

TPD1469

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Form P5693
Edition 22
July, 2000



OPERATION AND MAINTENANCE MANUAL for MODELS 2X and 22 MULTI-VANE® DRILLS and MODEL 22N51 MOTOR

NOTICE

Close Quarter Multi-Vane® Drills, Nonreversible Models 2XJA1, 2XKA1 and 2XMA2, and Reversible Models 22JA1, 22KA1, 22MA2 and 22NA1, are designed for heavy steel fabrication and maintenance.

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 1/2" (13 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.
- This tool can exert strong forces on the operator. Use proper support to control these forces.
- 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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WARNING LABEL IDENTIFICATION



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 re-suming use.

WARNING
Do not carry the tool by the hose.

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

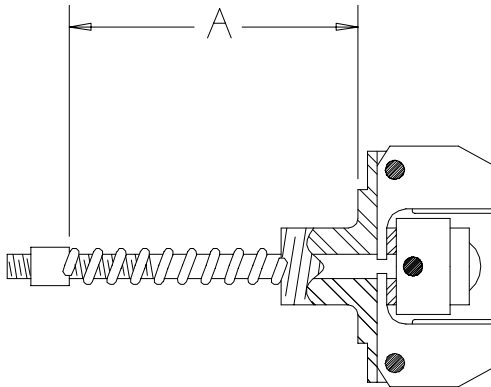
WARNING
Keep body stance balanced and firm. Do not overreach when operating this tool.

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

ADJUSTMENTS

GOVERNOR ADJUSTMENT

When installing a new Governor Assembly, screw the Adjusting Nut onto the Stem to **dimension "A"** shown in Dwg. TPD497. This will usually result in the proper governed free speed of the Spindle. However, this is only an approximate setting and, after checking with a tachometer, further adjustment may be necessary. Screw the Nut farther onto the Stem to increase the speed; back it off to decrease the speed.



A=1-31/32" for Drills with Standard Throttle
A = 1-7/8" for Motors equipped with Remote Control
(Dwg. TPD497)

The correct governed free speed for the various Models at the Spindle is:

| Model | Speed, rpm |
|-------------------------------|------------|
| 22JA1-EU, 2XJA1-EU | 1 025 |
| 22KA1-EU, 22KWA1-EU, 2XKA1-EU | 725 |
| 22MA2-EU, 2XMA2-EU | 350 |
| 22NA1-EU | 280 |

OILER ADJUSTMENT

To adjust oiler, remove the Backhead (12) and turn the Oiler Adjusting Screws (14). Turning the Screws in (clockwise) reduces the oil flow. Backing the Screws out increases the oil flow. The oil flow can be controlled by turning either Screw.

PLACING TOOL IN SERVICE

LUBRICATION



Ingersoll-Rand No. 50 Ingersoll-Rand No. 28

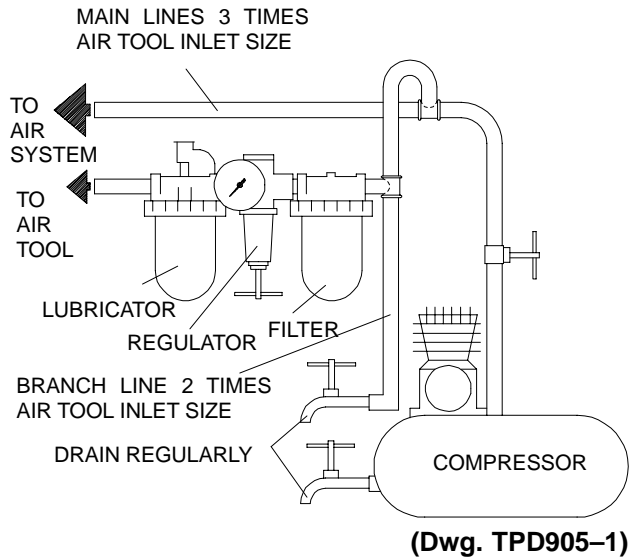
Always use an air line lubricator with this tool.
We recommend the following Filter-Lubricator-Regulator Unit:

USA N° C28-04-FKG0-28

Before starting the tool and after each eight hours of operation, unless the air line lubricator is used, after detaching the air hose, unscrew the Oil Chamber Plug (18) and fill the chamber in the Backhead (12) with Ingersoll-Rand No. 50 Oil.

