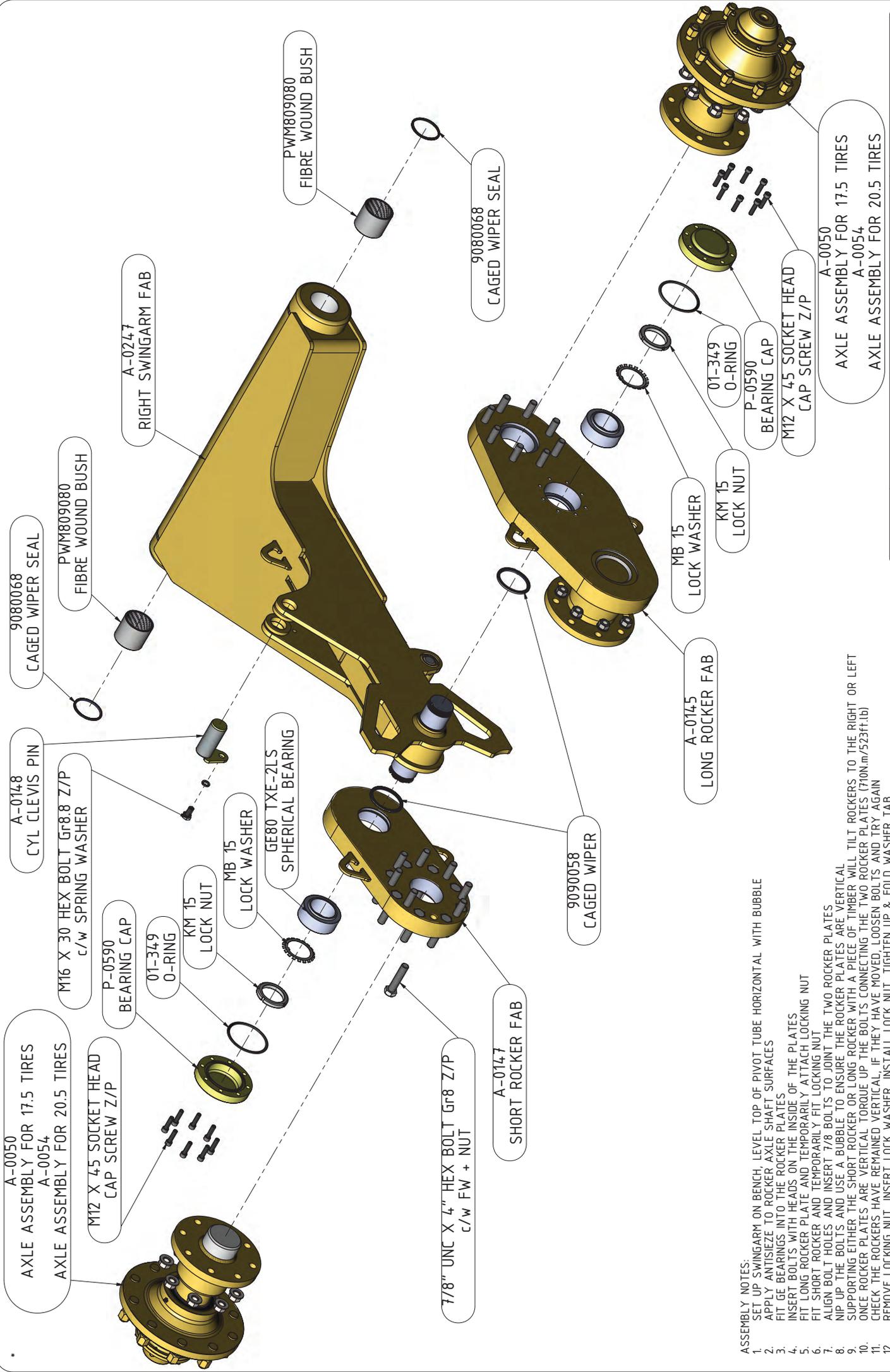




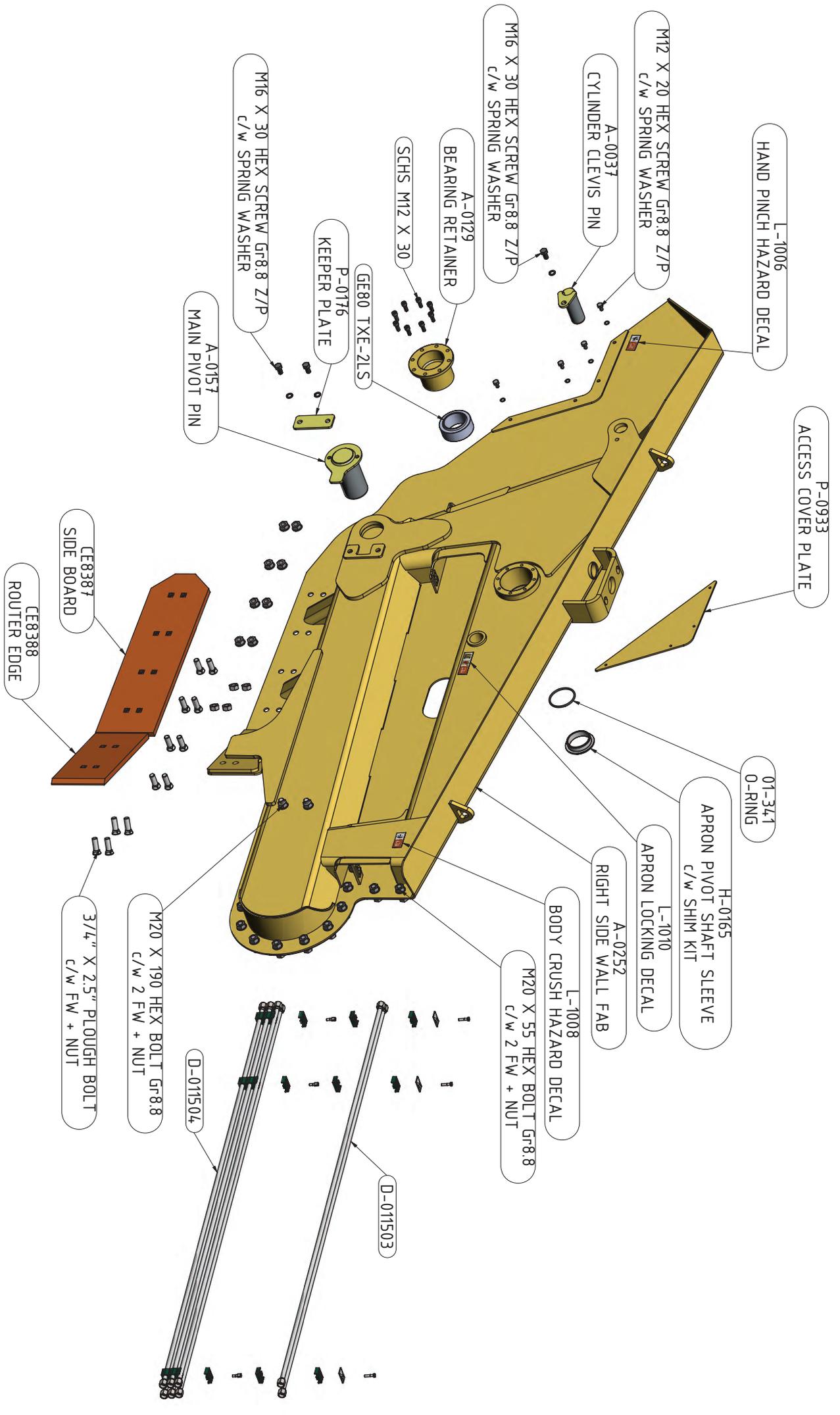


ASSEMBLY NOTES:

1. SET UP SWINGARM ON BENCH LEVEL TOP OF PIVOT TUBE HORIZONTAL WITH BUBBLE
2. APPLY ANTISEIZE TO ROCKER AXLE SHAFT SURFACES
3. FIT GE BEARINGS INTO THE ROCKER PLATES
4. INSERT BOLTS WITH HEADS ON THE INSIDE OF THE PLATES
5. FIT LONG ROCKER PLATE AND TEMPORARILY ATTACH LOCKING NUT
6. FIT SHORT ROCKER AND TEMPORARILY FIT LOCKING NUT
7. ALIGN BOLT HOLES AND INSERT 7/8 BOLTS TO JOIN THE TWO ROCKER PLATES
8. NIP UP THE BOLTS AND USE A BUBBLE TO ENSURE THE ROCKER PLATES ARE VERTICAL
9. SUPPORTING EITHER THE SHORT ROCKER OR LONG ROCKER WITH A PIECE OF TIMBER WILL TILT ROCKERS TO THE RIGHT OR LEFT
10. ONCE ROCKER PLATES ARE VERTICAL TORQUE UP THE BOLTS CONNECTING THE TWO ROCKER PLATES (710Nm/523ft.lb)
11. CHECK THE ROCKERS HAVE REMAINED VERTICAL, IF THEY HAVE MOVED, LOOSEN BOLTS AND TRY AGAIN
12. REMOVE LOCKING NUT, INSERT LOCK WASHER, INSTALL LOCK NUT, TIGHTEN UP & FOLD WASHER TAB
13. FIT ORING INTO GROOVE IN BEARING CAP AND INSTALL TORQUE UP (77Nm/57ft.lb)
14. ROTATE ROCKERS TO ENSURE THEY HAVE NOT BOUND UP DURING ASSEMBLY IF SO DISASSEMBLE AND CHECK THAT THE BEARING HOUSING IS FREE FROM FOREIGN OBJECTS AND TRY AGAIN.



