

OPERATION AND MAINTENANCE MANUAL for MODELS 232 AND 232-2 SUPER-DUTY AUTOMOTIVE 1/2" IMPACT WRENCHES

NOTICE

Model 232 and 232-2 Impact Wrenches are designed for use in general automotive repair, body shops, front end service and light truck and farm equipment applications. Ingersoll-Rand is not responsible for customer modification of tools for applications on which Ingersoll-Rand was not consulted.

⚠ WARNING

IMPORTANT SAFETY INFORMATION ENCLOSED.
READ THIS MANUAL BEFORE OPERATING TOOL.

IT IS THE RESPONSIBILITY OF THE EMPLOYER TO PLACE THE INFORMATION
IN THIS MANUAL INTO THE HANDS OF THE OPERATOR.

FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

PLACING TOOL IN SERVICE

- Always operate, inspect and maintain this tool in accordance with: American National Standards Institute Safety Code for Portable Air Tools (ANSI B186.1)
- For safety, top performance, and maximum durability of parts, operate this tool at 90 psig (6.2 bar/620 kPa) maximum air pressure at the inlet with 3/8" (10 mm) inside diameter air supply hose.
- Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool.
- Do not use damaged, frayed or deteriorated air hoses and fittings.
- Be sure all hoses and fittings are the correct size and are tightly secured. See Dwg. TPD905-1 for a typical piping arrangement.
- Always use clean, dry air at 90 psig maximum air pressure. Dust, corrosive fumes and/or excessive moisture can ruin the motor of an air tool.
- Do not lubricate tools with flammable or volatile liquids such as kerosene, diesel or jet fuel.
- Do not remove any labels. Replace any damaged label.

USING THE TOOL

- Always wear eye protection when operating or performing maintenance on this tool.
- Always wear hearing protection when operating this tool.

- Keep hands, loose clothing and long hair away from rotating end of tool.
- Note the position of the reversing lever before operating the tool so as to be aware of the direction of rotation when operating the throttle.
- Anticipate and be alert for sudden changes in motion during start up and operation of any power tool.
- Keep body stance balanced and firm. Do not overreach when operating this tool. High reaction torques can occur at or below the recommended air pressure.
- Tool shaft may continue to rotate briefly after throttle is released.
- Air powered tools can vibrate in use. Vibration, repetitive motions or uncomfortable positions may be harmful to your hands and arms. Stop using any tool if discomfort, tingling feeling or pain occurs. Seek medical advice before resuming use.
- Use accessories recommended by Ingersoll-Rand.
- Use only impact sockets and accessories. Do not use hand (chrome) sockets or accessories.
- Impact wrenches are not torque wrenches. Connections requiring specific torque must be checked with a torque meter after fitting with an impact wrench.
- This tool is not designed for working in explosive atmospheres.
- This tool is not insulated against electric shock.

NOTICE

The use of other than genuine Ingersoll-Rand replacement parts may result in safety hazards, decreased tool performance, and increased maintenance, and may invalidate all warranties.

Repairs should be made only by authorized trained personnel. Consult your nearest Ingersoll-Rand Authorized Servicenter.

Refer All Communications to the Nearest
Ingersoll-Rand Office or Distributor.

