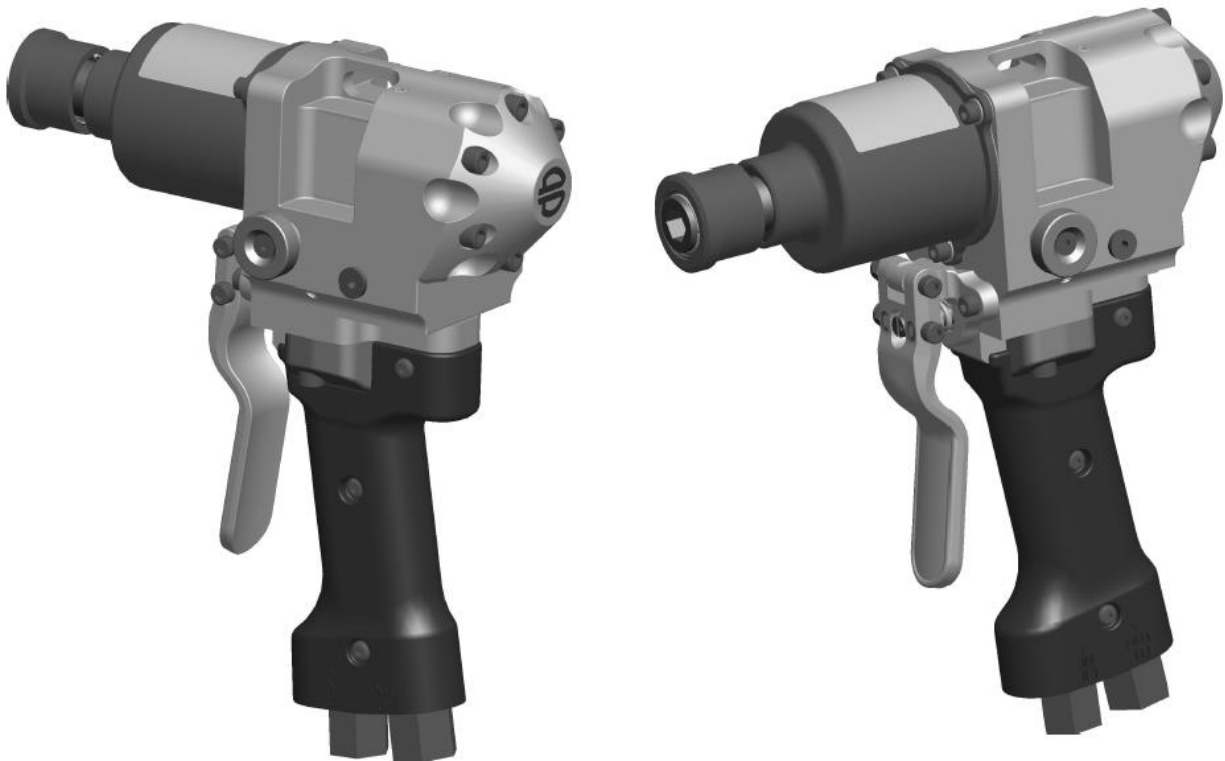


Hydraulic Rail Drill
910161
Operating and Maintenance Manual



Hydraulic Rail Drill

910161

Record of Changes

Rev No.	Date	Description of Changes
Rev 2	10.2018	Engineering updates / manual format changes
Rev 3	10.2019	Name Change
Rev 3.1	1.2023	Update layout and format

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Section 1: Overview and Safety

Hydraulic Rail Drill Overview

RRP designs and manufactures equipment primarily for the repair and new construction of rail and railroad tie track maintenance.

Hydraulic Rail Drill is a low pressure hydraulic rail drill MAG Series (Machined Aluminum, Gerotor) designed for drilling holes and fastening hardware.

The drill balances well in a gloved hand while the handle, grip and trigger have been ergonomically designed for ease of operation. The drill incorporates proven gerotor motor for long life and greater efficiency over gear type motors.

Do not use this machine for other than its intended purpose.

Please read these instructions when using this tool, which can only be used for the specified purpose. This instruction manual should be kept throughout the life of the tool.

The operator of this tool should:

- Have access to this operation instruction.
- Read and understand this operation instruction.

Environmental Protection



Comply with relevant national waste disposal laws and regulations. Waste electronic devices cannot be treated as household waste.

Equipment, accessories, and packaging shall be recyclable.



Don't throw the discarded equipment in trash cans.

Safety Information

For safe installation and operation of this equipment, carefully read and understand the contents of this manual. Improper operation, handling, or maintenance can result in equipment damage and personal injury.

Only trained and authorized personnel should be allowed to operate this machine. In addition, all personnel at the worksite should be aware of the safety concerns and their individual responsibilities prior to working this machine.

Please read and comply with all the safety precautions in this manual **before** operating this machine. Your safety is at risk.

Safety Terms



DANGER indicates a hazardous operating procedure, practice, or condition. If the hazardous situation is not avoided death or serious injury will occur.



WARNING indicates a hazardous operating procedure, practice, or condition. If the hazardous situation is not avoided death or serious injury could occur.



CAUTION indicates a potentially hazardous operating procedure, practice, or condition. If the hazardous situation is not avoided moderate or minor injury could occur.

Machine Use and Safety Precautions



Failure to follow safety precautions when operating this equipment can result in serious injury or death to the operator or other persons in the area. Observe the following precautions whenever you are operating, working on or near this equipment.

Do not make any modifications without authorization or written approval from Racine Railroad Products. Replace all Racine Railroad Products and OEM parts with genuine Racine Railroad Products and OEM parts. Using non-OEM parts may compromise the safety of the machine.

Do not wear loose clothing, jewelry, radio belts, etc., when operating, working on or near this equipment. They can be caught in moving parts and may result in severe injury.

Always wear appropriate personal protective clothing when operating this equipment: e.g., orange safety vest, hard hat, safety glasses with side shields, hearing protection, steel-toed safety boots, leather gloves, dust respirator, etc.

Always lift heavy objects with the knees and legs, not the arms and back.

Always keep hands, arms, feet, head, clothing, etc., out of the operating area and away from all rotating or moving components when operating, working on or near this machine.

Always make sure that all guards, covers, belts, hoses, and operating components are in good working order and that all controls are in the appropriate position before starting the engine.

Always make sure that all safety equipment installed properly and are in good working order. Do not operate the machine until unsafe conditions have been corrected.

Always operate in a well-ventilated area and make sure that the air filters, air filter covers, and muffler are in good condition.

Always keep the machine clean and free of debris. Operate the machine in a safe and responsible manner. Exercise caution when fueling, working on or near rotating or moving components, hot components, and fuel systems. Be aware of potential fire hazards and prevent sparks, exhaust, etc., from starting fires on the machine and/or work area.

Always comply with all instructions provided on any decals or placards installed on the machine and with any relevant amplifying information provided in this manual or other general operating procedures.

Always disconnect the drill from the power source and make sure that all controls are in a safe position and install all appropriate locking and safety devices before doing any of the following:

- Lubricating
- Adjusting
- Installing Tooling
- Making Repairs
- Performing Service



Tools are not insulated for use on or near energized conductors. Use of these tools near energized conductors may lead to electrical shock, causing severe injury or death.

Do not use these tools near energized conductors without adequately insulating operator and surroundings.



Tool parts rotate at high speeds and can cause severe personal injury. Keep **all** body parts away from moving parts of the tool when connected to a hydraulic power source or during operation.



Operator must clear all bystanders from the work area when handling, starting, and operating a tool to avoid injury to bystanders.



Do not over-reach while using a tool. Loss of balance can cause serious personal injury or death. Move closer to work area and securely support yourself and your work. **Always keep proper footing and balance.**



Hydraulic fluid is under pressure.

Always depressurize the hydraulic system before connecting or disconnecting a tool to avoid serious injury from escaping fluid. If injury results from escaping hydraulic fluid, seek immediate medical attention to avoid serious bodily injury.



Hot hydraulic fluid.

