



RIGID LANCING MACHINE

BRLM-500

USER MANUAL

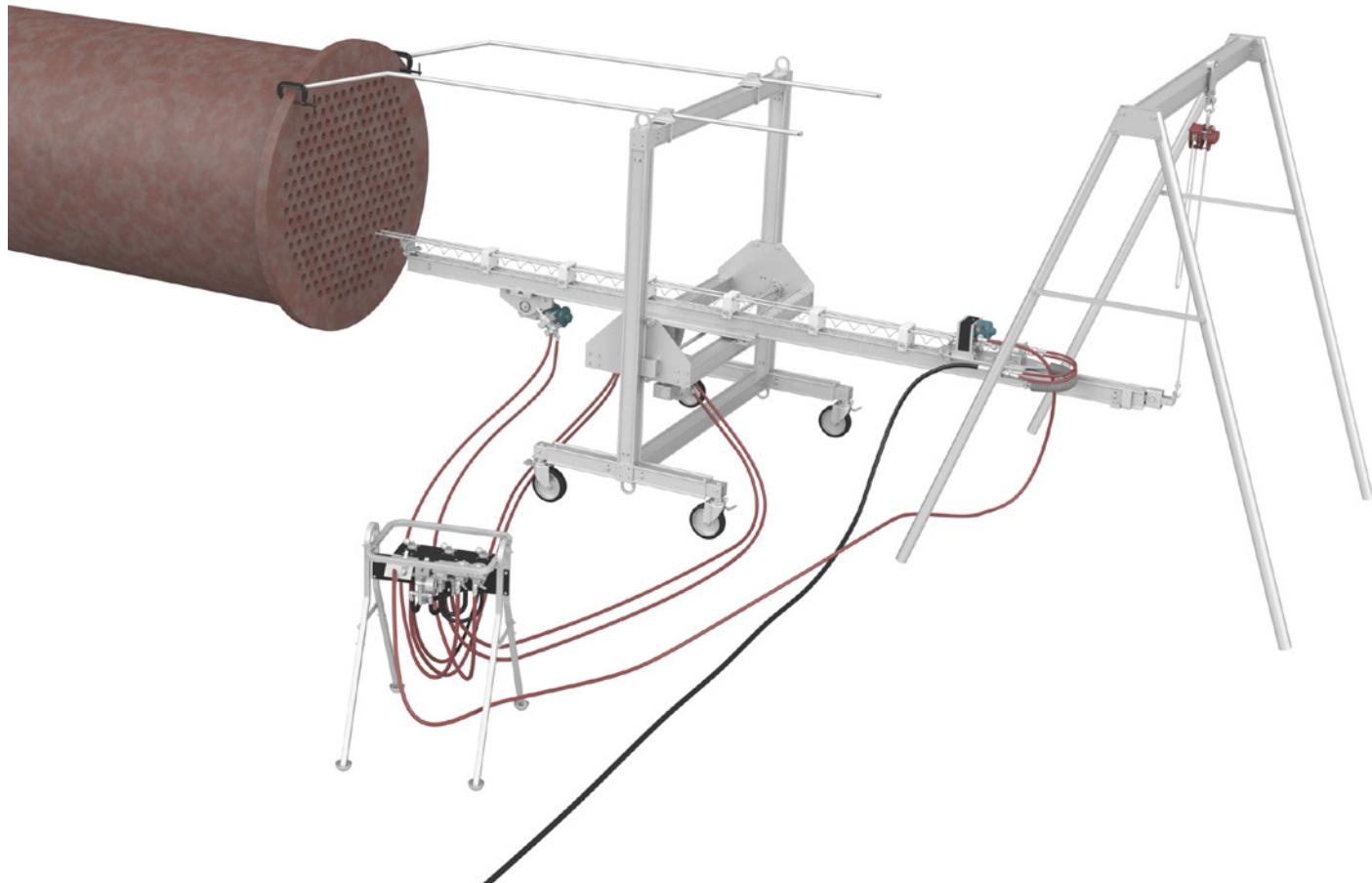


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This manual must be used in accordance with all applicable national laws. The manual shall be regarded as a part of the machine and shall be kept for reference until the final dismantling of the machine, as defined by applicable national law(s).

TOOL SPECIFICATIONS

	BRLM-500 (15K)	BRLM-500 (22K)	BRLM-500 (40K)
Pressure Range	2–15k psi 140–1000 bar	15–22k psi 1000–1500 bar	22–40k psi 1500–2800 bar
Flow Range	Up to 50 gpm Up to 189 l/min	Up to 50 gpm Up to 189 l/min	Up to 20 gpm Up to 76 l/min
Flow Coefficient	2.3 Cv	2.0 Cv	0.3 Cv (UHS) 0.5 Cv (UH)
Inlet Connection	1/2 NPT (P8)	3/4 MP (MP12)	9/16 HP (H9)
Lance Connection	1/8, 1/4 NPT	3/8, 9/16 LH	3/8, 9/16 LH
Standard Rail Length	BRLM 500-15 15ft / 4.6m	BRLM 500-15 15ft / 4.6m	BRLM 500-15 5ft / 4.6m
Standard Extensions	BRLM 080-X 5, 10, 15, 20, or 25ft 1.5, 3, 4.6, 6, or 7.6m	BRLM 080-X 5, 10, 15, 20, or 25ft 1.5, 3, 4.6, 6, or 7.6m	BRLM 080-X 5, 10, 15, 20, or 25ft 1.5, 3, 4.6, 6, or 7.6m
Stroke Length	Up to 60 ft Up to 18m	Up to 60 ft Up to 18m	Up to 60 ft Up to 18m
Weight Complete	1200–1500 lb 544–680 kg	1200–1500 lb 544–680 kg	1200–1500 lb 544–680 kg
Water Swivels	SG P12P12-62-0	SG MP12K-62-0	UH-H9H6-0
Rotation Air Motor	Gast 4AM 20 to 40 cfm @ 80 psi	Gast 4AM 20 to 40 cfm @ 80 psi	Gast 4AM 20 to 40 cfm @ 80 psi
Feed Air Motor	Gast 6AM 30 to 50 cfm @ 80 psi	Gast 6AM 30 to 50 cfm @ 80 psi	Gast 6AM 30 to 50 cfm @ 80 psi
Maximum Water Temperature	160 °F 70 °C	160 °F 70 °C	160 °F 70 °C

DESCRIPTION OF EQUIPMENT AND INTENDED USE

The Rigid Lancing Machine was designed for the effective cleaning of the inside of tubes within a heat exchanger bundle.

It is used with a rigid lance and nozzle head. Rigid Lances provide more forward-hitting power than flex lancing to clean difficult deposits. It is possible to operate 3 rotary lances simultaneously and remotely from the control box.

Air or hydraulic motors supply rotation and feed power. Since the lance is continuously rotated, a fewer number of larger, more powerful jets are used to completely clean the insides of the tubes. Larger jets will also penetrate tougher deposits more effectively than many smaller, non-rotating jets. Rotation of the tip also makes this tool effective for polishing tube walls. The powered feed allows all the jet power to be used in attacking the material ahead of the tip.

KEY FEATURES:

RIGID LANCE MACHING (BRLM-500)

- Adjustable feed rate for lance travel- Both directions of the lance can be regulated for speed to deliver appropriate cleaning.
- Adjustable lance stops- Forward stop to ensure complete tube coverage, optional retract stop to protect lances and operator
- Control Box - Control all movements of the complete package from up to 25 ft/8m away.
- Air or Hydraulic drive for power source flexibility.
- Expandable operating window - Allows for versatility for cleaning a variety of exchanger sizes.
- Steering control and tilt function - Positioner offers easy mobility and can be tilted to match the tube pitch angle of a bundle face.

WARNING AND SAFETY INSTRUCTIONS

OPERATOR TRAINING

Managers, Supervisors, and Operators MUST be trained in Health and Safety Awareness of High-pressure Water Jetting and hold a copy the Water Jetting Association (WJA) Code of Practice, or equivalent (see www.waterjetting.org.uk).

Operators MUST be trained to identify and understand all applicable standards for the equipment supplied. Operators should be trained in manual handling techniques to prevent bodily injury.

Operators MUST read, understand, and follow the Operational and Training Requirements (Section 7.0) of WJTA-IMCA's Recommended Practices For The Use Of High-pressure Waterjetting Equipment, or equivalent.

Operators MUST read, understand and follow the Warnings, Safety Information, Assembly, Installation, Connection, Operation, Transport, Handling, Storage, and Maintenance Instructions detailed in this manual.

StoneAge has designed and manufactured this equipment considering all hazards associated with its operation. StoneAge assessed these risks and incorporated safety features in the design. StoneAge **WILL NOT** accept responsibility for the results of misuse.

IT IS THE RESPONSIBILITY OF THE INSTALLER/OPERATOR to conduct a job specific risk assessment prior to use. Job specific risk assessment MUST be repeated for each different set up, material, and location.

The risk assessment MUST conform to the Health and Safety at Work Act 1974 and other relevant Health and Safety legislation.

The risk assessment MUST consider potential material or substance hazards including:

- Aerosols
- Biological and microbiological (viral or bacterial) agents
- Combustible materials
- Dusts
- Explosion
- Fibers
- Flammable substances
- Fluids
- Fumes
- Gases
- Mists
- Oxidizing Agents

PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

Use of Personal Protective Equipment (PPE) is dependent on the working pressure of water and the cleaning application. Managers, Supervisors, and Operators MUST carry out a job specific risk assessment to define the exact requirements for PPE. See Protective Equipment for Personnel (Section 6) of WJTA-IMCA's Recommended Practices For The Use Of High-pressure Waterjetting Equipment for additional information.

Hygiene - Operators are advised to wash thoroughly after all waterjetting operations to remove any waterblast residue which may contain traces of harmful substances.

First aid provision - users MUST be provided with suitable first aid facilities at the operation site.

PPE may include:

- **Eye protection:** Full face visor
- **Foot protection:** Kevlar® brand or steel toe capped, waterproof, non-slip safety boots
- **Hand protection:** Waterproof gloves
- **Ear protection:** Ear protection for a minimum of 85 dBA
- **Head protection:** Hard hat that accepts a full face visor and ear protection
- **Body protection:** Multi-layer waterproof clothing approved for waterjetting
- **Hose protection:** Hose shroud
- **Respiratory protection:** May be required; refer to job specific risk assessment

WARNING AND SAFETY INSTRUCTIONS

⚠️ WARNING

Operations with this equipment can be potentially hazardous. Caution MUST be exercised prior to and during machine and water jet tool use. Please read and follow all of these instructions, in addition to the guidelines in the WJTA Recommended Practices handbook, available online at www.wjta.org. Deviating from safety instructions and recommended practices can lead to severe injury and/or death.

- Do not exceed the maximum operating pressure specified for any component in a system. The immediate work area MUST be marked off to keep out untrained persons.
- Inspect the equipment for visible signs of deterioration, damage, and improper assembly. Do not operate until repaired. Make sure all threaded connections are tight and free of leaks.
- Users of the BRLM Rigid Lancing System MUST be trained and/or experienced in the use and application of high-pressure technology and cleaning, as well as all associated safety measures, according to the WJTA Recommended Practices for the use of High-pressure Water jetting Equipment.
- The Control Box should be located in a safe location where the operator has good visibility of the pipe and hose. The BRLM Lancing System and Control Box MUST be supervised at all times and should never be left unattended.
- Test the Control Box before operating the BRLM Rigid Lancing System with high-pressure water to verify the control valves move the hose in the intended direction, and that the dump valve is working properly.
- Always de-energize the system before opening the door to service or replace any parts. Failure to do so can result in severe injury and/or death.

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IT IS THE RESPONSIBILITY OF THE INSTALLER/OPERATOR to conduct a job specific risk assessment prior to use. Job specific risk assessment MUST be repeated for each different set up, material, and location.

The risk assessment MUST conform to the Health and Safety at Work Act 1974 and other relevant Health and Safety legislation.

PRE-RUN SAFETY CHECK

Refer to WJTA-IMCA's, Recommended Practices For The Use Of High-pressure Water jetting Equipment and/or The Water Jetting Association's, WJA Code of Practice for additional safety information.