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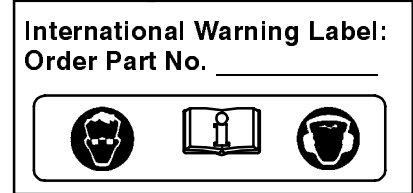
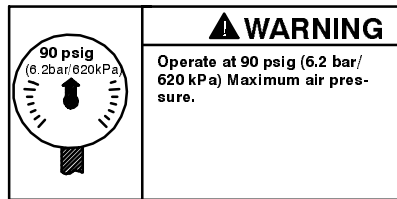
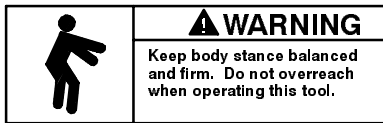
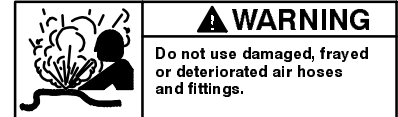
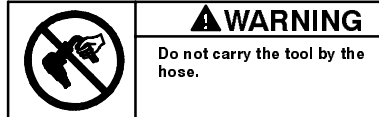
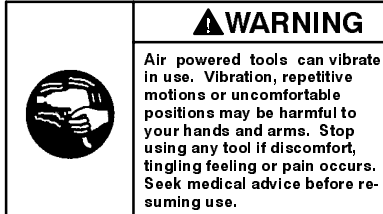
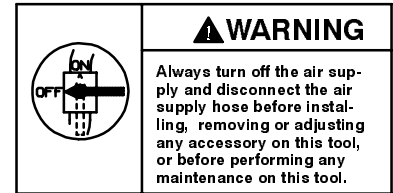
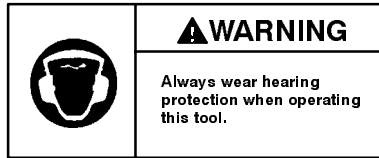
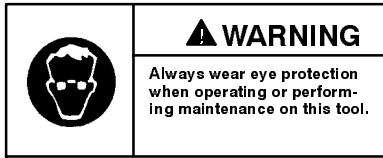
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INGERSOLL-RAND®
PROFESSIONAL TOOLS

WARNING LABEL IDENTIFICATION

⚠ WARNING

FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.



ADJUSTMENTS

SETTING THE POWER REGULATOR

⚠ WARNING

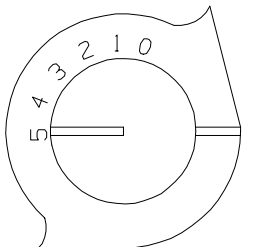
Impact wrenches are not torque control devices. Fasteners with specific torque requirements must be checked with suitable torque measuring devices after installation with an impact wrench.

Models 232 and 232-2 Impact Wrenches incorporate a power regulator into the reverse mechanism that allows the operator to have either full power output in one direction and reduced power output in the other direction or full power output in both directions. To adjust the power, proceed as follows:

For full power in both directions, rotate the reverse valve until the notch on each end of the reverse valve aligns with the number 5 on each side of the housing.

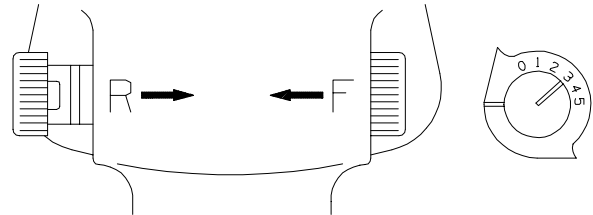
NOTICE

The numbers 0 thru 5 on the housing are only for reference and **DO NOT** denote a specific power output. Zero (0) designates the lowest power output while five (5) denotes the highest.



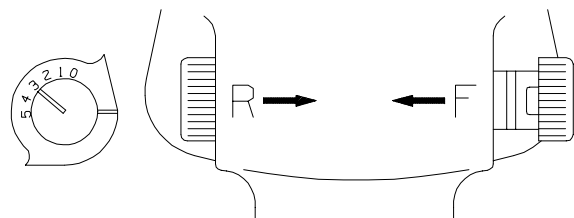
(Dwg. TPD1247)

For reduced power in the forward direction and full power in the reverse direction, push the reverse valve inward on the right side of the tool and rotate the reverse valve until the notch on the right side aligns with the desired number on the right side. This provides reduced power in forward but full power in reverse when the reverse valve is pushed in the opposite direction. See Dwg. TPD1248.



