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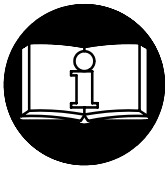
Edition 3
August, 2000

MAINTENANCE SECTION COVERING POWER MODULES for DAM40, DAMS40, DAMT40 AND DAMST40 MOUNTED TORQUE CONTROL AIR WRENCHES



⚠ 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 all regulations (local, state, federal and country), that may apply to hand held/hand operated pneumatic tools.**
- **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.**
- **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.**
- **This tool is not designed for working in explosive atmospheres.**
- **This tool is not insulated against electric shock.**

(Continued on page 2–2)

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.

Printed in U.S.A.

Ingersoll-Rand®

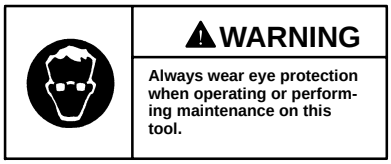
⚠ WARNING

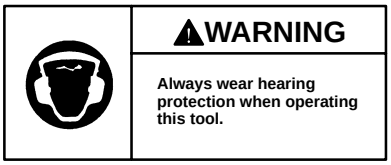
FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

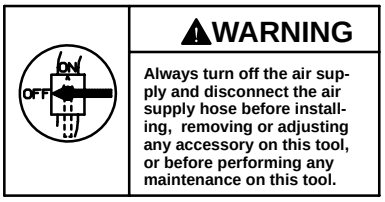
USING THE TOOL *(Continued)*

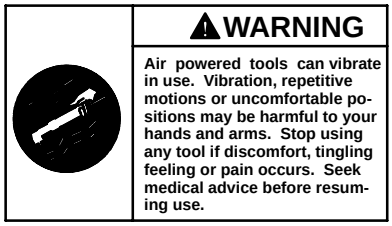
- **Do not remove the Inlet Plug without first disconnecting the live air supply.**
- **Whenever the Angle Head is installed or repositioned, the Throttle Lever must be positioned so that reaction torque will not tend to retain the throttle in the "ON" position.**
- **When installing or removing the output device on any tool, ALWAYS grasp a metal component of the tool while tightening or loosening the Coupling Nut or Spindle Cap. Acceptable clamping locations include, but are not limited to, the hex on the Gear Case, the Tool Hanger, the Torque Reaction Arm or any metal Mounting Plate. NEVER grasp the composite tool body or handle in vise jaws to restrain the torque of the Coupling Nut or Spindle Cap. Such practice will result in damage to the tool.**
- **Do not use power units and gear trains that exceed the capability of the output device.**
- **The Tube Nut Attachment has an opening on the front side for construction and application purposes. DO NOT, under any circumstance place your fingers in this opening.**
- **The Torque Reaction Bar must be positioned against a positive stop. Do not use the Bar as a dead handle and take all precautions to make certain the operator's hand cannot be pinched between the Bar and a solid object.**
- **When operated continuously for long periods of time, Series D Nutrunners may become hot at the spindle end of the tool. Take all precautions necessary to avoid skin contact with the hot surfaces. Prolonged contact may result in burns.**
- **All Series D Torque Control Wrenches and Nutrunners with reverse capability have rotational arrows molded into the housing in the area of the reversing mechanism. When the direction switching device is positioned nearest the molded circular arrow with an "F" in the center, spindle rotation will be forward or clockwise direction. When the direction switching device is positioned nearest the molded circular arrow with an "R" in the center, spindle rotation will be reverse or counterclockwise direction.**

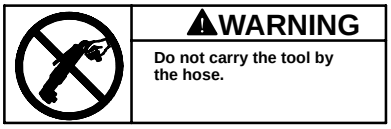
WARNING LABEL IDENTIFICATION

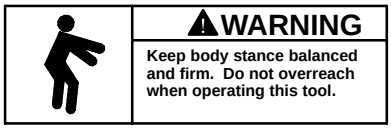


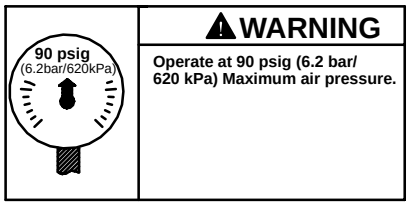


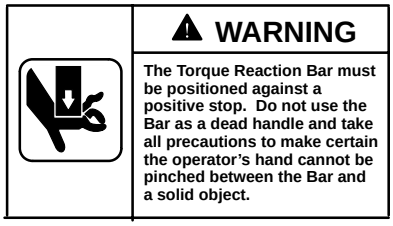












LUBRICATION

Adequate lubrication is imperative for maximum performance and durability of the gearing in these Tools.

