## RC150EX/RC200EX Rim Clamp® Tire Changer

For servicing motorcycle and ATV tire/wheel assemblies as well as automotive and most light truck tire/wheel assemblies.



RIM Safety page iv

\*Operating
Instructions

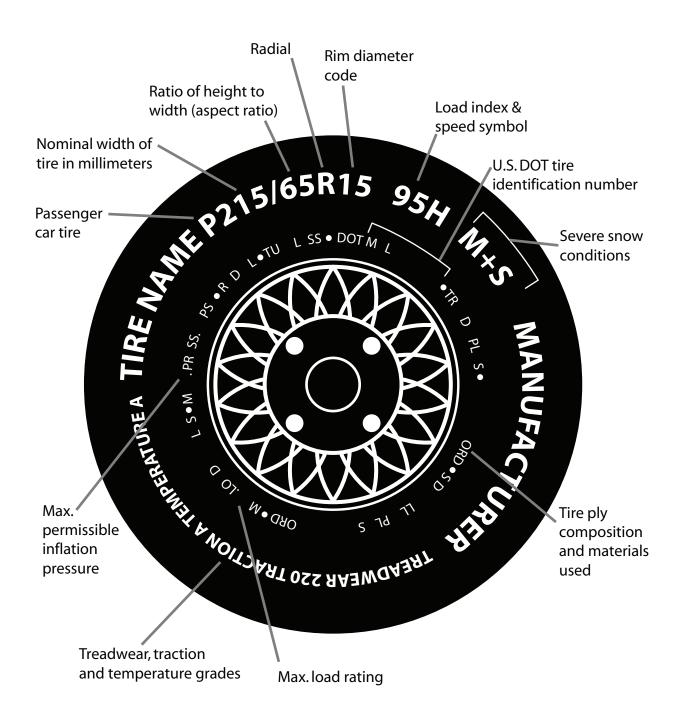
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# Safety Instructions Set-up Instructions Operation Instructions Maintenance Instructions

READ these instructions before placing unit in service. KEEP these and other materials delivered with the unit in a binder near the machine for ease of reference by supervisors and operators.

#### **Tire Specifications Diagram**



#### **Safety Instructions**

#### **Owner's Responsibility**

To maintain machine and user safety, the responsibility of the owner is to read and follow these instructions:

- Follow all installation instructions.
- Make sure installation conforms to all applicable Local, State, and Federal Codes, Rules, and Regulations; such as State, Federal OSHA Regulations and Electrical Codes.
- Carefully check the unit for correct initial function.
- Read and follow the safety instructions. Keep them readily available for machine operators.
- Make certain all operators are properly trained, know how to safely and correctly operate the unit, and are properly supervised.
- Allow unit operation only with all parts in place and operating safely.
- Carefully inspect the unit on a regular basis and perform all maintenance as required.
- Service and maintain the unit only with authorized or approved replacement parts.
- Keep all instructions permanently with the unit and all decals/labels/notices on the unit clean and visible.
- Do not override or bypass safety features.

#### **Operator Protective Equipment**

Personal protective equipment helps make tire servicing safer. However, equipment does not take the place of safe operating practices. Always wear durable work clothing during tire service activity. Loose fitting clothing should be avoided. Tight fitting leather gloves are recommended to protect operator's hands when handling worn tires and wheels. Sturdy leather work shoes with steel toes and oil resistant soles should be used by tire service personnel to help prevent injury in typical shop activities. Eye protection is essential during tire service activity. Safety glasses with side shields, goggles, or face shields are acceptable. Back belts provide support during lifting activities and are also helpful in providing operator protection. Consideration should also be given to the use of hearing protection if tire service activity is performed in an enclosed area, or if noise levels are high.

#### **Definitions of Hazard Levels**

Identify the hazard levels used in this manual with the following definitions and signal words:

#### DANGER

Watch for this symbol:



It Means: Immediate hazards, which will result in severe personal injury or death.

#### WARNING

Watch for this symbol:



It Means: Hazards or unsafe practices, which could result in severe personal injury or death.

#### **CAUTION**

Watch for this symbol:



It Means: Hazards or unsafe practices, which may result in minor personal injury or product or property damage.



Watch for this symbol! It means BE ALERT! Your safety, or the safety of others, is involved!

#### **Safety Notices and Decals**



Failure to follow danger, warning, and caution instructions may lead to serious personal injury or death to operator or bystander or damage to property. Do not operate this machine until you read and understand all the dangers, warnings and cautions in this manual. For additional copies of either, or further information, contact:

#### Hennessy Industries, Inc.

1601 JP Hennessy Drive LaVergne, TN 37086 (615) 641-7533 or (800) 688-6359 www.ammcoats.com



#### For additional information contact:

#### **Rubber Manufacturers Association**

1400 K Street N. W., Suite 900 Washington, DC 20005 (202) 682-4800 www.rma.org

#### Tire Guides, Inc.

The Tire Information Center 1101-6 South Rogers Circle Boca Raton, FL 33487-2795 (561) 997-9229 www.tireguides.com

#### Remember R.I.M.

Three Simple Steps To Help Keep Shops Safe



R.I.M. is a training program developed by Hennessy Industries to help keep tire technicians safe. By following the basic principles of R.I.M., technicians can avoid situations that can cause catastrophic accidents like tire explosions.

**R.I.M.** stands for read, inspect, and mount:

**Read** the tire size on a new tire before mounting to make sure it is the proper size for the wheel.

**Inspect** the wheel for cracks, rust, and or other damage that could cause an unsafe situation.

**Mount** the tire safely, making sure not to put any part of your body over the tire during inflation.

The most serious of possible accidents is a tire explosion. This is often caused by a tire/rim mismatch.

If a tire explodes on a tire changer, pressure causes it to fly straight up at tremendous speed. If a technician is standing over the tire, he can be seriously injured or killed.

Hennessy's R.I.M. program allows the technician to avoid situations that can cause tire explosions and other accidents. The full program, including training videos, brochures, posters, and other materials, is available from Coats distributors nationwide.



For more details, contact your Coats distributor or e-mail us.

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## **A** NOTICE

Read entire manual before assembling, installing, operating, or servicing this equipment.

#### **Principal Operating Parts**

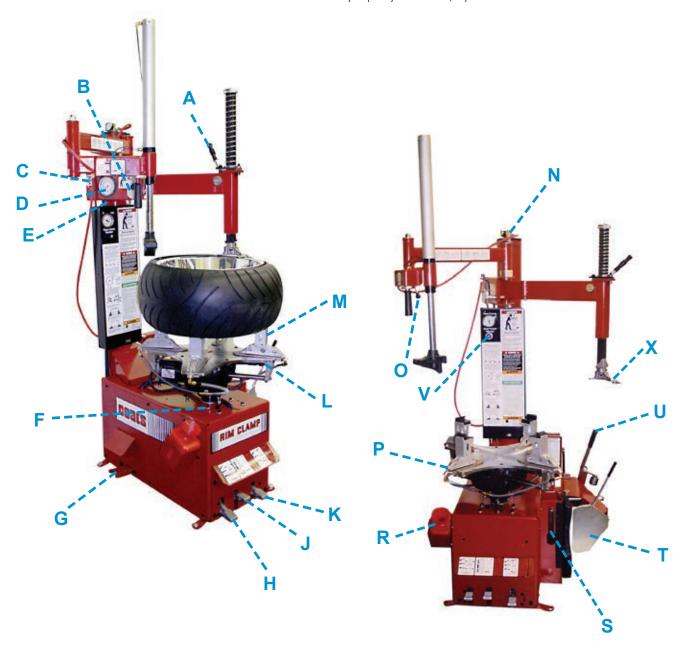
#### Do It Now!