(Dwg. TPD1248)

For reduced power in the reverse direction and full power in the forward direction, push the reverse valve inward on the left side of the tool and rotate the reverse valve until the notch on the left side aligns with the desired number on the left side. This provides full power in forward but reduced power in reverse when the reverse valve is pushed the opposite direction. See Dwg. TPD1249.



(Dwg. TPD1249)

PLACING TOOL IN SERVICE

LUBRICATION



Ingersoll-Rand No. 50



Ingersoll-Rand No. 100

Always use of an air line lubricator. We recommend the following Filter-Lubricator-Regulator Unit:

For International- No. C22-04-G00

For USA - No. C26-C4-A29

After each eight hours of operation, if an airline lubricator is not used, remove the Oil Chamber Plug (17) and fill the oil chamber with Ingersoll-Rand No. 50 Oil.

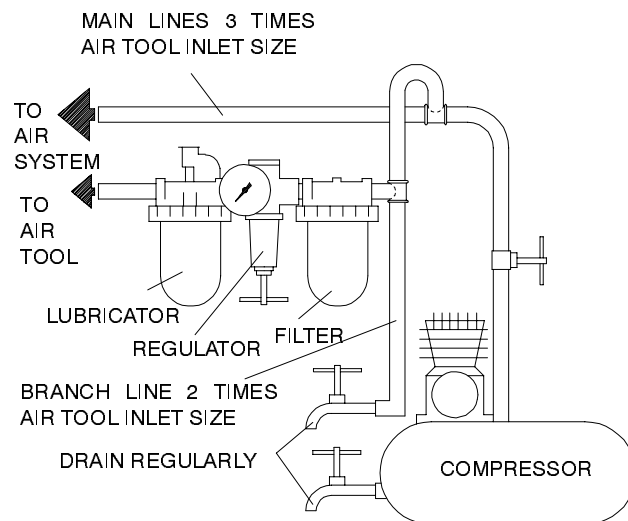
After each eight hours of operation, or as experience indicates, inject about 4 cc of the Ingersoll-Rand No. 100 Grease into the Grease Fitting (16).

LUBRICATION

Air Supply and Connections

Always use clean dry air at 90 psig maximum air pressure. Dust, corrosive fumes and/or excessive moisture can ruin the motor of an air tool. An air line filter can greatly increase the life of an air tool. The filter removes dust and moisture. Be sure all hoses and fittings are the correct

size and are tightly secured. See Dwg. TPB905-1 for a typical piping arrangement.



(Dwg. TPD905-1)