- ASSEMBLY NOTES:
1. SET UP SWINGARM ON BENCH, LEVEL TOP OF PIVOT TUBE HORIZONTAL WITH BUBBLE
 2. APPLY ANTISEIZE TO ROCKER AXLE SHAFT SURFACES
 3. FIT GE BEARINGS INTO THE ROCKER PLATES
 4. INSERT BOLTS WITH HEADS ON THE INSIDE OF THE PLATES
 5. FIT LONG ROCKER PLATE AND TEMPORARILY ATTACH LOCKING NUT
 6. FIT SHORT ROCKER AND TEMPORARILY FIT LOCKING NUT
 7. ALIGN BOLT HOLES AND INSERT 7/8 BOLTS TO JOIN THE TWO ROCKER PLATES
 8. NIP UP THE BOLTS AND USE A BUBBLE TO ENSURE THE ROCKER PLATES ARE VERTICAL
 9. SUPPORTING EITHER THE SHORT ROCKER OR LONG ROCKER WITH A PIECE OF TIMBER WILL TILT ROCKERS TO THE RIGHT OR LEFT
 10. ONCE ROCKER PLATES ARE VERTICAL TORQUE UP THE BOLTS CONNECTING THE TWO ROCKER PLATES (710N.m/523ft.lb)
 11. CHECK THE ROCKERS HAVE REMAINED VERTICAL, IF THEY HAVE MOVED, LOOSEN BOLTS AND TRY AGAIN
 12. REMOVE LOCKING NUT, INSERT LOCK WASHER, INSTALL LOCK NUT, TIGHTEN UP & FOLD WASHER TAB
 13. FIT O-RING INTO GROOVE IN BEARING CAP AND INSTALL. TORQUE UP (77N.m/57ft.lb)
 14. ROTATE ROCKERS TO ENSURE THEY HAVE NOT BOUND UP DURING ASSEMBLY. IF SO: DISASSEMBLE AND CHECK THAT THE STEP ON THE ROCKER SHAFT IS CLEAN AND FREE FROM FOREIGN OBJECTS AND CHECK THAT THE BEARING HOUSING IS FREE FROM FOREIGN OBJECTS AND TRY AGAIN.