Ingersoll–Rand No. 10

The use of an air line lubricator is recommended. For permanent installations, we recommend using an Ingersoll–Rand No. C11–03–G00 Filter–Lubricator–Regulator Unit.

If an air line lubricator is not used, inject 2 cc of the recommended oil into the air inlet before attaching the air hose and after each **eight** hours of operation.

ADJUSTMENTS

Before placing your Ingersoll–Rand Torque Control Wrench Mounted Power Module in service, several optional adjustments can be made to the unit which will enhance the performance of the tool. Selection and adjustments should be made prior to placing the tool in service.

CLUTCH ADJUSTMENT

To adjust the clutch on these Wrenches, proceed as follows:

1. Rotate the Clutch Adjusting Hole Cover (30) until the slot in the Cover aligns with a corresponding slot in the Motor Housing Assembly (12).
2. Using a wrench on the square drive spindle or hex bit insert, rotate the output spindle until the half circle notch on the motor end of the Clutch Adjusting Nut Lock (69) is visible in the slot.
3. Insert a #1 Phillips head screwdriver into the notch of the Nut Lock and one of the notches in the Clutch Adjusting Nut (68). Insert the screwdriver far enough to create a gap between the Nut Lock and Adjusting Nut.
4. Turn the screwdriver clockwise (as you would to tighten a screw) to increase the the clutch torque or counterclockwise to decrease the clutch torque.
5. Final clutch adjustment should be set on the job.

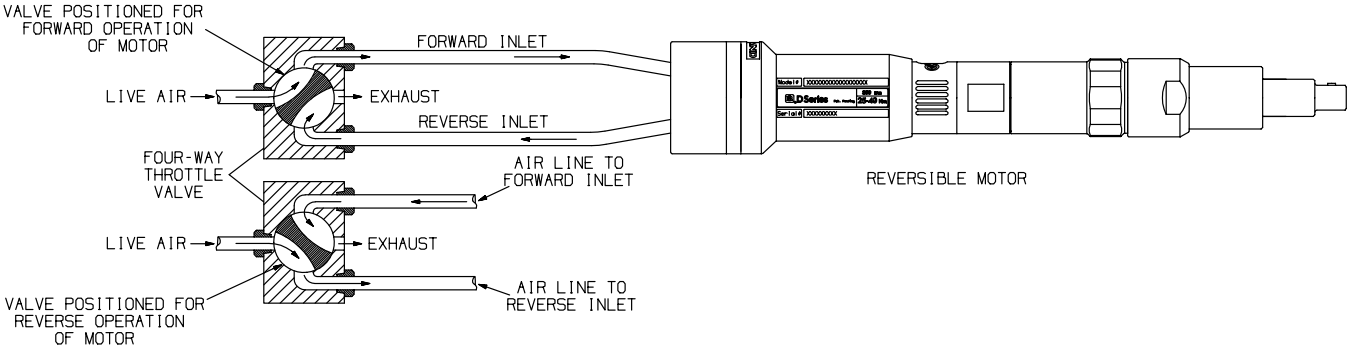
EXHAUST NOISE

Installing a mounted tool assembly without the Handle Assembly eliminates all the noise suppression equipment located inside the Handle. To reduce exhaust noise to acceptable levels without reducing torque output, install one or two external Mufflers (Part No. MRV015–AC980). If the application requires the tool to operate in the forward and reverse modes, install one Muffler in the exhaust port, designated by the letter ”E” and located at the rear of the Backcap. If the application requires the tool to operate only in direction, install one Muffler in the exhaust port and a second Muffler in the directional port (“F”–forward; ”R”–reverse) that is not being used in the application.