Now is a good time to contact product service to start warranty, otherwise warranty starts at time of shipment.

#### **Know Your Unit**

Compare this illustration with the unit before placing it into service. Maximum performance and safety will be obtained only when all persons using the unit are fully trained in its parts and operation. Each user should learn the function and location, of all controls.

Prevent accidents and injuries by ensuring the unit is properly installed, operated and maintained.





Replace any damaged or missing safety decals. They are available from COATS, (800) 688-6359.

- ▲ Vertical Slide Locking Handle Locks and unlocks vertical slide and sets correct vertical position to maintain head/wheel clearance.
- **Swing Arm Adjustment Knob** Adjusts swing arm/vertical slide assembly for proper horizontal positioning of duckhead® mount/demount tool.
- C Release Valve Allows the manual release of air pressure from tire when clip-on chuck is attached to tire valve.
- ▶ Air Inflation Gauge Registers tire pressure when clip-on chuck is attached to tire valve stem and inflation pedal is released.
- **E Tower** Support for horizontal swing arm, also air storage tank.
- **F** Oil Check Dipstick For transmission oil level.
- **G Inflation Pedal** Three-position pedal that allows inflation of tires through air hose and clip-on chuck.
- **H** Clamp Control Pedal Three-position pedal that opens and closes rim clamps.
- J Bead Loosener Control Pedal ─ Controls operation
  of bead loosener shoe.
- **K Tabletop Rotation Pedal** − Three-position pedal that controls rotation of tabletop.
- **LTabletop** Rotating chuck for tire changing.

- Three Position Motorcycle Clamps Holds wheel to tabletop for tire changing.
- N Pressure Safety Valve The high pressure safety valve is set to exhaust at line pressures above 185 PSI.
- Robotic Arm Control Valve Controls Vertical Movement of Robotic Arm Cylinder. (RC200 Only)
- P Bead Sealing Nozzles (In Slides) Expands tire sidewall to bead seat area of rim to seal tire to rim and allow inflation. (RC200 Only)
- **R** Lube Bottle Dispenser for rubber lubricant.
- **S Bead Lifting Tool** Used to lift and position tire bead correctly on duckhead®mount/demount tool.
- **T** Adjustable Bead Loosener Shoe Pivoting shoe for loosening tire beads.
- **Bead Roller Tool** Used to apply pressure against sidewall of tire.
- ▼ Clamping Pressure Adjustment Knob— Use to adjust the clamping pressure for different style rims.
- Motorcycle DuckHead® Mount/Demount Tool Mounts and demounts tire from wheel.

#### **Operating Instructions**

The unit must be properly operated and properly maintained to help avoid accidents that could damage the unit and injure the operator or bystanders. This section of the Operating Instructions manual review basic operations and use of controls. These instructions should be reviewed with all employees before they are allowed to work with the machine. Keep these instructions near the machine for easy reference.

#### Tire Bead Loosening and Demounting



This machine may operate differently from machines you have previously operated. Practice with a regular steel wheel and tire combination to familiarize yourself with the machine's operation and function.

Remember to remove all weights from both sides of the wheel. Weights left on back side of wheel may cause the wheel to be clamped unlevel. This may result in the combination mount/demount tool contacting the rim causing scratches. On alloy wheels, always rotate the wheel one turn after setting the tool to insure proper wheel chucking.

**NOTE:** Always review nicks and scratches with owners of expensive wheel and tire combinations prior to servicing.

**IMPORTANT:** Review the performance wheel section of this manual prior to servicing performance tire/wheel combinations.

**1.** Deflate tire completely by removing the valve core from the valve stem (Figure 1).

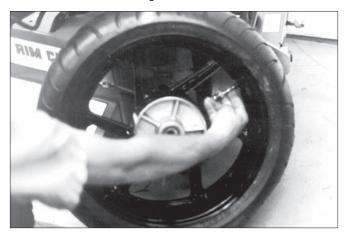


Figure 1 - Remove Valve Core to Deflate Tire



Loosening the beads on a partially or fully inflated tire is unsafe and causes excess movement and friction against the bumper pads and excessive wear on pivots. Deflate the tire completely to prolong the life of your machine.

**ATV NOTE:** It may be necessary on ATV wheels to leave 3-6 PSI in some of these wheels to facilitate bead loosening. Even after loosening one bead; it may be necessary to reinflate to 5 PSI to loosen the opposite bead.

**NOTE:** Always loosen the bead on the narrow side of the wheel's drop center first (motorcycle wheels may not have a narrow or long side, and some ATV wheels may bolt together). See Figure 4 for more information on the drop center.

**REMEMBER:** The clamps on the table top may extend beyond the table top itself. To avoid damaging the clamps, move them to their full inward position before positioning a tire for bead loosening.

**NOTE:** Use extra care in positioning the bead loosener shoe on larger wheels/tires, and on alloy wheels. Make sure the shoe rests next to but not on the rim, and not on the tire sidewall.

**2.** Pull the bead loosener shoe away from the machine and roll wheel into position. The valve stem should be in the 2 o'clock position. Position the bead loosener shoe against the tire next to, but not on, the rim. Depress the bead loosener foot pedal to actuate the shoe and loosen the bead. It may be necessary to loosen the bead in multiple locations around the tire (Figure 2).

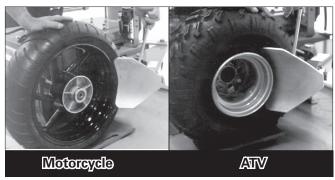


Figure 2 - Position Tire and Bead Loosener Shoe

**3.** Turn wheel around and repeat loosening procedure on the other side of the wheel. This should be the long side of the drop center.

**TIP:** It will be easier to clamp the wheel to the table top if the lower bead is loosened last.

**4.** Apply tire manufacturer's approved rubber lubricant liberally to entire circumference of both tire beads after loosening.

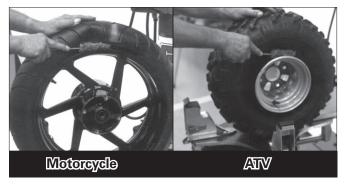


Figure 3 - Apply Rubber Lubricant to Tire Beads

**5a.** Prior to placing the wheel on the table top to clamp, observe the style and strength of the wheel and adjust the clamp pressure as necessary using the pressure regulator and gauge. Thin spun aluminum rims sometimes used on ATV and motorcycle are sometimes delicate and a reduced air pressure should be considered verses cast aluminum and steel wheels that can support more clamping force.

**5b.** Next, observe the rim size from the tire, i.e. 15, 16, 17, etc. Using the clamp pedal, place the clamp valve in the JOG IN position for prelocating the clamps to the rim diameter. Accomplish this by moving the pedal from the UP position to the 1/2-DOWN location. Then JOG the pedal DOWN allowing the clamps to move inward until the pointer on the clamps align with the rim diameter on the table top decal. It may be necessary to relocate the clamps on the clamp carriers. Each clamp should be in the same position before prelocating the clamps.

**5c.** Determine the mounting side of the wheel. The mounting side is the narrow side of the drop center. (Tire removed in Figure 4 for clarity.)

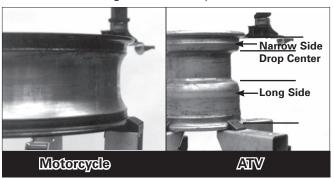


Figure 4 - Determining Mounting Side of Wheel

**6.** Place tire/wheel assembly on table top with mounting side up (Figure 5). Use the clamp control pedal to move the clamps inwards (push pedal down) or outwards (toggle pedal up). Clamp motorcycle and ATV wheels from the outside (clamps push inwards against the outside rim edge). Place rim flange into rear clamp and slowly move the other clamps inward until they contact the rim. Observe closely to prevent tire/ wheel damage.