After each forty-eight hours of operation, or as experience indicates, inject about 1 to 2 cc of Ingersoll-Rand No. 28 Grease into the Grease Fitting (2 and 17).

Occasionally, inject 2 to 3 drops of Ingersoll-Rand No. 50 Oil into the oil hole in the Throttle Sleeve (83).



HOW TO ORDER A LARGE DRILL

NONREVERSIBLE ROLL THROTTLE

| Model | Free Speed rpm | Capacity in Steel | | | | Spindle | Spindle Attachment |
|-------|----------------|-------------------|-----|---------|-----|--------------------------|--------------------|
| | | Drilling | | Reaming | | | |
| | | in. | mm. | in. | mm. | | |
| 2XJA1 | 1,025 | 9/16 | 14 | 3/8 | 10 | 0.703-16 thread | 0-1/2" Chuck |
| 2XKA1 | 725 | 9/16 | 14 | 7/16 | 11 | 0.703-16 thread | 0-1/2" Chuck |
| 2XMA2 | 350 | 7/8 | 22 | 5/8 | 16 | No. 2 Morse Taper Socket | |

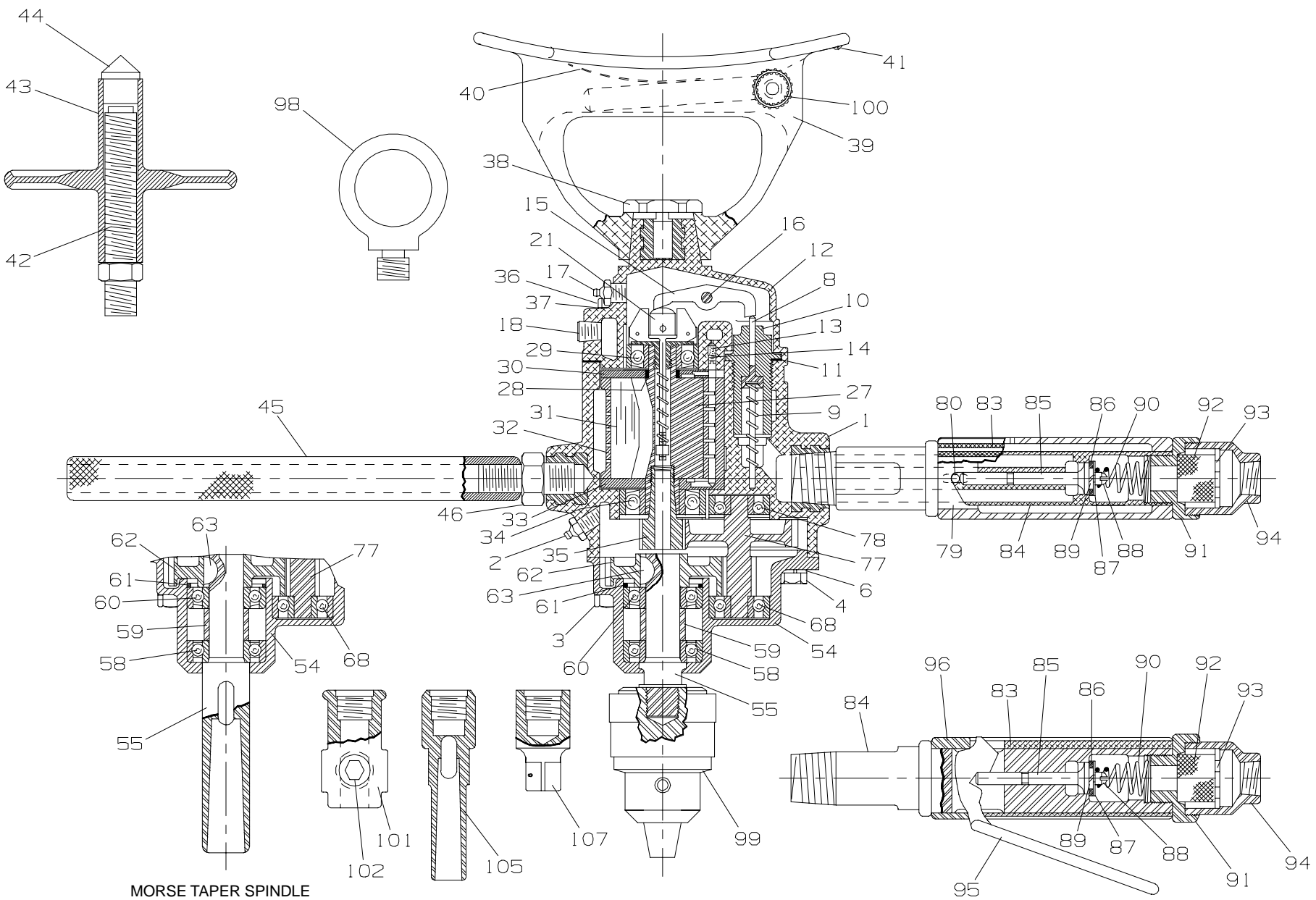
REVERSIBLE ROLL THROTTLE

| | | | | | | | |
|--------|-------|------|----|------|----|--------------------------|----------------------------|
| 22JA1 | 1,025 | 9/16 | 14 | 3/8 | 10 | Stub Taper, Threaded | 0-1/2" Chuck |
| 22KA1 | 725 | 9/16 | 14 | 7/16 | 11 | Stub Taper, Threaded | 0-1/2" Chuck |
| 22MA2 | 350 | 7/8 | 22 | 5/8 | 16 | No. 2 Morse Taper Socket | |
| 22NA1 | 280 | 7/8 | 22 | 5/8 | 16 | Stub Taper, Threaded | 5/8" Square Drive |
| 22KWA1 | 725 | — | — | — | — | Stub Taper, Threaded | 1/2" Shank Wood, Bit Chuck |

HOW TO ORDER A MOTOR

REVERSIBLE BASE-MOUNTED MULTI-VANE MOTOR

| Model | Free Speed, rpm |
|-------|-----------------|
| 22N51 | 280 |



MORSE TAPER SPINDLE

2X Series (Non-Reversible)

(Dwg. TPA121-2)

MAINTENANCE SECTION



PART NUMBER FOR ORDERING



| | | 2XJ, 2XK and 2XM | 22J, 22K, 22M, 22N and 22KW |