CONTROL VALVE

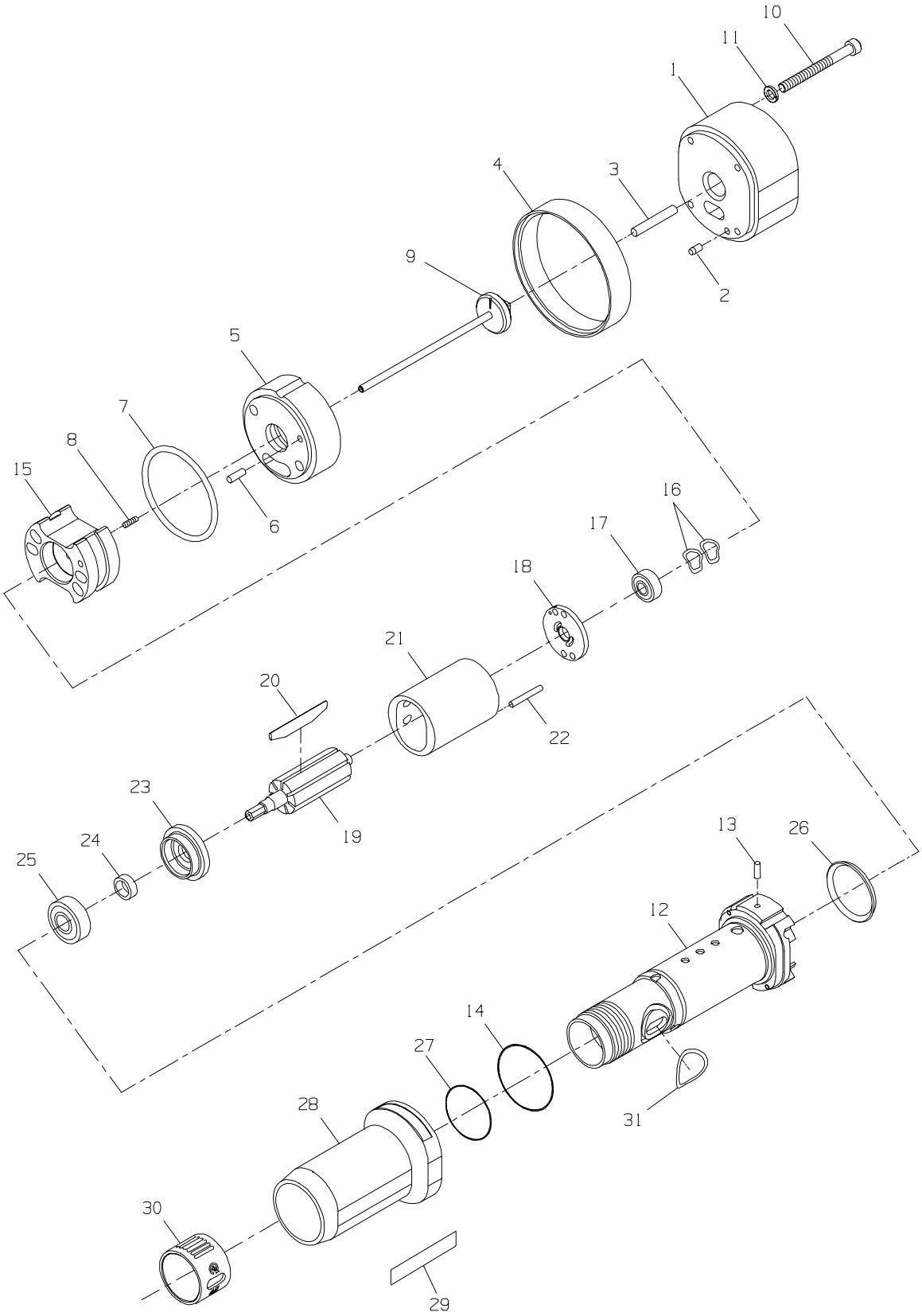
For optimum performance, the air source and supply lines must be capable of maintaining 90 psig (6.2 bar/620 kPa) air pressure at the tool. A 3/8” (10 mm) diameter or larger hose is necessary for ample air flow to each tool. When operating the tool in the reversible mode, it is necessary to put a four way valve in the air supply line because the reverse air inlet port becomes an auxiliary port when the tool operates in forward rotation. In reverse, the forward inlet becomes the auxiliary exhaust port. A diagrammed example is shown in Drawing TPC601–1.

FOUR WAY VALVE FOR CONTROLLING FORWARD AND REVERSE OPERATION OF MOTOR



(Dwg. TPC601–1)

POWER MODULE PARTS FOR 40 NM MOUNTED AIR TOOLS



(Dwg. TPA1545)