L-1006
HAND PINCH HAZARD DECAL

P-0933
ACCESS COVER PLATE

01-341
O-RING

H-0165
APRON PIVOT SHAFT SLEEVE
c/w SHIM KIT

L-1010
APRON LOCKING DECAL

A-0252
RIGHT SIDE WALL FAB

L-1008
BODY CRUSH HAZARD DECAL

M20 X 55 HEX BOLT Gr8.8
c/w 2 FW + NUT

M12 X 20 HEX SCREW Gr8.8 Z/P
c/w SPRING WASHER

A-0037
CYLINDER CLEVIS PIN

M16 X 30 HEX SCREW Gr8.8 Z/P
c/w SPRING WASHER

A-0129
BEARING RETAINER

SCHS M12 X 30

GE80 TXE-2LS

P-0176
KEEPER PLATE

M16 X 30 HEX SCREW Gr8.8 Z/P
c/w SPRING WASHER

A-0157
MAIN PIVOT PIN

CE8387
SIDE BOARD

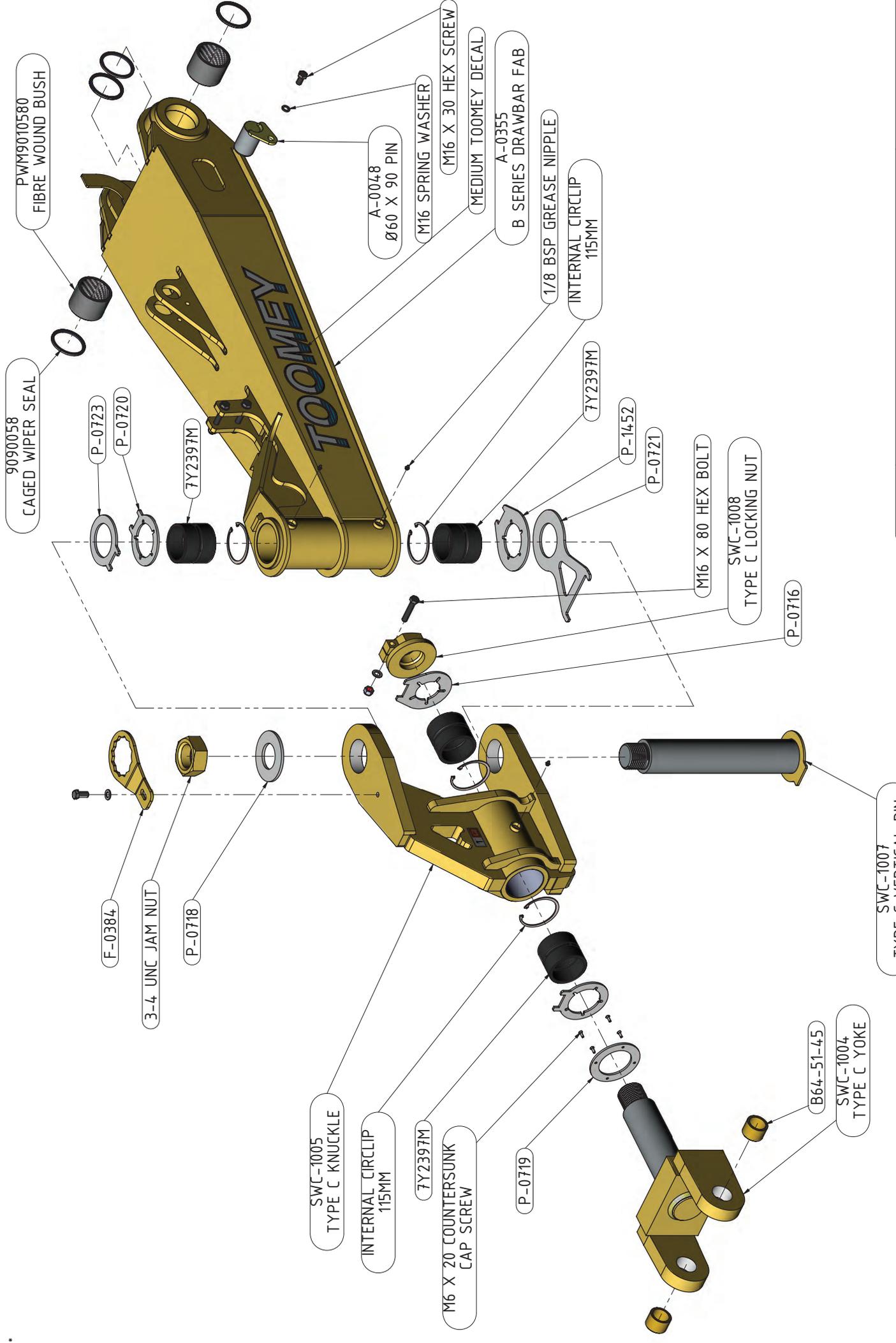
CE8388
ROUTER EDGE

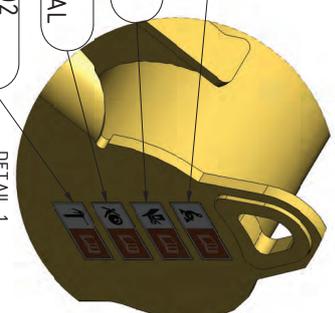
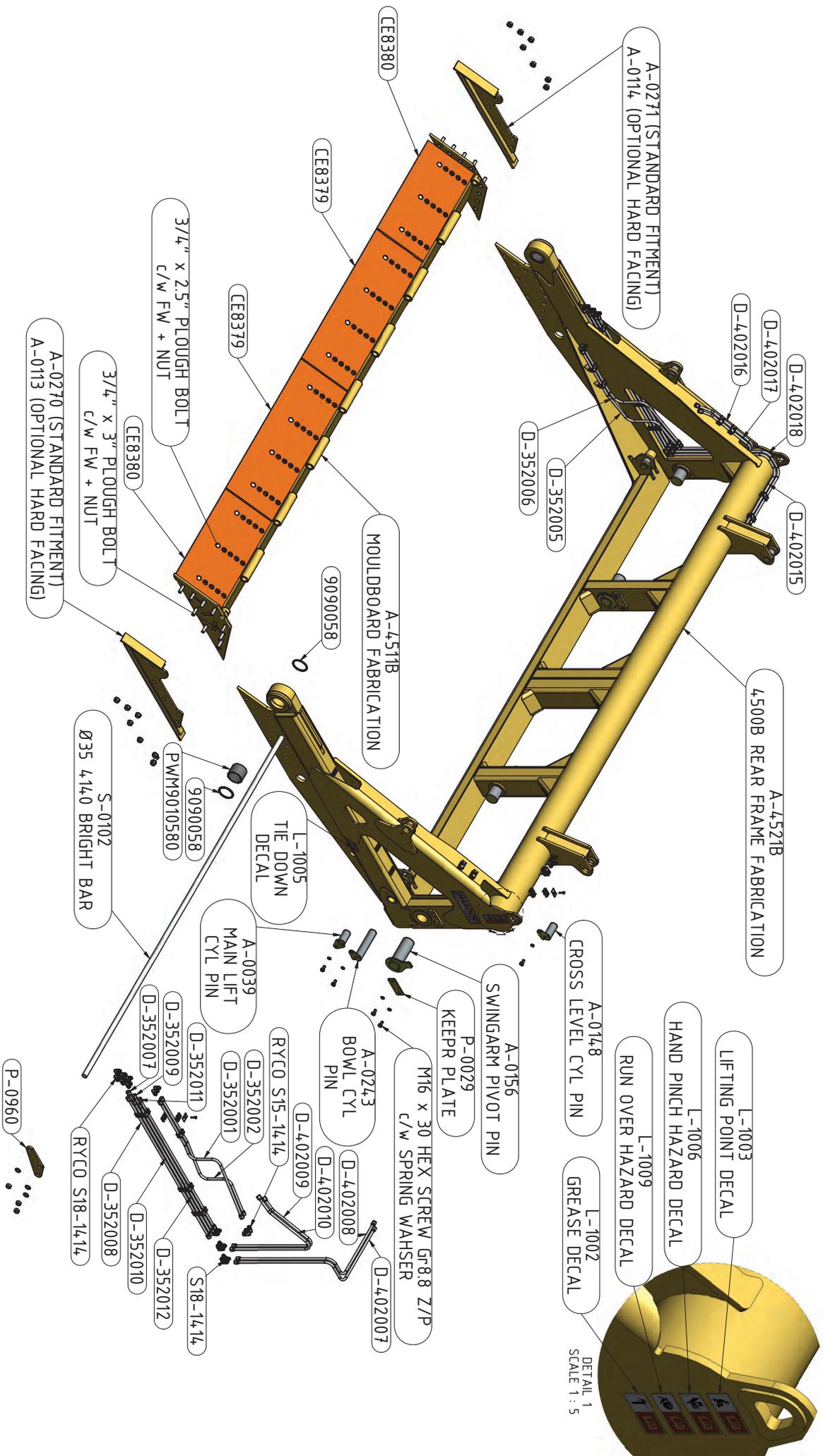
3/4" X 2.5" PLOUGH BOLT
c/w FW + NUT

