SM 018 B
JULY 2000

OPERATION AND MAINTENANCE MANUAL

3 MA SERIES AIR MOTORS
(NON REVERSIBLE, FLANGE MOUNTED)

MODEL	CODE/COM. NO.	FREE SPEED (rpm)	MAX. POWER (HP)	TORQUE AT MAX.POWER (ft.lbs)	STALL TORQUE (ft.lbs)
3MA-240	184A-B/04664793	270	0.83	32.3	62.0
3MA-450	184B-B/04664801	500	0.85	17.9	36.0
3MA-800	184C-B/04664819	950	0.86	9.5	17.0

⚠ WARNING

READ THIS MANUAL CAREFULLY BEFORE INSTALLING OPERATING OR SERVICING THIS EQUIPMENT.

IMPORTANT INSTRUCTIONS

- *Always operate, inspect and maintain this tool in accordance with American National Standards Institute Safety Code for Portable Air Tools (ANSI B186.1) and any other applicable safety codes and regulations.*
- *For safety, top performance and maximum durability of parts, operate this tool at 6.3 Kg/cm² (90 psig) maximum air pressure.*
- *Use 1/2" bore hose pipe*

⚠ WARNING

- *Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this tool.*
- *The use of other than genuine IR-Wadco parts may result in safety hazards, decreased tool performance and increased maintenance costs and may invalidate all warranty claims.*

For parts and service information, contact your local ARO distributor, or the Customer Service Dept. of the Ingersoll - Rand Distribution Center, White House, TN at PH : (615) 672 - 0801, Fax : (615) 672 - 0801

INGERSOLL-RAND WADCO TOOLS LTD.

WARNING LABEL IDENTIFICATION

⚠ WARNING

FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

⚠ WARNING

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

⚠ WARNING

Always wear hearing protection when operating this tool.

⚠ 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.

⚠ WARNING

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.

⚠ WARNING

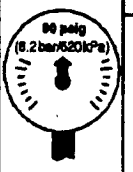
Do not carry the tool by the hose.

⚠ WARNING

Do not use damaged, frayed or deteriorated air hoses and fittings.

⚠ WARNING

Keep body stance balanced and firm. Do not overreach when operating this tool.



⚠ WARNING

Operate at 90 psig (6.2 bar/620 kPa) Maximum air pressure.

PLACING TOOL IN SERVICE

LUBRICATION

Oil : Ingersoll - Rand No. 10 Lubricant

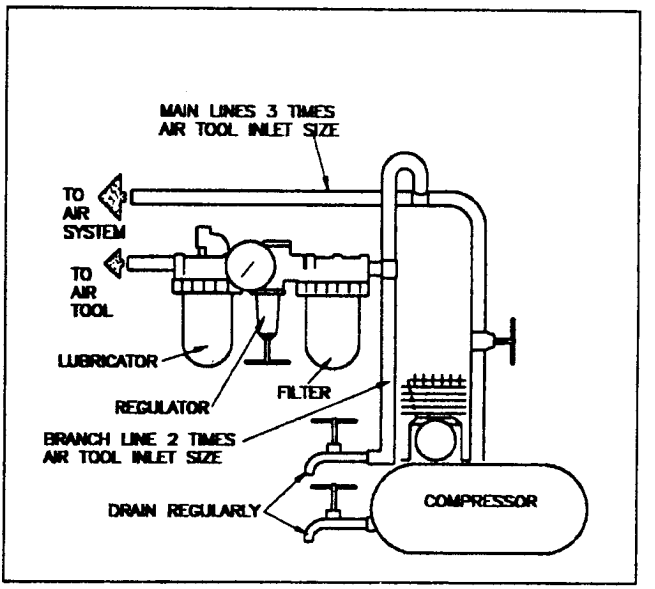
Grease : Ingersoll - Rand No. 28 Lubricant

We recommend the use of an air line lubricator in the air supply line. Attach the unit as close to the tool as practical. After each forty hours of operation, or as experience indicates, introduce 1.5cc of the recommended grease. Do not grease excessively. Too much grease in the Gear Case will cause heating.