HOW TO ORDER AN IMPACT WRENCH

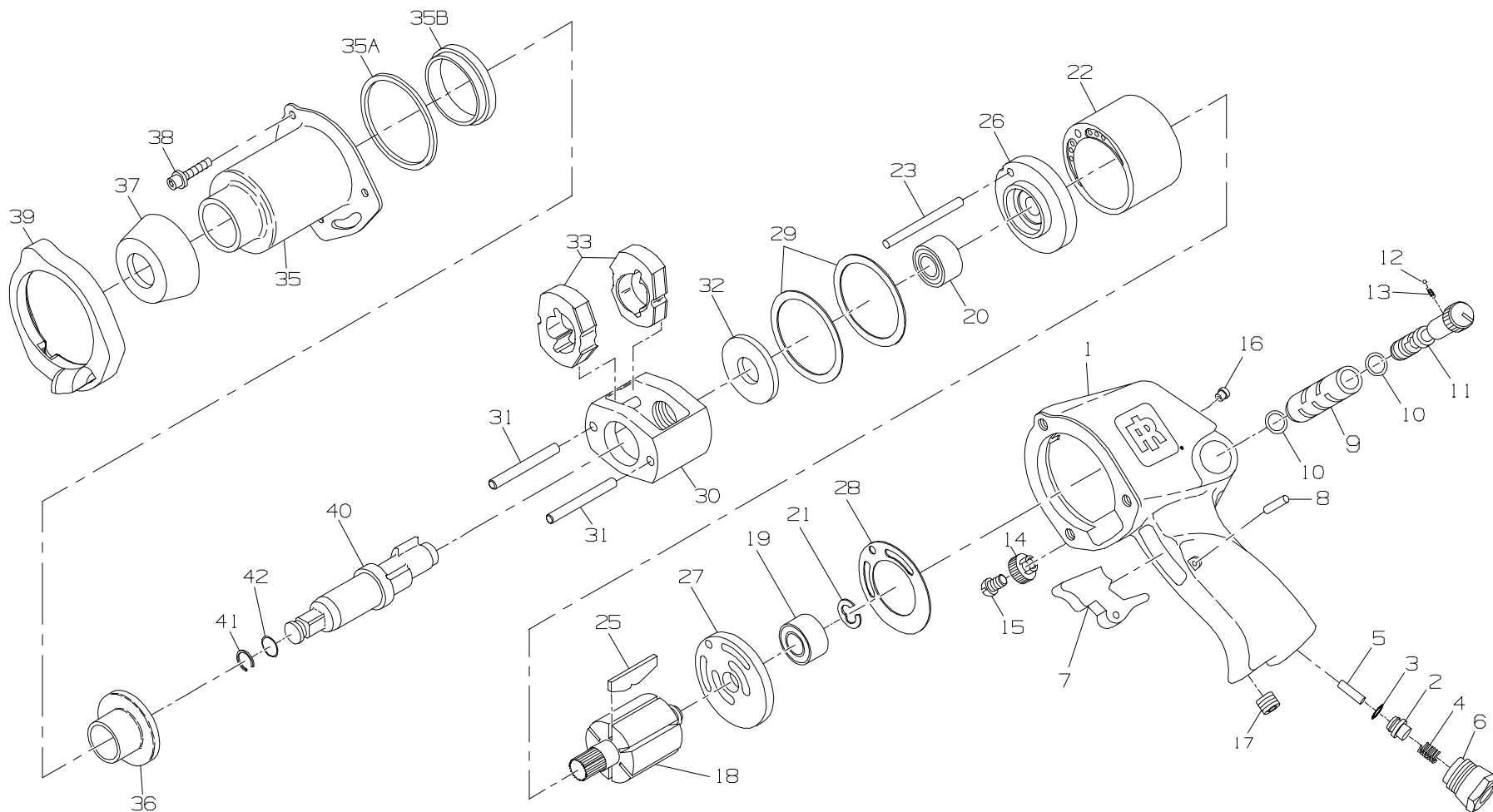
1/2" SQUARE DRIVE

Model	Impacts/min.	Recommended Torque Range	
		ft-lb	Nm
232	1 200	25-300	34-407

1/2" SQUARE DRIVE WITH 2" EXTENDED ANVIL

232-2	1 200	25-300	34-407
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MAINTENANCE SECTION



(Dwg. TPA1390)