M20 X 190 HEX BOLT Gr8.8
c/w 2 FW + NUT

D-011504

D-011503





DETAIL 1
SCALE 1 : 5

L-1003
LIFTING POINT DECAL

L-1006
HAND PINCH HAZARD DECAL

L-1009
RUN OVER HAZARD DECAL

A-0178
CROSS LEVEL CYL PIN

L-1002
GREASE DECAL

A-0156
SWINGARM PIVOT PIN

P-0029
KEEPER PLATE

M16 x 30 HEX SCREW GF8.8 Z/P
C/W SPRING WAHSER

A-0243
BOWL CYL
PIN

D-402008
D-402010
D-402009

D-352002
D-352001
D-352011

D-352009
D-352007
D-352010

D-352008
D-352012
S18-14.14

RYCO S18-14.14
RYCO S18-14.14

P-0960

L-1005
TIE DOWN
DECAL

A-0039
MAIN LIFT
CYL PIN

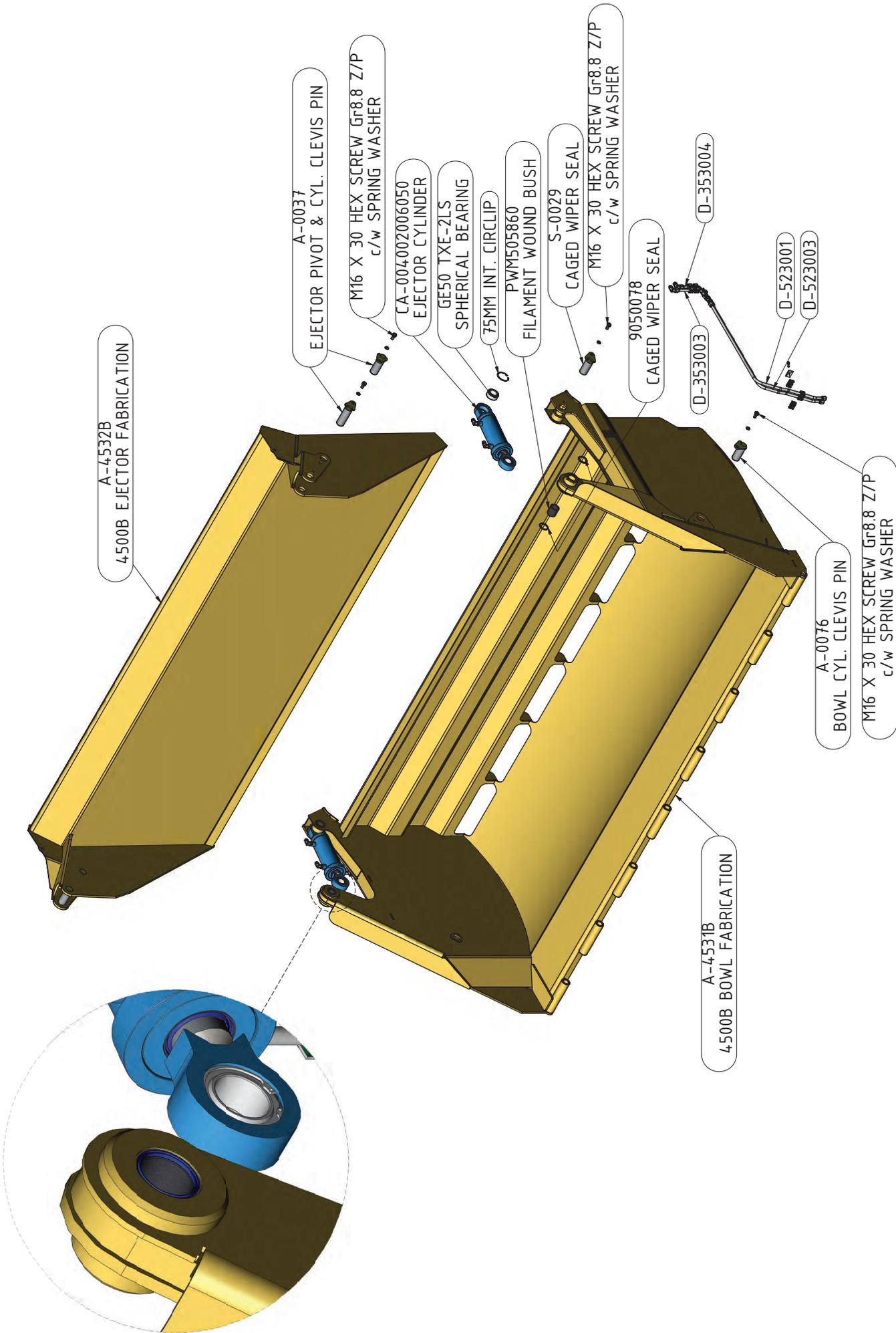
9090058
PMM9010580

S-0102
Ø35 4.14.0 BRIGHT BAR

A-0270 (STANDARD FITMENT)
A-0113 (OPTIONAL HARD FACING)