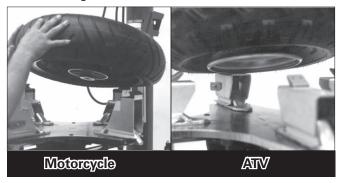


Figure 5 - Place Tire/Wheel Assembly on Table Top

**7.** Move the swing arm into position. Pull the locking handle forward to release the slide. Push down on the top of the vertical slide to move the demount tool into contact with the rim edge. Push the locking handle back to lock the slide into place. As the slide is locked, the mount/demount tool will move upward approximately 1/8 inch from the rim edge.

**Note:** On plastic mount/demount tool, the upward movement should be limited to 1/16-inch maximum.

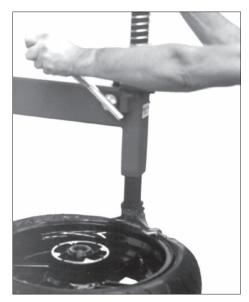


Figure 6 - Position Mount/Demount Tool

**8.** The mount/demount tool roller should be in contact with the rim edge. Turn the swing arm adjusting knob to move the tool away from the rim 1/8 to 1/4 inch. On expensive and polished rims, it is recommended a plastic bootie (p/n 8183373) be used over the mount/demount tool roller.



Figure 7 - Adjust Swing Arm to Position Tool Roller

**9.** Check tool positioning. Mount/demount tool should be positioned with 1/8 to 3/16" clearance between the top of the rim edge and the bottom of the tool (with plastic mount/demount tool it is recommended the vertical clearance be limited to a maximum of 1/16-inch), and 1/8 to 1/4 inch clearance between the rim edge and the tool. This clearance will be maintained as long as the locking handle and adjustment knob are not changed. The operator may swing the arm out of the way and back into place again without needing to reposition the tool (when changing a set of the same wheels).

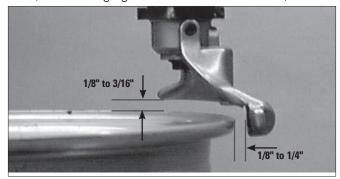


Figure 8 - Proper Mount/Demount Tool Position

**IMPORTANT:** The vertical tool clearance may change with machine use and should be inspected often. Failure to maintain the proper clearance may result in damage to the wheel rim and/or tire.

Also, note the valve stem position to the demount tool. Use the Robo-Arm® to push down on the tire opposite the demount tool to allow the bead to utilize the drop center area of the rim, this position reduces stresses in the bead and allows an easier bead lift.



Figure 8a - Insert Bead Lifting Tool

**10.** Insert the smooth curved end of the bead lifting tool over the forward end of the demount tool and below the top bead of the tire. Use your free hand to press down on the tire opposite the tool to help with tool insertion (Figure 9).



Figure 9 - Insert Bead Lifting Tool

**11.** Rotate the bead lifting tool down towards the wheel to lift the tire bead up and over the knob portion of the demount tool. The tool may be removed if desired (Figure 10).

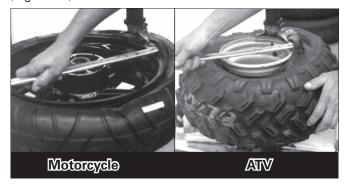


Figure 10 - Lift Bead Over Demount Tool

**12.** Depress the table top pedal to rotate the wheel clockwise. The demount tool will guide the upper bead up and over the edge of the wheel.

Now reposition the valve stem to the tail end of the Duckhead mount/demount tool before removing the second bead.

**NOTE:** Push down on the tire across from the demount tool during table top rotation to utilize the drop center area of the wheel. This reduces the tensional force on the bead during demount.

**13.** Lift and hold the tire at an angle so that the lower bead is resting in the drop center directly across from the demount tool, and is loose below the demount tool (Figure 11). Insert the smooth curved end of the bead lifting tool down over the forward end of the mount/ demount tool and below the lower bead. Lift the bead up and over the knob on the demount tool (Figure 11).

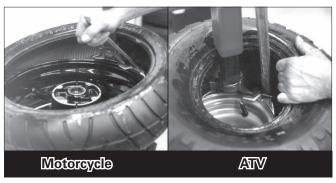


Figure 11 - Demounting Lower Bead

**14.** Depress the table top pedal to rotate the wheel. The demount tool will guide the bead up and over the edge of the wheel. Continue rotation until lower bead is demounted.

**NOTE:** With tube-type tires, demount the upper bead and remove the tube before demounting the lower bead.

**NOTE**: Table top rotation can be stopped at any time by removing your foot from the pedal.

**NOTE:** Normal table top rotation for demounting is clockwise. Depress the table top pedal to rotate this direction. To rotate the table top counterclockwise, lift the pedal up with your toe.



At times during the mounting and demounting procedure, the bead lifting tool may encounter resistance or come under load. Keep one hand firmly on the tool to avoid possible tool disconnect. Use the reversing feature to back out or jam ups.

#### **Tire Mounting**

This information must be read and followed carefully to prevent accidents and injuries during mounting.



Check tire and wheel carefully before mounting. Make sure the tire bead diameter and wheel diameter match exactly. Consult the Rubber Manufacturer's Association for approved rim widths for tire sizes. Mismatched tires and wheels explode.



Never Mount a tire and wheel handed to you by anyone without checking both tire and wheel for damage and compatibility. Be extra cautious of persons without knowledge of tire service. Keep by-standers out of service area.



Never mount a damaged tire. Never mount a tire on a rusty or damaged wheel. Damaged tires and/or wheels may explode.



If you damage the tire bead during mounting, STOP!, remove the tire and mark it as damaged. Do not mount a damaged tire.

- **1.** Before any mounting, inspect tire for damage and verify size match between tire and wheel (Figure 12).
- **2.** Inspect wheel closely for damage. Clean the wheel and remove any light corrosion or rubber residue (Figure 12). Do not attempt to service a heavily corroded wheel, damaged wheel, or bent wheel.

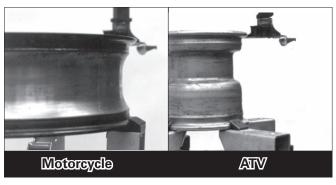


Figure 12 - Inspect and Clean the Wheel

**3.** Inspect valve stem and replace if necessary. Lubricate tire beads liberally with tire manufacturer approved lubricant (Figure 13).

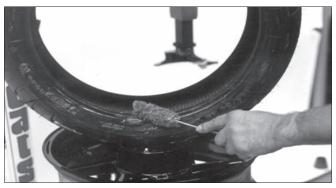


Figure 13 - Lubricate Tire Beads Liberally

**4.** Place tire over wheel and move swing arm into position. Position the tire so that the lower bead is above the rear extension of the mount/demount tool and below the front knob (Figure 14).

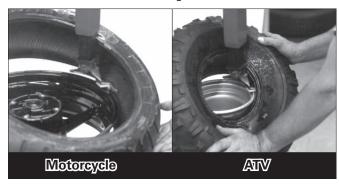


Figure 14 - Position Tire Against Mount/Demount Tool

**4a.** Make sure the valve stem is at the 9 o'clock position in front of bead lock. Position tire so that lower bead is above the rear extension of the mount/demount tool and below the front knob (figure 14a).