|------|---|-----------------------------|--|
| 1 | Motor Housing | | |
| | for 22N models | — | R22N-40 |
| | for models ending in -EU | R2XH-EU-40 | R22H-EU-K40 |
| | for all other models | R2XH-40 | R22H-K40 |
| * | Warning Label | | |
| | for models ending in -EU | EU-99 | EU-99 |
| | for all other models | WARNING-8-99 | WARNING-8-99 |
| * | Nameplate | | |
| | for models ending in -EU | R2H-EU-99 | R2H-EU-99 |
| | for all other models | R2H-99 | R2H-99 |
| 2 | Grease Fitting | 23-188 | 23-188 |
| ∅ 3 | Housing Stud (for 22N) (4) | R2N-133 | R2N-133 |
| | Housing Long Cap Screw (for all others) (4) | R22H-68 | R22H-68 |
| ∅ 4 | Housing Short Cap Screw (2) | R3-7 | R3-7 |
| 5 | Stud Nut (1 for each stud) | T06-139 | T06-139 |
| 6 | Lock Washer (6) | 8U-58 | 8U-58 |
| 7 | Reverse Valve Bushing | — | R22H-330 |
| 8 | Governor Valve | R3H-425 | R3H-425 |
| 9 | Governor Valve Spring | 503-431 | 503-431 |
| 10 | Governor Valve Bushing | R22H-429 | R22H-429 |
| • * | Air Port Gasket (1 for 2X Series and 2 for 22 Series) | R22H-210 | R22H-210 |
| • 11 | Backhead Gasket | R22H-283 | R22H-283 |
| 12 | Backhead | R22H-102 | R22H-102 |
| 13 | Oiler Felt (2) | R1-75 | R1-75 |
| 14 | Oiler Adjusting Screw (2) | R1-71A | R1-71A |
| 15 | Governor Lever | R22H-436 | R22H-436 |
| 16 | Governor Lever Pin | T22-306 | T22-306 |
| 17 | Grease Fitting | 23-188 | 23-188 |
| 18 | Oil Chamber Plug | R2-227 | R2-227 |
| 21 | Governor Assembly | R2XJ-A424 | R2XJ-A424 |

17

MAINTENANCE SECTION

* Not illustrated.

∅ Listed Cap Screw can be used as a replacement for the previously used Stud.

• 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) or each part indicated by a bullet (•) for every four tools in service.