PART NUMBER FOR ORDERING

PART NUMBER FOR ORDERING

1	Motor Housing Assembly	232-A40	27	Rear End Plate	231-12
2	Throttle Valve Assembly	404-50A	28	End Plate Gasket	231-283
◆ 3	Throttle Valve Face	405-159	29	Motor Clamp Washer (2)	227-207
◆ 4	Throttle Valve Spring	R1A-51	30	Hammer Frame Assembly	231-A703
5	Throttle Valve Stem	402-302	31	Hammer Pin (2)	231-704
6	Air Strainer Assembly	402-565	32	Hammer Frame Rear Washer	231-706
7	Trigger	705-93	◆ 33	Hammer (2)	231-724
8	Trigger Pin	533-656	35	Hammer Case Assembly	232-A727A
9	Reverse Valve Bushing	231-A330	◆ 35A	Hammer Case Gasket	230-36
◆ 10	Reverse Valve Bushing Seal (2)	PS3-67	35B	Hammer Case Pilot	405-800
11	Reverse Valve	231-329A	36	Hammer Case Bushing	705-941
◆ 12	Reverse Valve Detent Ball	AV1-255	37	Hammer Case Shield	AW234-109
◆ 13	Reverse Valve Detent Spring	231-664	◆ 38	Hammer Case Cap Screw (3)	231-638
14	Reverse Valve Knob	231-666	39	Grommet	232-110
15	Reverse Valve Knob Screw	231-665	◆ 40	Anvil Assembly (1/2" square drive)	
16	Grease Fitting	130SR-188		Standard length	231-A626A
*	Housing Label	WARNING-2-99		2" Extended length	231-A414A-2
17	Oil Chamber Plug	R0H-377	41	Socket Retainer	231-425A
*	Oiler Felt	261-63	42	Retainer O-ring	R1A-159
18	Rotor	231-53	*	Hammer Kit (includes illustrated parts 33[2], 35A, 38[3] and 40)	
19	Rear Rotor Bearing	402-22		for standard length	231-THK1
20	Front Rotor Bearing	4U-97		for 2" extended length	231-THK2
21	Rear Rotor Bearing Retainer	402-118	*	Tube of Grease	405-MG1
22	Cylinder	407-3	*	Bottle of Oil	405-M01
23	Cylinder Dowel	230-98	*	Lube Injector	230-228
25	Vane Packet (set of 6 Vanes)	221-42-6			
26	Front End Plate	231-11			

* Not illustrated.

◆ Indicates Tune-up Kit part.

MAINTENANCE SECTION

WARNING

Always wear eye protection when operating or performing maintenance on this tool
Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this tool or before performing any maintenance on this tool.

LUBRICATION

Each time a Model 232 Impact Wrench is disassembled for maintenance and repair or replacement of parts, lubricate the tool as follows:

1. Work approximately 6 to 8 cc of Ingersoll-Rand No. 100 Grease into the impact mechanism. Coat the Anvil (40) lightly with grease around the Hammer Case Bushing (36). Inject approximately 1 to 2 cc of grease into the Grease Fitting (17).
2. Use Ingersoll-Rand No. 50 Oil for lubricating the motor. Inject approximately 1 to 2 cc of oil into the air inlet before attaching the air hose.

DISASSEMBLY

General Instructions

1. Do not disassemble the tool any further than necessary to replace or repair damaged parts.
2. Whenever grasping a tool or part in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part or tool and help prevent distortion. This is particularly true of threaded members and housings.
3. Do not remove any part which is a press fit in or on a subassembly unless the removal of that part is necessary for repairs or replacement.
4. Do not disassemble the tool unless you have a complete set of new gaskets and O-rings for replacement.

Disassembly of the Impact Wrench

1. Clamp handle of Impact Wrench in a vise with square driver upward.
2. Unscrew and remove the three Hammer Case Cap Screws (38).
3. While lightly tapping on end of Anvil (40) with a plastic hammer, lift off Hammer Case (35), Hammer Case Pilot (35B) and Hammer Case Gasket (35A).
4. Grasp Hammer Frame (30) and carefully lift off entire impact mechanism, making certain not to drop two Hammer Pins (31). If it is necessary to disassemble the impact mechanism, refer to **Disassembly of the Impact Mechanism**. If it is unnecessary to disassemble impact mechanism, set it aside intact.

Disassembly of the Impact Mechanism

1. Set mechanism, driver end up, on a workbench.

NOTICE

Note the twin hammers within the Hammer Frame. These are identical, but must be placed in the Hammer Frame in a certain relationship. Using a felt-tipped pen, mark the top hammer “T↑” and the bottom hammer “B↑” with the arrows pointing upward. Mark both Hammers on the same end.

2. With mechanism sitting upright on workbench, slowly rotate Anvil in a clockwise direction until it comes up solid.

NOTICE

If you continue to rotate the Anvil, it will cam the Hammers out of engagement. Do not allow this to happen; merely rotate the Anvil until it comes up solid.

