RAD GUN OPERATION

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Rev	**Status**	**Rev. Date**	**Status Description**	**Prepared by**	**Reviewed by**	**Approved by**

The following is a step by step procedure on how to complete a specific task or meet a facility specific requirement. Standard Operating Procedures (SOPs) are written for all identified critical tasks. By virtue of the hazard or complexity associated with critical tasks it is paramount that the SOP be followed as written. SOPs contain a listing of high-level hazards associated with the task, for detailed hazard analysis reference the applicable Task Hazard Assessments. SOPs do not replace the requirements contained in the NACG Standards, Codes, and Processes nor does it replace the need to comply with required legislation. Section 8.0 references documentation that the worker shall understand before work commences.

1.0 PURPOSE

- To establish a Company standard to safely and effectively carry out work as it applies to using a rad gun.

2.0 SCOPE AND APPLICATION

- This document applies to all Company Heavy Construction and Mining operations. Ensure all site specific requirements are being met or exceeded before performing the task.

3.0 HAZARDS AND CONTROLS

- Pinching, crushing and line of fire injuries.
    - Body parts are to remain clear of the reaction arm and contact point. Do not place hands on barrel while tool is running.
    - Reaction arm is not to be used as a handle. Never hold the reaction arm while the tool is operating.
    - Ensure the reaction arm has a good surface to set against, a minimum of 10mm of contact must be made with the anchor point.
    - Select appropriate tool combination specific to the tire type, size and configuration **(See Appendix A – Rad Gun and Accessory Tool Selection)**
- Tool shifting when taking up load.
    - Hold the tool with two hands and ensure centre of gravity is balanced prior to pulling on the trigger.
    - While in use, tool must be supported at all times in order to prevent unexpected release in the event of a fastener or component failure.
- Equipment breaking, reaction arm failing or shifting.
    - Reaction arms are not to be modified or repaired.
    - Inspect tool before use for cracks, flaws or deformation.
    - Ensure reaction arm is secured in place with a snap ring.
    - Place the sole of the reaction arm against the surface. The reaction arm must make a minimum of 10mm of contact with the surface point.
- Injury/illness resulting from noise exposure.
    - Hearing protection to be worn while using rad guns.

- Tool failure and / or improper torquing.
    - Pre-use/post-use inspection to be completed. Tag out any rad guns that have any defects or damage.
    - Reaction arm and tool must be clean.
    - **Rad gun must be serviced and calibrated as per manufacturer specifications. At a MINIMUM servicing and calibration shall be conducted annually.**
    - Do not modify tool or substitute/exchange parts.
    - Always follow Calibration and/or Torque Chart specific to the tool being used to ensure pressures and torque values are accurate to the tool (for pneumatic rad guns).
    - NEVER exceed maximum air pressure setting on the Torque Chart (for pneumatic rad guns) as this will overload the wrench. Set air pressure while the tool is running, once the trigger is released you will see a slight increase on the air regulators pressure gauge from your original setting, this is normal and can be expected.
    - End of socket must be even with end of reaction arm; tool must operate at a 90-degree angle to work surface.
    - Only use thick wall impact or Hytorc sockets.
    - Cordless Rad Guns should be fully charged prior to use, if needed have a spare fully charged battery on standby.
    - Accuracy of a pneumatic Rad Gun may be affected by extreme cold weather due to the reduced output of the air compressor. When required, verify the torque value with a manual torque wrench and torque multiplier. OTR wheel assemblies must be verified when torquing in ambient temperatures below -20 degrees Celsius.
    - Rad gun must be sent for service if excessive vibration, heat and/or gear box noise is observed.
    - Do not operate any rad gun unless trained in its use.

4.0 CHECKLIST

- ☐ Attend all preparatory meetings (IE: daily PSI; job scope; review of JSA's and SOP's for the job).
- ☐ Complete FLRA cards before starting the work.
- ☐ Ensure all personnel involved in the task are aware of the hazards and the controls to be used, as identified in the SOP's; JSA's; and FLRA's
- ☐ Conduct a pre-job inspection of all equipment to be worked on and tools to be used.
- ☐ **Standard of Training required for working on this job: On-the job training.**

5.0 DEFINITIONS

5.1 Company

North American Construction Group (NACG) divisions, departments, or subsidiaries.