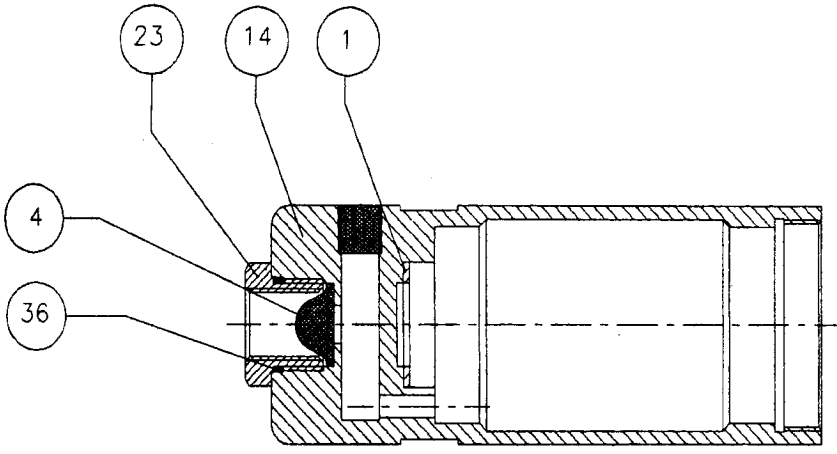
Grease leakage from the Spindle end is also an indication that an excessive amount of grease has accumulated within the Gear Box.

Whenever the Gear end of the Motor is disassembled, lubricate the gear train.

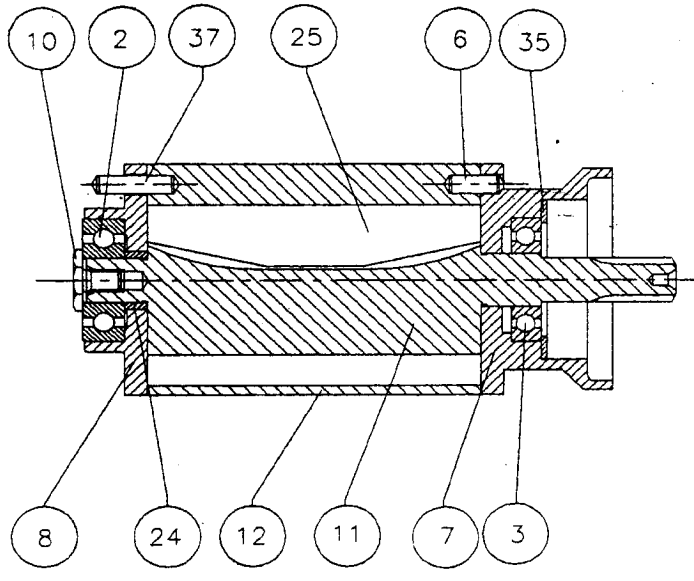
For 3 MA Series Air Motors work approximately 25cc of the recommended grease into the gear train and around the Bearings and on the Spindle.



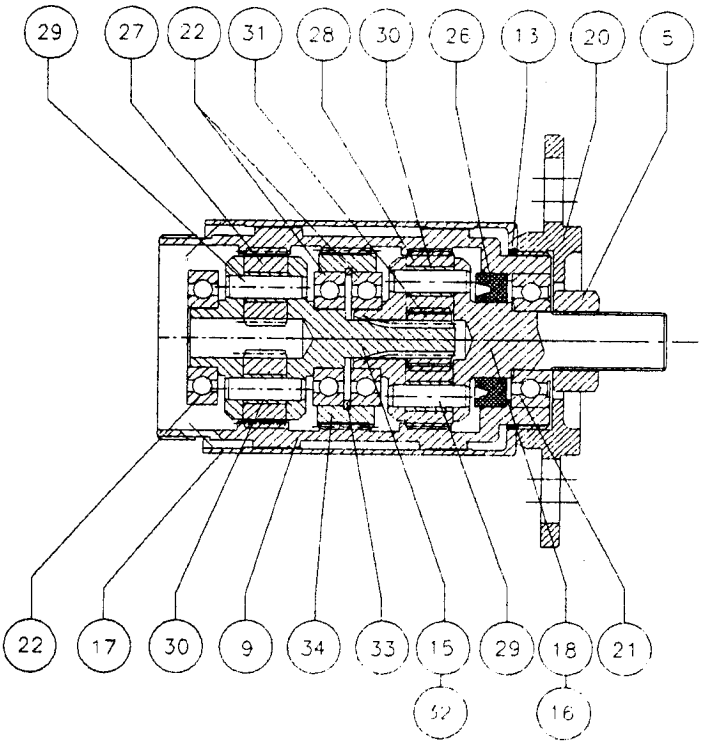
Always use an air line lubricator with this tool. A filter regulator and lubricator (FRL) unit is recommended.