3. Hold Hammer Frame firmly and without disturbing the hammers, gently lift Anvil simultaneously rotating it clockwise about 1/8 of a turn from the Hammer Frame.

NOTICE

The twin hammers are now free to slide from the Hammer Frame when the Hammer Pins are removed. Do not drop the Hammers (33).

4. With Anvil removed, lift out the two Hammer Pins.
5. Remove the Hammers.

Disassembly of the Motor

1. Lift Rear Hammer Frame Washer (32) and two Motor Clamp Washers (29) from front of motor.
2. Grasp splined end of Rotor (18) and pull assembled motor from Motor Housing (1).
3. Lift Front End Plate (26) and Front Rotor Bearing (20) from splined end of the Rotor.
4. Remove Cylinder (22) and Vanes (25).
5. Remove Rear Rotor Bearing Retainer (21).
6. Lift Rear End Plate (27) and Rear Rotor Bearing (19) from Rotor.
7. Unscrew Air Strainer (6) and remove it.
8. Withdraw Throttle Valve Spring (4), Throttle Valve (2), and Throttle Valve Stem (5). Remove Throttle Valve Face (3) from Throttle Valve.
9. Remove Trigger Pin (8) and Trigger (7).
10. Unscrew Reverse Valve Knob Screw (15) and remove Reverse Valve Knob (14).

NOTICE

This Screw is installed with Loctite®*. You may have to heat it slightly to loosen the Screw.

11. While slowly rotating Reverse Valve (11), withdraw it from Reverse Valve Bushing (9).

MAINTENANCE SECTION

NOTICE

Be careful not to lose the Reverse Valve Detent Ball (13) and Spring (14) from the hole in the side of the Reverse Valve.

ASSEMBLY

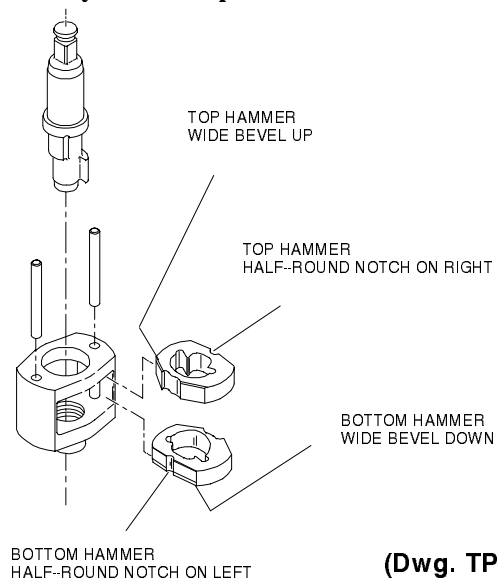
General Instructions

1. Always press on the **inner** ring of a ball-type bearing when installing the bearing on a shaft.
2. Always press on the **outer** ring of a ball-type bearing when installing the bearing in a bearing recess.
3. Whenever grasping a tool or part in a vise, always use leather-covered or copper-covered vise jaws. Take extra care with threaded parts and housings.
4. Always clean every part and wipe every part with a thin film of oil before installation.
5. Apply a film of o-ring lubricant to all O-rings before final assembly.
6. Check every bearing for roughness. If an open bearing must be cleaned, wash it thoroughly in solvent and dry it with a clean cloth. **Sealed or shielded bearings should never be cleaned.**