Exposure to hot hydraulic fluid can cause severe burns. Do NOT connect or disconnect a tool while the hydraulic power source is running and/or the hydraulic fluid is hot.



Never lock a tool trigger in the power ON position. A tool locked ON can lead to serious injury or death

Section 2: Specifications and Installation

Specifications

Weight:7.6 lbs (3.5 kg)

Length:9.0 in (229 mm)

Height:9.6 in (243 mm)

Width:3.6 in (91 mm)

Chuck Type:7/16" Quick Chuck

Optimal Pressure: 1000 - 2000 PSI

Flow Range:4-12 GPM

Optimal flow Range:.....4-8 GPM

Operation:.....Open/Closed option

Motor:Gerotor

Torque:550 ft-lbs

Tool Ports:.....#6 SAE O-ring (F)

System fluid temperature must not exceed 140° F (60° C) regardless of operating conditions and/or system.

Sufficient oil cooling is recommended to limit the system fluid temperature.

Maximum flow must not exceed the recommended rate as noted on the tool specification label. Install a flow meter in the return line to test the rate of all flow in the system before working the tool.

Operating pressure at the tool must not exceed 2000 lbs/in² (18.8 MPa). The system relief valve must be located in the supply circuit between the hydraulic power source and the tool to limit pressure to the tool.

Recommended Hydraulic Fluid

Any non-detergent hydraulic fluid which meets the following specifications may be used:

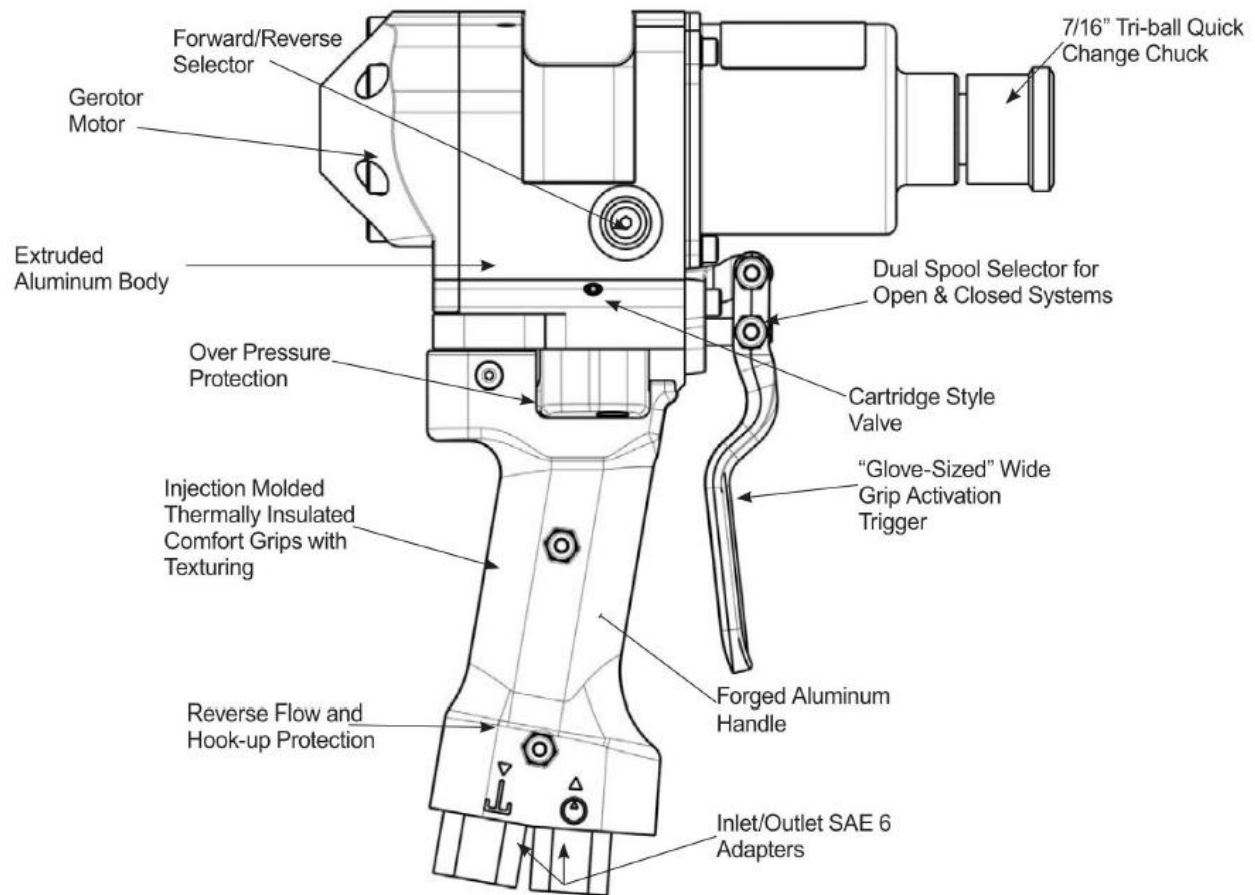
S.U.S. @ 100° F (38° C) 140 to 225

..... @ 210° F (99° C) 40 minimum

Flash Point340° F (170° C) min.

Pour Point.....-30° F (-34° C) min.

Rail Drill Components



Hose Requirements

It is not often necessary or advisable to use long hoses. All hoses must have an oil resistant inner surface and an abrasion resistant outer surface. Each hose must have male pipe ends for most application.

Longer hoses can be used when necessary but can affect the operation of the tool due to resistance in the hose.

If small diameter or long hoses are used, or if restrictive fittings are connected to the supply and return ports, the pressure required to push the fluid through the system and back to the tank will be higher. This will reduce tool power.

Important: Oil should always flow from the male coupler through the female coupler.

Note: The pressure increases in uncoupled hoses left in the sun. This may make them difficult to connect. When possible after use, connect the free ends of the operating hoses together.

Hose Types

Hydraulic hose types authorized for use with the tool are:

1. **Labeled and certified non-conductive.**

- This is the only hose authorized for use near electrical conductors.
- Constructed of thermoplastic or synthetic rubber inner tube, synthetic fiber braid reinforcement, and weather resistant thermoplastic or synthetic rubber cover.

2. **Wire braided** (conductive)

- This hose is conductive and must **never** be used near electrical conductors.
- Constructed of synthetic rubber inner tube, single or double wire braid reinforcement, and weather resistant synthetic rubber cover

3. **Fiber braided** (not certified or labeled non-conductive)

- This hose is conductive and must **never** be used near electrical conductors.
- Constructed of thermoplastic or synthetic rubber inner tube, synthetic fiber braid reinforcement, and weather resistant thermoplastic or synthetic rubber cover.

The rated working pressure of the hydraulic hose must be at least 175 bar (2500 psi).

Hydraulic Hose Recommendation

Hydraulic Hose Recommendation								
Flow Per Circuit		Length Each Hose		Use	Inside Diameter		SAE Spec Hose (Wire Braid)	SAE Spec Hose (Fiber Braid)
GPM	LPM	Feet	Meter		Inch	MM		
5 to 8	19 to 30	To 50	To 15	Both	1/2	13	SAE 100R1-8	100R7-8
5 to 8	19 to 30	51 to 100	15 to 30	Both	5/8	16	SAE 100R2-10	SAE 100R8-10
5 to 8	19 to 30	100 to 300	30 to 90	Pressure Return	5/8	16	SAE 100R2-10	SAE 100R8-10
					3/4	19	SAE 100R1-12	SAE 100R7-12
9 to 12	34 to 45	To 50	To 15	Both	5/8	16	SAE 100R2-10	SAE 100R8-10
9 v 12	34 to 45	51 to 100	15 to 30	Pressure Return	5/8	16	SAE 100R2-10	SAE 100R8-10
					3/4	19	SAE 100R3-12	SAE 100R7-12
9 to 12	24 to 45	100 to 200	30 to 60	Pressure Return	3/4	19	SAE 100R2-12	SAE 100R8-12
					1	25.4	SAE 100R1-16	SAE100R7-16

The rated working pressure of the hydraulic hose must be at least 2500 psi / 173 bar.