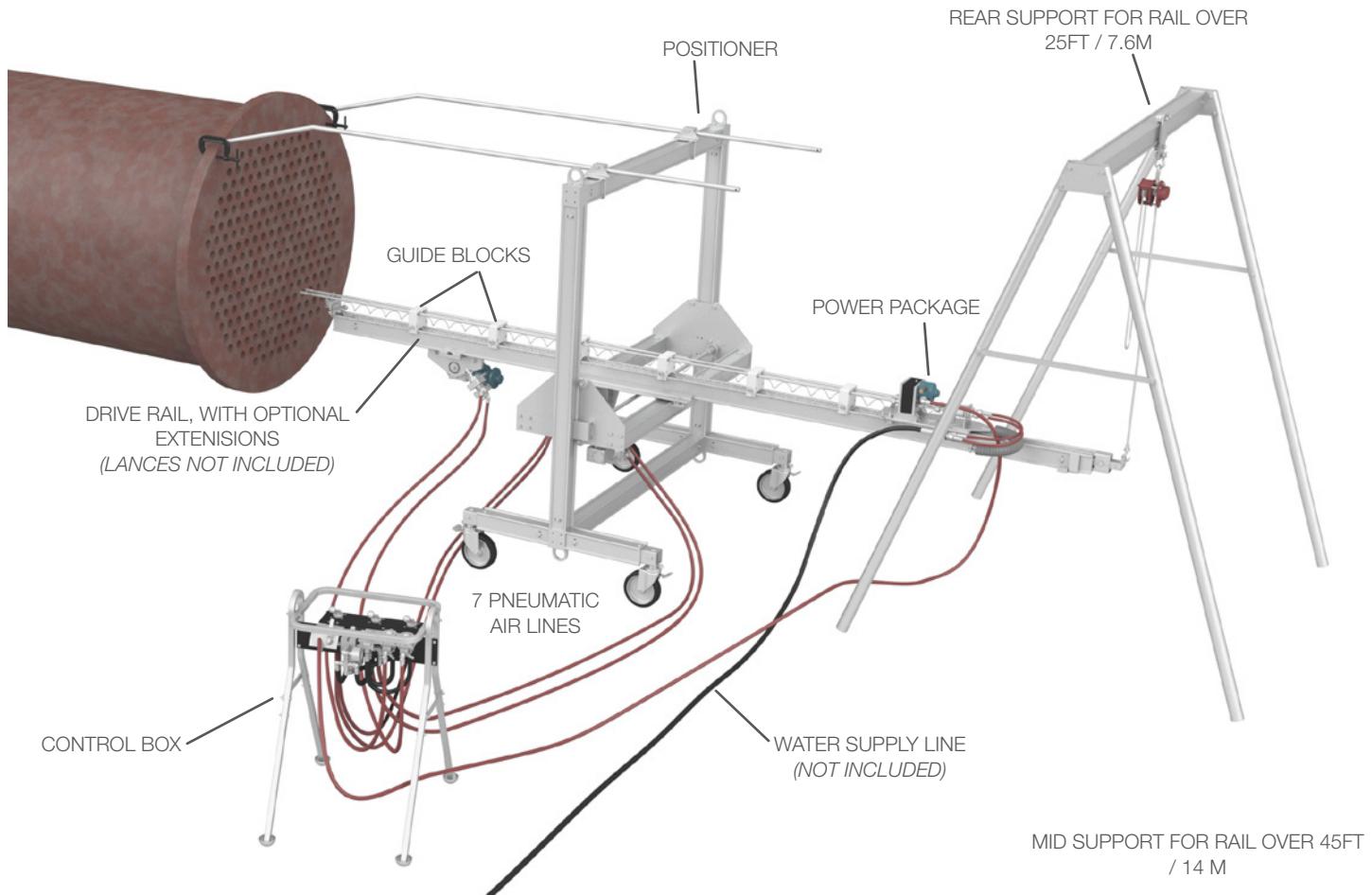
- Complete a job specific risk assessment and act on the resulting actions.
- Ensure the waterblasting zone is properly barricaded and that warning signs are posted.
- Adhere to all site safety procedures.
- Ensure no personnel are in the hydroblasting zone.
- Ensure the work place is free of unnecessary objects (e.g. loose parts, hoses, tools).
- Ensure all operators are using the correct Personal Protective Equipment (PPE).
- Check that the air hoses are properly connected and tight.
- Check all hoses and accessories for damage prior to use. Do not use damaged items. Only high quality hoses intended for waterblast applications should be used as high-pressure hoses.
- Ensure that operators never connect, disconnect, or tighten hoses, adapters, or accessories with the high-pressure water pump unit running.
- Check all high-pressure threaded connections for tightness.

The risk assessment MUST consider potential material or substance hazards including:

- Aerosols
- Biological and microbiological (viral or bacterial) agents
- Combustible materials
- Dusts
- Explosion
- Fibers
- Flammable substances
- Fluids
- Fumes
- Gases
- Mists
- Oxidizing Agents

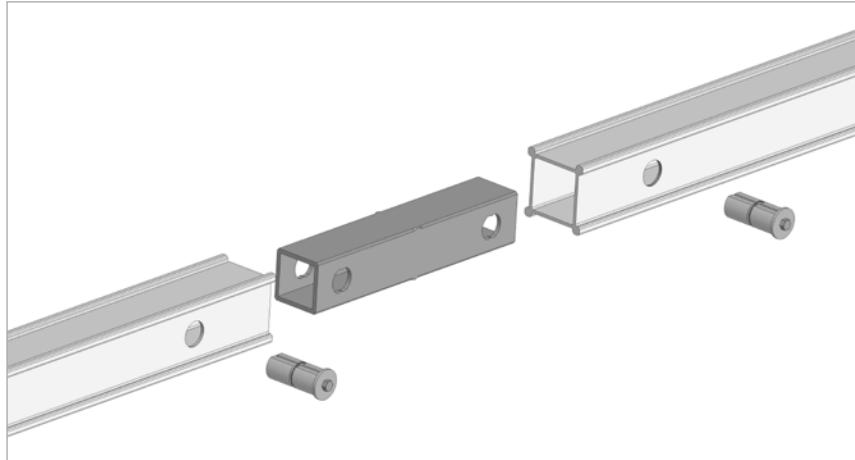
SYSTEM ASSEMBLY - OVERVIEW

BRLM 500-XX
RIGID LANCING MACHINE



ASSEMBLY, INSTALLATION, AND CONNECTION

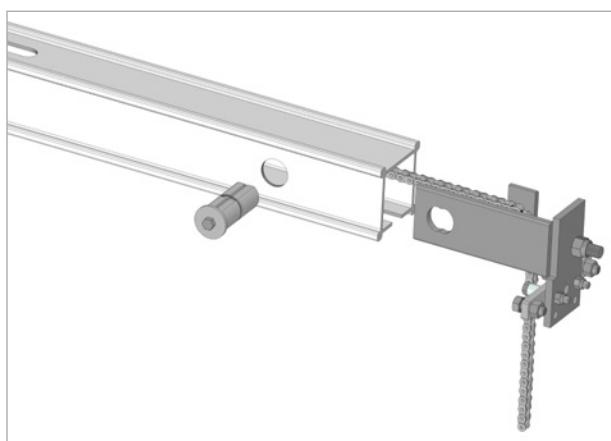
1. If an extension kit (BRLM 080) is used, insert the splice tube into the rear of the drive rail (the end without a slot) and slide the extension section over the splice tube. The extension rail has no slots and can be installed using either end. Use two wedge bolts oriented to pull and tighten these sections together. Splice the chain provided with the extension kit onto the chain from the drive section.



2. The drive gearbox shaft may be positioned 2'-8" or 3'-10" back from the front of the machine in order to allow clearance for existing channel heads or other obstructions. Feed a tape measure through the rear of the rail, through the slots you determine the drive motor should be positioned in, and through the end of the rail. Using wire, attach the chain to the tape measure and pull it back through the rail and slots.

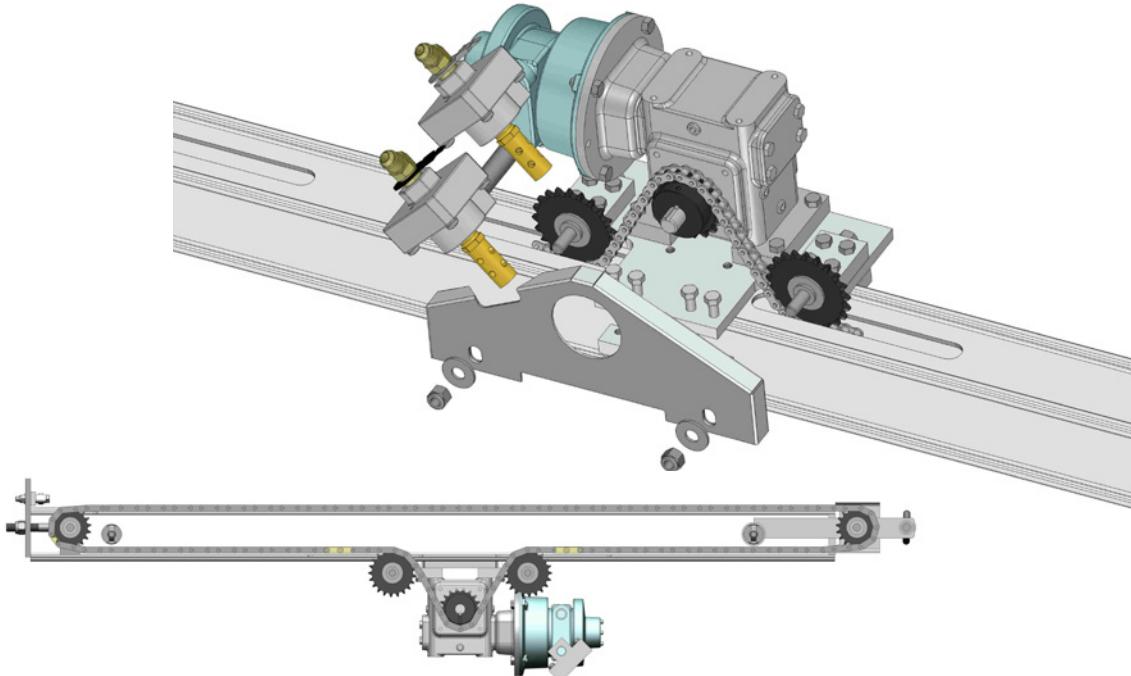


3. Feed the Chain over the front idler and slide the front idler into the rail. Note the sprocket is off center and should stick through the slot in the rail. Install the wedge bolt, making sure to orient the halves so that they expand in the direction to pull the idler assembly into the rail. Tighten the expansion bolt to secure the idler to the rail. REPEAT the entire procedure for rear idler assembly.

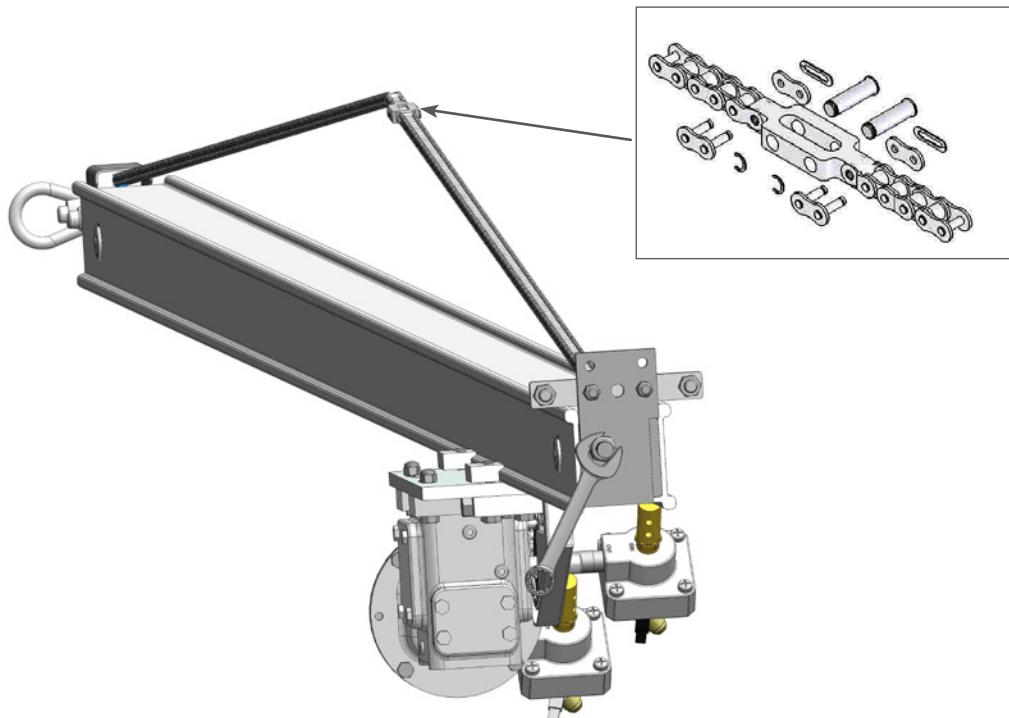


ASSEMBLY, INSTALLATION, AND CONNECTION

- For installation of the drive assembly, remove the chain guard and only two of the rail clamps. Slightly loosen the other two clamps. Thread the chain, under the two outside sprockets and over the center sprocket. Center the drive over the slots and secure all the clamps to the rail. Replace the chain guard (Note washer locations) and flip the assembly over.

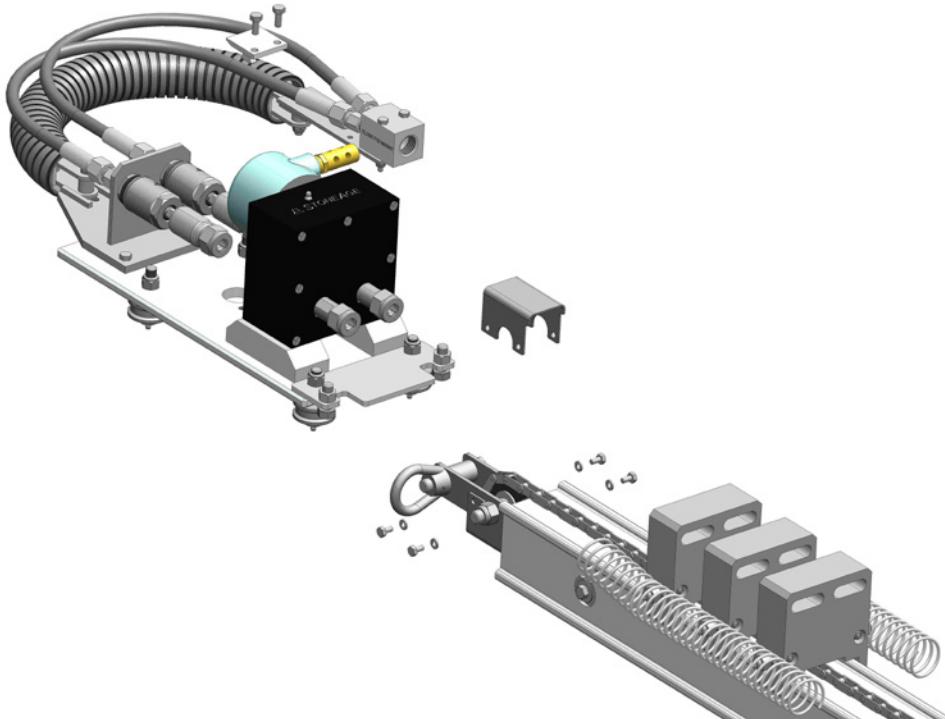


- Complete chain loop by attaching the chain to the chain hook link with (2) chain master links. Adjust the chain tension so there is about 1 inch of chain height for every 5 feet or rail length. This can be done by tightening the tension nut at the end of the rail.