PART NUMBER FOR ORDERING

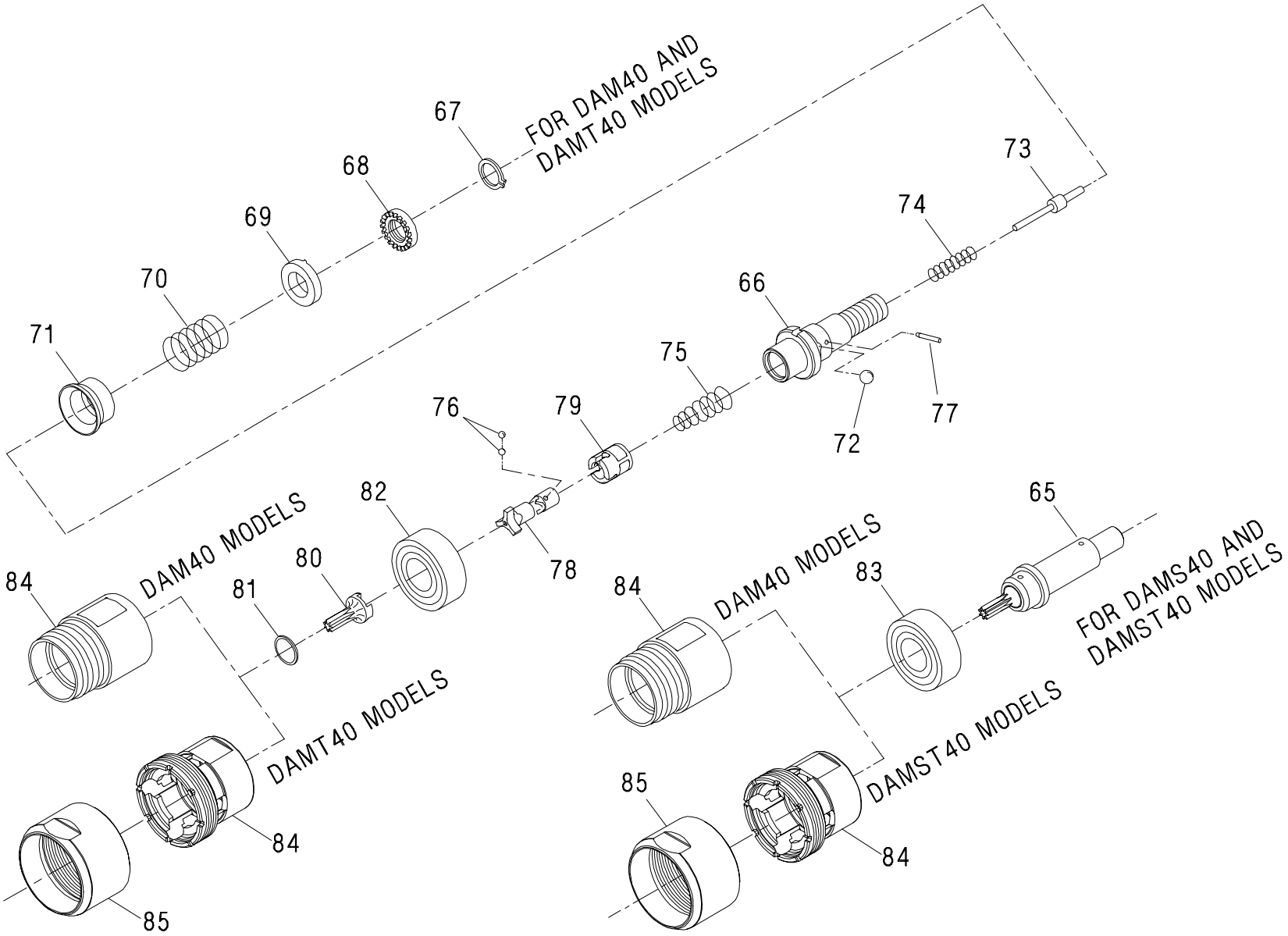
		Back Cap Assembly	DAM–A25
	1	Back Cap	DAM–25
	2	Back Cap Alignment Pin	7RL–56
	3	Valve Stop Pin	ST700–363–R
	4	Back Cap Spacer	DAM–87
		Manifold Assembly	DAM–A86
	5	Manifold	DAM–86
	6	Manifold Alignment Pin	9DF5846–667
•	7	Manifold Seal	WFS182–211
	8	Bearing Housing Plug (for stall models only)	400–25–74–12
•	9	Shutoff Valve Assembly (for automatic shutoff models only)	DAA40–A435
•	10	Back Cap Mounting Screw (4)	DAA40–68
	11	Mounting Screw Lock Washer (4)	DAA40–58
	12	Motor Housing Assembly	DAA40–A40
	13	Housing Alignment Pin	DAA40–669
•	14	Rear Motor Housing Seal	DAA40–610
	15	Rear Rotor Bearing Housing	DAM–203
	16	Rotor Bearing Spring (2)	DG20–278
	17	Rear Rotor Bearing	DG20–22
	18	Rear End Plate	DAA40–12
	19	Rotor	DAA40–53
	20	Vane Packet (set of 7 Vanes)	DAA40–42–7
	21	Cylinder Assembly	DAA40–A3
	22	Cylinder Dowel	9DF5846–667
	23	Front End Plate	DAA40–11
	24	Rotor Spacer	DG10–65–5
	25	Front Rotor Bearing	LG1–24
	26	Motor Clamp Washer	401A9–554
	27	Front Motor Housing Seal	WFS182–211
+	28	Housing Sleeve Assembly	DAA40–A39
	29	Warning Label	DAA40–99
	30	Clutch Adjusting Hole Cover	DAA40–415
	31	Adjusting Hole Cover O–ring	R4–210
	*	Screwdriver	DAA40–26
	*	Tune–up Kit (includes illustrated items 7, 9, 14, 17, 20, 25, 27, 31, 73, 74, 75, 76 [6], 77 [3], 81, and Gear Module Components Part Numbers DAA40–5 and DAA40–606)	DAA40–TK1