PART NUMBER FOR ORDERING



| | | 2XJ, 2XK and 2XM | 22J, 22K, 22M, 22N and 22KW |
|------|--|-----------------------------|--|
| 27 | Rotor | R22H-K53 | R22H-K53 |
| 28 | Rotor Bearing Spacer | R2H-65 | R2H-65 |
| • 29 | • Rear Rotor Bearing | R2-22 | R2-22 |
| • 30 | • Rear End Plate | R2J-12 | R22H-12 |
| • 31 | • Vane Packet (set of 5 Vanes) | R2-42B-5 | R2-42B-5 |
| 32 | Cylinder | R2J-3 | R22H-3 |
| * | Cylinder Dowel | R22H-98 | R22H-98 |
| • 33 | • Front End Plate | R2J-11 | R22H-11 |
| • 34 | • Front Rotor Bearing | R2-24A | R2-24A |
| 35 | Rotor Pinion for 2XJ, 2XK, 22J, 22K and 22KW (15 teeth) | R2J-17 | R2J-17 |
| | for 2XM and 22M (9 teeth) | R2M-17A | R2M-17A |
| | for 22N (17 teeth) | R2N-17 | R2N-17 |
| 36 | Backhead Cap Screw (6) | R22H-68 | R22H-68 |
| 37 | Backhead Cap Screw Lock Washer (6) | 8U-58 | 8U-58 |
| 38 | Breast Plate Screw | T15-278 | T15-278 |
| 39 | Breast Plate | R22H-79 | R22H-79 |
| 40 | Chuck Wrench Clip | R2J-247 | R2J-247 |
| 41 | Clip Screw | R2J-248 | R2J-248 |
| | Feed Screw Assembly | T04-A3 | T04-A3 |
| 42 | Feed Screw | T04-3 | T04-3 |
| 43 | Feed Handle | T05-2A | T05-2A |
| 44 | Feed Handle Center | T05-244A | T05-244A |

* 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) or each part indicated by a bullet (●) for every four tools in service.