3/4" x 3" PLOUGH BOLT
C/W FW + NUT

3/4" x 2.5" PLOUGH BOLT
C/W FW + NUT



A-4532B
4500B EJECTOR FABRICATION

A-0037
EJECTOR PIVOT & CYL. CLEVIS PIN

M16 X 30 HEX SCREW Gr8.8 Z/P
c/w SPRING WASHER

CA-004002006050
EJECTOR CYLINDER

GE50 TXE-2LS
SPHERICAL BEARING

75MM INT. CIRCLIP

PWM505860
FILAMENT WOUND BUSH

S-0029
CAGED WIPER SEAL

M16 X 30 HEX SCREW Gr8.8 Z/P
c/w SPRING WASHER

9050078
CAGED WIPER SEAL

D-353003

D-353004

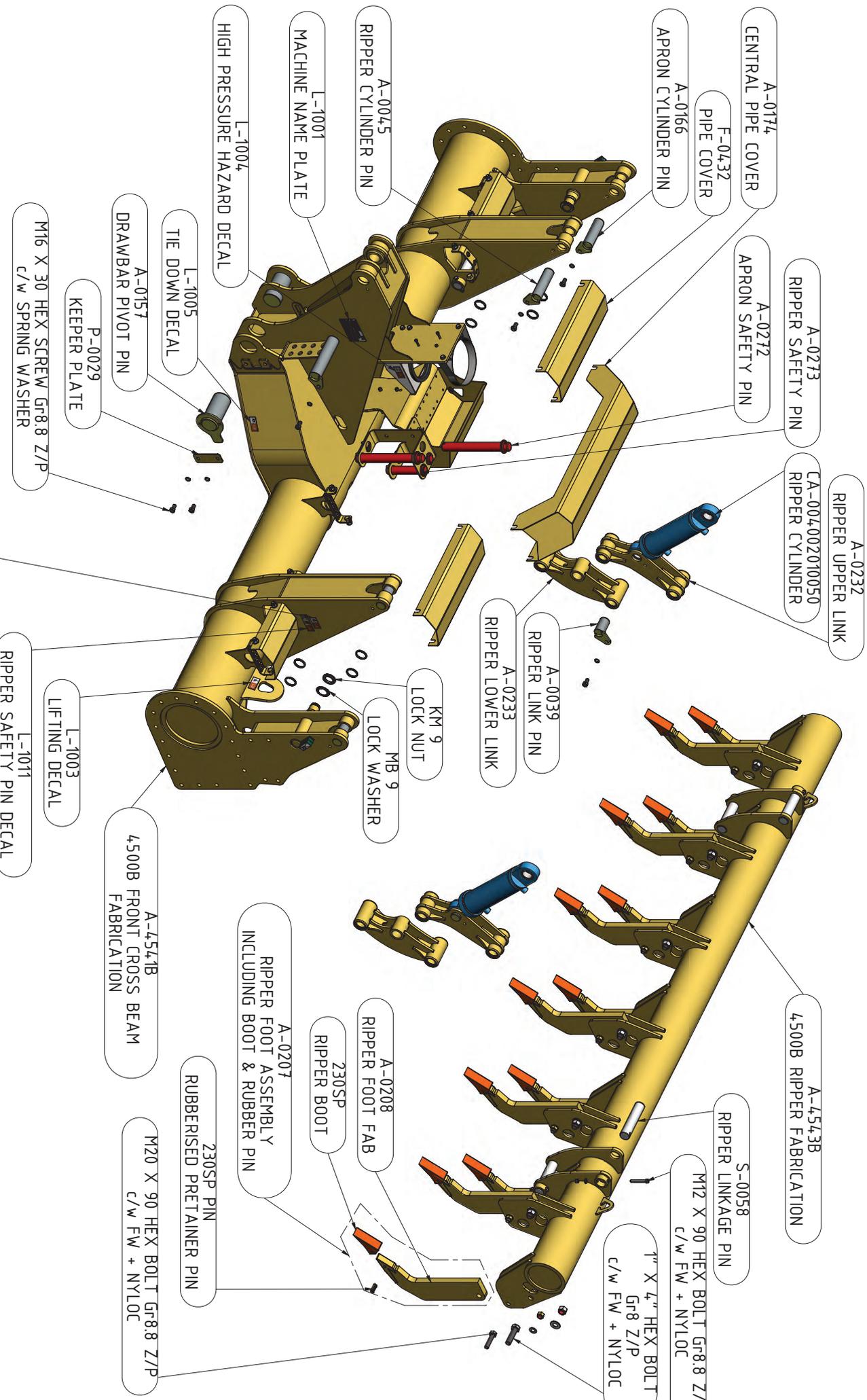
D-523001

D-523003

A-0076
BOWL CYL. CLEVIS PIN

M16 X 30 HEX SCREW Gr8.8 Z/P
c/w SPRING WASHER

A-4531B
4500B BOWL FABRICATION



A-0232
RIPPER UPPER LINK

CA-004002010050
RIPPER CYLINDER

A-0272
RIPPER SAFETY PIN

A-0174
CENTRAL PIPE COVER

F-0432
PIPE COVER

A-0166
APRON CYLINDER PIN

A-0271
RIPPER SAFETY PIN