ROTOR HOUSING ASSY.



MOTOR ASSY.



GEAR BOX ASSY.

BILL OF MATERIAL

3 MA - *

Sr. No.	DESCRIPTION	*240	*450	*800
1.	SPRING WASHER	1	1	1
2.	BEARING	1	1	1
3.	BEARING	1	1	1
4.	STRAINER	1	1	1
5.	NUT	1	1	1
6.	ROLL PIN	1	1	1
7.	LOWER CENTRE PLATE	1	1	1
8.	UPPER CENTRE PLATE	1	1	1
9.	GEAR CASE	1	1	1
10.	CLAMP SCREW	1	1	1
11.	ROTOR	1	1	1
12.	CYLINDER BUSHING	1	1	1
13.	' O ' RING	1	1	1
14.	ROTOR HOUSING	1	1	1
15.	DRIVE SHAFT	1	1	0
16.	SPINDLE	1	0	0
17.	MUFFLER	1	1	1
18.	SPINDLE	0	1	1
19.	NAME PLATE	1	1	1
20.	FLANGE	1	1	1
21.	BEARING	1	1	1
22.	BEARING	3	3	3
23.	REDUCER	1	1	1
24.	SPACER	1	1	1
25.	ROTOR BLADE	5	5	5
26.	OIL SEAL	1	1	1
27.	IDLER GEAR (19 T)	6	3	0
28.	IDLER GEAR (16 T)	0	4	8
29.	IDLER GEAR PIN	6	7	8
30.	NEEDLE ROLLER	90	105	120
31.	SUN WHEEL	0	1	2
32.	DRIVE SHAFT	0	0	1
33.	INTERNAL CIRCLIP	1	1	1
34.	BEARING CARRIER	1	1	1
35.	SPACER	1	1	1
36.	' O ' RING	1	1	1
37.	ROLL PIN	1	1	1

MINOR TUNE-UP KIT
FOR 3MA SERIES AIR MOTORS
P/No. TK1005

Sl. No.	Part Name	Qty
4	Strainer	1
6	Roll Pin	1
13	O-Ring	1
25	Rotor Blade	5
26	Oil Seal	1
36	O-Ring	1
37	Roll Pin	1

MAJOR TUNE-UP KIT FOR 3MA SERIES AIR MOTORS

Sr. No.	Part Name	Quantity reqd. for each Models of 3MA Series		
		240	450	800
1	Spring Washer	1	1	1
2	Bearing	1	1	1
3	Bearing	1	1	1
4	Strainer	2	2	2
6	Roll Pin	2	2	2
13	O-Ring	2	2	2
21	Bearing	1	1	1
22	Bearing	3	3	3
24	Spacer	1	1	1
25	Rotor Blade	10	10	10
26	Oil Seal	2	2	2
27	Idler Gear (19 T)	6	3	-
28	Idler Gear (16 T)	-	4	8
29	Idler Gear Pin	6	7	8
30	Needle Roller	90	105	120
31	Sun Wheel	-	1	2
33	Internal Circlip	1	1	1
35	Spacer	1	1	1
36	O-Ring	2	2	2
37	Roll Pin	2	2	2
Major Tune-up Kit P/No.		TK5024	TK5025	TK5026

DISASSEMBLY

General Instructions

⚠ WARNING

1. Always disconnect the air supply before doing any maintenance.
2. Always use protective eye wear when performing maintenance on a tool or when operating a tool.
3. Do not disassemble the tool any further than necessary to replace or repair damaged parts.
4. Do not disassemble the Motor unless you have a complete set of new gaskets and ' O ' rings for replacement.
5. Do not remove any part which is a press fit in or on a subassembly unless the removal of that part is necessary for repair or replacement.
6. Whenever grasping a tool or part in a vice, always use leather - covered or copper - covered vice jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members and housings.
7. The modular construction of 3 series motors permits selective disassembly whereby gearing can be separated from the power unit and disassembled without removing the motor from the Rotor Housing, or the motor can be removed and disassembled without removing the gear train from the gear chambers. Because of the modular construction, the steps in the following disassembly procedures can be sequentially changed to meet the particular situation.