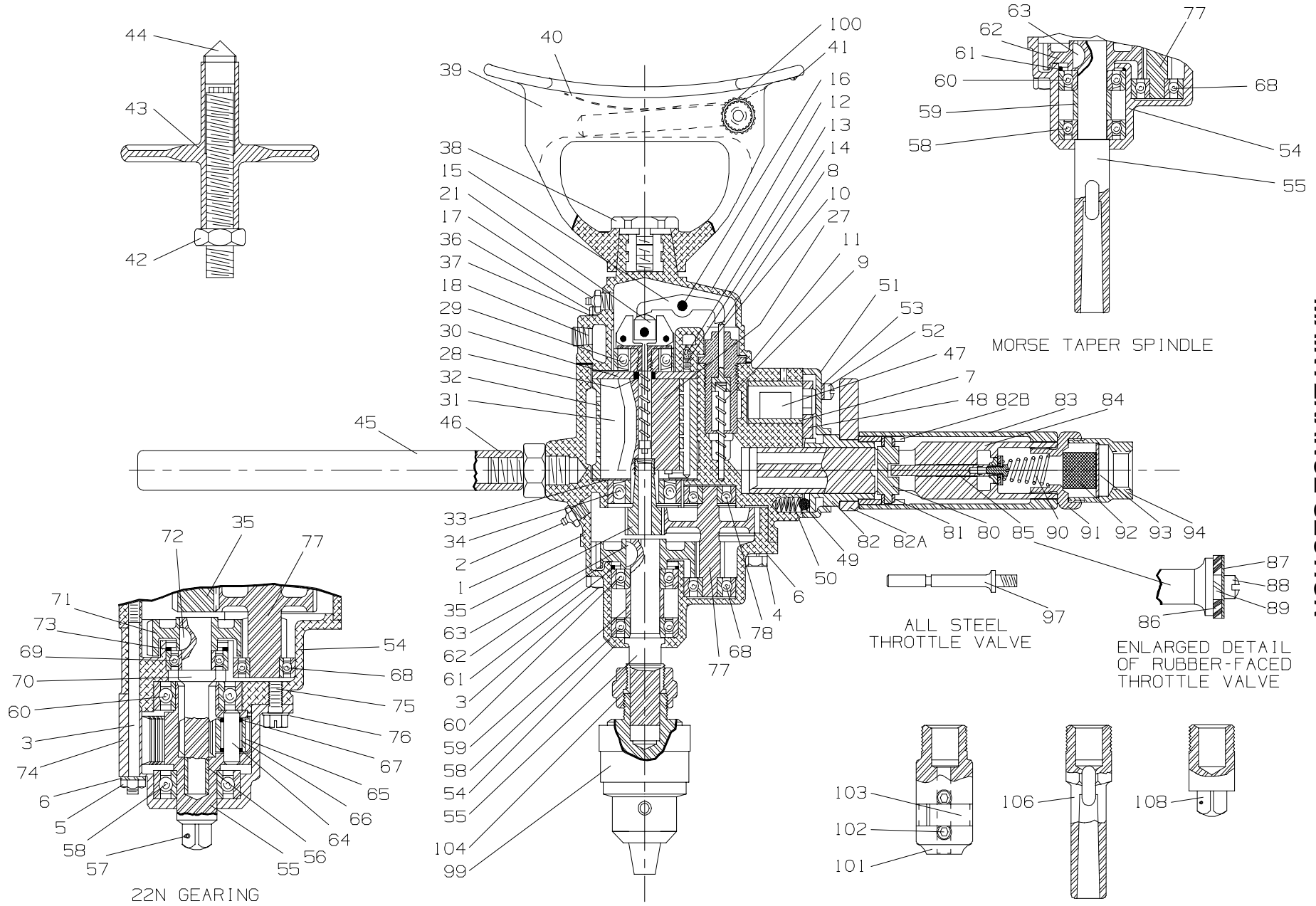
PART NUMBER FOR ORDERING



| | | 2XJ, 2XK and 2XM | 22J, 22K, 22M, 22N and 22KW |
|------|---|-----------------------------|--|
| 45 | Dead Handle | R2K-48 | R2K-48 |
| 46 | Dead Handle Stud | R2K-364A | R2K-364A |
| 47 | Reverse Valve | — | R22H-329 |
| 48 | Reverse Valve Sector | — | TCC-428 |
| ∇ 49 | Stop Pin | — | R22H-491 |
| ∇ 50 | Stop Pin Spring | — | 5UT-759 |
| 51 | Sector Cover | — | TCC-429A |
| 52 | Sector Cover Screw (4) | — | TCC-430 |
| 53 | Sector Cover Screw Lock Washer (4) | — | T05-58 |
| * | Throttle Body Set Screw | — | TCCW-433 |
| * | Throttle Body Set Screw Lock Washer | — | D02-537 |

* Not illustrated.

∇ Used only with Manual-Closing Throttles. In compliance with the Williams-Steiger Occupational Safety and Health Act, Manual-Closing Throttle Assemblies and parts used exclusively for Manual-Closing Throttles will be furnished only on international orders.



MAINTENANCE SECTION

22N GEARING

MORSE TAPER SPINDLE

ALL STEEL THROTTLE VALVE

ENLARGED DETAIL OF RUBBER-FACED THROTTLE VALVE

22 Series (Reversible)

(Dwg. TPA122-3)



PART NUMBER FOR ORDERING



| | | 2XJ, 22J | 2XK, 22K, 22KW | 2XM, 22M | 22N |
|----|---|----------|-------------------|----------|------------|
| 54 | Gear Case | | | | |
| | for threaded Stub Taper or No. 2 Morse Taper Spindle | RM2J-37 | RM2J-37 | RM2J-37 | — |
| | for No. 3 Morse Taper Spindle | — | — | R2M-137 | — |
| | for 5/8" Square Drive or Stub Taper Spindle | — | — | — | R2N-37 |
| | Spindle Assembly | | | | |
| | Threaded Spindle (for Series 2X) | R2J-A8 | R2K-A8 | R2K-A8 | — |
| | Stub Taper Spindle (for Series 22) | R22J-A8 | R22K-A8 | R22K-A8 | — |
| | Stub Taper Spindle | — | — | — | R22N-A8 |
| | No. 2 Morse Taper Spindle | R2H-A108 | R2M-A108 | R2M-A108 | — |
| | No. 3 Morse Taper Spindle | — | — | R2M-A208 | — |
| | 5/8" Square Drive Spindle with Pin-Type Retainer | — | — | — | R22N-AP108 |
| | 5/8" Square Drive Spindle with Ball-Type Retainer | — | — | — | R22N-AB108 |
| 55 | Spindle | | | | |
| | Threaded (703-16 thd.) (for Series 2X) | R2H-8 | R2H-8 | R2H-8 | — |
| | Stub Taper (for Series 22) | R22H-8 | R22H-8 | R22H-8 | — |
| | Stub Taper | — | — | — | R22N-8 |
| | No. 2 Morse Taper | R2M-108 | R2M-108 | R2M-108 | — |
| | No. 3 Morse Taper | — | — | R2M-208 | — |
| | 5/8" Square Drive with Pin-Type Retainer | — | — | — | R22N-P108 |
| | 5/8" Square Drive with Ball-Type Retainer | — | — | — | R22N-B108 |
| 56 | Spindle Gear Shaft Bushing | — | — | — | T06-110 |
| 57 | Socket Retaining Plunger (for 5/8" Square Drive Spindle) | | | | |
| | Pin-Type | — | — | — | 808-716 |
| | Ball-Type | — | — | — | 8U-715 |