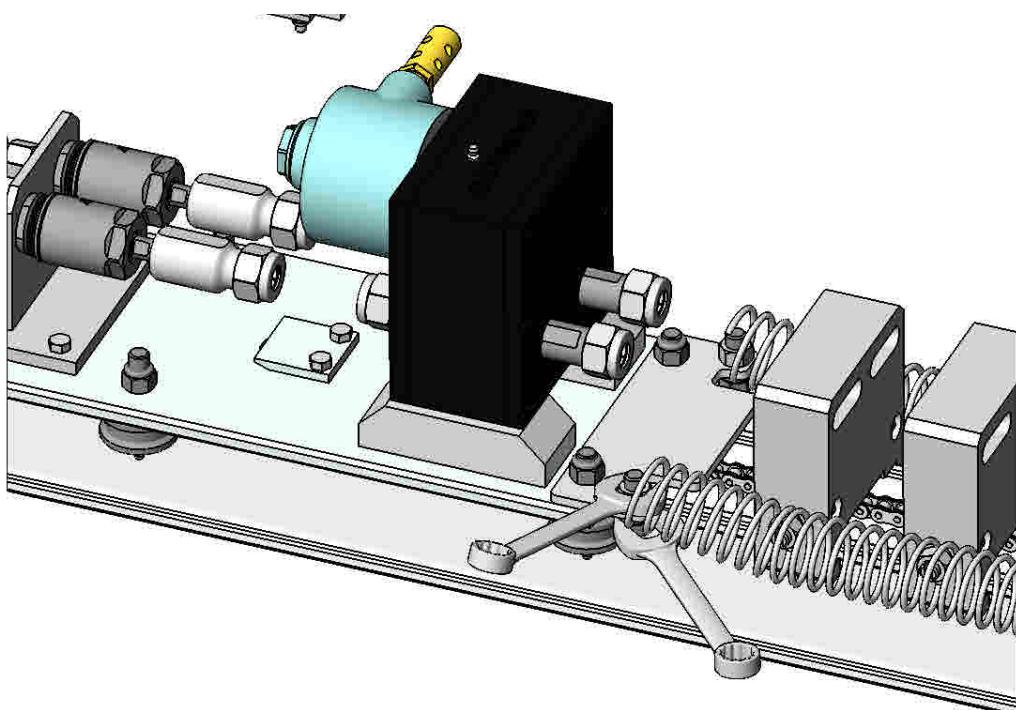


ASSEMBLY, INSTALLATION, AND CONNECTION

6. Remove rear chain guard and slide the guide blocks onto the rail and move them all the way to the front. Next, remove the chain hook from the carriage and slide the carriage onto the rail. It may be necessary to loosen the rollers on one side to make it easier to install. Be sure to tighten all the rollers and replace the guard once finished.

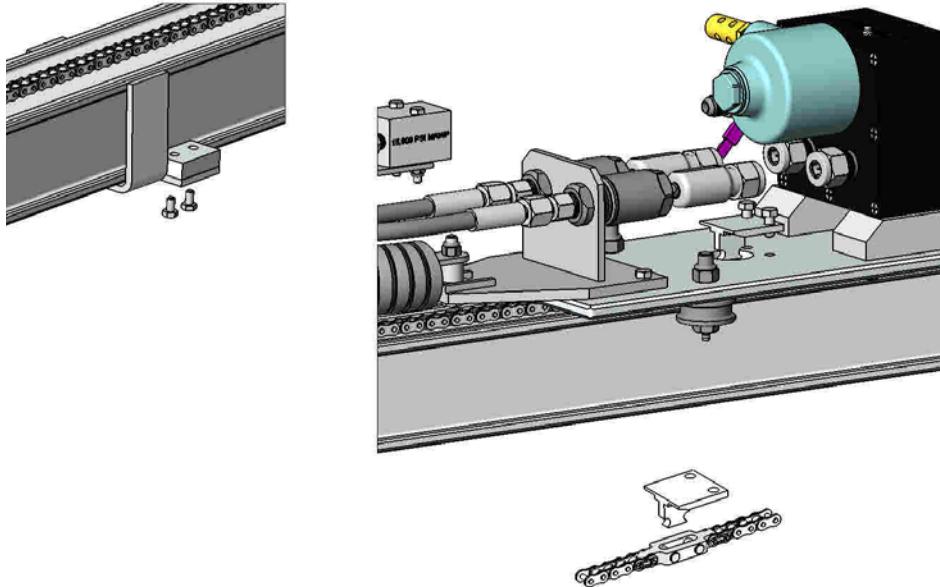


7. Attach the cable coils to the carriage and to the front idler assembly using the slotted anchor bolts. Be sure not to tighten the bolt over 20 ft-lbs of torque.

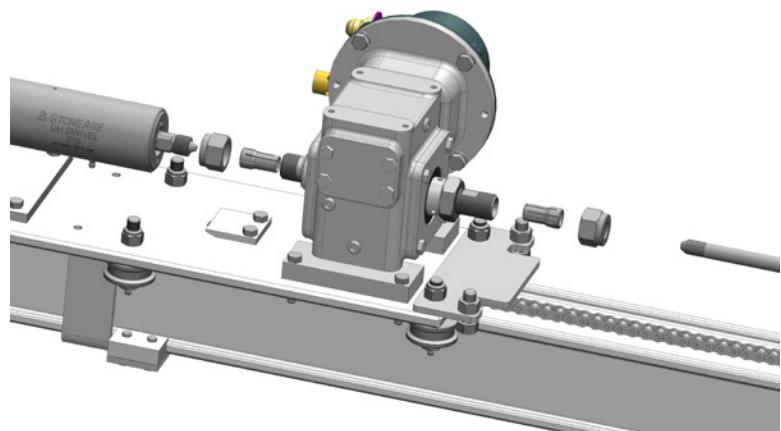
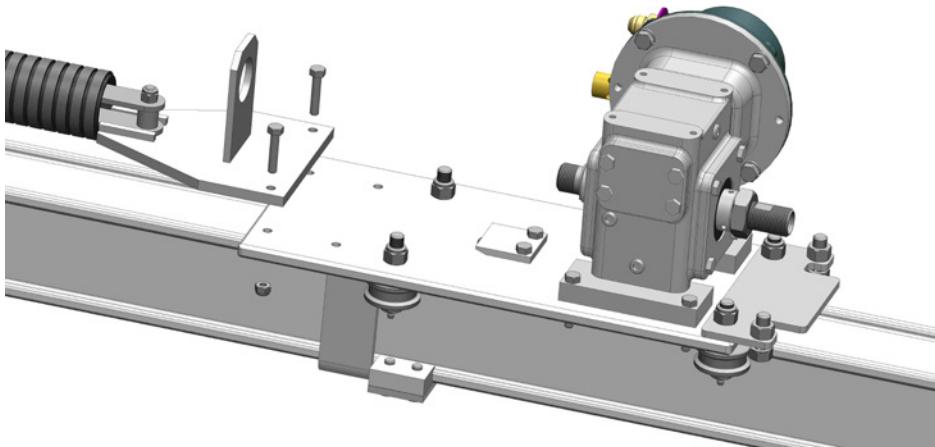


ASSEMBLY, INSTALLATION, AND CONNECTION

8. Attach the rear stop to the rail. The exact position of the stop can be easily adjusted at a later time. Next, install the chain hook by slipping it through the carriage plate and in between the pins on the chain link. It often helps to move the carriage back and forth to lock it into place.

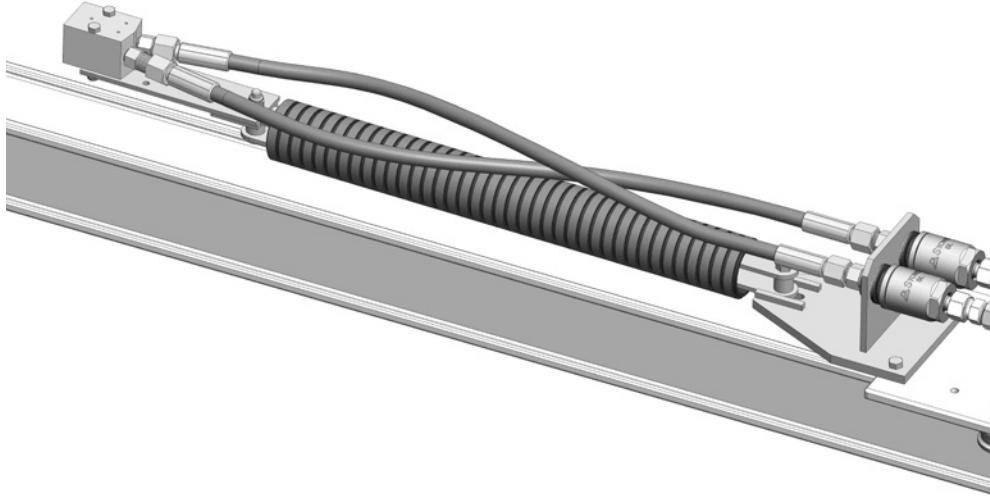


9. Attach the swivel bracket to the carriage plate. Then choose either the 9/16" or 3/8" collets and couplings set, to match the lance size. Insert the proper collets and the gland nuts. Slide the lance or lances through the gearbox and attach to the swivel with a coupling, making sure to properly prepare the threads on the end of the lance using anti-seize and Teflon tape with pipe threads. Slide the swivel back into the hole in the rear support and tighten the gland nuts to clamp the collets onto the lance.

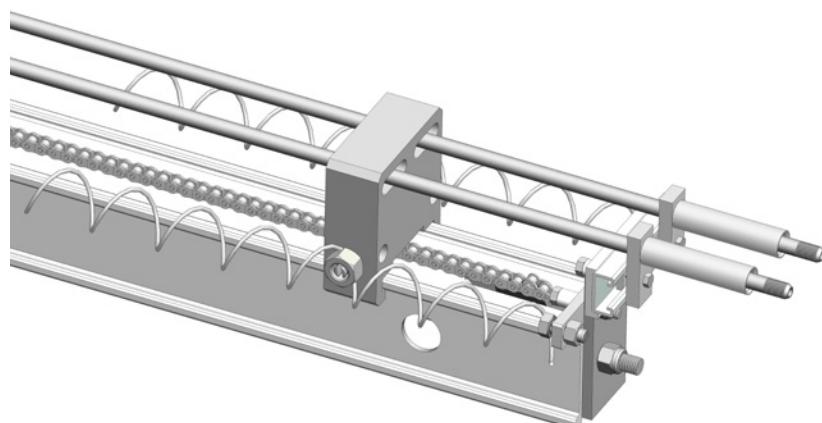
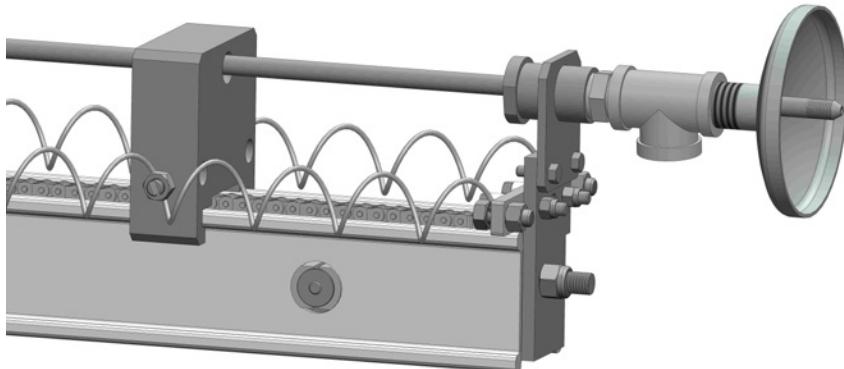


ASSEMBLY, INSTALLATION, AND CONNECTION

10. Attach the tail chain to the carriage plate; if using a single rotary machine, straighten the tail chain and clamp the single hose in the clamp blocks. If using the dual rotary machine, attach the Y-Manifold to the tail chain; install the adapters into the swivel inlets and the manifold ports (use anti-seize). Straighten the tail chain and cross the hoses over each other from the swivels to the manifold ports as shown in the above illustration.



11. Attach the appropriate sized guide tube to the front of the rail. Advance or retract the carriage so the end of the lance where the tip will be located is about two inches inside the front splash guard (about the length of the nozzle tip). Install the rear stop up against the rear carriage wheels at this point to set the retract stop point. On a vertical setup, the rear stop will be way up in the air and not easily adjusted later.



ASSEMBLY, INSTALLATION, AND CONNECTION

Lances and Tips:

Lances - It is recommended that high strength alloy be used instead of standard pipe grades; 3/8 tubing can be threaded for 1/8 pipe, and 9/16 tubing can be threaded for 1/4 pipe. The material selected should have adequate wall thickness for the pressure being used. Lances with larger inside diameters will minimize pressure drop at higher flows, but will be limited in their operating pressure.

Tips - There are several different lance tip types; the most basic and cheapest is the steel tip with drilled orifices. Jet patterns can be selected to optimize unplugging or polishing. Since the lancing machine provides rotation, fewer and larger jets can be used. When rigid lancing on a securely supported lancing machine, there is no need to put in backward facing jets. While the drilled steel tip can be used up to 40,000 psi, orifice life at this pressure is less than 10 hours. At 20,000 psi, about 20 hours useful life can be expected, while at 10,000 psi (depending on water filtration) a drilled tip can last up to 40 hours. For the higher pressures, replaceable sapphire orifices can be used. Jet angles can be somewhat limited with the replaceable orifices; depending on the tip diameter, it may not be possible to put in radial porting.

Another type of tip includes a carbide cutting blade on the front. This type of tip is the only type that the operator is allowed to jam in to the material, as mechanical cutting is taking place along with waterjet cutting.

The third type of tip uses a single carbide nozzle insert, placed into the tip at a slight angle. This single, very focused jet will be pushed around by the slight side force and wobble its way through.