* Not illustrated.

• To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set) of each part indicated by a bullet (•) for every four tools in service.

\+ To ensure proper labeling when ordering a Housing Sleeve Assembly, furnish the complete model number for the tool on which the new Sleeve Assembly will be installed.

CLUTCH PARTS FOR 40 NM MOUNTED AIR TOOLS



(Dwg. TPB1023)

PART NUMBER FOR ORDERING

			DAM40 & DAMT40	DAMS40 & DAMST40
	65	Drive Shaft Assembly	—	
		for DAMS40 models	—	DAMS40–A581
		for DAMST40 models	—	DAMT40–A581
	#	Clutch Assembly		—
		for DAM40 models	DAA40–A581	—
		for DAMT40 models	DAAT40–A581	—
	66	Clutch Shaft	DAA40–581	—
•	67	Clutch Adjusting Nut Stop	12E–6	—
	68	Clutch Adjusting Nut	DAA40–582	—
	69	Clutch Adjusting Nut Lock	DAA40–588	—
	70	Clutch Spring	DAA40–583	—
	71	Cam Follower	DAA40–406	—
•	72	Clutch Ball (3)	2U–722	—
•	73	Shutoff Spool	DAA40–900	—
•	74	Valve Return Spring	DAA40–842	—
•	75	Reset Spring	DAA40–627	—
•	76	Shutoff Ball (6)	DAA40–629	—
•	77	Cam Pin (3)	DAA40–704	—
	78	Cam Shaft	DAA40–502	—
	79	Cam Block	DAA40–721	—
	80	Clutch Spindle		—
		for DAM40 models	DAA40–584	—
		for DAMT40 models	DAMT40–584	—
•	81	Spindle Retainer	7L1B–28	—
	82	Clutch Bearing	R1602–510	—
	83	Drive Shaft Bearing	—	R1602–510
	84	Clutch Housing		
		for DAM40 and DAMS40	DAA40–580	DAA40–580
		for DAMT40 and DAMST40	DAMT40–580	DAMT40–580
	85	Coupling Nut		
		for DAMT40 and DAMST40	DEA40–43	DEA40–43

When replacing the Clutch Assembly or any clutch components, check the gap of the Shutoff Valve Assembly as instructed on page 2–10 and, if necessary, adjust the gap as instructed.

• To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set) of each part indicated by a bullet (•) for every four tools in service.

⚠ WARNING

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. Failure to do so could result in injury.

Always use protective eyewear when performing maintenance on a tool or operating a tool.