PART NUMBER FOR ORDERING



| | | 2XJ, 22J | 2XK, 22K, 22KW | 2XM, 22M | 22N |
|----|---|-----------------|---------------------------|-----------------|------------|
| | Plunger Retaining Spring (for 5/8" Square Drive Spindle) | — | — | — | 5UHD-718 |
| 58 | Spindle Bearing | R2H-510 | R2H-510 | R2H-510 | D01-616 |
| 59 | Spindle Bearing Spacer | R2H-111 | R2H-111 | R2H-111 | — |
| 60 | Thrust Bearing | R2H-97 | R2H-97 | R2H-97 | G7-24 |
| 61 | Bearing Retainer | R2H-118 | R2H-118 | R2H-118 | — |
| 62 | Spindle Gear | R21-9 | R2K-9 | R2K-9 | — |
| 63 | Spindle Gear Key | TC-18 | TC-18 | TC-18 | — |
| 64 | Planet Gear Shaft (3) | — | — | — | R2N-191 |
| 65 | Planet Gear (3) | — | — | — | R2N-10 |
| 66 | Planet Gear Roller (63) | — | — | — | R2N-152 |
| 67 | Roller Retaining Plate (6) | — | — | — | R2N-655 |
| 68 | Intermediate Gear Front Bearing | T06-33 | T06-33 | T06-33 | T06-33 |
| 69 | Spindle Gear Bearing | — | — | — | T06-24 |
| 70 | Spindle Gear Shaft | — | — | — | R2N-16 |
| 71 | Spindle Gear | — | — | — | R2J-9 |
| 72 | Spindle Gear Key | — | — | — | TC-18 |
| 73 | Bearing Retainer | — | — | — | R2H-1 18 |
| 74 | Gear Case Cover | — | — | — | R2N-378 |
| 75 | Gear Case Cover Cap Screw | — | — | — | R2N-103 |
| 76 | Cover Cap Screw Lock Washer | — | — | — | 8U-58 |
| 77 | Intermediate Gear for 2XJ and 22J (13/45 teeth) | R2J-82 | — | — | — |
| | for 2XK, 22K and 22KW (10/45 teeth) | — | R2K-82 | — | — |
| | for 2XM and 22M (9/50 teeth) | — | — | R2M-82A | — |
| | for 22N (13/43 teeth) | — | — | — | R2N-82 |
| 78 | Intermediate Gear Rear Bearing | R1L-24 | R1L-24 | R1L-24 | R1L-24 |