Figure 14a - Position Tire Against Mount/Demount Tool

- **5.** Depress table top pedal and rotate the wheel to mount the lower bead. Use the drop center of the wheel to reduce the tensional force on the bead by pressing down on the tire directly across from the mount tool. Rotate table top until lower bead is fully mounted.
- **6.** For top bead, rotate the table top until the valve stem is directly across from the mount tool. Lift the upper bead up and over the rear of the mount tool. With your left hand press down on the tire between the mount tool and the valve stem to hold the tire in the drop center. Depress the table top pedal and rotate the tire until the bead is mounted. Continue to press down on the tire during the remaining mounting process.



Do not force the tire onto the rim. Bead damage could result making the tire unsafe and/ or creating the risk of injury.

**NOTE:** If table top rotation stalls, reverse the table top momentarily until the tire bead is again loose on the wheel. Reposition the mount tool, make sure the bead is correctly positioned in the drop center of the wheel, then attempt mounting again.

**NOTE:** For low profile or stiff sidewall tires, it may be advantageous to use the bead lifting tool to initially hold the upper bead down in the drop center, or use drop center tools.

**NOTE:** For tube type tires, mount the lower bead first, move swing arm out, install the tube, and then mount the upper bead.

## Special Instructions For Demounting Extremely Wide Motorcycle Tires (RC200)

**101.** First review the large decal located on the tower of the changer. Read and understand the information.

**102.** On very wide motorcycle tires (over 8-inches wide) it may be advantageous to remove the motorcycle clamps from the machine and replace with three position automotive clamps.

The automotive three position clamps are accessories and can be ordered as p/n 8184926 for four clamps. Also, the plastic protection booties are recommended and can be ordered as p/n 8183604 for 10.



**103.** As with motorcycle clamps, after bead loosening and before clamping the wheel, preposition the clamps.



Figure 15 - Shown With Automotive Clamps And Plastic Protective Booties

**104.** With the tire bead loosened from the rim, position the wheel in the center of the table clamping system. If the sidewalls are extremely stiff, the Robo Arm™ may be placed in the center of the wheel (protect the surface with rag) and press the wheel down with the RoboArm to assist in clamp engagement. Adjust to

appropriate clamp pressure. Activate the clamps slowly and observe rim clamping.



**105.** To assist in positioning the duckhead at the location near the rim, use the Robo Arm to press the tire sidewall down.



**106.** Lubricate the upper bead surface. To assist, position the manual roller assembly into the receiver. Press down and the roller between the rim and the tire bead. This will allow easy lubrication of the upper bead surface and rim flange.



107. Insert the smooth curved end of the bead lifting tool over the forward end of the demount tool and below the top bead of the tire. Lift the bead up and over the knob on the demount tool. Also, note the valve stem position to the demount tool. Use the Robo-Arm® to push down on the tire opposite the demount tool to allow the bead to utilize the drop center area of the rim, this position reduces stresses in the bead and allows an easier bead lift.



**108.** Before rotating the bead up and on the duckhead, use the Robo Arm to push the upper bead into the rim's drop center.



**109.** If may be necessary to push the tire sidewall down at several locations to ease the stress in the tire bead.



**110.** Once the bead is located on the duckhead, the lift tool maybe removed completely.



Next, jog the machine rotation a short distance and observe the bead removal. Continue to rotate the rim until the bead is completely removed.



**111.** Lower bead removal is typical with standard procedures. The RoboArm may be used to assist in holding the lower bead up in the wheel's drop center.

## Special Instructions For Mounting Extremely Wide Motorcycle Tires (RC200)

**201.** Mount the first bead as a typical tire. Note that many tires may be pushed over the rim flange manually after lubricant has been applied.



**202.** For the top bead, lubricate the bottom side of the top bead and the edge.

**203.** Lubricate the rim completely in the drop center area.

**204.** Place tire over wheel and move swing arm into position making sure the valve stem is at the 9 o'clock position in front of bead lock. Position tire so that lower bead is above the rear extension of the mount/demount tool and below the front knob (figure 19).

Use Robo Arm™ to push down on tire 90 degrees clockwise from mount/demount tool to allow bead to utilize drop center area of rim.



**205.** Rotate the assembly slowly about 90-degrees and observe.



**206.** Reposition the RoboArm back to 90-degrees forward of the duckhead and finish the mounting.



**207.** Use the RoboArm to push down on tire and swing duckhead from rim position.



## Special Instructions For Demounting Extra Wide ATV Type Wheels/Tires Down To 8-inch Diameter Using Automatic Clamps

**A200.** After loosening the beads, move clamps to inward most position, adjust to appropriate clamp pressure and the clamp wheel.



A201. Position duckhead near rim.

A202. Lubricate beads and rim.



**A203.** Using typical procedures, remove upper bead.



**A204.** To remove the lower bead on very wide tires, the lever bar may be placed under the lower bead and rotated up.



Mounting ATV Type Wheels/Tires Down To 8-inch Diameter

**A205.** First bead can usually be mounted manually after lubricant application to bead area and rim.



**A206.** Top bead is mounted using typical procedures.



## Demounting Small 6-inch To 8-inch Diameter Wheels/Tires

**B201.** After loosening beads, clamp the wheel and lubricate the tire beads; also place a fulcrum into the wheel center hole.



**B202.** Position the Snake<sup>™</sup> tool and remove the top bead. Next remove the second bead.

**Note:** The Snake<sup>™</sup> tool is a product of Ken-Tool® and can be purchased through most tire supply companies.



## Mounting Small 6-inch To 8-inch Diameter Wheels And Tires

**B203.** Wheel shown clamped with a fulcrum placed in the wheel center.



**B204.** Lubricate the beads and rim.



**B205.** Use Snake<sup>™</sup> tool to install both beads.

**Note:** The Snake<sup>™</sup> tool is a product of Ken-Tool® and can be purchased through most tire supply companies.



**B206.** A pair of regular vice-grip type pliers attached to the rim may be used to hold the bead lock.



#### Inflation

Tire inflation is performed in three steps: **BEAD SEAL, BEAD SEAT, and INFLATION**. These steps are explained in detail. Read the explanation of each step and understand them thoroughly before proceeding.



Tire failure under pressure is hazardous. This tire changer Will Not Restrain Exploding Tires, rims or other related equipment. Inspect tire and wheel carefully for match, wear, damage, or defects before mounting. Always use approved tire bead lubricant during mounting and inflation.



The clip-on chuck allows the operator to keep hands and entire body back from inflating tire. Improper use of the clip-on chuck could result in personal injury. The chuck must be an open/freeflow style with all parts in proper working order.



Check for proper inflation gauge operation. Accurate pressure readings are important to safe tire inflation. Refer to the Operating Maintenance section of this manual for instructions.

The inflation pedal, located at the center of the left side of the machine, controls the flow of air through the inflation hose, and has three positions.

**Note:** The clip-on chuck on the end of the hose should always be an open/freeflow style with all parts in proper working order.

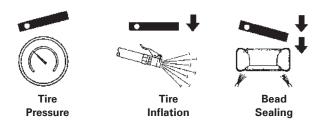
**Position 1 - Tire Pressure** – With the inflation hose attached to the tire valve and the pedal in this position, the air gauge will register the air pressure in the tire. Whenever your foot is removed from the pedal, it will return to this position.

**Position 2 - Tire Inflation** – This is the first activated position. With the inflation hose attached to the tire valve and the pedal in this position, line pressure is allowed to flow through the valve system and into the tire for inflation. Correct tire pressure is not indicated on the gauge in this position.

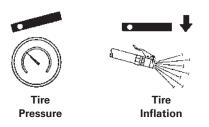
**Position 3 - Bead Sealing -** This is the second and last activated position. With the inflation hose attached to the tire valve and the pedal in this position, line pressure is allowed to flow through the valve and to the

air-flate bead seal jets on the tabletop for bead sealing.