OPERATION

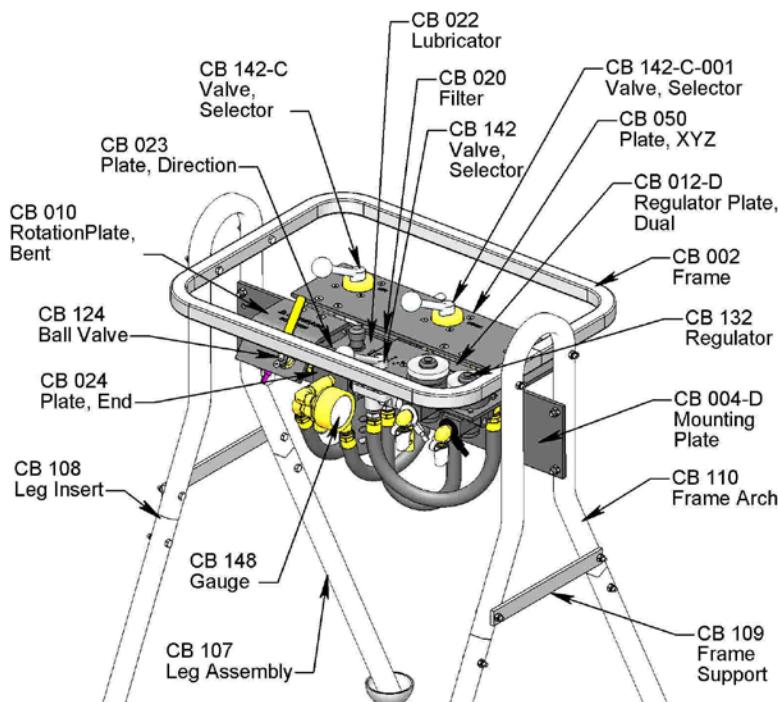
- Make sure the far end of the tube bundle is flagged off and no one is within this area. A deflector plate is recommended for debris and water, particularly in horizontal bundles.
- Turn the advance regulator on the control box down to zero, switch the selector valve to forward and slowly increase the regulator until the carriage begins to move, switch the selector valve back to off, leaving the regulator at this low setting. Think of the regulators as controlling push force as well as speed.
- Advance the carriage on the lancing machine until the tip is just inside the first tube if it is open or partially open; if it is a plugged tube, do not drive the tip into the material until the water pressure has started to come up; stop just short of the tip entering the tube.
- Start the rotation of the lances and close the dump valve; bring the pressure up slowly with the pump throttle or bypass valve. If it is a plugged tube, advance the tip into the material.
- Once operating pressure is reached, advance the lance into the tube. The forward regulator setting may need to be increased at this time to make the carriage move, as the jet thrust may be pushing back against the feed. Gradually increase the forward regulator, which is increasing the push force as well as the feed rate. Watch the lances to make sure they are not starting to flex; if they are, slightly decrease the regulator setting and leave it at this point. Also watch the machine and positioner for evidence of increasing load. If the machine hydraulics more than once or twice while cleaning every tube, the feed rate should be decreased to prevent this. Hydraulicking forces can be high enough to bend and destroy the lances; they can pick up a vertical machine, positioner and scaffold with two people standing on platforms (at least 500 pounds). Once an optimum feed rate is determined, the regulator has an adjustable stop that can be set and repeatedly returned to if desired.
- If the tubes are open and only being polished, there is an optimum feed rate to allow the jets to achieve complete coverage; multiply the number of jets by the orifice size of the jets and the rotation speed of the lance (600 rpm if the rotation speed is set on full). The result will be the feed rate in inches per minute to achieve complete jet coverage. Sometimes the material may require multiple jet strikes to be removed. The only way to determine this is to complete a cleaning pass at a certain speed, then check the tube for cleaning effectiveness and adjust the feed rate accordingly. If desired, set the adjustable stop in the regulator.
- The direction of the carriage should be reversed when the operator hears or observes the jets exiting at the far end of the tube bundle. The retract regulator can be slowed to allow an additional cleaning pass on the return stroke, or retracted at full speed if the forward cleaning pass is sufficient. Dump the pressure when the jets begin to exit the tube. Once a tube is cleaned and the nozzle tip retracted to clear the tube, use the positioner to move the machine to the next tube or tubes in that row. A practiced operator will be able to align the machine very quickly and likely in one move, but an inexperienced operator should take time initially to make sure the tip is aligned, otherwise the tip will run into the tube face and possibly bend and destroy a lance, particularly if the forward regulator is set at a high push/feed rate. Leaving the forward speed slower helps with tube alignment for an inexperienced operator.

CONTROL BOX TO SYSTEM ASSEMBLY

Control Box:

The control box consists of a ball valve that is used to turn on/off the rotation; it can also be partially opened/closed to regulate the rotation speed. There is a single air line connected from the exit of the ball valve to the rotation port on the air motor; the port selected should rotate the lance in a direction to tighten the nozzle tip onto the lance. Always blow out the air hoses before connecting to the motor ports.

The selector valve and two regulators are used to control the feed direction and speed as well as the push/pull force of the drive. Two hoses are connected from the regulators to the drive air motor; connect the hoses to match the description on the selector valve regarding direction. Reverse the hoses to the motor to achieve this if necessary. Continue in the same manner to connect two hoses to each of the LP positioning motors.

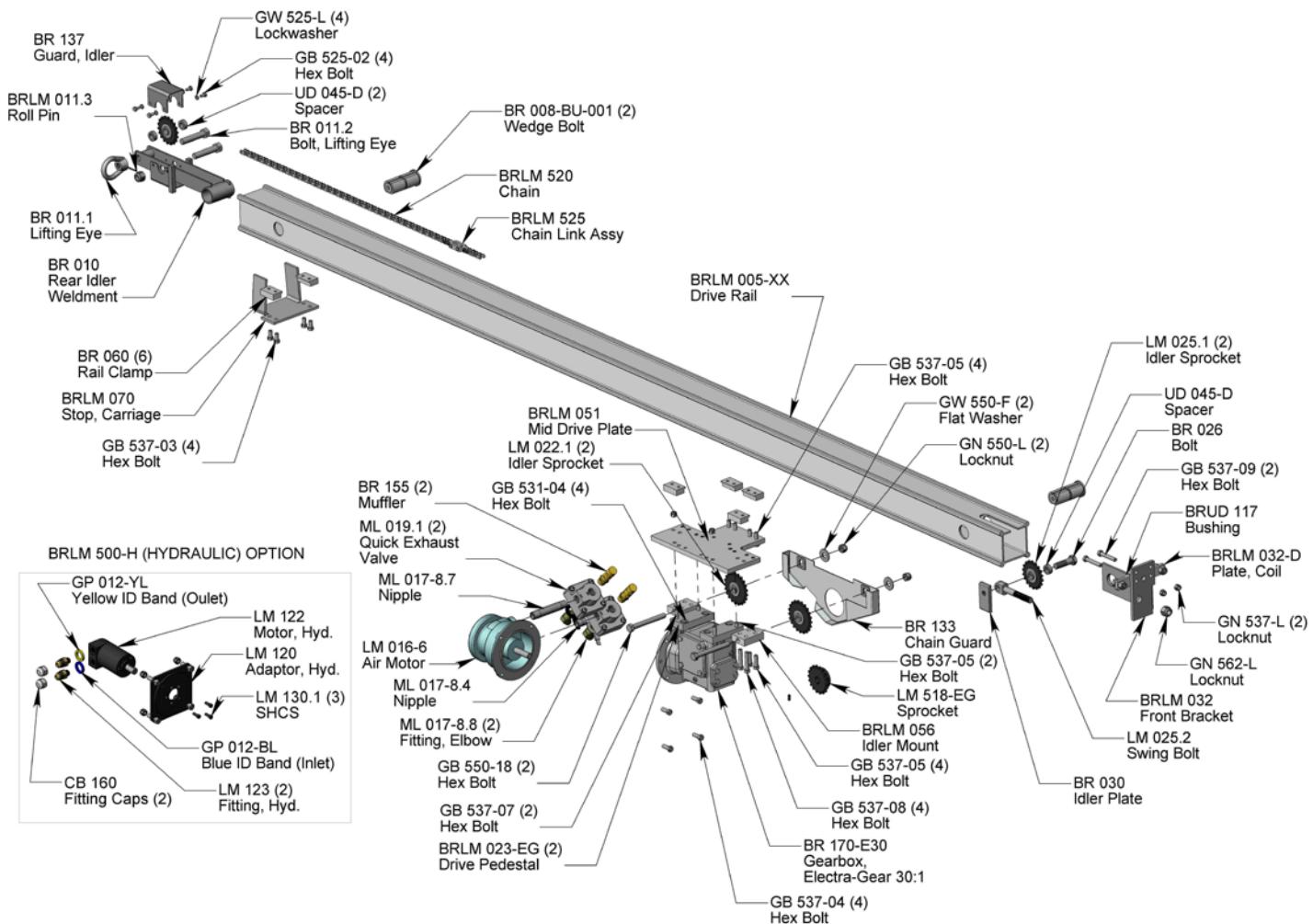


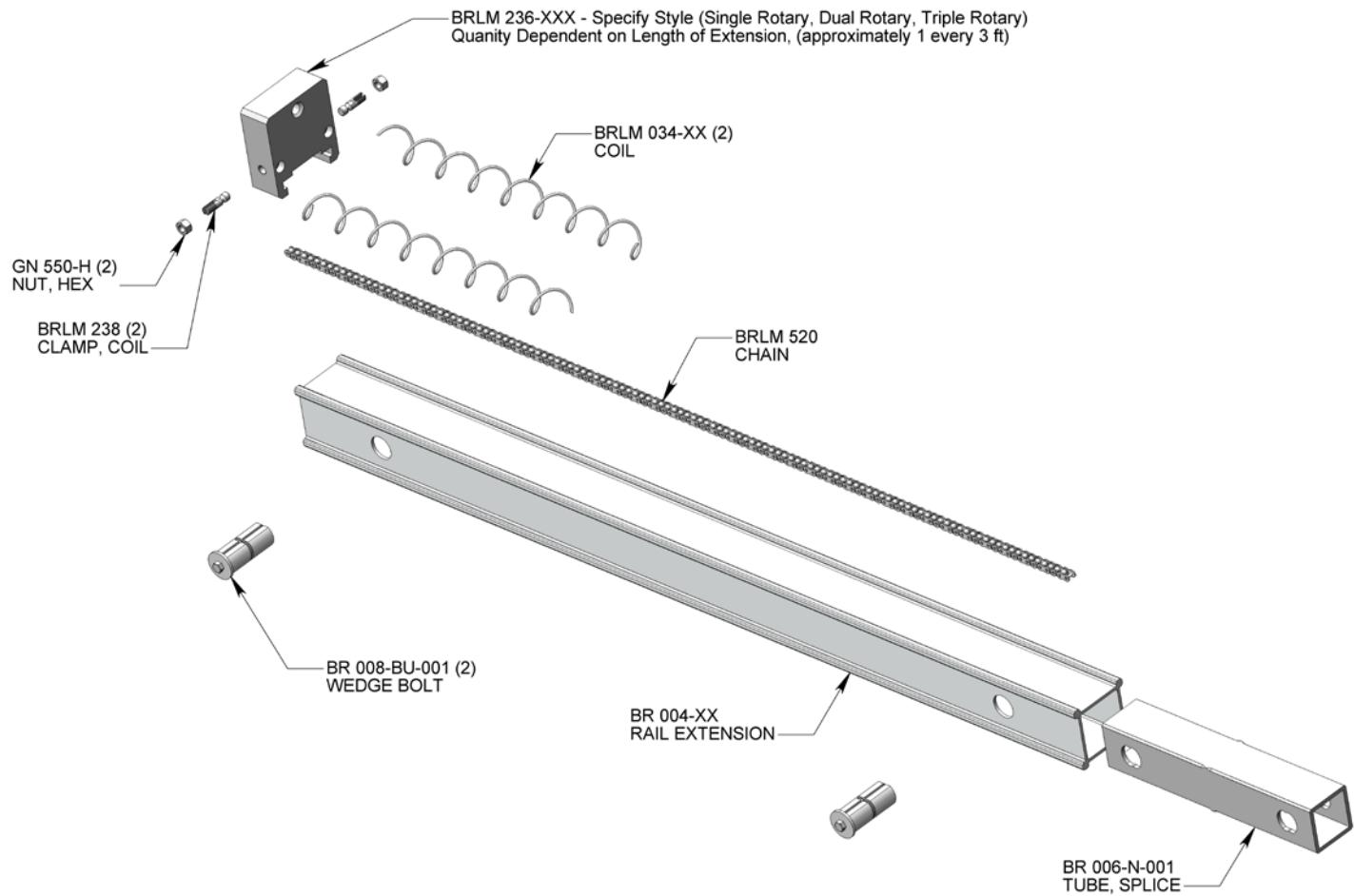
MAINTENANCE

Maintenance Item	Maintenance Required
Air Supply	A compressed air source of at least 70 cfm at 80 psi is required. Lower pressure will result in slower rotation and feed rates. Blow air through all hoses before connecting. Drain the filter bowl if it fills with water.
Rail	The lance rail should be kept clean. Do not apply any lubrication to the rail, as this tends to collect grit and increase wear.
Chain	Spray with a light oil occasionally to prevent corrosion
Air Motor	Air motors should be lubricated after use to prevent internal corrosion and seizing. To do this, remove air hose from motor fitting and squirt in some light oil. Reconnect air line and run for a few seconds to distribute oil in motor. If the air motor seizes and does not run, remove air motor from gearbox, squirt some oil into ports, and try to rotate motor shaft with wrench until it breaks free. This does have the risk of damaging the vanes in the motor, but usually is successful.