Assembly of the Motor

1. Make certain Reverse Valve Bushing Seals (10) are properly located in undercuts in Reverse Valve Bushing (9).
2. Dampen Reverse Valve (11) with light oil. Install Reverse Valve Detent Spring (13) followed by Reverse Valve Detent Ball (12) in hole in Reverse Valve. With the Impact Wrench in an upright horizontal position and while facing handle end of Impact Wrench, slowly rotate the Reverse Valve and insert it from left to right in the splined end of Reverse Valve Bushing.
3. Apply Loctite®* 271 to Reverse Valve Knob Screw (15). Attach Reverse Valve Knob (14) to Reverse Valve with Reverse Valve Knob Screw and tighten Screw to 40 to 50 in.-lb (4.5 to 5.6 Nm) torque.
4. Place Trigger (7) in Housing (1) and secure it with Trigger Pin (8).
5. Install Throttle Valve Face (3) on Throttle Valve (2).
6. Install Throttle Valve Stem (5), Throttle Valve and Throttle Valve Spring (4).
7. Install Air Strainer Assembly (6) and tighten it to 30 to 35 ft.-lb (40.5 to 47.5 Nm) torque.
8. Using a sleeve that will contact only outer ring of bearing, press Front Rotor Bearing (20) into Front End Plate (26) and Rear Rotor Bearing (19) into Rear End Plate (27).
9. Slip Front End Plate and Bearing over splined hub of Rotor (18).
10. Grasp splined hub of Rotor in leather-covered or copper-covered vise jaws so that Rotor is in a vertical position.
11. Dampen each Vane (25) with light oil and insert a Vane into each vane slot.
12. Set the Cylinder (22) over the Rotor and onto the Front End Plate.
13. Slide Rear End Plate and Bearing onto rotor hub and against Cylinder.
14. Install Rear Rotor Bearing Retainer (21) in groove on rotor hub.
15. Align dowel hole in both End Plates with the one through Cylinder and insert a guide rod 5/32" diameter x 6" long (3.9 mm diameter x 152 mm long). Allow rod to protrude from Rear End Plate.
16. Grasp handle of the Motor Housing in leather-covered or copper-covered vise jaws so that bore of the Motor Housing is horizontal.
17. Wipe a thin film of light grease on End Plate Gasket (28) and press Gasket firmly against Rear End Plate.
18. Insert protruding end of guide rod into dowel hole in bore of Motor Housing and slide motor along rod until it is completely seated.
19. Remove guide rod and replace it with Cylinder Dowel (23).
20. Reposition Motor Housing in vise so that open face of Motor Housing is upward.
21. Place two Motor Clamp Washers (29), convex side first, against Front End Plate so that inner rim of leading Washer contacts End Plate and outer rim of trailing Washer contacts Hammer Case Pilot (35B).
22. Place Rear Hammer Frame Washer (32) over hub of Rotor and against Front Rotor Bearing.

Assembly of the Impact Mechanism



(Dwg. TPD652)

MAINTENANCE SECTION

1. Coat Hammers (33) with a light film of Ingersoll-Rand No. 100 Grease.
2. Replace Hammers in Hammer Frame (30) exactly as they were when you marked them prior to disassembly.

NOTICE

If you are installing new Hammers or want to change the location of the existing Hammers to utilize both impacting surfaces, slide the Hammers in the Hammer Frame so that the half-round notch on one Hammer is located on one side of the Frame and the half-round notch on the other Hammer is located on the other side of the Frame.

3. Replace Hammer Pins (31).
4. Examine base of Anvil (40) and note its contour. While looking down through the Hammer Frame, swing top Hammer to its full extreme one way or another until you can match contour of Anvil. Enter Anvil into Hammer Frame and through first Hammer. Swing bottom Hammer in opposite direction from top Hammer and maneuver Anvil slightly until it drops into bottom Hammer

Assembly of the Impact Wrench

1. Set assembled impact mechanism down over splined hub of Rotor.
2. Smear a thin film of Ingersoll-Rand No. 100 Grease on inside surface of Hammer Case Bushing (36), and place the Hammer Case down over Anvil and against Motor Housing.
3. Install Hammer Case Cap Screws (39). Tighten Hammer Case Cap Screws to 60 to 70 in-lb (6.8 to 7.9 Nm) torque.