**1.** If the rim has been clamped from the outside for tire mounting, release the clamps, lift the tire, and move the clamps to the center of the tabletop.



**Inflation Pedal Positions (RC200)** 



Inflation Pedal Positions (RC150)

The inflation pedal, located at the center of the left side of the machine, controls the flow of air through the inflation hose.

Note the Pedal Positions (See Diagram)



Use of bead sealing jets without a tire in place can cause dirt and debris to be blown into the air with enough force to injure operator and/or bystander. Do not use the bead sealing control position to inflate a tire.

R. This unit is equipped with a pressure limiter to assist the operator with proper tire inflation. When the inflation pedal is held in position 2, the pressure limiter cycles the machine between position 2 (inflation) and position 1 (at rest, no airflow to tire). This cycling helps to prevent over inflation of the tire. Tires can still be over inflated and explode with the use of this pressure limiter if all of the instructions in this manual are not followed completely. The pressure limiter will keep most car and light truck tires from inflating beyond 60 PSI (smaller tires may reach higher pressures). It is the operator's responsibility to follow all instructions and to control inflation pressure as specified in these instructions. Check the function of the pressure limiter regularly and maintain it according to the instructions provided in this manual for safe and proper operation. Do not tamper with or attempt to adjust the pressure limiter. Tires requiring inflation beyond 60 PSI should be inflated in a safety cage.

#### **Bead Sealing**

**1.** Position valve stem in front of operator and connect the inflation hose with the clip-on chuck. Hold tire up against upper edge of the wheel. Be sure tire's top bead does not cover the bottom of the valve stem (figure 16).



Figure 16 - Lift Tire Upwards for Bead Sealing

- **2.** Depress inflation pedal to position 2 and hold about one second to begin air flow through tire valve, then depress pedal to position 3 and hold briefly less than one full second. The blast of air from the jets will expand tire and seal the beads.
- **3.** Release the inflation pedal and allow it to return to position 1. Verify that both beads are completely sealed to the wheel. Repeat these steps if beads have not sealed. It may be necessary to wait a few seconds for the air storage tank pressure to recover before attempting again.
- **S.** If tire and wheel are properly lubricated and operator cannot achieve bead seal after three or four attempts, the valve core may be removed from the valve stem to allow more air flow into the tire to assist with bead seal. After bead seal is achieved, remove the clip-on chuck and reinstall the valve core. Reattach the clip-on chuck after core is installed.

#### **Bead Seating**



NEVER exceed 40 PSI to seat beads while using this tire changer. If more than 40 PSI is permitted by tire manufacturer, ALWAYS use safety cage and clip-on chuck. NEVER exceed recommended pressure after seating beads. ALWAYS keep hands and entire body back from inflating tire.

An exploding tire, wheel, or bead sealing equipment may propel upward and outward with sufficient force to cause serious injury or death to operator or bystander.



Check tire pressure frequently. If operator is unable to obtain Bead Seat, something is wrong. Deflate tire completely, inspect tire and wheel, correct any problems found, relubricate both tire beads, and reattempt Bead Seal and Seat procedures. Follow all safety instructions in this manual and on machine.

**1.** Once tire pressure is indicated on the air gauge (inflation pedal in position 1; foot removed from pedal), continue to inject air into the tire (inflation pedal position 2) in short intervals. Check the pressure frequently. Stand back during bead seat. Keep hands, arms, and entire body away from tire during this procedure (figure 17).



Figure 17 - Stand Back during Bead Seat

#### Inflation



NEVER exceed tire manufacturer's recommended air pressure. Tires can explode, especially if inflated beyond these limits. Use clip-on air chuck, keep hands, arms and entire body back from inflating tire. Avoid distraction during inflation. Check tire pressure frequently to avoid over inflation. Excessive pressure can cause tires to explode, causing serious injury or death to operator or bystander.

- 1. Make sure both beads are seated. When both beads are seated, the tire is ready for inflation.
  - **2.** Replace the valve core if it was removed.
- **3.** Depress the inflation pedal to position 2 to inflate the tire. The pressure limiter will cycle the air flow as described earlier. On most tires, the pressure limiter will cease air flow at approximately 60 PSI. On smaller volume tires the pressure may be higher.
- **4.** Release air pressure from tire by pressing the manual release valve button (inflation hose must be attached to the valve stem, Figure 18). Never add or adjust tire pressure using an air hose without a clip-on air chuck and in-line valve. Do not use a hand-held style chuck (figure 19).
- **5.** Important: When inflating automotive, light truck, and motorcycle (ATV see note 6) tires that require more than 60 PSI, always use a safety cage and air hose with a clip-on air chuck and in-line valve. The air hose must have enough length between the chuck and the operation/in-line valve to allow the operator to stand outside the trajectory.

**6. ATV Tire Inflation**: ATV tire inflation is unique in that the bead seat pressure allowed is more than the operating pressure. ALWAYS follow the tire manufacturer's information on inflation. This information can be printed on the sidewall, on the tire sticker, or from the manufacturer.



Figure 18 - Location of Manual Release Valve



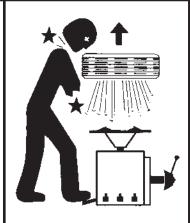
Figure 19 - Do Not Use a Hand-held Style Air Chuck

## **A** DANGER

**Explosion Hazard Never exceed 40 PSI while** seating beads. If you use more than 40 PSI always use safety cage.

Remember R.I.M.

(see page iv and back cover)



## **A DANGER**

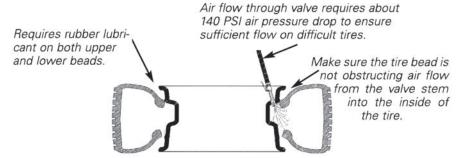
**Explosion Hazard Never inflate tire** above manufacturer's recommended pressure after bead is seated.

## Stages of Inflation on a Conventional Tire and Rim

Review these descriptions and diagrams carefully. Refer to them as necessary during bead sealing, bead seating, and inflation to verify that you are proceeding properly and safely.

#### **Bead Sealing**

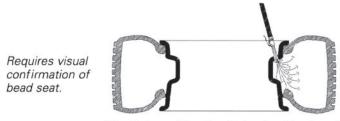
Bead sealing is the process of capturing air pressure between the tire and the rim. The tire will usually contain about 1/2 to 2 PSI at initial bead seal.



#### **Bead Seating**

Bead seating usually occurs on the long tapered side of the wheel first and the shorter side last. Bead seating will usually require at least 7 PSI in the tire. 40 PSI is the maximum safe pressure at this stage regardless of tire operating pressure. For tires requiring more than 40 PSI to bead seat use safety cage.

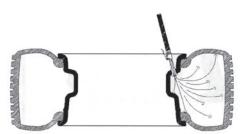
Most European import cars and many aftermarket alloy wheels are very tight and can be difficult to bead seat. Also note that asymmetrical hump and run-flat tires are extremely difficult to bead seat. Follow tire manufacturer's recommended procedure for bead seating.



Stand clear of the tire during bead seat and inflation.

#### Inflation

After the beads are seated, the tire is ready to be inflated. Do not inflate the tire above the manufacturer's recommended pressure as stamped on the tire sidewall. The typical inflation pressure for automobile tires is between 24 and 45 PSI. Light truck inflation pressure typically covers a wider range.