PARTS DIAGRAM

BRLM 500-XX
RIGID LANCING MACHINE

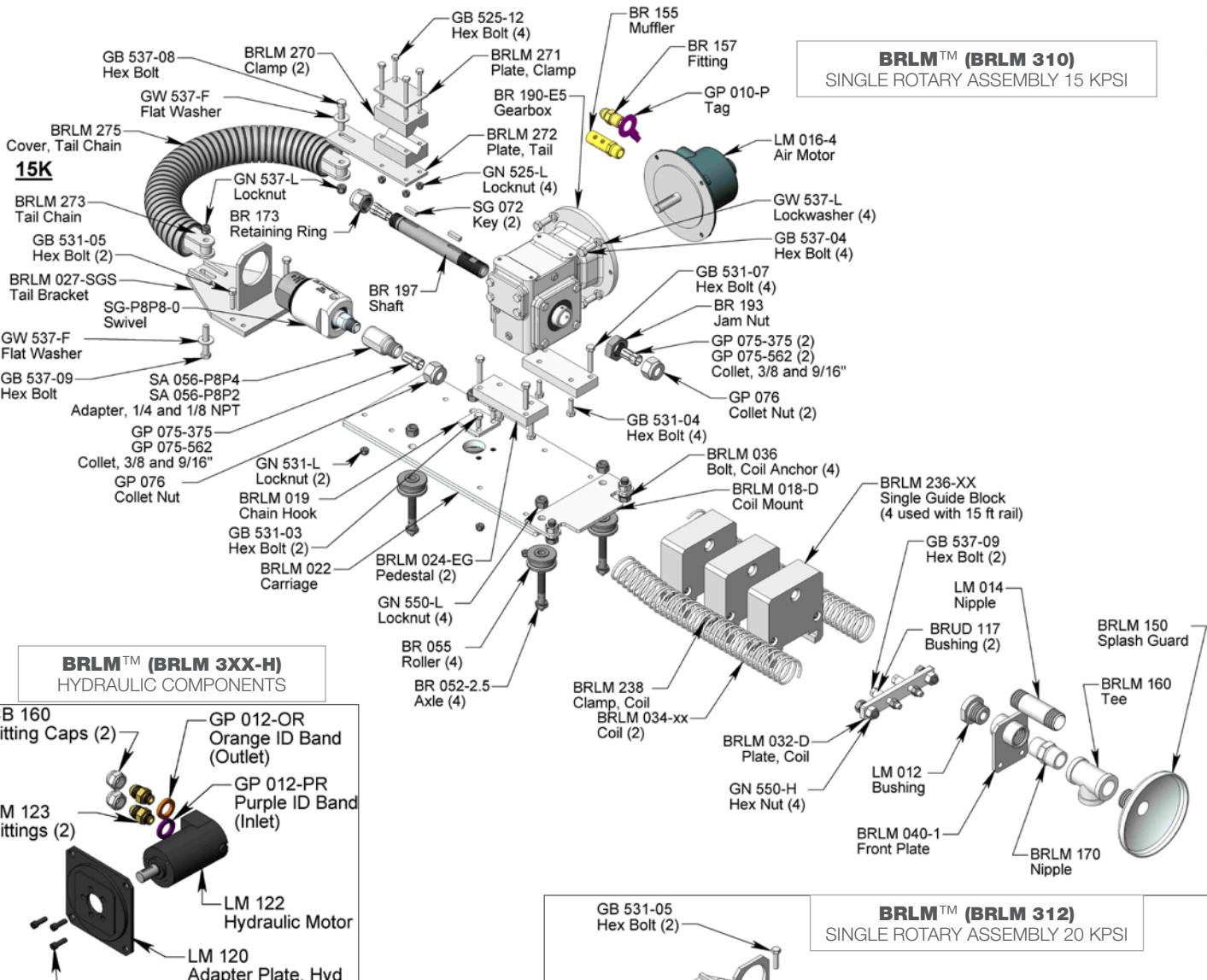


BRLM 580-X EXTENSION KIT

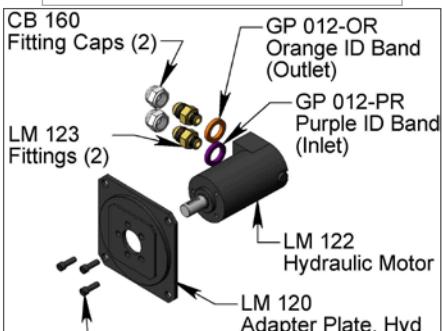
PARTS DIAGRAM

BRLM (BRLM 3XX)

SINGLE ROTARY ASSEMBLY 15, 20, AND 40 KPSI

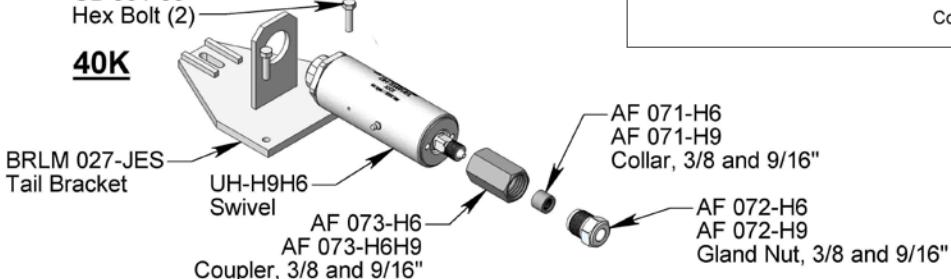


BRLM™ (BRLM 3XX-H) HYDRAULIC COMPONENTS



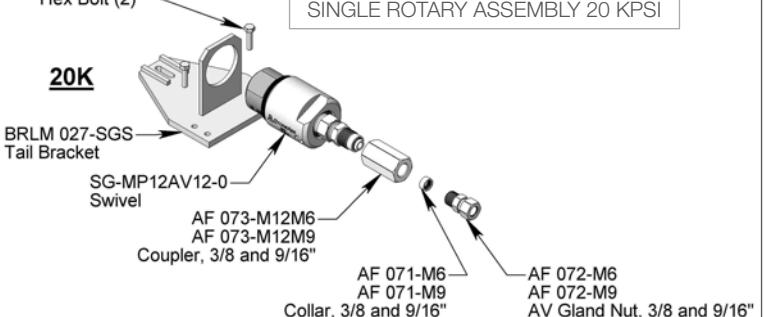
BRLM™ (BRLM 330) SINGLE ROTARY ASSEMBLY 40 KPSI

40K

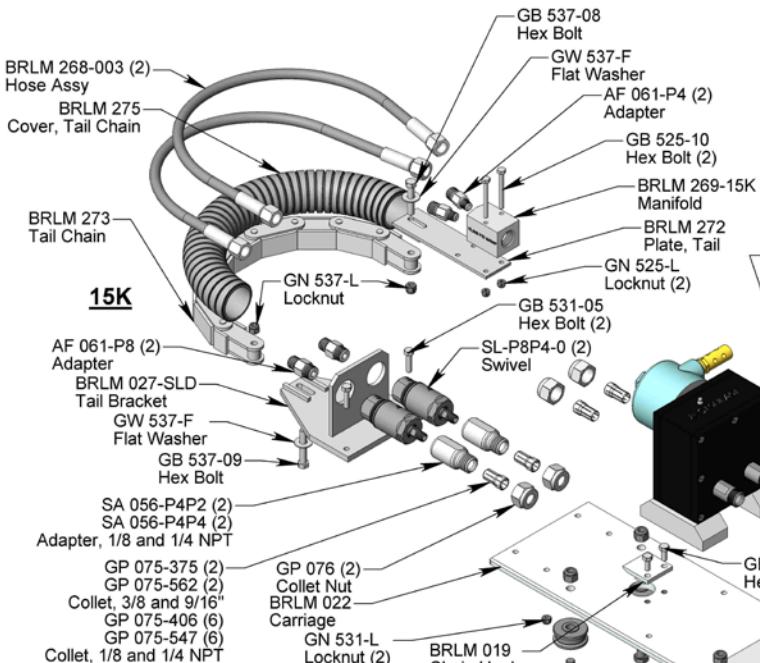


BRLM™ (BRLM 312) SINGLE ROTARY ASSEMBLY 20 KPSI

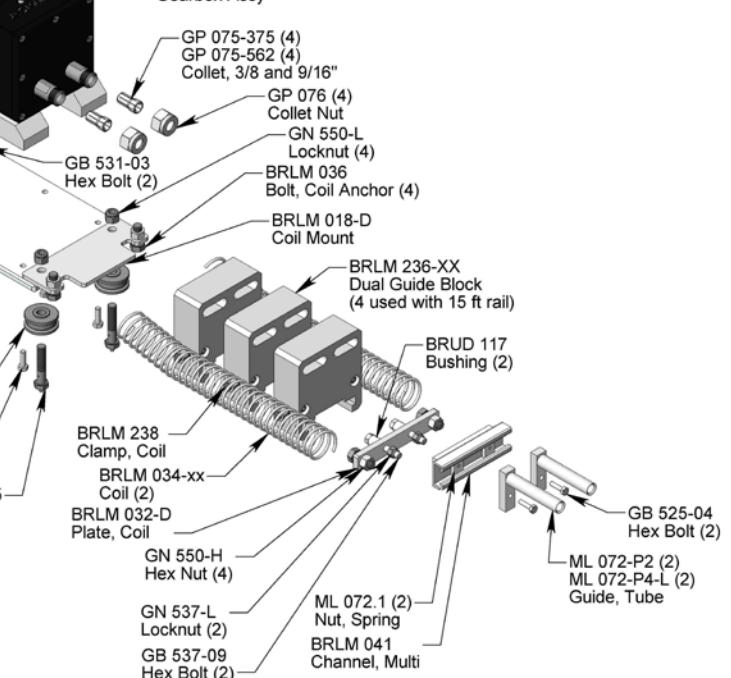
20K



BRLM™ (BRLM 3XX)
DUAL ROTARY ASSEMBLY 15, 22, AND 40 KPSI



BRLM™ (BRLM 341)
DUAL ROTARY ASSEMBLY 15 KPSI

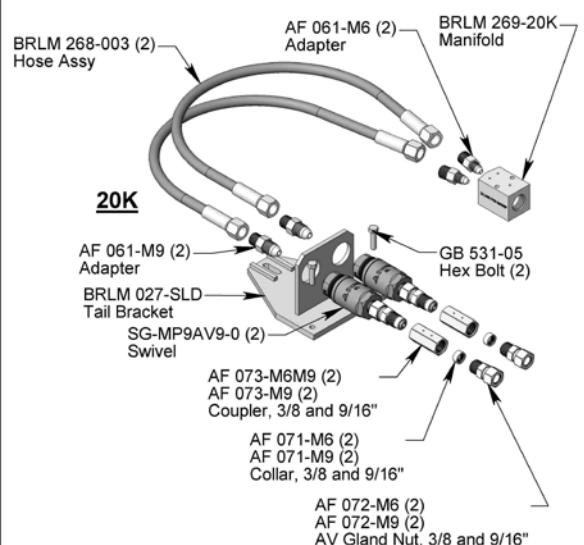
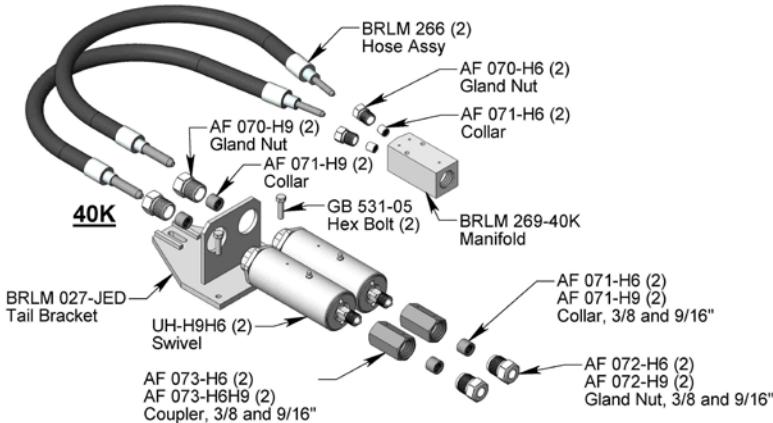


BRLM™ (BRLM 3XX-H)
HYDRAULIC COMPONENTS



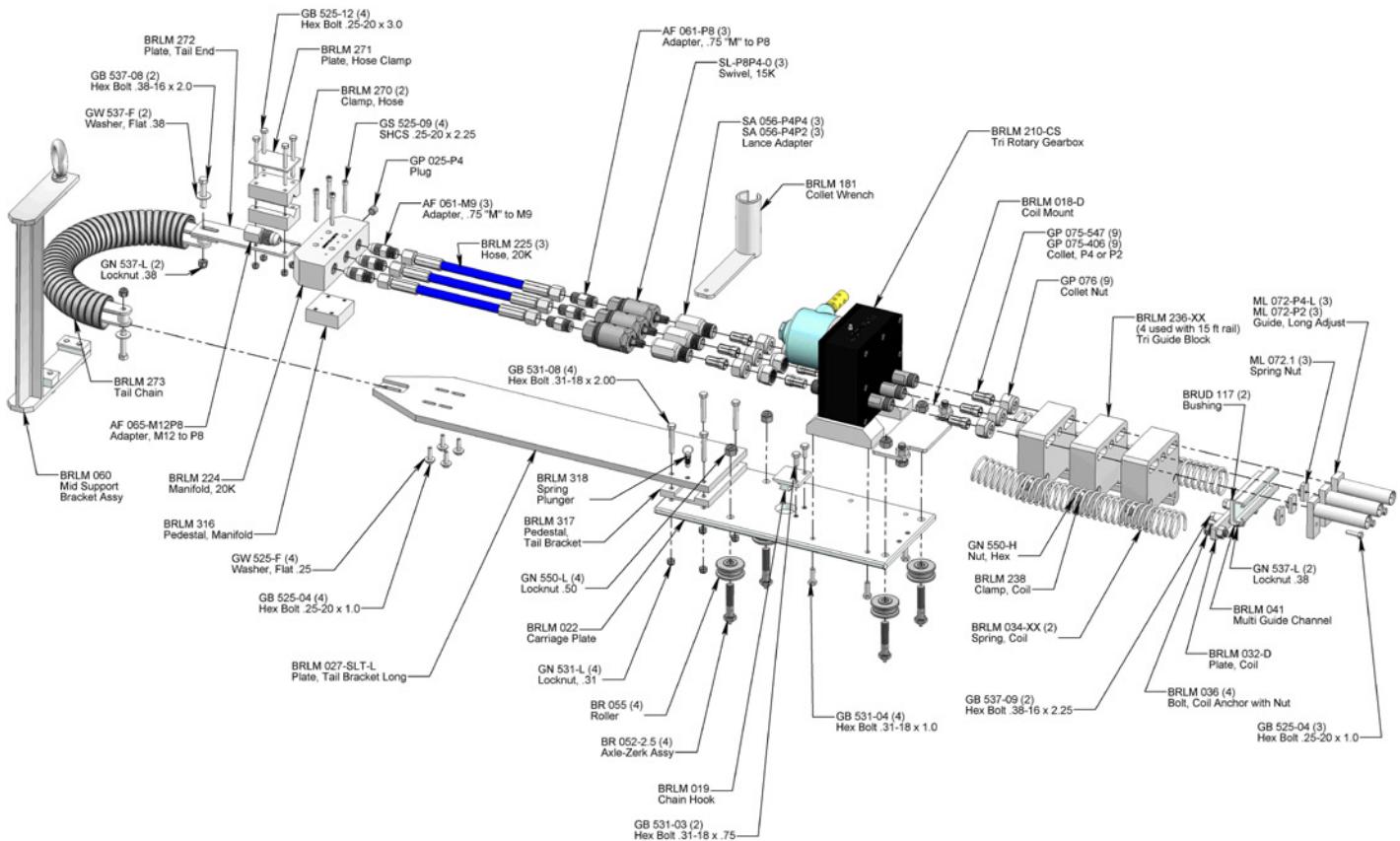
BRLM™ (BRLM 351)
DUAL ROTARY ASSEMBLY 22 KPSI