6.0 PROCEDURE

6.1.1 Assembly – Pneumatic Rad Guns

1) Large diameter are hoses using the twist lock open end type air couplers should have air hoses blown out before connecting to the Rad Gun to ensure the lines are free of obstructions and debris.
2) Connect the wrench to the air outlet side of the Cage Assembly.

3) Before each use, inspect for things such as: dirt; cracked casing; and airline quick couplers are good.
4) Ensure the air-tool oil in the lubricator is to the correct level. Never operate the tool without air-tool oil.
5) Use a 1/2-inch air line with 100 PSI supply and (30 CFM air as the minimum) air supply volume.
6) Know where to shut off the air supply in case of an emergency.
7) Assess the position where it will be used and select the best reaction arm that will make a minimum of 10mm of contact with the anchor point, won't bind or cause pinching, and won't slip off.
8) Always install the reaction arm facing outward, never back towards the trigger. Disconnect the air line before changing a reaction arm or socket. Install the retaining spring and ensure it is set correctly into the grooves.

6.1.2 Assembly – Electric and Cordless Rad Guns

1) Ensure electrical cords are inspected prior to use, check for cracks, frayed wires, plugs are not damaged.
2) When using extension cords, ensure the extension cord is of the correct wire gauge/size for the current requirements of the tool.
3) Cordless Rad Gun battery charges are to keep in a dry location and in a well-ventilated area when is use.
4) Before each use, inspect for things such as: dirt, cracked casing, trigger switch and torque setting display are in good condition.
5) Know where to shut off the electrical supply in case of an emergency.
6) Assess the position where it will be used and select the best reaction arm that will make a minimum of 10mm of contact with the anchor point, won't bind or cause pinching, and won't slip off.
7) Always install the reaction arm facing outward, never back towards the trigger.
8) Disconnect the electrical supply before changing a reaction arm or socket. Install the retaining spring and ensure it is set correctly into the grooves.

6.2 Setting the Torque for Tightening

6.2.1 Setting the Torque for Tightening – Pneumatic Rad Guns

1) There is a **Torque Chart** attached with each gun that tells you what air pressure is needed for the foot-pounds of torque you want. This chart is "**Specific to each individual Rad Gun"**, charts must not be used for guns other than the one indicated on the chart by its serial number.
2) Inspect the air regulator and determine that it is functional and properly zeroed.
3) The gun must be running in the **FORWARD** setting, but not under load. Adjust the regulator until the correct pressure is shown on the gauge.

6.2.2 Setting the Torque for Tightening – Electric and Cordless Rad Guns

1) Adjust the digital torque setting by using the increase or decrease buttons on the tool to the required torque.

6.3 Setting the Torque for Loosening

6.3.1 Setting the Torque for Loosening – Pneumatic Rad Guns

1) Look to the **Torque Chart** to establish the maximum air pressure and set the air pressure to the maximum. NEVER exceed the maximum air pressure noted on the torque chart. The gun must be running in the **REVERSE** setting, but not under load. Adjust the regulator until the correct pressure is shown on the

gauge, when the trigger is released the air pressure on the regulator gauge will be slightly higher than what the regulator was adjusted too, this is expected and is normal.

2) If the fastener does not loosen, DO NOT increase the air pressure higher than the torque chart specifies. Use the next size larger sized Rad Gun if the fastener does not loosen.

6.3.2 Setting the Torque for Loosening – Electric and Cordless Rad Guns

1) Adjust the digital torque setting by using the increase button on the tool to the maximum torque setting. If the Rad Gun does not loosen the fastener use the next size larger Rad Gun.