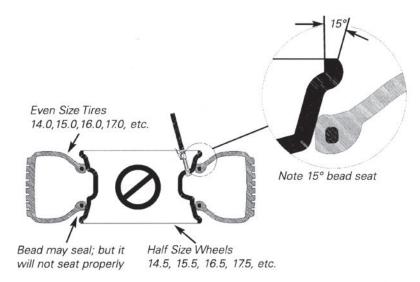
Stand clear of the tire during inflation.

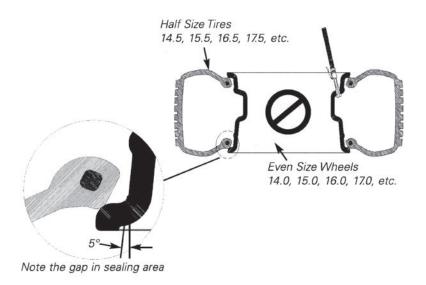
#### **Mismatched Tires and Wheels**

Never mount and inflate mis-matched tires and wheels.



Mismatched tire and wheel combinations will explode, if you attempt to force a bead seat, causing personal injury or death to operator and/or bystanders.





## Performance, Custom and Aluminum Wheels



Only tire technicians with experience and training on custom wheels should attempt to service expensive custom alloy or aluminum wheels and high-performance low-profile tires.

#### **Pre-Operation Notes:**

- Ensure all weights have been removed.
- Clamp wheel from the outside.
- Use ample lubricant for mount and demounting.
- Always review wheel nicks and/or scratches with the owner before servicing.

#### Performance Tires and Wheels • Demounting

Follow these instructions for performance type tires and wheels, including run-flat tires and their associated wheels, and asymmetrical hump wheels.

- **1.** Remove valve core and completely deflate tire.
- **2.** Pull the bead loosener shoe away from the machine and roll the tire into position against the bumper pads. Position the tire with the valve stem in the 2 o'clock position (in direct line with the bead loosener shoe). Always loosen the bead on the narrow/mounting side of the wheel first (figures 4 and 20).



Figure 20 - Position Tire for Bead Loosening

**AA.** Wheels with an asymmetrical hump have a larger "ledge" type hump around the wheel except at the valve hole making them more difficult to mount and demount (figure 21). Always loosen the beads near the valve stem on both sides of rim.

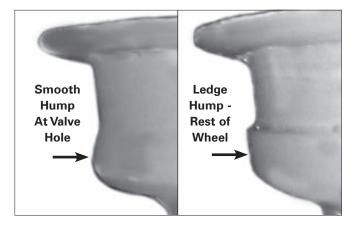


Figure 21 - Asymmetrical Hump Wheel

**AB.** Some wheels/tires have a low pressure sensor/ transmitter strapped to the wheel (figure 22). This is especially true on run-flat tire/wheel systems. The sensor is positioned directly opposite from the valve stem. Other low pressure warning systems have the sensor as part of the valve. To avoid damaging the sensor, always loosen the top bead with the valve stem at the 2 o'clock position first, then loosen the bottom bead with the valve stem at the 2 o'clock position, and then continue to loosen the remaining circumference of the beads as necessary. Avoid loosening at 180 degrees (opposite) the valve.



Figure 22 - Wheel with Low Pressure Sensor/Transmitter

**3.** Loosen bottom bead, starting with valve stem at 2 o'clock position next to the loosener shoe (figure 23).



Figure 23 - Loosen Bottom Bead

#### **Aluminum and Custom Wheels**

Follow instructions provided for standard steel wheels, except:

**AC.** After loosening and lubricating both beads, rotate the table top until the clamps are in the 12, 3, 6, and 9 o'clock positions (figure 24).

## **A** CAUTION

Clamp control pedal must be in the full up or full down position (detent position) to maintain clamping force on wheel.

**AD.** Clamp wheel from the outside. Position rim edge into clamp at 12 o'clock position. Lower the wheel and depress the clamp control pedal. Slowly move the clamps inward until they securely contact the outside edge of the rim. Engage the detent position (pedal in full down position) to maintain clamped pedal position.

**TIP:** This is usually accomplished by crouching down in front of the tire changer, holding the wheel with the right hand, and operating the clamp control pedal with the left hand. This allows the operator to watch the clamps as they move to ensure proper, damage-free clamping.

**4.** Clamp wheel to the table top as described in item AD. Always clamp custom wheels from the outside.

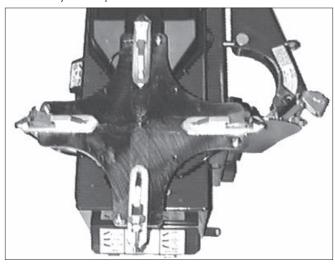


Figure 24 - Rotate Table Top to 12 o'clock

**5.** Depress the tire sidewall downward with the aid of the Robo Foot providing clearance for the duckhead® mount/demount tool to be positioned (figure 25). Move swing arm into place. Increase the horizontal distance between the demount tool and the wheel an additional 1/16 to 1/8 inch with the adjustment knob.



Figure 25 - Helper Foot Depressing Sidewall of Tire

**10.** Lubricate upper bead liberally. Use the bead roller tool to help push the tire bead down so bead area is easier to reach for lubrication (Figure 26).



Figure 26 - Lubricate Upper Bead

**11.** Locate the valve stem just before the demount head before proceeding (Figure 27).



Figure 27 - Position Valve Stem Under Demount Head

**12.** Place the helper foot opposite the demount head and push the bead into drop center. Insert bead lifting tool between knob on demount tool and tire bead Figure 28). Use roller tool to provide clearance.



Figure 28 - Insert Bead Lifting Tool

**13.** Rotate lifting tool down over wheel to lift bead up and over the knob and at the same time remove helper foot (Figure 29).



Figure 29 - Rotate Lifting Tool Down for Demount

#### Performance Tires & Wheels • Mounting

Before beginning any of the mounting activities, review all of the caution, warning and danger instructions associated with mounting already listed in the early part of the manual concerning tire/rim size match, inspect for damage, etc.

**14.** Install or review condition of any pressure sensor devices. This will prevent having to remount the tire later.

**15.** Begin the tire mounting process by lubricating both tire beads and the rim if necessary (figure 30).



Figure 30 - Lubricate Tire Beads

**16.** For mounting the lower bead; position the tire at an angle to the rim and mount (figure 31).



Figure 31 - Mount the Lower Bead

**17.** Next position the rim for the best mounting by assuring the valve stem or sensor devices will not prevent the upper bead from using the wheel's full drop center. Typically valves or sensor devices are positioned at 90 degrees forward of the duckhead.

**18.** Position the valve stem at 9 o'clock position in front of bead lock. Lift the bead over the rear of the mounting head. Use the helper tool to hold the bead in the drop center (Figure 32). Rotate the wheel in short steps and apply extra lubricant to mount upper bead.



Figure 32 - Mount Upper Bead, Use Helper

**19.** On extremely tight tire and wheel combinations, it may be necessary to use the bottom of the helper foot to flip the tire bead over the rim flange (Figure 33)

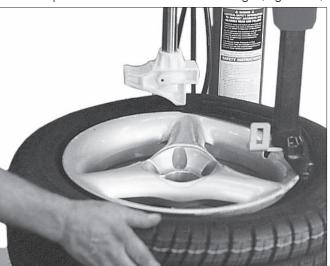


Figure 33 - Helper Foot to Flip Bead Over Rim Flange

#### **Custom and Special Wheels**



Only tire technicians with experience and training on custom wheels should attempt to service expensive custom alloy or aluminum wheels and high-performance low-profile tires.

#### **Alloy Wheels**

Some manufacturers offer wheels with little or no drop center. These are not DOT approved. The tire or wheel - or both - can be damaged and the tire could explode under pressure , resulting in serious injury or death. Do not mount/demount this type of wheel (figure 34).