Disassembly of Gear Box

1. Unthread Flange (20) (Left hand thread)
2. Take out ' O ' Ring (13) and Muffler (17).
3. Holding the Spindle (16 / 18) stationary using an allen key 3/16" A/F, remove the Nut (5) with a Spanner 19 mm A/F.
4. Use a spanner 44 mm A/F to loosen the Gear Case (9) from the Rotor Housing (14). The Motor assembly will also come out along with the Gear Case Assembly.
5. Hold the Gear Case (9) in a vice.
6. Tap end of Spindle (16 / 18) using a soft hammer. The Spindle, Bearing Carrier and Drive Shaft assemblies along with the Motor Assembly will come out.
7. Using a wedge shaped tool and hammer separate the Bearing Carrier (34) from the Spindle and Drive Shaft assemblies.
8. Lightly grasp the splined portion of thr Drive Shaft (15 / 32) in Copper - Covered vice jaws.
9. Pull the Motor Assembly so that Drive Shaft Assembly gets separated from it.
10. Hammer out the Idler Gear Pins (29) from the Spindle (16 / 18) and Drive Shaft (15 / 32) so that Idler Gears (27 / 28) and Sun Wheel (31) can be taken out.

Disassembly of the Motor

1. Loosen the Clamp Screw (10) using a 3/8" A/F. Spanner.

2. Tap drive end of Rotor (11) with a soft hammer, motor will come apart.
3. If the Upper Centre Plate Bearing (2) needs to be replaced, press it out from the Upper Centre Plate (8).
4. Remove Roll Pins (6 / 37) if required only.
5. Lift off the Cylinder Bushing (12).
6. Remove the Rotor Blades (25).
7. If the Lower Centre Plate Bearing (3) needs to be replaced, press it out from Lower Centre Plate (7).

ASSEMBLY

General Instructions

⚠ WARNING

1. Always use protective eye wear when performing maintenance on a tool or operating a tool.
2. Always press on the inner ring of a ball - type bearing when installing the bearing on a shaft.
3. Always press on the outer ring of a ball - type bearing when installing the bearing in a bearing recess.
4. Check every bearing for roughness. If an open bearing must be cleaned, wash it thoroughly in clean solvent and dry with a clean cloth. Work grease thoroughly into every open bearing before installation. Sealed or shielded bearings should never be cleaned.
5. Except for bearings, always clean every part and wipe every part with a thin film of oil before installation.
6. When grasping a Motor or one of its parts in a vice, always use leather or copper vice jaw covers to protect the surface of the part and reduce the likelyhood of damage. This is particularly important when clamping threaded members, shafts with splines etc.
7. Apply ' O ' Ring lubricant to each ' O ' Ring before assembly.

Assembly of Motor & Housing

1. Slide the Spacer (24) over the unsplined end of the Rotor (11).
2. Slide the Upper Centre Plate (8), flat side first and then the Bearing (2) onto the Rotor Shaft.
3. Tighten the Clamp Screw (10) on to the Bearing using a 3 / 8" A / F spanner.

NOTE :-

The clearence between the Upper Centre Plate (8) and the Rotor (11) is critical. This should be set to 0.04 / 0.06 mm. using a feeler gauge or shim, (if required the Spacer (24) can be ground from one side)

4. Replace the Roll Pins (6 / 37) into the Cylinder Bushing (12).

NOTE :-

The shorter Roll Pin (6) should go into the deeper hole and vice versa.