Hydraulic Fluid Recommendation

Inspect hoses for cuts, crushing, leaks, or abrasion, which may be a safety hazard or reduce fluid flows.

The following fluids work well over a wide temperature range at startup, allow moisture to settle out, and resist biological growth likely in cool operating hydraulic circuits.

Others that meet or exceeds the specifications of these fluids may also be used.

Type	Hydraulic fluid
Amsoil	AWH ISO 32
Chevron	Rando HD Premium Oil MV ISO VG 32 Rando HDZ ISO 32
Gulf	Harmony AW ISO Multi-Grade 32
Mobil	DTE Oil Excel 32
Schaeffer	Dillex Supreme Hydraulic Fluid w/ Dynavis ISO 46.
Shell	Shell Tellus S2 VX 32
Sunoco	Sunvis 1032 HVI Hydraulic Oil

Tool Connecting Procedures

1. Stop the engine before connecting the tool and or hoses to the power unit, and when switching hoses or tools.
2. Turn the hydraulic on/off valve to the off position before starting the engine.

Make sure all hoses are connected for correct flow direction to and from the tool being used.

When routing hose in the work area, position them where personnel will not be at risk of tripping over them where vehicles can run over the hoses. Do not lay hose over sharp objects.



WARNING Pressurized fluid escaping from a damaged hose can penetrate the skin and be injected in the body causing injury or death.

Do not pull on hoses to drag the power unit or tool.

Connecting Hoses

1. Wipe quick couplers with a clean lint free cloth before connecting them.
2. Depressurize the system.
3. Allow system and hydraulic fluid to cool if too hot to handle.
4. Securely connect the return (tank "R") hose from the power source to the tool.
5. Securely connect the supply (pressure "P") hose from the power source to the tool.

It is recommended that you connect the return hoses first and disconnect last to minimize or avoid trapping pressure within the tool.

When connecting the quick couplers, the flow should run from male coupler to the female coupler. The female coupler on the tool is the inlet. Quick couplers are marked with a flow direction arrow.



WARNING Pressurized fluid escaping from a damaged hose can penetrate the skin and be injected in the body causing injury or death.

Do not pull on hoses to drag the power unit or tool.

Note: When possible, connect the free ends of uncoupled hoses to prevent build up in the hoses. The sun can also increase pressure in the hoses and make connecting them difficult.

Disconnecting Hoses

1. Stop the hydraulic power source.
2. Depressurize the system.
3. Allow system and hydraulic fluid to cool.
4. Disconnect the supply (pressure) hose to the power source (pressure port) from the tool (IN port).
5. Disconnect the return (tank) hose to the hydraulic power source (return port) from the tool (OUT port).
6. To prevent contamination, always install dust caps over the hydraulic ports of the tool when disconnected.

Setting for Open-Center or Closed-Center

The Rail Drill is equipped to allow the tool to be used with either Open or Closed Center hydraulic power systems. To change between open and closed center remove the bolt holding the trigger to the spool and flip the trigger up.

1. For open center operation, turn trigger spool so that the red dot on the front of the trigger points towards the letters O/C on trigger.
2. For closed center, turn trigger spool so that the red dot on the front of the trigger points toward the letters C/C on trigger.
3. Reattach the trigger.

Open-Center Systems

An Open-Center System is a hydraulic system in which the oil circulates at all times.

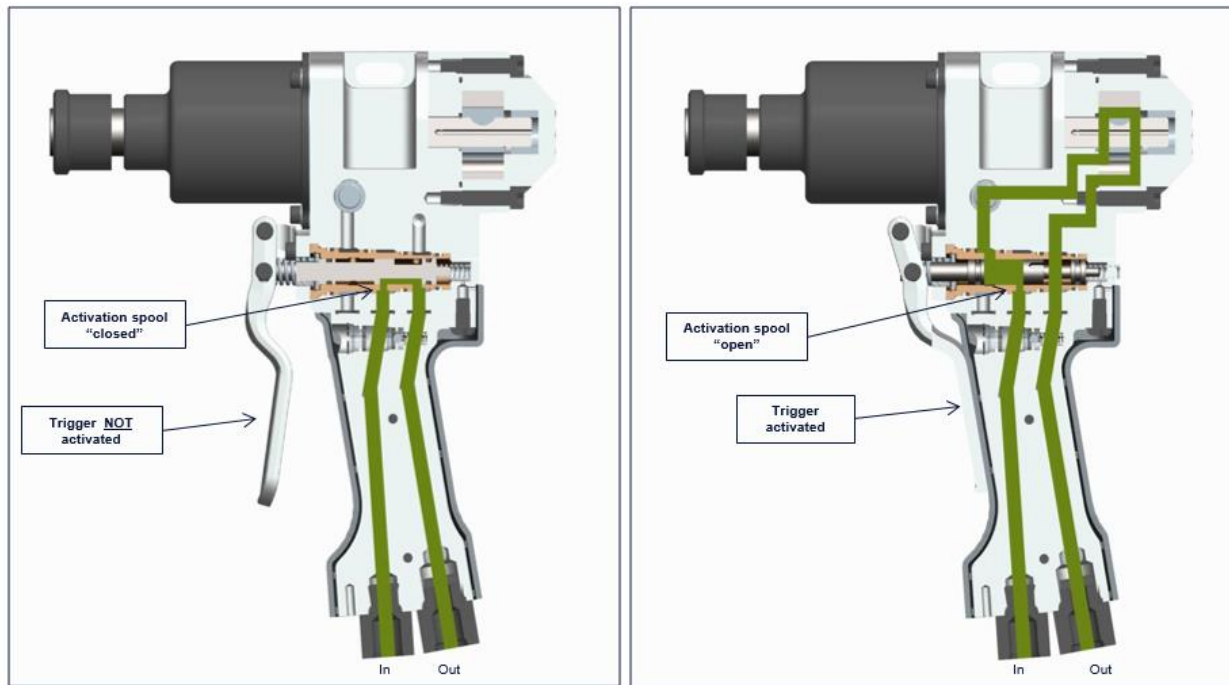
- When a tool is in the circuit and not activated, the oil bypasses the tool motor returning to tank.
- When the trigger is activated, oil is diverted by an activation spool into the gerotor motor.
- These systems do not provide as much instant power as their closed-center counterparts.



The Rail Drill is factory set at *Open-Center*.

This is indicated by the position of the dot to the right of the slot.

The green represents the hydraulic fluid flow path through the drill.



The trigger **is not** activated. Activation spool closed and returns hydraulic fluid back to tank.

The trigger is activated. Activation spool now open and porting directs fluid to gerotor motor to turn shaft.

Closed-Center Systems

A Closed-Center System is hydraulic system in which the oil flows from the pump source to the tool (in its off position) and stops. It does *not* return to the tank

- When the trigger is actuated the pressure and flow is instantaneously released into the tool.
- These systems provide great amounts of instant power.

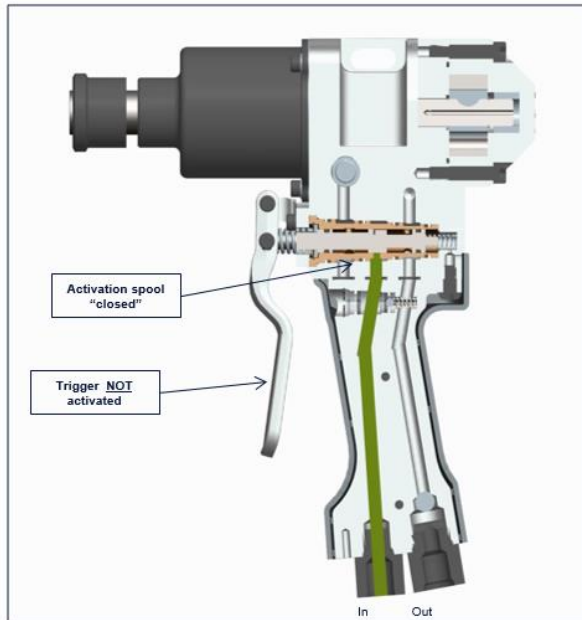
Because of the surges created, the system must contain an accumulator to limit any potential damage these spikes might cause.