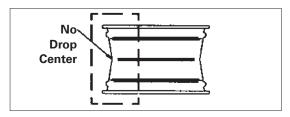


Figure 34 - No Drop Center

## **European Performance Wheels** (Asymmetrical Hump)

Some European wheels have very large humps except near the valve hole. On these wheels, the beads should be loosened at the valve hole on both the upper and lower sides first (figure 35).

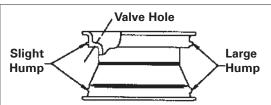


Figure 35 - Asymmetrical Hump on European Wheels

#### **Tube Type Tires**

#### Mounting

- **1.** Avoid pinching or forcing the tube.
- **2.** Apply rubber lubricant to the beads of the tire.
- **3.** Mount the bottom bead.
- **4.** Round out the tube with a small amount of air.
- **5.** Apply rubber lubricant to the tube.
- 6. Insert the tube into the tire.
- **7.** Mount the top bead.

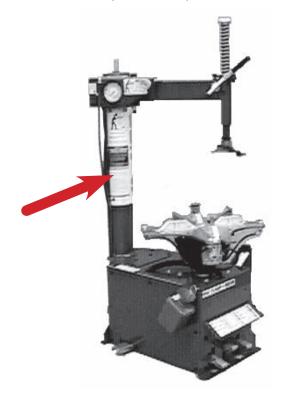
#### **Demounting**

- **1.** After tire beads are loosened, lubricate the beads and rim liberally.
- **2.** Position demount tool and bead lifting tool as described in steps 8 through 12 on pages 5 and 6. Depress table top pedal and rotate only a short distance at a time. This allows you to stop the process should the tube get pinched.
- **3.** After upper bead is demounted, remove tube and demount lower bead.



#### Do It Now

Make sure the instruction and warning decal is clean and clearly visible to operator.



#### **Maintenance Instructions**

Read and follow all the maintenance instructions provided in this manual to keep the machine in good operating condition. Refer to the other materials received with the unit and to the service bulletins from the manufacturer for additional instructions on proper maintenance and service. Regular inspections and proper maintenance are essential to preventing accidents and injuries.



Before making any inspection, adjustment, or repair, disconnect the power source and block out all moving parts to prevent injury.



Keep the machine and the immediate work area clean. Do not use compressed air to remove dirt and debris from the machine. Foreign material may be propelled into the air and into operator or bystander causing personal injury.



Wear protective clothing, equipment and eye protection when making any adjustments or repairs to the machine.

- **A.** The vertical slide should be cleaned with a vaporizing solvent and then lubricated with chassis grease once a month.
- **B.** Check the adjustment of the Duckhead mount/demount tool once a month. See instructions this page.
- **C.** The table top, clamps, steel Duckhead mount/demount tool, and other working surfaces should be cleaned with a vaporizing solvent every month.
- **D.** Inspect clamps. If using Max-Grip<sup>™</sup> clamps then replace any worn or damaged grips and covers or if using other clamps then remove metal chips and dirt from the serrations with a wire brush every month.

**E.** Check the tire pressure gauge function daily, and check the accuracy monthly. Use a pressurized tire and a high quality stick-type pressure gauge. If necessary, adjust the dial of the machine gauge. If the gauge is defective, replace it immediately (part number 8107985). Contact COATS at (615) 641-7533. Check function of the pressure limiter weekly. Always reinstall the lens after adjusting the gauge.

**F.** Make sure all fasteners are securely tightened.

- **G.** Make certain that all guards and covers are in place.
- **H.** Check for worn, damaged or missing parts including grips and protective covers. Replace them before allowing the unit to be used.
- I. On a daily basis, inspect the unit and check to be certain that all systems are operating normally. Detailed inspection and testing procedures are specified for various components at regular intervals. Set up a chart and assign responsibility for these items.



Replace any damaged or missing safety decals. They are available from COATS, (800) 688-6359.

**Important:** These instructions will help you service the unit. Instructions are for a person with some mechanical ability and training. No attempt has been made to describe all basic steps. For example, how to loosen or tighten fasteners. Also basic procedures such as cycling systems and checking operation of the equipment are not fully described since they are known to anyone who does mechanical and service work. Do not attempt to perform work beyond your ability or at which you have no experience. If you need assistance, call an authorized service center or contact COATS directly, (800) 688-6359.

#### **Duckhead® Mount/Demount Tool Cleaning**

Clean dirt and debris from the mount/demount tool (duckhead) roller with small screw driver or pick.



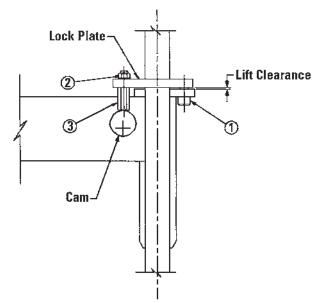
## Duckhead Mount/Demount Tool Adjustment

#### **To Adjust Tool Head Lift**

Shoulder screw (ref.1) sets the tool head lift for metal duckhead mount/demount tools – no adjustment required. Place **3 Shims 85606345** on screw if using a plastic duckhead mount/demount tool.

#### To Adjust Lock Tightness

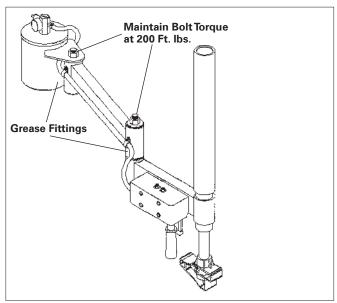
With lock handle unlocked, loosen jam nut (ref. 2) and adjust pin (ref. 3) until a slight firmness is obtained, then tighten jam nut and check. Also recheck tool head lift at this time.



#### **Robotic Arm Maintenance**

**A.** Grease the robotic arm to maintain smooth rotation. Grease fittings have been provided at the pivot joints.

**B.** Check bolt torque periodically at pivot joints. Proper Torque is 200 ft. lbs.



#### **Oil Injector Maintenance**

The oil injector (on units so equipped) typically require annual service. The oil level in the oil reservoir tank should be checked regularly.

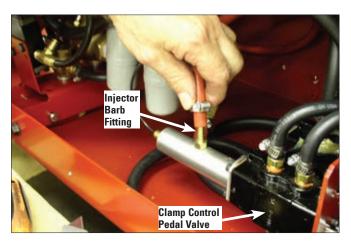
Add oil to oil reservoir tank when fluid level is a quarter full or below. Remove cap from the oil reservoir tank and add Chevron Regal® R & O 32 oil to full line (air tool oil is an acceptable substitute). Replace cap and clean up any spilled oil.

**Important:** An air lock will form if the hose between the reservoir and injector is ever empty of oil. In this case, after filling the reservoir tank, the line must be bled of air at the injector connection as follows:

- **1.** Disconnect all power sources, both air and electricity inputs. Allow any stored air in the reservoir to escape by depressing the inflate pedal.
- 2. Remove the side panel and locate the oil injector.
- 3. Prime the oil injector.

#### a. Oil Injector With Bleeder Screw

Loosen bleeder screw until oil drips from screw and all air is relieved from the oil line hose. Retighten the bleeder screw.



#### b. Oil Injector Without Bleeder Screw

Remove the oil line hose from the injector barb fitting. Allow air to escape from the hose by lowering the hose end below level of reservoir until oil is present. Drip oil into hose barb fitting on injector until barb fitting is full. Reinstall oil line hose onto oil injector barb fitting.