5. Place the Cylinder Bushing (12) over the Rotor (11), aligning the Roll Pin (37) in the Cylinder Bushing (12) with the dowel hole in the Upper Centre Plate (8).
6. Apply a film of light oil to each Rotor Blade (25) and insert a Rotor Blade, straight edge out, into each vane slot in the Rotor (11). If new Rotor Blades are required, replace the entire set.
7. Grasp shoulder of Upper Centre Plate (8) in a vice having leather covered jaw.
8. Check the Lower Centre Plate (7) for wear. If there is excessive wear replace with a new one.
9. Press the Lower Centre Plate (7) and Bearing (3) onto the Rotor Shaft aligning the Roll Pin (6) in the Cylinder Bushing (12) with the dowel hole in the Lower Centre Plate (7).
10. Replace Spacer (35) next to Lower Centre Plate Bearing (3).
11. Hold Rotor Housing (14) in a vice so that the open side is at the top.
12. Insert the Spring Washer (1), Motor Assembly into the Rotor Housing aligning the Roll Pin in the Upper Centre Plate (8) and the blind hole in the Rotor Housing.
13. Clean the face of the Reducer (23) and Strainer (4) in a suitable cleaning solution before assembling into the tool. Assemble Strainer (4) in the Reducer (23). Also assemble ' O ' Ring (36).
14. Using a wrench tighten the Reducer (23) onto the Rotor Housing.

Assembly of Gear Box

1. Place the shoulder of the Drive Shaft (15 / 32) / Spindle (16 / 18) on the vice jaws.
2. Place the Idler Gear (27 / 28) fitted with Needle Rollers (30) inside the slot of the Drive Shaft (15 / 32) / Spindle (16 / 18).

IMP :- In models where Sun Wheel/s (31) are to be used introduce it before assembly of Idler Gears.

3. Press the Idler Gear Pin (29) inside.
4. Install Internal Circlip (33) inside the Bearing Carrier (34) using Circlip pliers.
5. Lubricate Bearings (22) with the recommended grease and install in the Bearing Carrier (34).
6. Assemble Oil Seal (26) inside the Gear Case (9) so that the concave face faces the splined portion of Gear Case.
7. Assemble the Bearing Carrier (34) on to the unthreaded end of the Spindle (16 / 18).
8. Press Drive Shaft Assembly into the Bearing (22) of the Bearing Carrier (34) assembly.
9. Insert the whole assembly into the Gear Case (9) threaded end first, sliding the splines of Bearing Carrier (34) in the internal gear of Gear Case (9).
10. Support the unsplined end of the Drive Shaft (15 / 32). Lubricate Bearing (21) with the recommended grease. Install it in the recess in the Gear Case pressing the outer race of bearing.
11. Holding the Spindle (16 / 18) from rotating using an allen key 3/16" A/F tighten the nut with Spanner 19mm A/F.

12. Lubricate Bearing (22) with recommended grease. Install it on the Drive Shaft (16 / 18) pressing the inner race of the bearing.
13. Hold the Rotor Housing Assembly on the A/F in a vice.
14. Tighten the Gear Case Assembly using a Spanner 44 mm A/F on to the Rotor Housing Assembly.
15. Assemble the Muffler (17) with the large diameter end going first.
16. Coat ' O ' Ring lubricant over the ' O ' Ring (13) and install it in the groove on the Gear Case (9).
17. Tighten the Flange (20) on to the Gear Case (9) (Left hand thread).

TROUBLE SHOOTING GUIDE

Trouble	Probable Cause	Solution
Motor will not operate	Rotor shaft and idler gears binding due to improper installation	Using an allen key, turn the output shaft. If the force to be applied is very great considering the gear ratio, the gearing is improperly installed and must be reassembled. See Paragraphs .for assembly of the gearing
	Spline in shaft of drive shaft and idler gears binding due to improper installation	Solution same as above
	Rotor Blades do not move out of their slots	The Centre - punch mark on Rotor Housing A/F should be upper most while clamping the tool in horizontal position.
Loss of power	Low air pressure at motor	Check air supply For top performance, the air pressure, must be 90 psig (6.3 Kg/cm^2) at the inlet
	Worn Vanes	Install a new Set of Vanes
	Inadequate motor lubrication	check air line lubricator. Refer page 3 for lubrication specifications
	Worn or damaged parts	Disassemble the motor and examine parts. Replace any worn or damaged parts
Motor heats up	Inadequate lubrication	Refer to Lubrication Section on Page 3
Gear Box heat up beyond normal increase	Improper lubrication	Refer to Lubrication Section on Page 3
Grease leakage	Too much grease in the gear box	Refer to Lubrication Section on Page 3