BRLM™ (BRLM 361)
DUAL ROTARY ASSEMBLY 40 KPSI

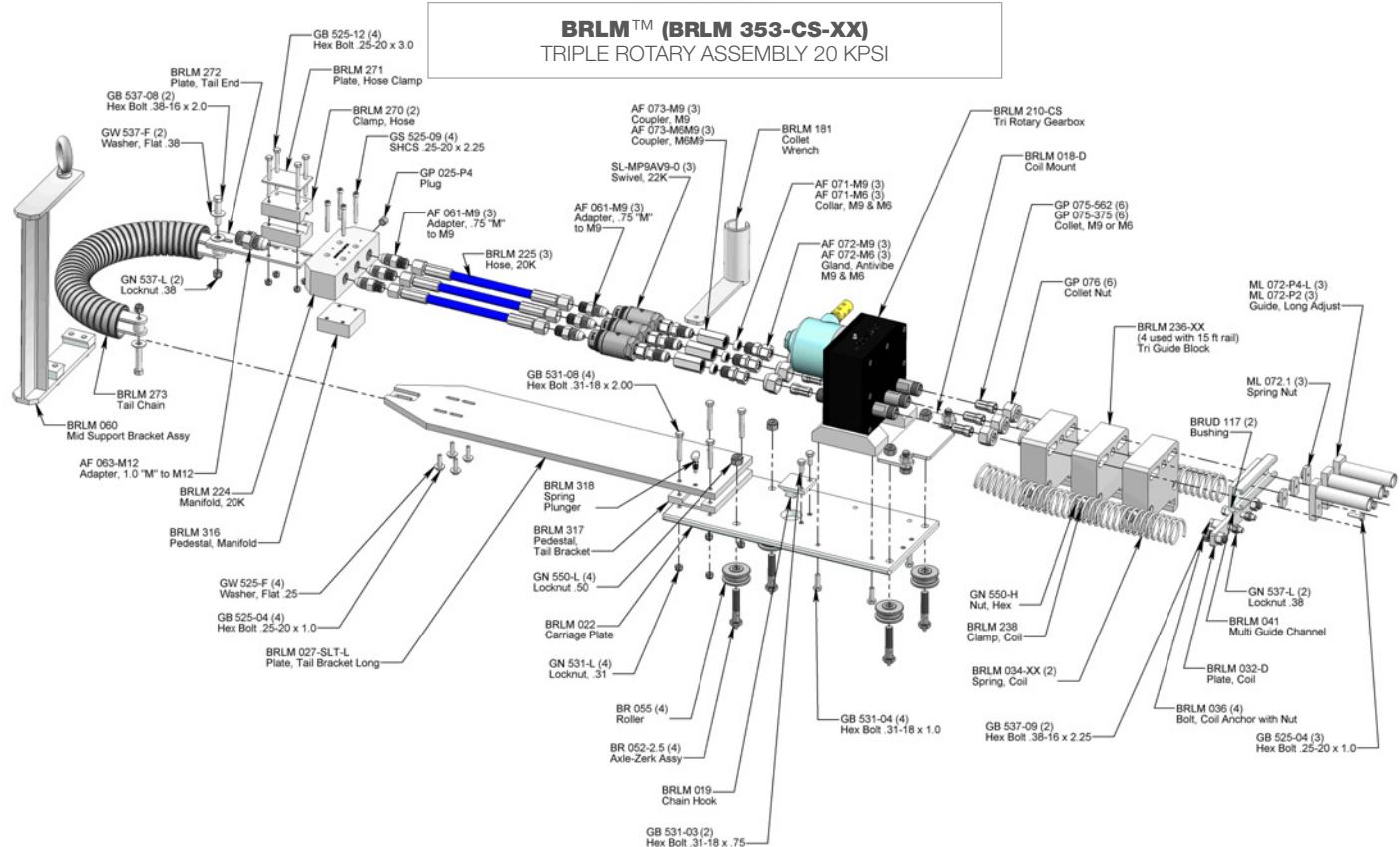


PARTS DIAGRAM

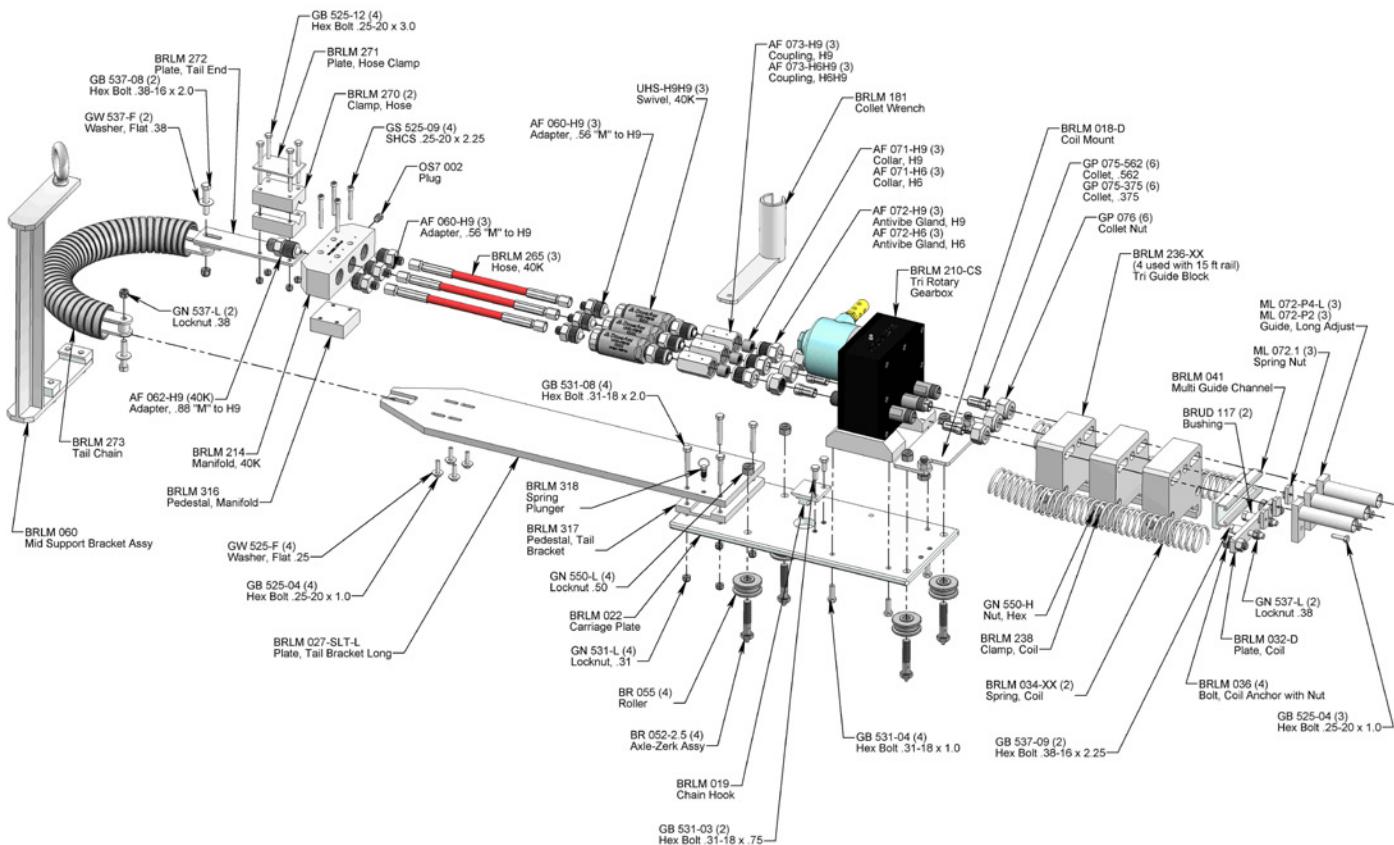
BRLM™ (BRLM 343-CS-XX)
TRIPLE ROTARY ASSEMBLY 15 KPSI



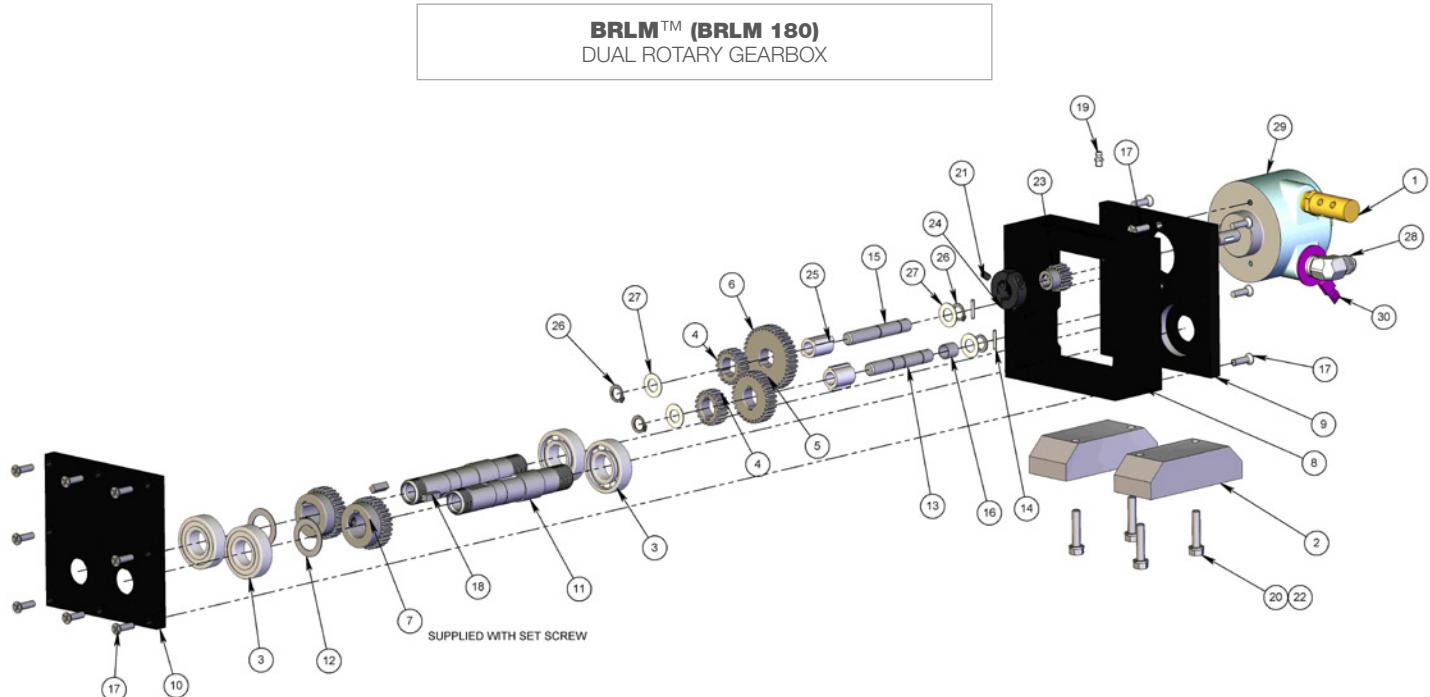
BRLM™ (BRLM 353-CS-XX)
TRIPLE ROTARY ASSEMBLY 20 KPSI



BRLM™ (BRLM 363-CS-XX)
TRIPLE ROTARY ASSEMBLY 40 KPSI



PARTS DIAGRAM

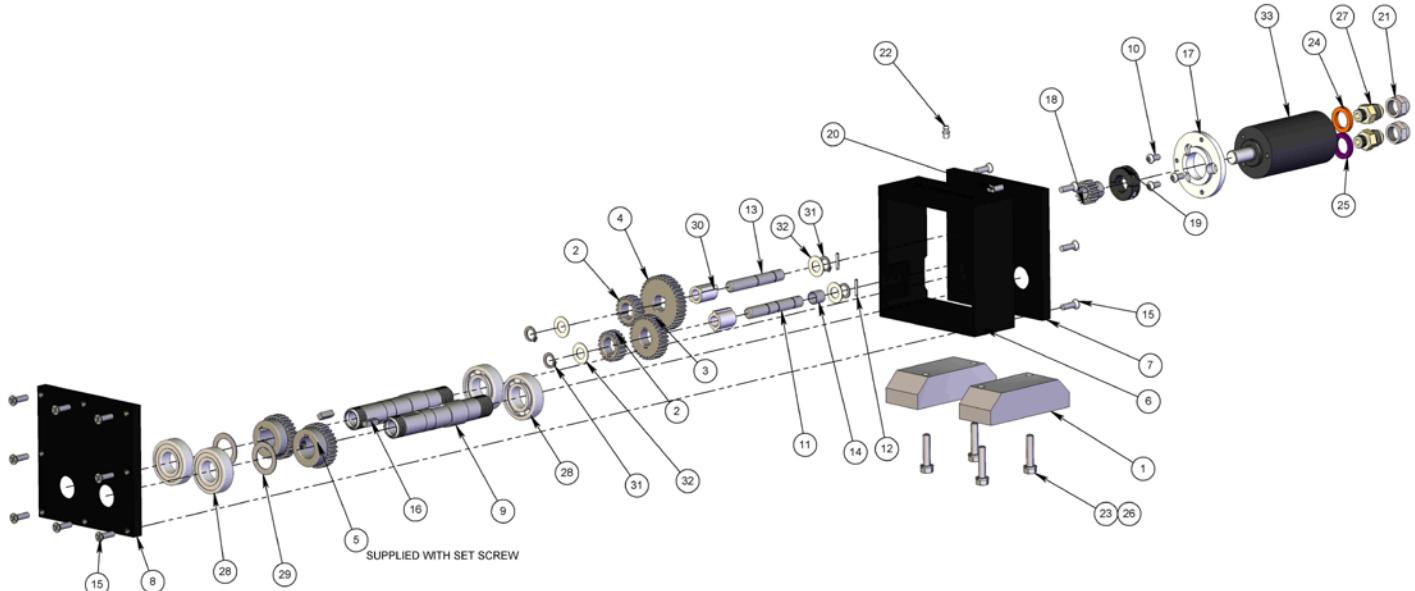


#	PART NUMBER	QTY.
1	BR 155 MUFFLER	1
2	BRLM 024-SA BLOCK, MOUNT STD	2
3	BRLM 109 BEARING	4
4	BRLM 172 BOSTONGEAR-GB20	2
5	BRLM 174 BOSTONGEAR-GB30	1
6	BRLM 176 BOSTONGEAR-GB38	1
7	BRLM 178 BOSTONGEAR-NB30B-1	2
8	BRLM 182 HOUSING, SPUR	1
9	BRLM 183 PLATE, COVER REAR	1
10	BRLM 184 PLATE, COVER FRONT	1