6.4 Operating the Wrench

1) Select Rad Gun and accessory tools (Reaction Arm, Sockets, Extensions) applicable to the tire type, size and configuration **(See Appendix A – Rad Gun and Accessory Tool Selection)**
2) Confirm rad gun has been serviced and calibrated within the last year (minimum).
3) Inspect tool. Any damages, deformations, cracks, excessive vibration, excessive heat or excessive gear box noise must be reported to supervision immediately and the tool must be tagged out.
4) Follow 950C-C-028 – Hazardous Energy Isolation Code and ensure the equipment is stable.
5) The socket must be an impact socket that you have hand-fit to ensure it is the correct size.
6) Install the securing pin into the socket and an “O”” ring over the socket to hold the pin.
7) Check that it is set properly for forward or reverse.
8) Place the socket on the nut/bolt and adjust the reaction arm to the proper position. Place the sole of the reaction arm against the surface. The reaction arm must make a minimum of 10mm of contact with the anchor point, won’t bind or cause pinching, and won’t slip off.
9) Ensure the reaction arm is set to the correct side of the surface it will push against. Squeeze the trigger partially to bring the reaction arm into contact with the reaction point.
10) Be aware that as the tool takes up the load it may shift or move.
11) WARNING! Never have your fingers or hand on the reaction arm when the gun is running.
12) When in use, the tool must be supported at all times to prevent unexpected release in the event of a fastener or component failure.
13) Fully depress the trigger and keep it fully depressed until the wrench stalls, otherwise full torque may not be applied.
14) Release the trigger and remove the socket from the bolt/nut.

6.5 Cordless Power Tool Battery Disposal

1) Defective cordless tool batteries must be disposed of as per Company environmental policies and or site specific environmental disposal policies.
2) Defective batteries must be placed in the appropriate disposal containers/receptacles.

7.0 NOTES

If this task is to be done by a method different than described in this SOP, the work must **STOP** and the alternate method must be **DOCUMENTED** with an adequate hazard assessment tool such as a JSA. The document must be **APPROVED** by a supervisor before such procedures are implemented.

8.0 REFERENCES

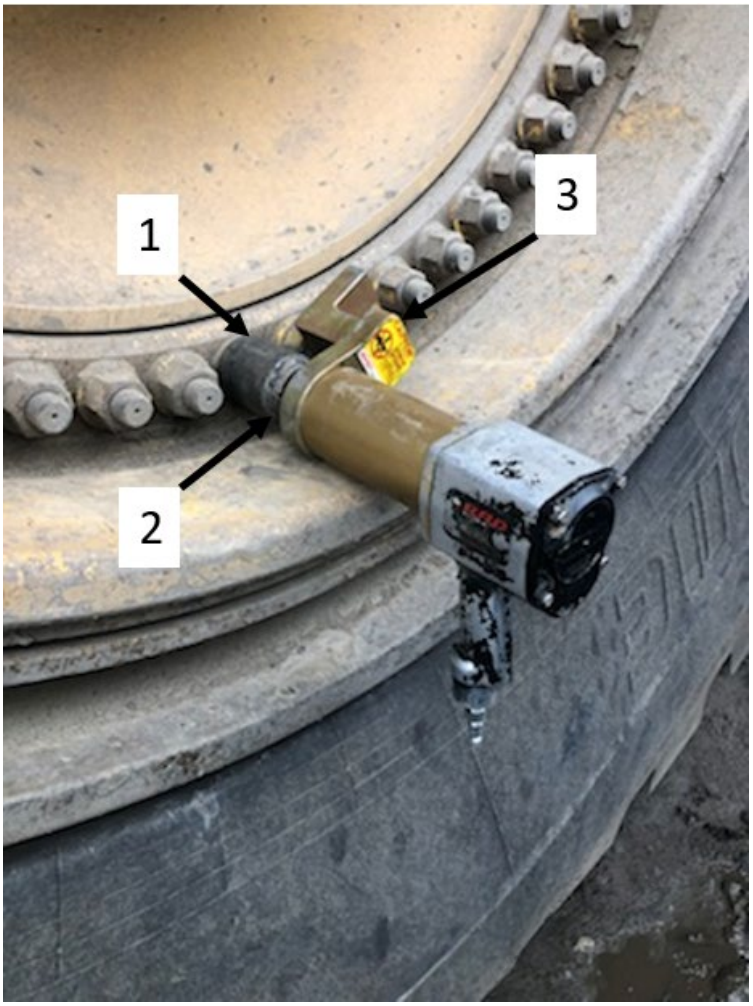
- Manufacturers Specifications: Rad Torque Systems
- Alberta Occupational Health and Safety Act, Regulation and Code – {Part 25, Tools Equipment and Machinery}
- Occupational Safety and Health Administration 1910 Subpart P – Hand and Portable Powered Tools and Other Hand-Held Equipment
- 960C-SOP-500 Pneumatic Tools and Compressed Air; Use of
- 950C-C-028 Hazardous Energy Isolation Code