DISASSEMBLY

Disassembly of the DAM40 and DAMT40 Clutch

1. Carefully grasp the Housing Sleeve Assembly (28) with the clutch end upward, and using a wrench on the flats of the Clutch Housing (84), unscrew and remove the Clutch Housing.
2. Grasp the Clutch Spindle (80) and pull the assembled clutch off the Rotor (19).
3. Remove the Shutoff Spool (73) and Valve Return Spring (74) from either the shaft of the Rotor or the inside of the Clutch Shaft (66).
4. Insert the jaws of snap ring pliers into the holes of the Clutch Adjusting Nut Stop (67) and expand the Stop only enough to release the pressure against the Clutch Shaft. While keeping the pressure relieved, unscrew the assembled clutch from the Stop as you would unscrew a nut from a bolt. Expanding the Stop sufficiently to clear the Shaft in a normal manner will distort the snap ring beyond acceptable limits.
5. Insert the tip of a #1 Phillips head screwdriver into the notch in the motor end of the Clutch Adjusting Nut Lock (69) and one of the notches in the Clutch Adjusting Nut (68) and turn the screwdriver counterclockwise (as you would to remove a screw) to back the Nut off the Clutch Shaft. Insert the screwdriver far enough to create a gap between the Nut Lock and Adjusting Nut.
6. Remove the Nut Lock, Clutch Spring (70), Cam Follower (71) and three Clutch Balls (72) from the Clutch Shaft.
7. Pull the Clutch Bearing (82) off the spindle end of the Clutch Shaft.
8. To remove the three Cam Pins (77), position one pin downward and sharply rap the motor end of the Clutch Shaft on a workbench mat or a piece of corrugated cardboard box. Repeat the process for each of the remaining two Pins.
9. Using a thin blade screwdriver, spiral the Spindle Retainer (81) out of the groove in the Clutch Shaft and pull the Clutch Spindle from the Shaft.
10. Pull the Cam Shaft (78), Cam Block (79) and Reset Spring (75) from the Clutch Shaft.
11. To remove the six Shutoff Balls (76), insert the shaft of the Shutoff Spool into the end of the Cam Shaft to prevent the Balls from becoming lodged in the central opening. Position one of the shutoff ball openings downward and sharply rap the Cam Shaft on a workbench mat or a piece of corrugated cardboard box. Two Shutoff Balls are installed in each hole. Repeat the process at the other two locations for the remaining four Balls.

Disassembly of the DAMS and DAMST40 Drive Shaft Mechanism

1. Carefully grasp the Housing Sleeve Assembly (28) with the spline end of the Drive Shaft Assembly (65) upward, and using a wrench on the flats of the Clutch Housing (84), unscrew and remove the Clutch Housing.
2. Grasp the Drive Shaft and pull the assembled Shaft off the Rotor (19).
3. Pull the Drive Shaft Bearing (83) off the spindle end of the Drive Shaft.

Disassembly of the Motor

1. Using a 2–1/2 mm hex wrench, unscrew and remove the four Back Cap Mounting Screws (10) with the Mounting Screw Lock Washers (11).
2. Pull the assembled motor away from the Back Cap.
3. **For shutoff models,** pull the Shutoff Valve Assembly (9) out of the Manifold Assembly (5).
4. Remove the Back Cap Spacer (4) and Manifold Assembly from the Motor Housing Assembly (12).
5. Pull the Clutch Adjusting Hole Cover (30) and the Housing Sleeve Assembly (28) off of the Motor Housing. Remove the Adjusting Hole Cover O–ring (31), the Front Motor Housing Seal (27) and Rear Motor Housing Seal (14) from the Motor Housing Assembly.
6. Lightly rap the back cap end of the Motor Housing on a padded surface to dislodge the assembled motor from the Housing.
7. Remove the Motor Clamp Washer (26) from the Housing or front of the assembled motor.
8. Grasping the Front End Plate (23) in one hand, tap the hex shaft end of the Rotor (19) with a plastic hammer to remove the Front End Plate, Front Rotor Bearing (25) and Rotor Spacer (24) from the Rotor.
9. Slide the Cylinder Assembly (21) off the Rotor and remove the seven Vanes (20).
10. Remove the Rear Rotor Bearing Housing (15) and two Rotor Bearing Springs (16) from the back cap end of the Rotor.
11. Press the Rear Rotor Bearing (17) along with the Rear End Plate (18) from the shaft of the Rotor.

Assembly of the Motor

1. Place the Rear End Plate (18), face with the kidney shaped slots leading, onto the non–hexed hub of the Rotor (19). Position the Rear Rotor Bearing (17) on the same hub and press the Bearing onto the shaft against the Rear End Plate.
2. Install the Cylinder (21) over the Rotor so that the Cylinder Dowel (22) enters the hole in the Rear End Plate.
3. Apply a thin film of oil to each Vane (20) and insert a Vane into each of the rotor vane slots.
4. Place the Rotor Spacer (24) on the hex end hub of the Rotor and install the Front End Plate (23) over the Spacer, counterbored end trailing, against the rotor face.
5. Position the Front Rotor Bearing (25) onto the rotor hub so that the red stained end will be visible when the Bearing is in the End Plate. Pressing on the inner race of the Bearing, press the Bearing onto the hub and into the Front End Plate.