11	BRLM 186 SHAFT, SPUR GEAR	2
12	BRLM 188 SHIM, SS	2
13	BRLM 190 SHAFT, FINAL	1
14	BRLM 191 SPRING PIN, .125 X .75	2
15	BRLM 192 SHAFT, INTERMEDIATE	1
16	BRLM 193 SPACER,FINAL SHAFT	1
17	BRLM 194 FHSCS .25-20 X .88 LONG	18
18	BRLM 195 KEY, SQ .250 X .250 X .75	2
19	FS 004-0 ZERK, STRAIGHT	1
20	GB 531-06 BOLT, HEX .31-18 X 1.50	4

21	GSS 525-28-37CU SET SCREW	1
22	GW 531-L LOCK WASHER	4
23	HRS 510 GEAR, 15T	1
24	HRS 510.2 COLLAR ASSY, PINION	1
25	HRS 515 GEAR BUSHING	2
26	HRS 518 RETAINING RING, SL EXTERNAL	4
27	HRS 529 THRUST WASHER	4
28	HRS 573 FITTING 90 DEG P8J8	1
29	SG 055 AIR MOTOR	1
30	GP 010-P PLASTIC ID WASHER P8	1

BRLM™ (BRLM 180H)
DUAL ROTARY GEARBOX HYDRAULIC OPTION

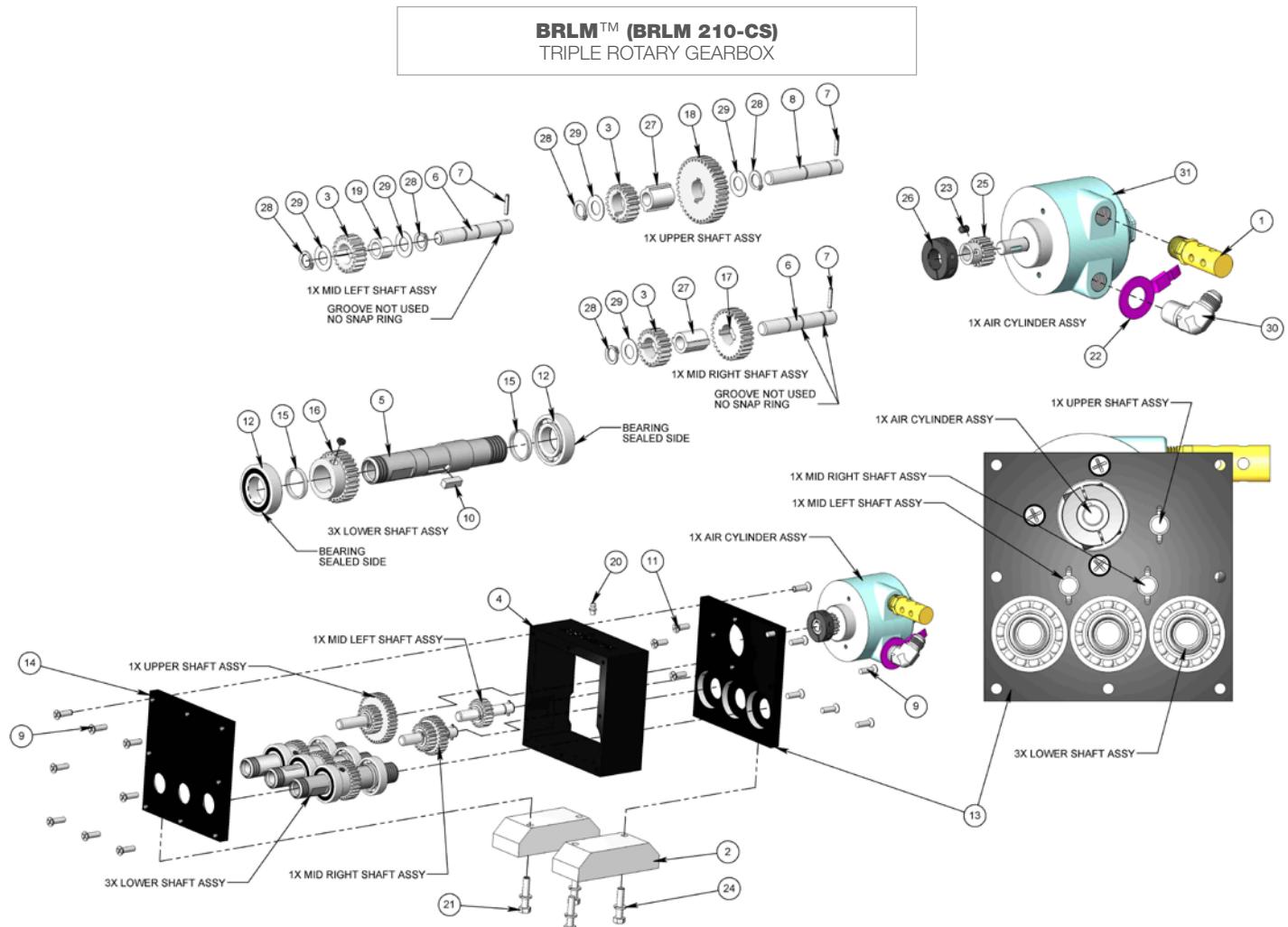


#	PART NUMBER	QTY.
1	BRLM 024-SA BLOCK, MOUNT STD	2
2	BRLM 172 BOSTONGEAR-GB20	2
3	BRLM 174 BOSTONGEAR-GB30	1
4	BRLM 176 BOSTONGEAR-GB38	1
5	BRLM 178 BOSTONGEAR-NB30B-1	2
6	BRLM 182 HOUSING, SPUR	1
7	BRLM 183 PLATE, COVER REAR	1
8	BRLM 184 PLATE, COVER FRONT	1
9	BRLM 186 SHAFT, SPUR GEAR	2
10	BRLM 189 SBHCS .25-.28 X .50 LONG	3
11	BRLM 190 SHAFT, FINAL	1

12	BRLM 191 SPRING PIN, .125 X .75	2
13	BRLM 192 SHAFT, INTERMEDIATE	1
14	BRLM 193 SPACER,FINAL SHAFT	1
15	BRLM 194 FHSCS .25-.20 X .88 LONG	15
16	BRLM 195 KEY, SQ .250 X .250 X .75	2
17	BRLM 196 ADAPTER, HYD MOTOR	1
18	BRLM 197 GEAR 15T HYD MOTOR	1
19	BRLM 198 COLLAR ASSY, PINION	1
20	BRLM 199 FHSCS .25-.20 X .75 LONG	3
21	CB 160 JIC-8 CAP	2
22	FS 004-0 ZERK, STRAIGHT	1
23	GB 531-06 BOLT, HEX .31-.18 X 1.50	4

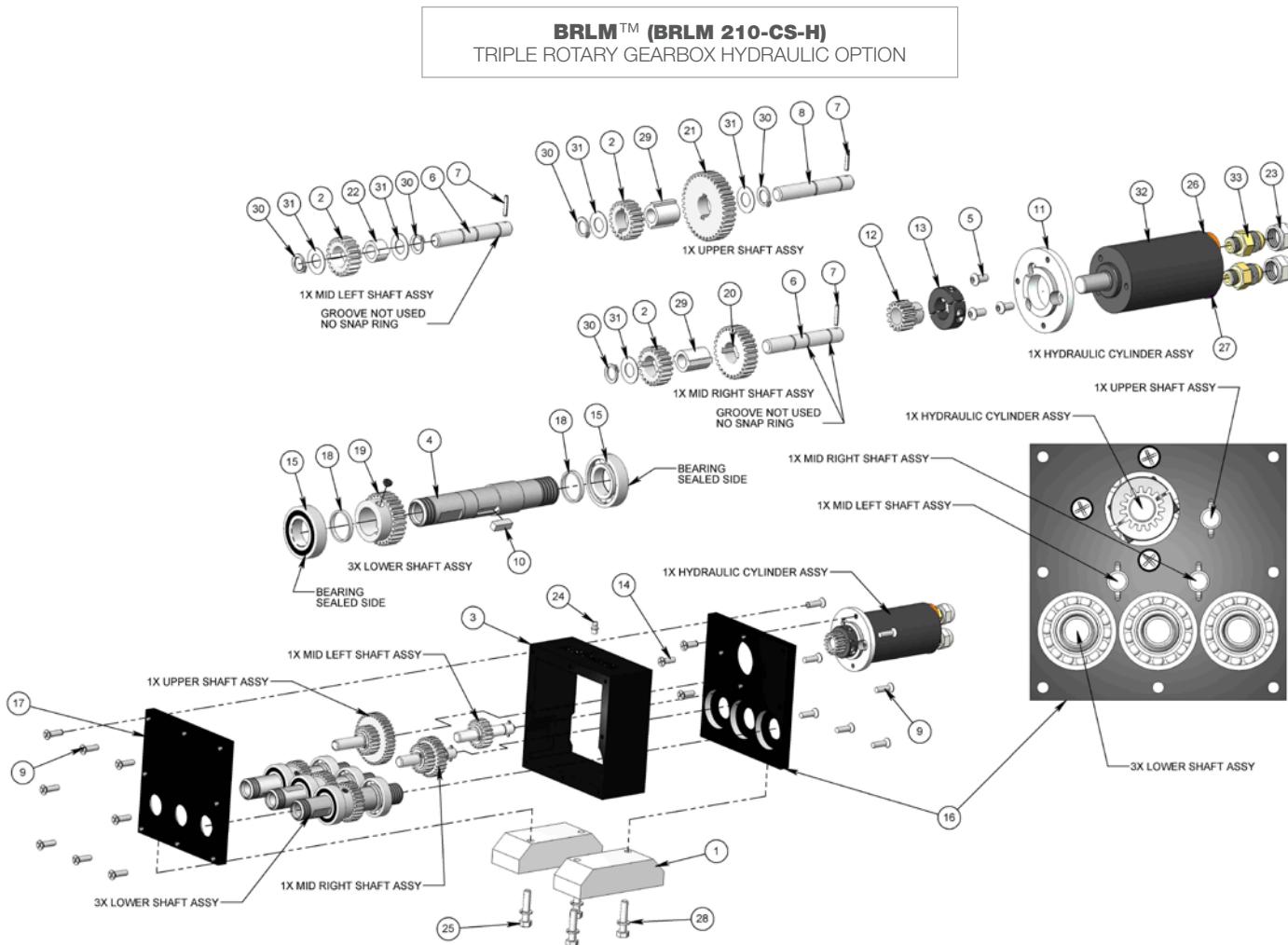
24	GP 012-OG ORANGE ID BAND	1
25	GP 012-PR PURPLE ID BAND	1
26	GW 531-L LOCK WASHER	4
27	LM 123 FITTING HYD	2
28	BRLM 109 BEARING	4
29	BRLM 188 SHIM, SS	2
30	HRS 515 GEAR BUSHING	2
31	HRS 518 RETAINING RING, SL EXTERNAL	4
32	HRS 529 THRUST WASHER	4
33	LM 121 HYD MOTOR	1

PARTS DIAGRAM



#	PART NUMBER	QTY.
1	BR 155 MUFFLER	1
2	BRLM 024-SA BLOCK, MOUNT STD	2
3	BRLM 172 BOSTONGEAR-GB20	3
4	BRLM 182 HOUSING, SPUR	1
5	BRLM 186 SHAFT, SPUR GEAR	3
6	BRLM 190 SHAFT, FINAL	2
7	BRLM 191 SPRING PIN, .125 X .75	3
8	BRLM 192 SHAFT, INTERMEDIATE	1
9	BRLM 194 FHSCS .25-20 X .88 LONG	15
10	BRLM 195 KEY, SQ .250 X .250 X .75	3
11	BRLM 199 FHSCS .25-20 X .75 LONG	3
12	BRLM 201 BEARING	6
13	BRLM 203 PLATE, COVER REAR	1
14	BRLM 204 PLATE, COVER FRONT	1
15	BRLM 207 SPACER, SPUR SHAFT	6

16	BRLM 211 GEAR, MODIFIED	3
17	BRLM 212 BOSTONGEAR-GB28	1
18	BRLM 213 BOSTONGEAR-GB37	1
19	BRLM 215 GEAR BUSHING MOD	1
20	FS 004-0 ZERK, STRAIGHT	1
21	GB 531-06 BOLT, HEX .31-18 X 1.50	4
22	GP 010-X PLASTIC ID WASHER P8	1
23	GSS 525-28-37CU SET SCREW	1
24	GW 531-L LOCK WASHER	4
25	HRS 510 GEAR, 15T	1
26	HRS 510.2 COLLAR ASSY, PINION	1
27	HRS 515 GEAR BUSHING	2
28	HRS 518 RETAINING RING, SL EXTERNAL	5
29	HRS 529 THRUST WASHER	5
30	HRS 573 FITTING 90 DEG P8J8	1
31	SG 055 AIR MOTOR	1