9.0 APPENDICES

- Appendix A - Rad Gun and Accessory Tool Selection

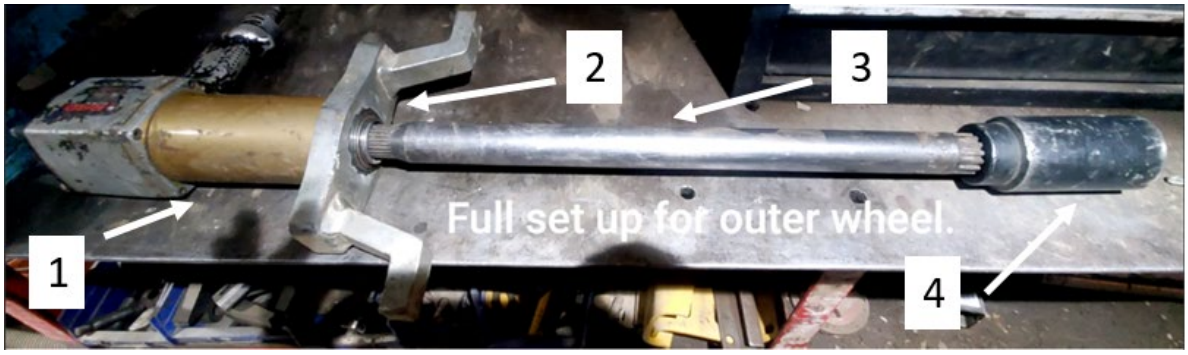
Appendix A Rad Gun and Accessory Tool Selection

Komatsu 930
Front Wheel / Inside Wheel Position



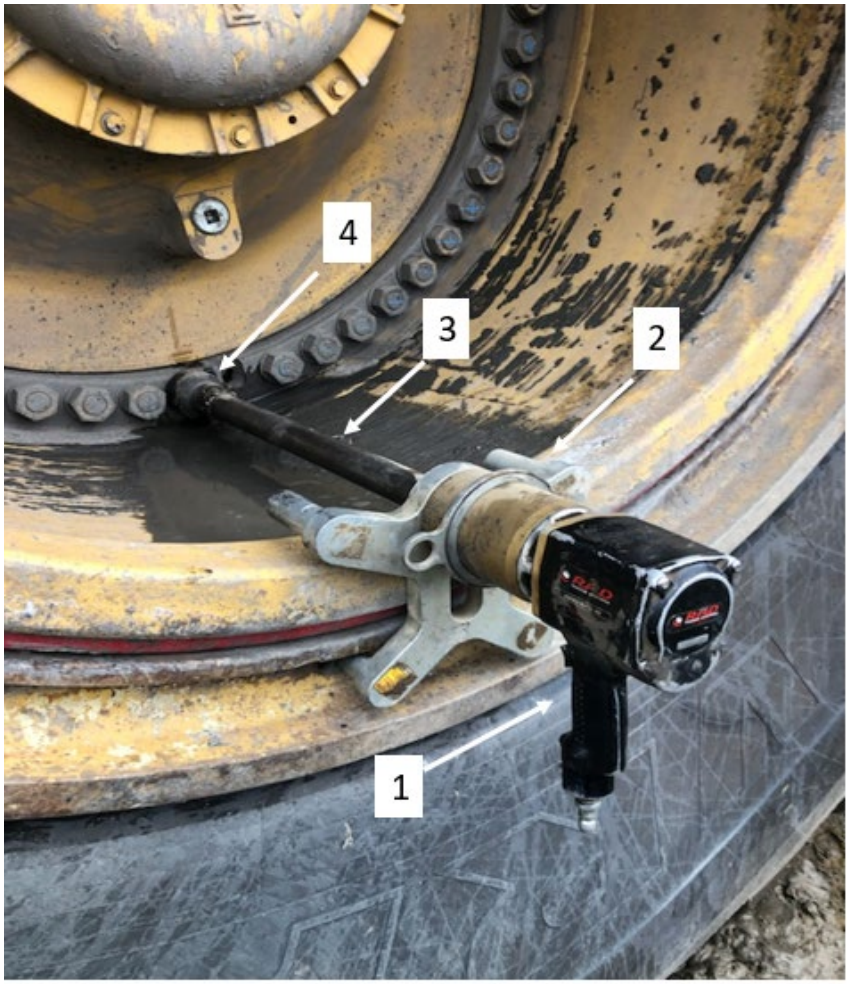
Item	Part Number	Description
1	Not Identified	1-7/8” Deep Socket
2	11363	Rad Gun to Square Drive Adapter
3	11531	Reaction Arm