NOTICE

The Clutch Assembly or Drive Shaft Assembly must be assembled with the motor before attaching the Back Cap. If the Clutch or Drive Shaft is not assembled, set the motor aside and assemble the clutch as instructed in the section, ASSEMBLY OF THE DAM40 and DAMT40 CLUTCH or ASSEMBLY OF THE DAMS40 and DAMST40 DRIVE SHAFT MECHANISM.

Assembly of the DAM40 and DAMT40 Clutch

1. Install two Shutoff Balls (76) into each of the three holes located radially in the Cam Shaft (78) and then slide the assembly into the Cam Block (79). Fill the cam shaft holes with grease to retain the Balls.
2. Press the Clutch Bearing (82) onto the spindle end of the Clutch Shaft.
3. Install the Reset Spring (75), tapered end leading, onto the small hub of the Cam Shaft and insert the assembled parts, Spring first, into the central opening at the non–threaded end of the Clutch Shaft (66).
4. Apply pressure to the assembly to keep it in the Shaft and install the three Cam Pins (77) into the radial holes in the Clutch Shaft and into the slots of the Cam Shaft to capture the assembly.
5. Position the Clutch Spindle (80) in the bearing end of the Clutch Shaft and secure it by using a thin blade screwdriver to spiral the Spindle Retainer (81) into the groove inside the Clutch Shaft.
6. Fill the holes in the Clutch Shaft near the large flange with grease and install the three Clutch Balls (72) in the holes. Slide the Cam Follower (71), large end first, onto the threaded end of the Clutch Shaft and pull it forward to capture the Balls between the flange and the Follower.
7. Slide the Clutch Spring (70) and the Clutch Adjusting Nut Lock (69), notched face trailing, onto the threaded end of the Clutch Shaft.
8. Secure the components by threading the Clutch Adjusting Nut (68), notched face leading, onto the Clutch Shaft. Insert a #1 Phillips head screwdriver into the notch of the Nut Lock and one of the notches in the Nut. Insert the screwdriver far enough to create a gap between the Nut Lock and Adjusting Nut. Turn the screwdriver clockwise as you would to tighten a screw to move the Nut along the Shaft until it clears the groove for the Clutch Adjusting Nut Stop (67).
9. Insert the jaws of snap ring pliers into the holes of the Clutch Adjusting Nut Stop and expand the Stop only enough to release any pressure against the Clutch Shaft. While keeping the pressure relieved, screw the assembled clutch onto the Stop, as you would screw a nut onto a bolt, until the Stop enters the groove. Expanding the Stop sufficiently to clear the Shaft in a normal manner will distort the snap ring beyond acceptable limits.
10. Install the Rear Motor Housing Seal (14), Front Motor Housing Seal (27) and Hole Cover O–ring (31) in the grooves in the Motor Housing (12).
11. Slide the Housing Sleeve Assembly (28), large end first, onto the Motor Housing. Slide the the Clutch Adjusting Hole Cover (30) onto the Motor Housing against the Sleeve Assembly.
12. Insert the assembled clutch, Spindle first, into the Clutch Housing (84).
13. Thread the assembled clutch and Housing onto the Motor Housing and tighten the joint between 20 and 25 ft–lb (27 and 35 Nm) torque.

CAUTION

In the following step, make certain the spline of the Clutch Spindle properly engages the Drive Coupling, Rotor Pinion or Planet Gears. Improper engagement will damage the splines and may force the Clutch rearward causing the Shutoff Valve Assembly to move out of correct adjustment.

14. **For DAMT40 models,** use the Coupling Nut (85) to secure the transducer style Gear Case to the Clutch Housing.

Assembly of the DAMS40 and DAMST40 Drive Shaft Mechanism

1. Press the Drive Shaft Bearing (83) onto the spindle end of the Drive Shaft (65).
2. Insert the assembled Drive Shaft, spindle end first, into the Clutch Housing (84).
3. Thread the assembled Drive Shaft and Housing onto the Motor Housing (12) and tighten the joint between 20 and 25 ft–lb (27 and 35 Nm) torque.

CAUTION

In the following step, make certain the spline of the Drive Shaft Assembly properly engages the Drive Coupling, Rotor Pinion or Planet Gears. Improper engagement will damage the splines.

4. **For DAMST40 models,** use the Coupling Nut (85) to secure the transducer style Gear Case to the Clutch Housing.