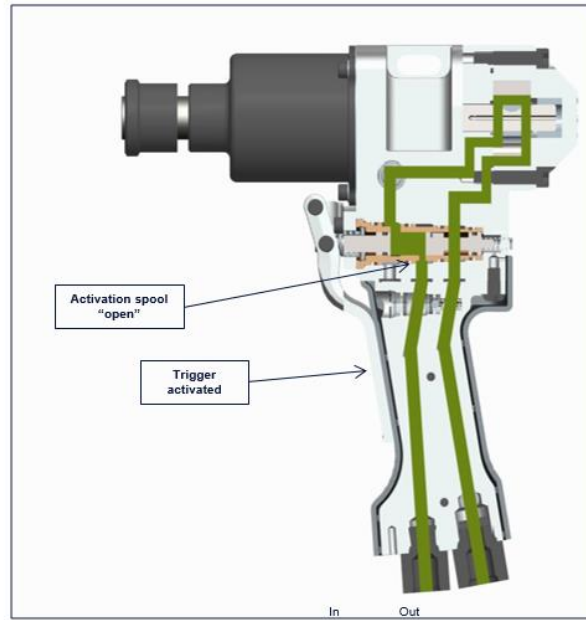
The Rail Drill is at *Closed-Center*.

This is indicated by the position of the dot to the right of the slot.

The green represents the hydraulic fluid flow path through the drill.



The trigger *is not* activated. Activation spool closed with no return path.



The trigger is activated. Activation spool now open and porting directs fluid to gerotor motor to turn shaft.

Section 3: Tool Operation

Personal Protective Equipment



Before operating this machine, make sure that all general safety precautions are observed, and that proper personal protective clothing is worn as described below.

At a minimum, operators should wear the following Personal Protective Equipment:

1. Safety Glasses
2. Hearing Protection
3. Hard Hat
4. High Visibility Safety Vest
5. Leather Work Gloves (outside the cab)
6. Steel Toed Safety Shoes

Pre-Operation



Accidental tool start can cause serious personal injury. Do not install or remove tool attachments on a tool that is connected to a hydraulic power source.

Tool and attachment may be hot. Hot surfaces can cause serious bodily burns. Use caution when working around these components.

Worn or damaged attachments may fail during use and cause severe personal injury. Discard tool attachment if any cracks, chips, or gouges are present.

Bit may fail during use, potentially causing severe personal injury. Some bits with a long spiral or wide flute spacing may not be acceptable for use with this tool.

Drill test holes to determine if bit whips, bends under side-load, or lunges forward at breakthrough. Do not use a bit that behaves as above.

1. Inspect the quick change chuck. Remove any dirt or other contamination that may have accumulated in the chuck.
2. Slide and hold quick change chuck away from tool and remove drive shank
3. Insert desired bit into hex socket of tool and release chuck.
4. To remove drill bit, slide and hold quick change chuck away from tool and remove bit.

Operation: Drill Socket / Bit

The Rail Drill operates by automatically supplying fluid in such a way that it turns the drive shaft of the assembly. As the trigger is depressed, it moves the spool to close off the flow of oil to the return port and directs the flow of oil through the tool circuit.

The flow of oil through the directional spools causes the shaft to turn and rotate the drive assembly. With no or minimal resistance, the anvil and hammer turn in unison.

As greater resistance is encountered during use of the drill, the force of the resistance causes the hammer to slip and strike the anvil resulting in the impact action. The impact action continues until the resistance is reduced or the work completed.

 **WARNING** Rotating parts. Keep all body parts away from rotating parts of the tool to avoid personal injury.

1. Inspect the square drive. Remove any dirt or other contamination that may have accumulated in the chuck.
2. Slide desired square drive socket onto drive on the tool or insert the desired bit in quick-change chuck.
3. Connect the hydraulic hoses from the hydraulic power source to the tool.
4. Start the hydraulic power source. Allow power source to run (idle) for a few minutes to warm hydraulic reservoir fluid.
5. Set the directional spool to the desired position (forward or reverse).

 **CAUTION** The torque values listed under specifications are approximate and dependent on hydraulic oil temperature, fluid condition, pump flow and many other variables present while using these tools.

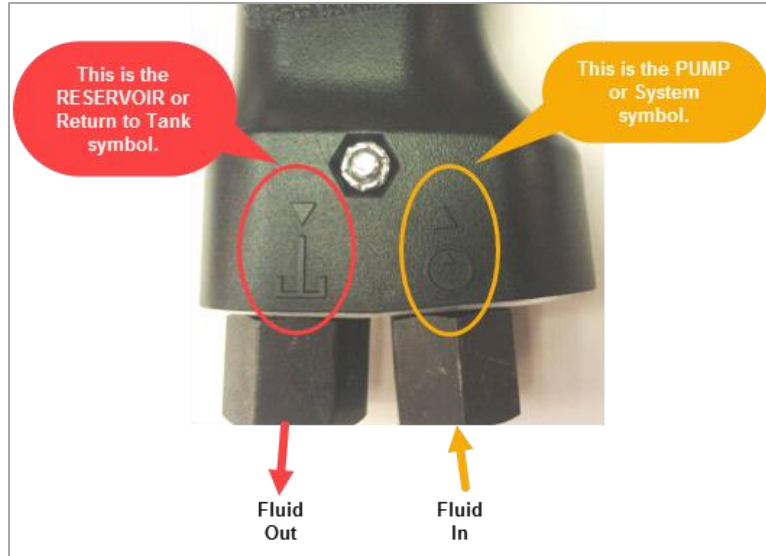
To achieve a specified torque, use a calibrated torque wrench.
Failure to follow this instruction may cause an incorrect torque value in situations requiring a specific torque.

Never change spool direction while the tool is operating. Shifting the spool while the tool is operating may cause internal tool damage. Always allow the tool to come to a complete stop before changing direction.

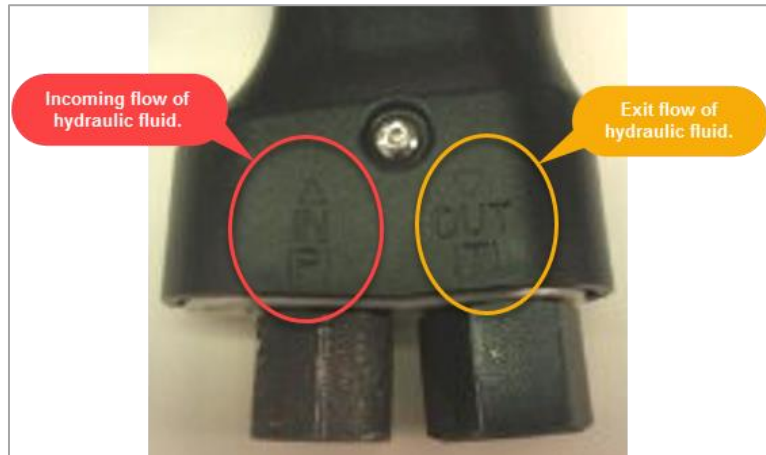
6. Grasp the tool handle. Place your opposite hand on the top of the tool. This will allow leverage to be applied while operating.
7. To start the tool, squeeze the trigger.
8. To stop the tool, release the trigger.
9. After the tool has stopped rotating completely, lay the tool on a flat stable surface.
10. When the tool is not in use, stop the hydraulic power source flow to reduce excess heat build-up and unnecessary wear on tool components.