Komatsu 930
Rear Outside Wheels



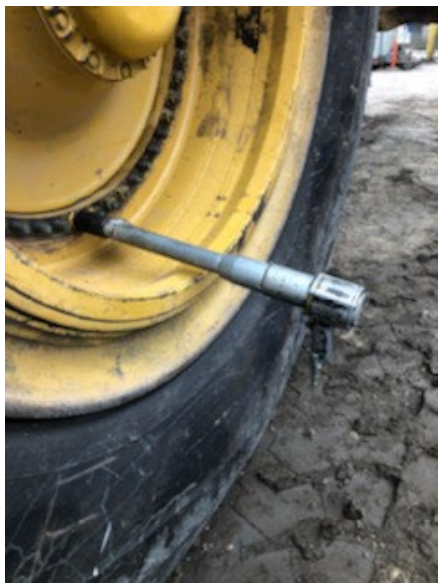
Item	Part Number	Description
1	Not Identified	Rad 34GX
2	11533	Double Footed Reaction Arm
3	20874	26” Extension
4	9530L	1-7/8” Extra Deep Socket (6.5” Long)

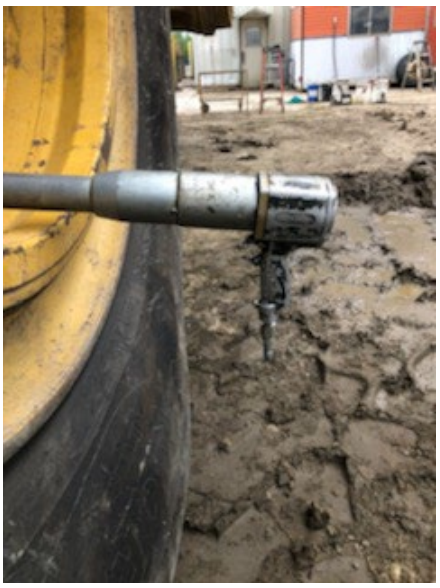
Caterpillar 797 All Wheel Positions
Rad 60 for Loosening / Tightening



Item	Part Number	Description
1	Not Identified	Rad 60 (Used for Loosening / Tightening)
2	28704	Four Point Reaction Arm
3	28714	26” Extension
4	95M55	55 mm Socket

Cat 793, 789, 785, 777, 773 all use a Rad 1800 with attached 18 inch extension.





Item	Part Number	Description
-	Not Identified	1-7/16” Deep Socket (Caterpillar 793)
-	Not Identified	1-1/2” Deep Socket (Caterpillar 789 and 785)
-	Not Identified	1-/3/4” Deep Socket (Caterpillar 777 and 773)

Komatsu 830 front and rear wheel positions also use an 1800 with built on 18-inch extension, and an 1 - 5/8" socket.

Komatsu Rear Wheels

Item	Part Number	Description
1	Not Identified	Rad 1800 with built on 18" extension
2	Not Identified	Reaction Arm
3	Not Identified	1-5/8" Socket