A-0045
RIPPER CYLINDER PIN

L-1001
MACHINE NAME PLATE

L-1004
HIGH PRESSURE HAZARD DECAL

L-1005
TIE DOWN DECAL

A-0157
DRAWBAR PIVOT PIN

P-0029
KEEPER PLATE

M16 X 30 HEX SCREW Gr8.8 Z/P
c/w SPRING WASHER

L-1006
HAND PINCH HAZARD DECAL

A-4543B
4500B RIPPER FABRICATION

S-0058
RIPPER LINKAGE PIN

M12 X 90 HEX BOLT Gr8.8 Z/P
c/w FW + NYLOC

1" X 4" HEX BOLT
Gr8 Z/P
c/w FW + NYLOC

A-0039
RIPPER LINK PIN

A-0233
RIPPER LOWER LINK

KM 9
LOCK NUT

MB 9
LOCK WASHER

A-0208
RIPPER FOOT FAB
RIPPER BOOT

A-0207
RIPPER FOOT ASSEMBLY
INCLUDING BOOT & RUBBER PIN

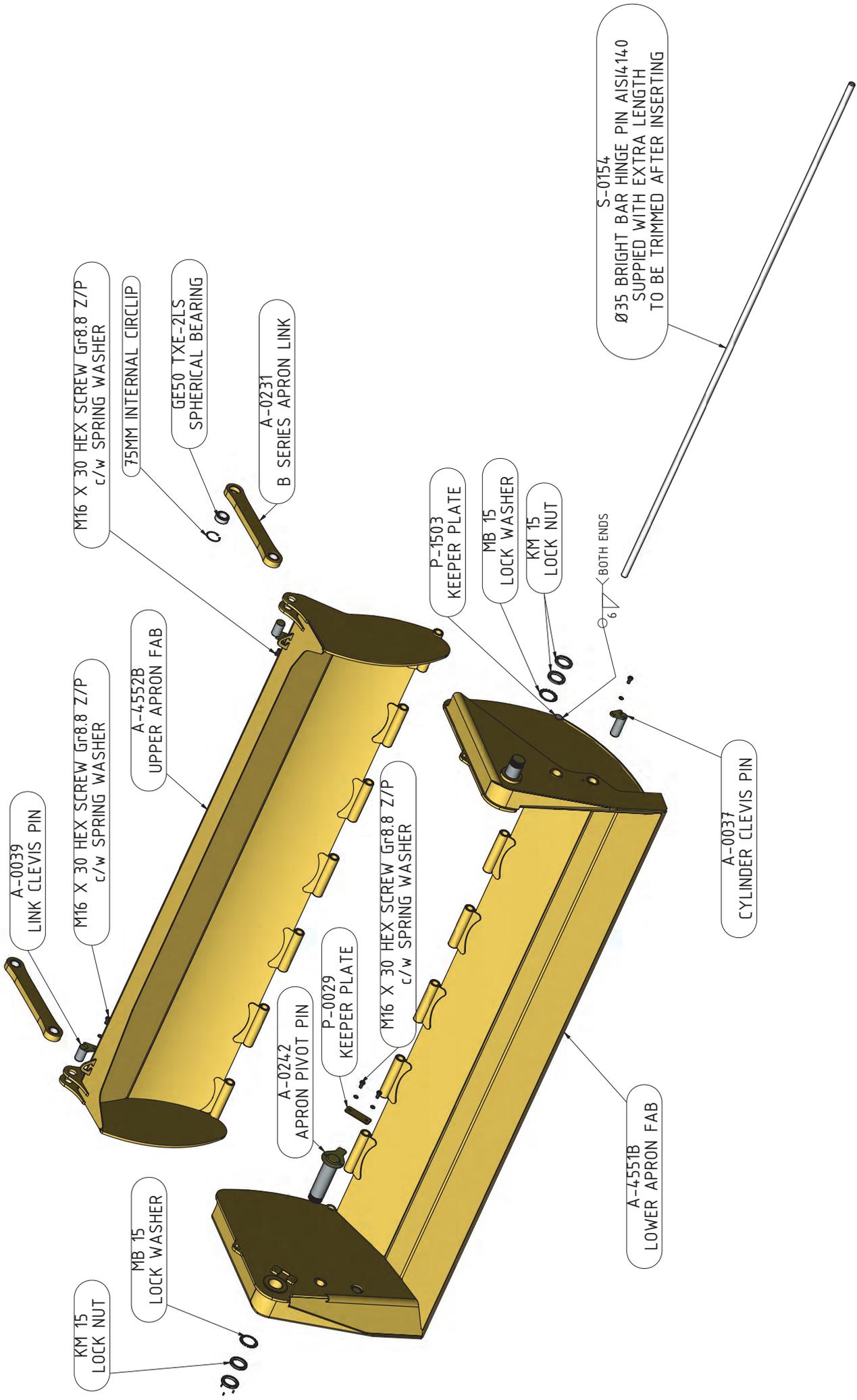
230SP PIN
RUBBERISED PRETAINER PIN

M20 X 90 HEX BOLT Gr8.8 Z/P
c/w FW + NYLOC

A-4541B
4500B FRONT CROSS BEAM
FABRICATION

L-1003
LIFTING DECAL

L-1011
RIPPER SAFETY PIN DECAL