Handle Grip Hydraulic Flow Indicators

Right Trigger



Left Trigger

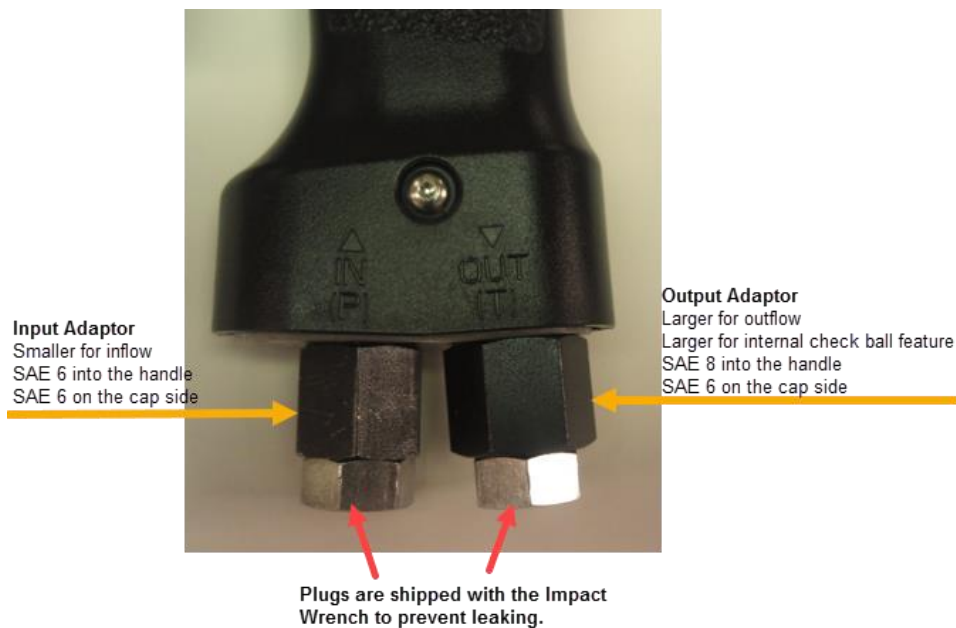
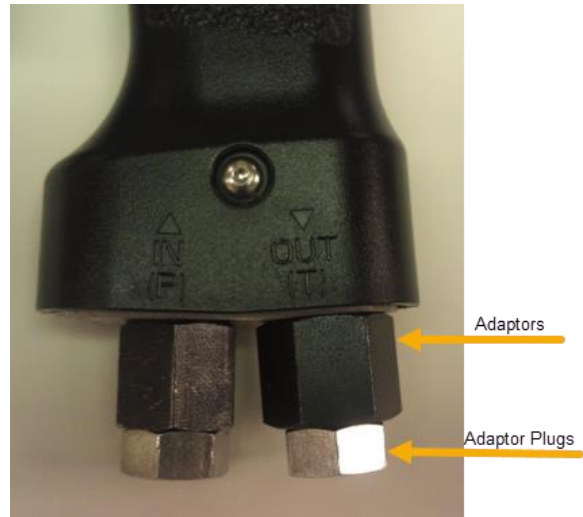


Inlet and Outlet Adaptors

The steel adaptors serve to protect the forged aluminum threads from being damaged from other adaptors or couplers, especially tapered NPT pipe thread.

The adaptors are polarized; the output adaptor is larger (SAE 8) because its internal feature interfaces with a reverse flow check ball.

Note: Removal of these adaptors by a customer voids the warranty.



Common Hook-Ups – Couplers



Common Hook-Ups – Plumbed w/ Hose Set

Non-Conductive Rubber (NCR) Hoses

- 8-foot hose
- 10-foot hose

Swivels

- 2 required
- Located between the Inlet/Outlet adaptors and the hose assembly
- Used for ease of assembly when attaching the hose to the drill at the factory prior to shipment.

Note: NCR hoses are banded at various intervals for ease of maneuverability when in use.



Swivels



Hose Bands

Section 4: Maintenance

It is highly recommended to practice regular check-ups and maintenance in accordance with the usage frequency to keep your tool in better condition and reduces total running costs.



WARNING

Do not perform maintenance on the machine while the hydraulic power source motor is running or when hoses are connected.

All maintenance must be done with the tool disconnected from the power source.

Cleaning and Maintenance Recommendations

- Wipe all external surfaces after each use with a clean, lint free cloth to remove surface contaminants from the tool.
- Store all tools in an enclosed area to prevent weather from contaminating their systems.

Safety Devices

When maintenance is complete, make sure the following:

- The hydraulic control valves are operable.
- The hydraulic quick couplers and hoses are safe to use.

Storage Preparation

- Cover male and female hose whips.
- Store in the upright position. Secure tool to prevent it from being knocked over.
- Store the machine on a smooth level surface.
- The tool should be stored in a cool, dry environment which is not subjected to rapid temperature changes.

Daily



WARNING

Do not attempt to locate hydraulic leaks by feeling around hoses and fitting with hand. Pin-Hole leaks can penetrate the skin.

- Wipe all tool surfaces, fittings, and couplings free of grease, dirt, and foreign materials.
- Inspect the tool, hydraulic system, hoses, and fittings for signs of leaks, cracks, wear, and/or damage. Replace if necessary.
- To prevent contamination, always install dust caps over the hydraulic ports when disconnected.
- Inspect machine for damage and wear, replace as required.

Monthly

- Perform a detailed inspection of the systems hoses and fittings according to the hydraulic hose operator's manual and as stated in SAE standard j1273, May 1989 or latest revision.

Replace the hoses and/or fittings if necessary.

Troubleshooting



WARNING

Stop and depressurize the hydraulic system before connecting or disconnecting a tool. Failure to follow these instructions can lead to severe personal injury.

Read and follow the instructions in this manual for the proper way to connect and disconnect tools from the hydraulic system.

1. The tool must be connected to the correct power source system. Verify the hydraulic power source system matches the tool requirements.
2. Verify that the pressure and return hoses are connected properly to the tool and hydraulic power source ports.
3. The hydraulic power source reservoir must be filled to full level with hydraulic fluid.
4. After verifying the above, start the power source flow. All power sources shut-off devices must be engaged or opened (clutch engaged, separate ON/OFF valves open, etc.).
5. Check the tool to see if it operates

Note: If the tool does not operate, it will be necessary to determine where the problem exists (i.e., in the tool, hoses, or hydraulic power source).

Determining the Problem Area

1. Stop the power source.
2. Depressurize the system and allow to cool.
3. Disconnect the existing tool from the hoses and power source.
4. Stop the power source flow.
5. Disconnect the existing hoses from the known, properly operating tool and power source.
6. See the tool's operator manual for the correct disconnect Procedure.
7. Connect a different set of hoses to the known, properly operating tool and power source.
8. Start the power source flow.

If the known, properly operating tool operates with the different set of hoses, the problem is in the disconnected hoses.

If the known, properly operating tool does not operate, the problem is in the power source. See your power source operator's manual for troubleshooting.

If, after following all steps in the Troubleshooting section, it has been determined that the problem lies with the tool, proceed to the Troubleshooting Guide. Use of the Troubleshooting Guide will help you identify and determine the cause of the problem.

Note: It is not recommended that the end-user attempt to perform repairs, as special tools and procedures are required.

Excess heat may be generated through any combination of pump inefficiencies, oil bypassing over relief valves, pre-existing flow controls, or unusual restrictions in the system. Where these and other possible inefficiencies exist, substantially larger reservoirs and/or coolers may be required.

Should you have any problems or questions with your Rail Drill, please do not hesitate to contact the Racine Railroad Products.

Troubleshooting Guide

Symptom	Cause	Resolution
Tool will not operate.	Tool not properly connected	Check pressure and return conditions
	Low oil volume and/or pressure	Check hydraulic power source. Tool will not operate if inlet pressure is below 1000 psi or flow is less than 40 GPM
Tool runs at low speed.	Low oil volume and/or pressure	Check hydraulic power source for recommended flow, pressure, and proper conditions.
	Contaminated hydraulic system	Remove contamination and clean hydraulic system.
Too runs too fast.	Relief valve blocked or contaminated.	Check relief valve. Clean or replace as necessary.
	Excessive pressure or flow.	Verify correct hydraulic power source is being used. Adjust hydraulic power supply.
Oil leakage from trigger area.	Damaged O-rings in spool.	Replace O-rings. *Factory service is required.
Actuation Trigger sticks.	Excessive flow.	*Factory service is required. Check trigger, sleeve spool for binding.
	Broken spring.	Replace spring.
	Contamination.	Clean sleeve and spool. Check hydraulic system.
Tool trigger plunger sticks or works hard.	Check for dirt or deposits.	Clean components
	Trigger binding (trigger bent, trigger pivot pin to tight, etc.)	Inspect, adjust trigger where binding occurs.
System overheats.	Excessive flow.	Reduce RPM of engine.
	Inefficient cooling.	Increase reservoir size and/or oil cooler.