#	PART NUMBER	QTY.
1	BRLM 024-SA BLOCK, MOUNT STD	2
2	BRLM 172 BOSTONGEAR-GB20	3
3	BRLM 182 HOUSING, SPUR	1
4	BRLM 186 SHAFT, SPUR GEAR	3
5	BRLM 189 SBHCS .25-.28 X .50 LONG	3
6	BRLM 190 SHAFT, FINAL	2
7	BRLM 191 SPRING PIN, .125 X .75	3
8	BRLM 192 SHAFT, INTERMEDIATE	1
9	BRLM 194 FHSCS .25-.20 X .88 LONG	15
10	BRLM 195 KEY, SQ .250 X .250 X .75	3
11	BRLM 196 ADAPTER, HYD MOTOR	1
12	BRLM 197 GEAR 15T HYD MOTOR	1
13	BRLM 198 COLLAR ASSY, PINION	1
14	BRLM 199 FHSCS .25-.20 X .75 LONG	3
15	BRLM 201 BEARING	6
16	BRLM 203 PLATE, COVER REAR	1

17	BRLM 204 PLATE, COVER FRONT	1
18	BRLM 207 SPACER, SPUR SHAFT	6
19	BRLM 211 GEAR, MODIFIED	3
20	BRLM 212 BOSTONGEAR-GB28	1
21	BRLM 213 BOSTONGEAR-GB37	1
22	BRLM 215 GEAR BUSHING MOD	1
23	CB 160 JIC-8 CAP	2
24	FS 004-0 ZERK, STRAIGHT	1
25	GB 531-06 BOLT, HEX .31-18 X 1.50	4
26	GP 012-0G ORANGE ID BAND	1
27	GP 012-PR PURPLE ID BAND	1
28	GW 531-L LOCK WASHER	4
29	HRS 515 GEAR BUSHING	2
30	HRS 518 RETAINING RING, SL EXTERNAL	5
31	HRS 529 THRUST WASHER	5
32	LM 121 HYD MOTOR	1
33	LM 123 FITTING HYD	2

PARTS DIAGRAM

BRLM
GUIDE BLOCK KITS

Attach blocks every 8th coil.

5 FT EXTENSION
(2 BLOCKS, 1 TAIL)



10 FT EXTENSION
(3 BLOCKS, 1 TAIL)



15 FT EXTENSION
(4 BLOCKS, 1 TAIL)



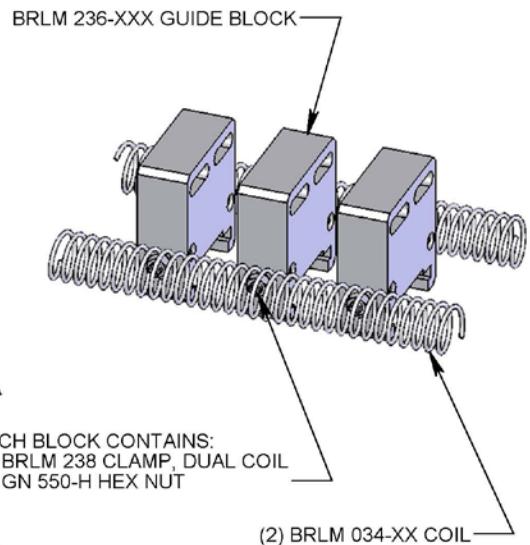
15 FT DRIVE
(4 BLOCKS, 2 TAILS)



20 FT EXTENSION
(6 BLOCKS, 1 TAIL)



25 FT DRIVE
(7 BLOCKS, 2 TAILS)



EACH BLOCK CONTAINS:
(2) BRLM 238 CLAMP, DUAL COIL
(2) GN 550-H HEX NUT

(2) BRLM 034-XX COIL

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TERMS AND CONDITIONS

1. Acceptance of Terms and Conditions. These Terms and Conditions shall operate as Seller's acceptance of Buyer's purchase order, and such acceptance is made expressly conditional on assent by Buyer to the Terms and Conditions. Such assent shall be deemed to have been given unless written notice of objection to any of such Terms and Conditions (including inconsistencies between Buyer's purchase order and this acceptance) is given by Buyer to Seller promptly on receipt hereof.

Seller desires to provide its Buyer with prompt and efficient service. However, to negotiate individually the terms of each sales contract would substantially impair Seller's ability to provide such service. Accordingly, products furnished and services rendered by Seller are sold only on the Terms and Conditions stated herein. Notwithstanding any Terms or Conditions on Buyer's order, Seller's performance of any contract is expressly made conditional on Buyer's agreement to Seller's Terms and Conditions of sale unless otherwise specifically agreed to in writing by Seller. In the absence of such agreement, commencement of performance, shipment and/or delivery shall be for Buyer's convenience only and shall not be deemed or construed to be an acceptance of Buyer's Terms and Conditions. **PRODUCTS SOLD BY SELLER ARE DESIGNED AND INTENDED TO BE USED AT HIGH PRESSURES AND SPEEDS, AND MAY BE DANGEROUS IF OPERATED IMPROPERLY OR WITHOUT THE USE OF APPROPRIATE SAFETY DEVICES AND GUARDS. BUYER IS CAUTIONED TO CAREFULLY READ AND UNDERSTAND THESE TERMS AND CONDITIONS, AS THEY HAVE IMPORTANT LEGAL CONSEQUENCES.**

2. Payment/Prices. Unless other arrangements have been made in writing between Seller and Buyer, payment for product delivered shall be made upon receipt of invoice. The prices shown on the face hereof are those currently in effect. Prices invoiced shall be per price list in effect at the time of shipment. Prices are subject to increase for inclusion of any and all taxes which are applicable and which arise from the sale, delivery or use of Seller's products or services and for the collection of which Seller is or may be responsible to any governmental authority unless acceptable exemption certificates are provided by Buyer in accordance with law. Buyer shall pay all charges for transportation and delivery and all excise, order, occupation, use or similar taxes, duties, levies, charges or surcharges applicable to the equipment or services being purchased, whether now in effect or hereafter imposed by any governmental authority, foreign or domestic.

3. Warranty. Subject to the limitations and conditions hereinafter set forth, Seller warrants to the original Buyer that its products are free from defects in workmanship and material for a period of one (1) year months from shipment. Seller's obligation under this warranty shall be limited to repairing, replacing or issuing a credit for, at Seller's option, any products or services it finds to be defective in material or workmanship. In no event shall Seller be liable for any incidental, consequential or indirect damages of any kind. **THIS WARRANTY SHALL BE IN LIEU OF ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY FOR MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.** No statement or recommendation made by Seller or its representative to Buyer or User shall constitute a warranty by Seller or a waiver or modification to any of the provisions hereof or create any liability for Seller. All warranty claims are subject to the exclusions and limitations set forth below:

a. The warranty shall not apply if the product or service (1) has been subject to misuse, negligence or accident; (2) has not been installed or

operated in accordance with Seller's recommendations; (3) has been operated under more severe conditions than those specified for the particular product or service; (4) has been operated beyond the rated capacity of the product; or (5) has been repaired or altered outside Seller's facilities or in any way so as, in Seller's judgment, to affect its stability or reliability.

b. Products that Seller furnishes, but does not manufacture, carry only the warranty of the manufacturer of such products. Where other manufacturers' or suppliers' products used in Seller's products or services prove defective, Seller's liability shall exist only to the extent that Seller is able to recover from such manufacturers or suppliers for such defects.

c. Any warranty granted by Seller to the Buyer shall be deemed void if any goods covered by such warranty are used for any purpose not recommended or permitted. In addition, the Buyer shall indemnify Seller and hold Seller harmless from and against any and all claims, damages, losses, costs, expenses and other liability of whatever nature that Seller suffers or incurs by reason of any such unintended use.

d. Notice of defective product or service must be given in writing to Seller by Buyer or User within fifteen (15) business days following receipt of goods. Buyer or User shall keep such products or services in an unaltered condition for examination by Seller's representative. No goods may be returned for credit or adjustment without prior written permission from Seller.

4. Product Liability. Buyer specifically acknowledges that the products being purchased may be operated at high speeds and/or pressures, and that as such they may be inherently dangerous if not used correctly. Buyer shall be solely responsible for the safe operation of the products at all times and for determining the safety devices and guards that may be required for the safe operation of the products. Buyer shall undertake to specify and order all safety devices and guards necessary for the safe operation of the equipment covered. All safety devices and guards offered in Seller's quotations are recommended for purchase. Seller may provide necessary safety devices and guards not offered in this quotation at an extra price in accordance with the specifications of Buyer. Buyer shall at all times use and require its employees to use all necessary and appropriate safety devices, guards and proper safe operating procedures. Buyer shall not remove or modify any such devices, guards or warning signs and shall insist on safe operating practices on the part of its personnel. In no event shall Seller be responsible for any injuries to persons or property caused by defects in any equipment, including by way of illustration and not limitation, any pumps, compressors, fittings, connections, components, piping or hoses up to the point that same are connected to the product. Buyer agrees to indemnify and to save Seller harmless from any and all liability or obligation incurred by or against Seller, including costs and attorneys' fees, to or by any persons injured directly or indirectly in the operation of the equipment furnished under the following conditions:

- a. if Buyer fails to purchase and use necessary and appropriate safety devices and guards as determined and/or recommended by Seller;
- b. if Buyer fails to maintain in good working order such safety devices and guards as are purchased from Seller;
- c. if Buyer adds, omits, repairs, modifies, replaces or substitutes any components on the equipment without permission from Seller;

d. if Buyer exceeds at any time the maximum safe loads, pressures or speeds recommended by Seller for the equipment furnished hereunder without the specific written consent of Seller; or

e. if Buyer otherwise fails to operate the product or equipment in accordance with Seller's printed instructions or otherwise negligently operates the equipment.

5. Delivery. Seller is not obligated to make delivery by a specified date, but will always use its best efforts to make delivery within the time requested. All deliveries are based on F.O.B. Seller's factory, unless specifically agreed otherwise, and Buyer shall pay all shipping costs and insurance from that point. Seller, in its sole discretion, will determine and arrange the means and manner of transportation of the products. Responsibility of Seller shall cease and Buyer assumes all risk of loss or damages upon Seller's delivery to and receipt by a common carrier. Carriers shall be responsible for goods lost or damaged in transit and Buyer shall immediately notify the carrier in writing of such loss or damage. At Buyer's request Seller will offer its assistance. **THE PROPOSED SHIPMENT DATE IS AN ESTIMATE. UNDER NO CIRCUMSTANCES SHALL SELLER HAVE ANY LIABILITY WHATSOEVER FOR LOSS OF USE OR FOR ANY DIRECT OR CONSEQUENTIAL DAMAGES RESULTING FROM DELAY REGARDLESS OF THE REASON(S).** Shortages or errors must be reported within fifteen (15) business days from receipt of shipment to secure adjustment. No merchandise may be returned without securing written approval from Seller. Seller will notify Buyer promptly of any material delay and will specify the revised delivery date as soon as practicable. Seller shall not be liable for any delay in delivery or performance, or for any failure to manufacture, deliver or perform due to (a) any cause beyond its reasonable control; (b) any act of God, act of Buyer, act of civil or military authority, governmental priority, strike or other labor disturbance, flood, epidemic, war, riot, delay in transportation or car shortage; or (c) inability on account of any cause beyond the reasonable control of Seller to obtain necessary materials, components, services or facilities. In the event of any such delay, the date of delivery or of performance shall be extended for a period equal to the time lost by reason of the delay.

6. Technical Advice. All technical advice, recommendations and services of Seller are intended for use by persons having adequate skill, at their own risk, and Seller assumes no responsibility, and Buyer hereby waives all claims against Seller, for results obtained or damages incurred from the use of Seller's advice, recommendations and services.

7. Modification. These Terms and Conditions are intended by Seller and Buyer to constitute a final, complete and exclusive expression of agreement and cannot be supplemented or amended without Seller's prior written approval. Seller's waiver of any breach, or failure to enforce any of the Terms and Conditions at any time, shall not in any way affect, limit or waive Seller's right thereafter to enforce and compel strict compliance with every Term and Condition thereof. If any provisions of these Terms and Conditions are held to be invalid or unenforceable, such invalidity or unenforceability shall not affect the validity or enforceability of the other portions hereof.

8. Disputes. Buyer and Seller shall attempt in good faith promptly to resolve any dispute arising under these Terms and Conditions by negotiations between representatives who have authority to settle the controversy. If unsuccessful, Buyer and Seller shall further attempt in good faith to settle the dispute by nonbinding third-party mediation, with

fees and expenses of such mediation apportioned equally to each side. Any dispute not so resolved by negotiation or mediation may then be submitted to a court of competent jurisdiction in accordance with the terms hereof. These procedures are the exclusive procedures for the resolution of all such disputes between the parties. All sales, agreements for sale, offers to sell, proposals, acknowledgments and contracts of sale, including, but not limited to, purchase orders accepted by Seller, shall be considered a contract under the laws of the State of Colorado and the rights and duties of all persons, and the construction and effect of all provisions hereof shall be governed by and construed according to the laws of such state. A state or federal court located within the State of Colorado shall have sole and exclusive jurisdiction over any litigation concerning any such matters as well as any alleged defects of any products or equipment covered thereby or damages sustained as a result of such alleged defects. If any litigation is commenced between Seller and Buyer, or their personal representatives, concerning any provision hereof, the party prevailing in the litigation shall be entitled, in addition to such other relief that is granted, to a reasonable sum as and for their attorneys' fees and costs in such litigation or arbitration.

STONEAGE TRADEMARK LIST

View the list of StoneAge's trademarks and service marks and learn how the trademarks should be used. Use of StoneAge trademarks may be prohibited, unless expressly authorized.

<http://www.StoneAgetools.com/trademark-list/>

STONEAGE PATENT DATA

View the list of StoneAge's current U.S. patent numbers and descriptions.

<http://www.sapatents.com>



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