M16 X 30 HEX SCREW Gr8.8 Z/P
c/w SPRING WASHER

75MM INTERNAL CIRCLIP

GE50 TXE-2LS
SPHERICAL BEARING

A-0231
B SERIES APRON LINK

S-0154
Ø35 BRIGHT BAR HINGE PIN AISI4140
SUPPLIED WITH EXTRA LENGTH
TO BE TRIMMED AFTER INSERTING

A-0039
LINK CLEVIS PIN

M16 X 30 HEX SCREW Gr8.8 Z/P
c/w SPRING WASHER

A-4552B
UPPER APRON FAB

P-1503
KEEPER PLATE

MB 15
LOCK WASHER

KM 15
LOCK NUT

BOTH ENDS

M16 X 30 HEX SCREW Gr8.8 Z/P
c/w SPRING WASHER

A-0242
APRON PIVOT PIN

P-0029
KEEPER PLATE

M16 X 30 HEX SCREW Gr8.8 Z/P
c/w SPRING WASHER

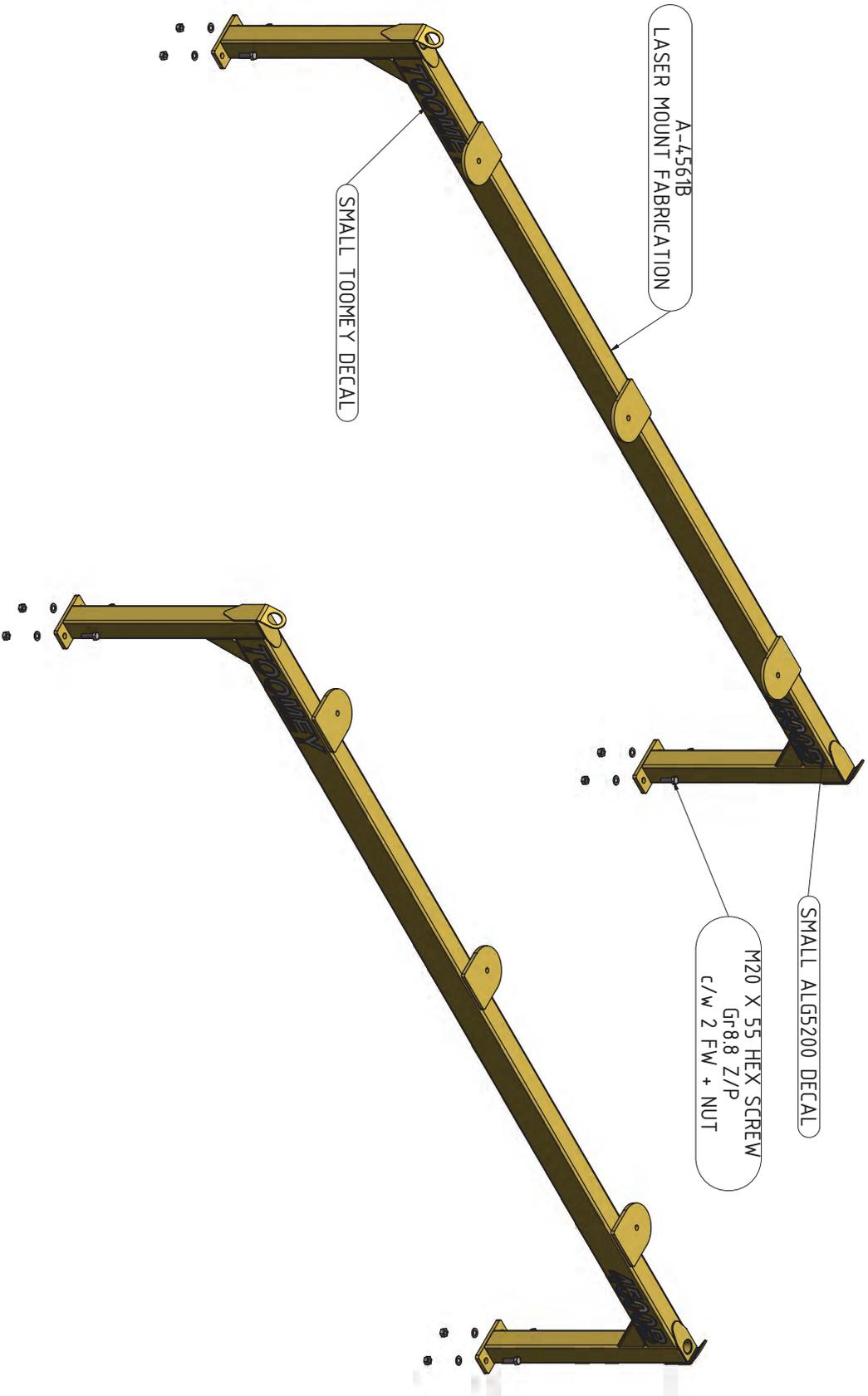
A-0037
CYLINDER CLEVIS PIN

KM 15
LOCK NUT

MB 15
LOCK WASHER

A-4551B
LOWER APRON FAB

NOTE: KM15 LOCK NUT SOCKET REQUIRED TO TIGHTEN UP LOCKING NUTS IN THE SIDE WALLS



7.4 COSHH Datasheets