Assembling the Motor to the Back Cap

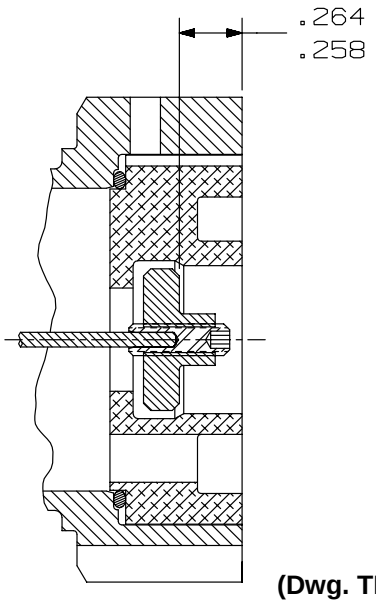
1. Drop the Motor Clamp Washer (26), concave side first, into the motor bore of the Motor Housing (12).
2. **For DAM40 and DAMT40 models,** remove or do not install the Bearing Housing Plug (8) in the threaded central opening of the Bearing Housing (15).
   For DAMS40 and DAMST40 models, thread the Bearing Housing Plug (8) into the threaded central opening of the Bearing Housing (15).
3. **For DAM40 and DAMT40 models,** apply some grease to the Shutoff Spool (73) and Valve Return Spring (74). Install the Spring on the long stem of the Spool and insert the short stem of the assembly into the hole in the hex end of the Rotor (19).
4. Hold the Motor Housing horizontally and slide the assembled motor into the Housing. Make certain the rotor hex engages the internal hex of the Clutch Shaft (66) or Drive Shaft (65).
5. Install the two Rotor Bearing Springs (16) in the recess of the Rear Rotor Bearing Housing (15) and place both in position against the Bearing. Make sure that the Cylinder Dowel (22) enters the dowel hole in the Bearing Housing.
6. Install the Manifold Seal (7) on the small hub of the Manifold (5).
7. Slide the Manifold Assembly into the Housing making certain that the Manifold Alignment Pin (6) enters the hole in the Bearing Housing and the groove along the exterior of the manifold body engages the pin in the Housing.
8. **For DAM40 and DAMT40 models,** insert the shaft of the Shutoff Valve Assembly through the central opening of the Manifold and Bearing Housing.
9. **For DAM40 and DAMT40 models,** the distance between the large end of the Manifold and the top surface of the large flange of the Shutoff Valve Assembly is critical for efficient operation. The gap must be between .258” and .264” (6.55 mm and 6.70 mm) wide. (See Dwg. TPD1863).

NOTICE

If the Clutch Housing or any clutch components have been replaced, the Shutoff Valve Assembly will require adjustment.

To determine if the gap is correct, insert the Shutoff Valve Assembly (9), shaft first, into the central opening of the motor assembly and measure the distance with a depth micrometer.

Shutoff Adjustment for Mounted 40 Nm Air Tools



(Dwg. TPD1863)

If the gap is incorrect, proceed as follows:

a. Remove the Valve Assembly from the motor.
b. Place a wrench on the square of the valve.
c. Insert a hex wrench into the end of the shaft and turn it clockwise to shorten the gap or counter clockwise to increase the gap.
d. Install the Valve Assembly and remeasure the gap. Repeat the process until the distance is correct.

10. Place the Backcap Spacer (4) on the Manifold and position assembled Backcap (1), Alignment Pin (2) first, against the Spacer. Make certain the Pin enters the alignment hole in the Manifold.
11. Install the four Backcap Mounting Screws and Lock Washers and tighten the screws between 12 and 18 in–lb (1.4 and 2.0 Nm) torque.

TROUBLESHOOTING GUIDE

Trouble	Probable Cause	Solution
Low power or low free speed	Low air pressure at the inlet	Check air supply. For top performance, the air presure must be 90 psig (6.2 bar/620 kPa) at the inlet.
	Worn or broken Vanes	Install a **complete** set of new Vanes.
	Worn or broken Cylinder	Replace the Cylinder if it is cracked or if the bore appears wavy or scored.
	Improper lubrication or dirt buildup	Clean and lubricate the motor unit parts.
	Incorrect gap in Shutoff Valve Assembly	Adjust the gap as explained in the section **ASSEMBLING THE MOTOR TO THE BACK CAP.**
	Improperly installed Mufflers	Make certain the Mufflers are installed in the correct ports.
Tool fails to shut off	Dirty Shutoff Valve Assembly	Clean any dirt from the Shutoff Valve.
	Bent stem on Shutoff Valve	Straighten the stem of the Valve or replace the Valve.
	Valve out of adjustment	Adjust the Valve to get the required gap specified on Page 2–10.

NOTICE

SAVE THESE INSTRUCTIONS. DO NOT DESTROY.