- **4.** Reconnect air/electric sources and cycle the clamp control pedal a few times checking for oil and air leaks.
- **5.** Test the machine for full function before returning the machine to operation.
- **6.** Monitor oil consumption to ensure oil is being used in system.

#### **Pressure Limiter Maintenance**



Operating a tire changer with a defective, improperly adjusted, or by-passed pressure limiter could cause an operator to accidentally over pressurize a tire, resulting in a tire explosion with severe injury or death to the operator or bystanders.

Always be sure that the pressure limiter is present and is operating properly.



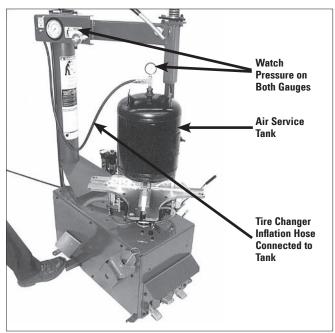
Never inflate tire above manufacturer's recommended pressure after bead is seated. Pressure limiter is set at 60 PSI. Any required inflation above 60 PSI should be performed in an inflation chamber/safety cage or securely mounted on the vehicle if an inflation chamber is not available. A tire explosion may cause personal injury or death to operator or bystanders.

The pressure limiter helps prevent inflation of standard size or larger tires or tubes beyond 60 PSI to minimize risk of explosion. This device is for the safety of the operator and bystanders. Proper operation of the pressure limiter is essential to safe operation of the machine.

Check operation of the pressure limiter as shown and described below at least monthly:

- **1.** Remove tires and/or wheels from the machine.
- **2.** Connect the inflation hose to an empty service tank with a pressure gauge (gauge should read 0). Use a certified tank with at least 200 PSI pressure rating.
- **3.** Depress inflation pedal to position 1 to start airflow through the hose and into the tank. Maintain a steady pressure for constant flow.
- **4.** Watch the rising pressure on the tank gauge and the gauge on the machine. Machine gauge should cycle between check and inflation pressures while tank gauge climbs steadily. As tank pressure reaches 60 PSI, the pressure limiter should stop the airflow automatically. Both gauges should read 60 PSI ± 5 PSI.
- **5.** Release inflation pedal. Check manual release valve function by pressing the button and releasing pressure from the tank until it reaches 50 PSI. Disconnect inflation hose, and release air inside tank.

**6.** Replace pressure limiter if it fails to cycle properly during inflation, if it fails to shut air supply off at 60 PSI, or if it malfunctions in any other way. Do not operate machine with a faulty pressure limiter.



#### **Setup Instructions**

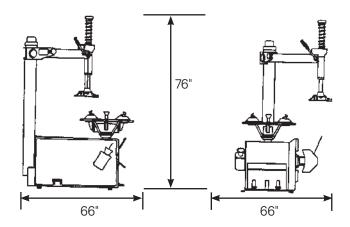


Proper unit installation is necessary for safe use and efficient operation. Proper installation also helps protect the unit from damage and makes service easier. Always place safety poster and instructions near the unit.

#### Location

Select a location using the drawings below. The area should provide the operator with enough space to use the equipment in a safe manner. The area selected should be well lit, easy to clean and should be away from oil, grease, brake lathe chips, etc. Avoid areas where bystanders and customers may be present.

#### **Workspace Requirements**



#### Air Source

The RC100 requires a 5 CFM air source at 150 PSI. The operating pressure range for all models is between 110 PSI and 175 PSI at the machine. For motorcycle and ATV tires, this pressure should be regulated to 90-100 PSI at the machine.

The unit is furnished with a 1/4" pipe thread male fitting for easy connection. This connection is located on the right side of the rear of the machine. A 1/4" ID hose (or pipe) for connection to the machine is satisfactory. Sufficient air pressure ensures good performance.

#### **Electrical Source**

Electrical models require power as follows:

15 amp, 115V, 60 Hz, 1 PH electrical circuit

Refer to the caution decal that is located by the unit's power cord.

Refer to the serial tag located on the lower part of the machine for specific electrical requirements for the unit. Have a licensed electrical technician perform any necessary changes to the power source before plugging in the unit. The electrical source must have a solid connection (less than 1 ohm) between ground and building ground.

#### Floor Mounting

As Hennessy can not be certain of the environment and conditions of the locations where the equipment will be installed, it is recommended that the safety manager review the shop floor conditions and local regulatory practices to determine if bolting of the equipment to the shop floor is necessary or advisable.

#### **NOTES**

#### **NOTES**

### ONE WORD FOR SAFETY

#### READ INSPECT MOUNT

#### READ...

Mounting and inflating the wrong size tire can get you hurt. Read the size on the tire and make sure it matches the rim. Be especially careful about putting a smaller tire on a larger rim, such as a 16-inch tire on a 16.5-inch rim.

Inflation of a mismatched tire and rim can cause an explosion.

#### INSPECT...

shop foreman.

damage.

#### MOUNT...

Before you put any tire Once you've made sure the tire is OK on a rim, inspect the rim and the right size and the rim is OK, for rust, tough spots, bent mount the tire safely. NEVER, ever lean edges, or cracks that could over the tire when you're inflating it. If prevent the tire from seat- a tire does explode, it will go straight ing right. If you spot any up. You don't want to be over the tire of these problems, don't if that happens. Also, never over-inflate mount the tire until the rim the tire, even if the bead doesn't seat. has been checked by your Never inflate over 40 PSI. If the tire hasn't seated, something is wrong. Inspect the tire for bead Deflate the tire and check it and the rim again. If it doesn't work the second time, try another tire.

#### **BE CAREFUL OF THESE SITUATIONS:**

- 1. Damaged Bead or Beads.
- 2. Rusty Wheels. (particularly in the bead seat area)
- 3. Bent or Cracked Wheels.
- 4 A. Mismatched.

(A mis-match of a 16-inch tire to a 16.5inch rim causing an explosion)

4 B. Mismatched.

(16.5-inch tire on a 16-inch rim)

- 5. Walk-In Tire and Rim.
- 6. Back Injuries.
- 7. Hand or Finger Injuries.

(Hands or fingers too close to inflating tire or bead seats which may cause injury.)

8. Standing Clear. (Never put any part

of your body over the tire changer during inflation.)

- 9. Beads will not Seat at 40 PSI.
- 10. Improper Inflation.

Remember R.I.M. (Read, Inspect, Mount) for every tire.

FAILURE TO READ AND FOLLOW ALL WARN-INGS AND INSTRUCTIONS INTHIS MANUAL CAN LEAD TO SERIOUS PERSONAL INJURY OR DEATH TO OPERATOR OR BYSTANDER.

THE OWNER IS RESPONSIBLE FOR MAIN-TAINING THE OPERATION INSTRUCTIONS AND DECALS FOR OPERATOR REFERENCE. FOR ADDITIONAL COPIES. CONTACT HEN-NESSY INDUSTRIES, INC., 1601 J.P. HENNESSY DRIVE, LAVERGNE, TENNESSEE, 37086 - (800) 688-6359.

TIRE FAILURE UNDER PRESSURE IS HAZ-ARDOUS! This tire changer Will Not Restrain Exploding Tires, rims or other related equipment.

TIRES CAN EXPLODE, ESPECIALLY IF INFLATED BEYOND SPECIFIED LIMITS. DO NOT EXCEED TIRE MANUFACTURERS REC-**OMMENDED AIR PRESSURE.** 

AN EXPLODING TIRE, RIM, OR BEAD SEAT-ING EQUIPMENT MAY PROPEL UPWARD AND OUTWARD WITH SUFFICIENT ENERGY TO CAUSE SERIOUS INJURY OR DEATH TO OPERATOR AND/OR BYSTANDERS.