Troubleshooting Guide Continued

Symptom	Cause	Resolution
Too leaks hydraulic fluid. WARNING: Do not use tool. Tool with leak may cause bodily injury.	Tool components loose.	Factory service may be required. Tighten component hardware.
	Damaged O-rings or gaskets.	Replace worn or damaged O-rings or gaskets.
	Incorrect grease used in nose housing.	Remove nose assembly, clean components, and repack with appropriate grease.
	Tool components worn or damaged.	Disassemble tool. Replace worn or damaged components.
Power source works but tool lacks power or does not operate.	Inappropriate hydraulic system.	Check type of hydraulic power source, open-center, or closed-center.

Section 5: Parts and Service Support

Technical Support & Service

Telephone and web-based technical support is available for current production models through our Technical Service Department. Service Manuals and limited technical support may be available for models that are no longer in production.

Telephone and E-mail Technical Support

Telephone and e-mail technical support is available on normal U.S. business days from 8:00 AM to 5:00 PM U.S. Central Time Zone (GMT +6 (+5 Daylight Savings Time)). Contact us at:

Phone: (262) 637-9681

E-mail: techserv@racinerailroad.com

Non-Warranty Technical or Field Service Support

Depending upon the circumstances and availability of technical service personnel, we may provide technical assistance and/or field service support, *at the customer's expense*, to assist in the correction of non-warranty related problems. Contact our Technical Service Department to coordinate Non-Warranty Technical or Field Service Support.

Warranty Technical or Field Service Support

Depending upon the circumstances and availability of technical service personnel, we may provide technical assistance and/or field service support, *at no charge to the customer*, to assist in the correction of warranty related problems. Contact our Technical Service Department to coordinate Warranty Technical or Field Service Support.

Warranty Parts & Service

Warranty parts and service are coordinated through our Technical Service Department.

Warranty Parts Claims

Material claimed to be defective must be returned to our factory for evaluation. Defective materials will be replaced, or your account will be credited if replacement materials have already been purchased. Please contact our Technical Service Department at the address provided below if you have any questions or problems.

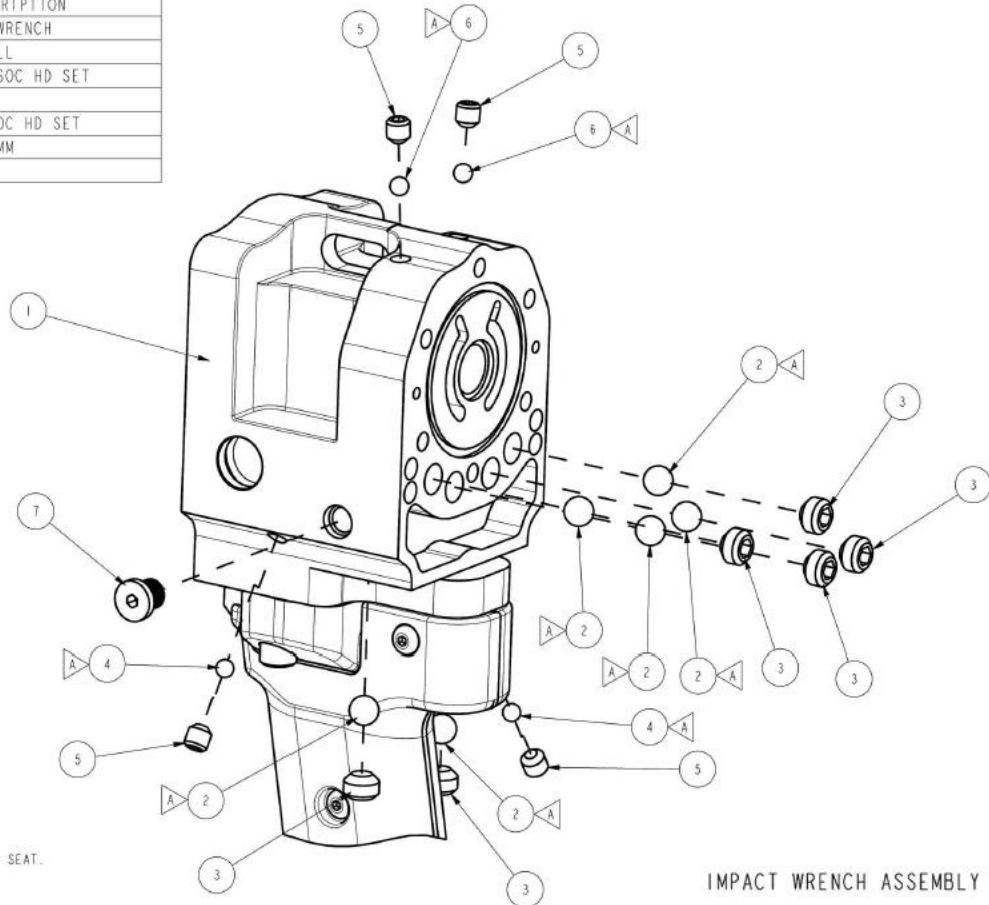
Warranty Service Support

Depending upon the circumstances and availability of technical service personnel, we may provide technical assistance and/or field service support, *at no charge to the customer*, to assist in the correction of warranty related problems. Contact our Technical Service Department at the address provided below to coordinate Warranty Technical or Field Service Support.

Parts

BILL OF MATERIAL

PT NO.	QTY	DESCRIPTION
1	1	BODY, IMPACT WRENCH
2	6	5/16 STEEL BALL
3	6	3/8-24 X .25 SOC HD SET
4	2	STEEL BALL
5	4	25-28X .25LG SOC HD SET
6	2	BALL, STEEL 5MM
7	1	PLUG, SAE #2



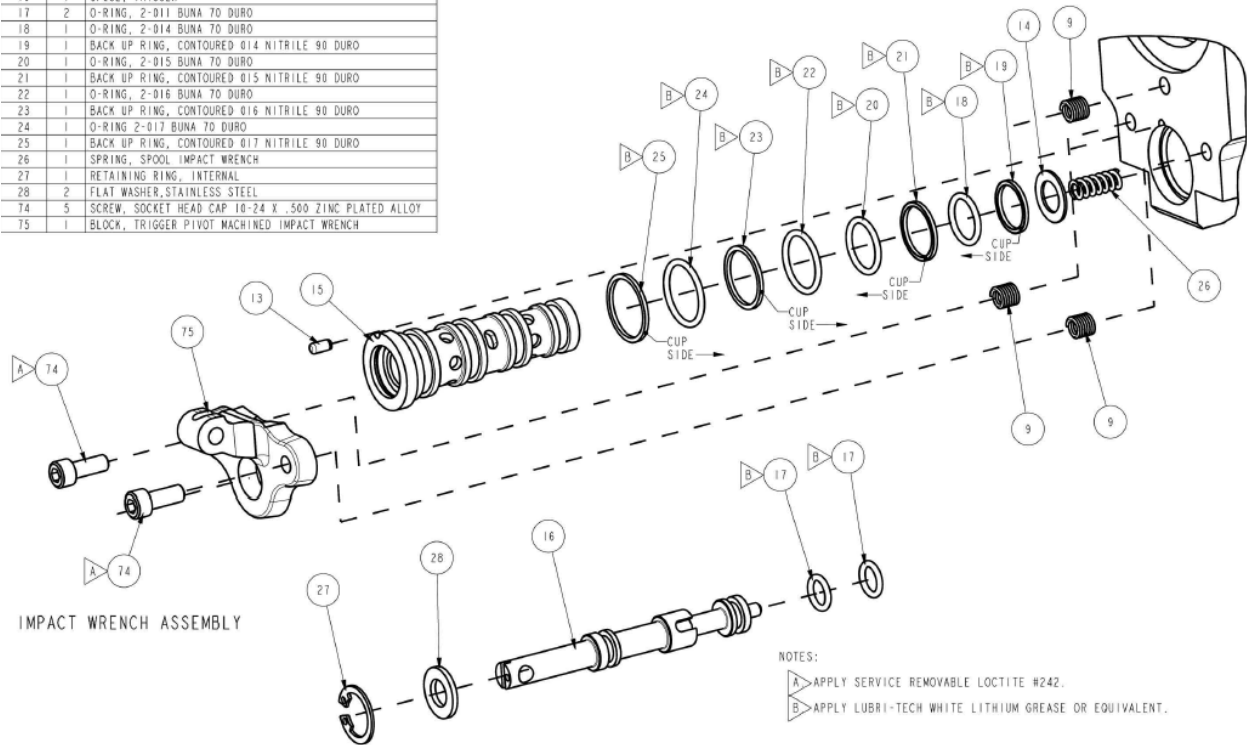
NOTES:

A> LIGHTLY COIN BALL SEAT.

IMPACT WRENCH ASSEMBLY

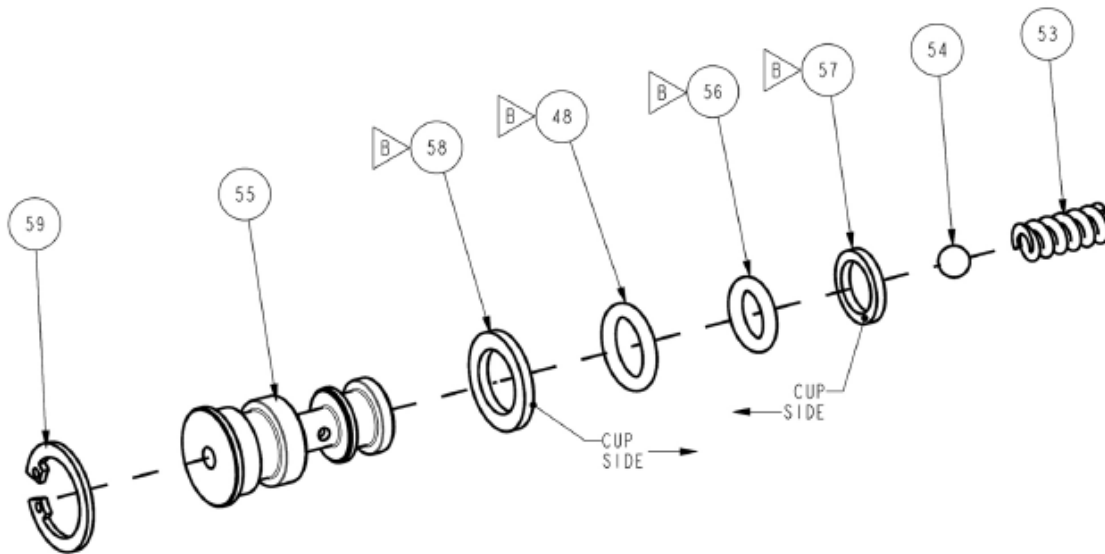
BILL OF MATERIAL

PT. NO.	QTY	DESCRIPTION
13	1	DOWEL PIN ST .125 X .250
14	1	WASHER, SPOOL REAR
15	1	SLEEVE, TRIGGER SPOOL
16	1	SPOOL, TRIGGER
17	2	O-RING, 2-011 BUNA 70 DURO
18	1	O-RING, 2-014 BUNA 70 DURO
19	1	BACK UP RING, CONTOURED 014 NITRILE 90 DURO
20	1	O-RING, 2-015 BUNA 70 DURO
21	1	BACK UP RING, CONTOURED 015 NITRILE 90 DURO
22	1	O-RING, 2-016 BUNA 70 DURO
23	1	BACK UP RING, CONTOURED 016 NITRILE 90 DURO
24	1	O-RING 2-017 BUNA 70 DURO
25	1	BACK UP RING, CONTOURED 017 NITRILE 90 DURO
26	1	SPRING, SPOOL IMPACT WRENCH
27	1	RETAINING RING, INTERNAL
28	2	FLAT WASHER, STAINLESS STEEL
74	5	SCREW, SOCKET HEAD CAP 10-24 X .500 ZINC PLATED ALLOY
75	1	BLOCK, TRIGGER PIVOT MACHINED IMPACT WRENCH



BILL OF MATERIAL

PT NO.	QTY	DESCRIPTION
48	4	O-RING, 2-011 BUNA 70 DURO
53	1	SPRING, BYPASS VALVE IMPACT WRENCH
54	1	5/32 BALL
55	1	BODY, BYPASS VALVE HIW716MAG
56	1	O-RING
57	1	BACKUP RING 8-010
58	1	BACKUP RING, CONTOURED OIL NITRILE 90 DURO
59	1	RETAINING RING

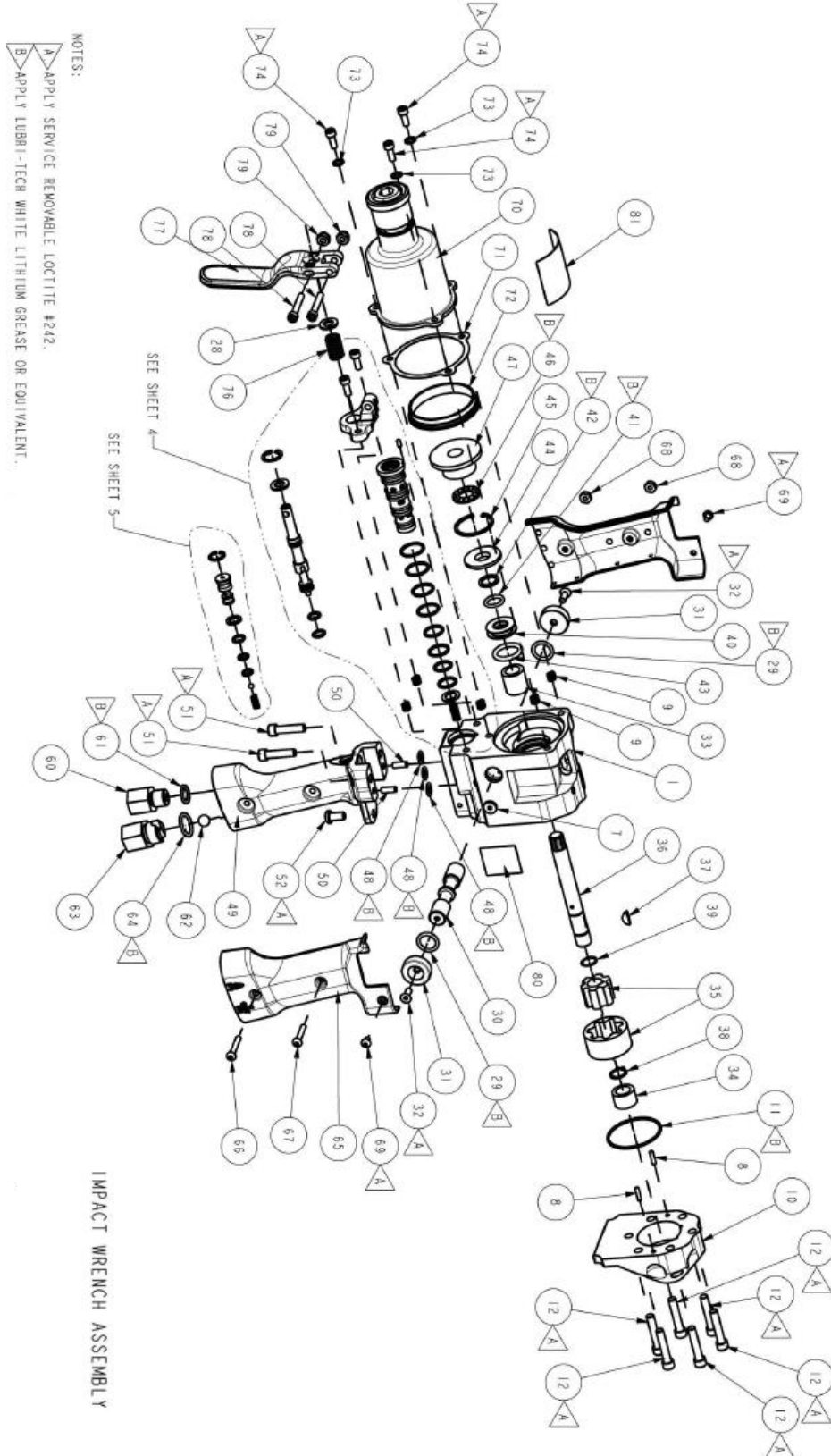


NOTES:

A. BYPASS VALVE CRACKING PRESSURE 2800 PSI REFERENCE.

B. APPLY LUBRI-TECH WHITE LITHIUM GREASE OR EQUIVALENT.

IMPACT WRENCH ASSEMBLY



BILL OF MATERIAL

PT NO.	QTY	DESCRIPTION
1	1	BODY, IMPACT WRENCH
2	6	5/16 STEEL BALL
3	6	3/8-24 X .25 SOC HD SET
4	2	STEEL BALL
5	4	25-28X.25LG SOC HD SET
6	2	BALL, STEEL 5MM
7	1	PLUG, SAE #2
8	2	DOWEL PIN ST .125 X .50
9	5	HELICOIL, 10-24 X 1.5
10	1	END CAP, IMPACT WRENCH
11	1	O-RING 2-031
12	6	SCREW, SOCKET HEAD CAP 1/4-20 X 1.250
13	1	DOWEL PIN ST .125 X .250
14	1	WASHER, SPOOL REAR
15	1	SLEEVE, TRIGGER SPOOL
16	1	SPOOL, TRIGGER
17	2	O-RING, 2-011 BUNA 70 DURO
18	1	O-RING, 2-014 BUNA 70 DURO
19	1	BACK UP RING, CONTOURED 014 NITRILE 90 DURO
20	1	O-RING, 2-015 BUNA 70 DURO
21	1	BACK UP RING, CONTOURED 015 NITRILE 90 DURO
22	1	O-RING, 2-016 BUNA 70 DURO
23	1	BACK UP RING, CONTOURED 016 NITRILE 90 DURO
24	1	O-RING 2-017 BUNA 70 DURO
25	1	BACK UP RING, CONTOURED 017 NITRILE 90 DURO
26	1	SPRING, SPOOL IMPACT WRENCH
27	1	RETAINING RING, INTERNAL
28	2	FLAT WASHER, STAINLESS STEEL
29	2	O-RING, 2-113 BUNA 70 DURO
30	1	SPOOL, DIRECTIONAL
31	2	BUTTON, DIRECTION
32	2	SCREW, FLAT HEAD CAP 10-24 X .50 ZINC PLATED ALLOY
33	1	BEARING
34	1	BEARING
35	1	GEROTOR
36	1	SHAFT, IMPACT WRENCH
37	1	WOODRUFF KEY
38	1	RETAINING RING
39	1	RETAINING RING, SPIROLOX
40	1	CARRIER RING, SHAFT IMPACT WRENCH HIW716
41	1	O-RING, 2-112 DISOGRIN URETHANE
42	1	112 BACKUP RING (STANDARD TEFLON)
43	1	O-RING, 2-210 BUNA
44	1	STEP SPACER
45	1	RETAINING RING
46	1	THRUST BEARING
47	1	SPACER, IMPACT WRENCH
48	4	O-RING, 2-011 BUNA 70 DURO
49	1	HANDLE, MACHINED IMPACT WRENCH
50	2	DOWEL PIN, ALLOY STEEL 3/16 DIA X 1/2 LENGTH
51	2	SCREW, SOCKET HEAD CAP 1/4-20 X 1.000 ZINC PLATED ALLOY
52	1	SCREW, BUTTON HEAD CAP 1/4-20 X .50 ZINC PLATED ALLOY
53	1	SPRING, BYPASS VALVE IMPACT WRENCH
54	1	5/32 BALL
55	1	BODY, BYPASS VALVE
56	1	O-RING
57	1	BACKUP RING
58	1	BACKUP RING, CONTOURED OIL NITRILE 90 DURO
59	1	RETAINING RING
60	1	INLET ADAPTER
61	1	O-RING
62	1	STEEL BALL 3/8
63	1	OUTLET ADAPTER
64	1	O-RING
65	1	HANDLE, ASSEMBLY IMPACT WRENCH
66	1	SCREW, BUTTON HEAD CAP 8-32 X 1.13 STAINLESS STEEL BLACK OXIDE
67	1	SCREW, BUTTON HEAD CAP 8-32 X 1.00 STAINLESS STEEL BLACK OXIDE
68	2	NUT, NY-LOCK LOW PROFILE 8-32
69	2	SCREW, BUTTON HEAD CAP 8-32 X .25 STAINLESS STEEL BLACK OXIDE
70	1	NOSE, IMPACT WRENCH
71	1	GASKET, HAMMER CASE
72	1	RETAINER, GASKET
73	3	LOCK WASHER #10
74	5	SCREW, SOCKET HEAD CAP 10-24 X .500 ZINC PLATED ALLOY
75	1	BLOCK, TRIGGER PIVOT MACHINED IMPACT WRENCH
76	1	SPRING, SPOOL IMPACT WRENCH FRONT
77	1	TRIGGER, MACHINED IMPACT WRENCH
78	2	SCREW, SOCKET HEAD CAP 10-32 X 1.25 ZINC PLATED ALLOY
79	2	LOCK NUT, STAINLESS STEEL 10-32
80	1	LABEL, IDENTIFICATION
81	1	LABEL, WARNING
82	1	SOMI, IMPACT WRENCH

Section 6: Warranty Terms and Conditions

Warranty Period

Each new machine and new parts of our manufacture are warranted against defects in material and workmanship for one year from the date of shipment from our factory.

When contacting customer service for factory parts, service or warranty support please provide the:

- Racine Railroad Products Model
- Serial Number
- Any locally assigned identification

Vendor Parts Warranty Period

Other equipment and parts used, but not manufactured by Racine Railroad Products, Inc., are covered directly by the manufacturer's warranty for their products.

Warranty Parts and Service

We will repair or replace, without charge, F.O.B. factory, Racine, Wisconsin, USA, any part Racine Railroad Products manufactures which is proven to be defective during the warranty period.

Material claimed defective must be returned, if requested, to the factory within 30 days from the date of the claim for replacement. Ordinary wear and tear, abuse, misuse, and neglect are not covered by this warranty. Depending upon the circumstances, we may provide technical assistance and/or technical service support, without charge, to assist in the correction of warranty related problems.

Non-Warranty Parts and Service

Material damaged through normal wear and tear, abuse, misuse and/or neglect are not covered by our warranty and should be ordered directly from our Customer Service.

Note: Parts for models that are no longer in production may not be available.

Non-Warranty Parts Orders

When placing a parts order please provide the following information:

- Company Name and Billing Address
- Purchase Order Number and Issuing Authority
- Shipping Address
- Special Handling Instructions
- Contact Phone Number
- Machine Model and Serial Number
- Part Numbers and Quantities Being Ordered

Note: *Please use Racine Railroad Products part numbers when ordering parts.* Racine Railroad Products part numbers are shown in the parts lists and drawings of this manual and have only six (6) numbers.

Any part number with other than six numbers (e.g., contains alpha-numeric characters) is a Vendor Part Number and **not** a Racine Railroad Products part number