PART NUMBER FOR ORDERING



| | | NONREVERSIBLE DRILLS | | REVERSIBLE DRILLS |
|------|--|-----------------------------|-----------------------|--------------------------|
| | | Roll Throttle | Lever Throttle | Roll Throttle |
| | Throttle Assembly | R2XH-A417 | R2XH-AL401 | R22H-A518-2 |
| 79 | Throttle Cam | T01-317A | — | — |
| 80 | Throttle Valve Lift Pin | TCC-306B | — | R4H-306 |
| 81 | Throttle Valve Lift Pin Roller (2) | — | — | TAA-426 |
| 82 | Throttle Sector | — | — | R33P5-1487 |
| 82A | Reverse Lever (for reversible models only) | — | — | R55H-314 |
| * | Reverse Lever Set Screw (2) | — | — | R2J-561 |
| 82B | Throttle Cam (for reversible models only) | — | — | 22MA2-317 |
| 83 | Throttle Sleeve | TCL-305 | R2J-269 | R4H-305 |
| × 84 | Throttle Body | R3H-401 | R3H-401 | 22B518-409 |
| ⊕ 85 | Rubber-Faced Throttle Valve | R3H-402 | R3H-402 | R3H-402 |
| • 86 | Throttle Valve Face | 8000-159A | 8000-159A | 8000-159A |
| 87 | Throttle Valve Face Cap | 8000-157 | 8000-157 | 8000-157 |
| 88 | Throttle Valve Face Retaining Screw | R4-158 | R4-158 | R4-158 |
| 89 | Retaining Screw Lock Washer | H54U-352 | H54U-352 | H54U-352 |
| • 90 | Throttle Valve Spring | TAA-418 | T01-308 | TAA-418 |
| | Air Strainer Assembly | R22H-A565 | R22H-A565 | R4H-A565 |
| 91 | Air Strainer Cap | R3H-566 | R3H-566 | R4H-566 |
| 92 | Air Strainer Screen | R3H-61 | R3H-61 | R3H-61 |
| 93 | Air Strainer Screen Support | R3H-567 | R3H-567 | R3H-567 |
| 94 | Air Strainer Body | R22H-565 | R22H-565 | R3H-565 |
| 95 | Throttle Lever | — | R2J-273 | — |
| 96 | Throttle Lever Spacer | — | R2J-270 | — |
| * | Rotational Label | R2H-100 | R2H-100 | R3H-565 |
| 97 | All Steel Throttle Valve | T01-302 | T01-302 | T01-302 |

* Not illustrated.

× If ordered as a replacement for a Throttle Body equipped with an All-Steel Throttle Valve also order the Rubber Faced Throttle Valve (85). The Throttle Body for use with the All-Steel Throttle Valve is discontinued.

⊕ Cannot be used as a replacement for the All-Steel Throttle Valve.

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MAINTENANCE SECTION

PART NUMBER FOR ORDERING



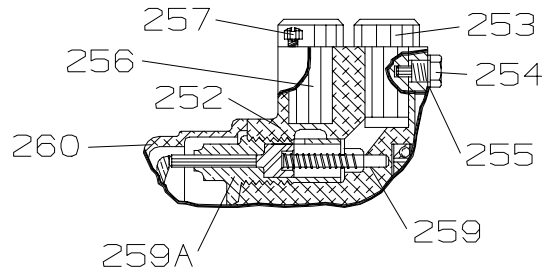
| | | 2XJ, 2XK and 2XM | All Series 22 |
|-----|--|---------------------|---------------|
| 98 | Suspension Ring | T05-365 | T05-365 |
| 99 | Drill Chuck | | |
| | 1/8" to 5/8" capacity | R2H-99 | — |
| | 0 to 1/2" capacity | T05-99A | — |
| | 5/64" to 1/2" capacity | — | DE-99C |
| 100 | Drill Chuck Wrench | | |
| | for 1/8" to 5/8" chuck | T05-J253 | — |
| | for 0 to 1/2" chuck | T05-J253 | — |
| | for 5/64" to 1/2" capacity | — | R1T-J253 |
| 101 | Wood Bit Chuck | R2H-151 | R22W-151 |
| 102 | Wood Bit Chuck Screw | | |
| | (1 for R2H-51; 2 for R22W-151) | R33W-150 | R33W-150 |
| 103 | Chuck Screw Retainer | — | R33W-149 |
| * | Wood Bit Chuck Wrench (5/16" x 6" long hex wrench) | K-27 | K-27 |
| 104 | Chuck Nut | — | DE-347A |
| 105 | Use-Em-Up Socket (No. 2 Morse Taper Socket) | T05-294-2 | — |
| 106 | Morse Taper Socket | | |
| | No. 1 Morse Taper Socket | T05-323-1 | DE-323A-1 |
| | No. 2 Morse Taper Socket | T05-323-2 | DE-323A-2 |
| | No. 3 Morse Taper Socket | T05-323-3 | DE-323A-3 |
| 107 | Socket Adapter (1/2" square drive) (Pin-Type Retainer) | R2J-212B | — |
| • * | Socket Retaining Plunger | 804-716 | — |
| * | Retaining Plunger Spring | 5UHD-718 | — |
| 108 | Socket Adapter (Overall length 1-3/4") | | |
| | 1/2" Square Drive | — | DE-215A |
| | 5/8" Square Drive | — | DE-215B |
| * | Hose Nipple (1/2" hose to 3/8" male pipe) | A01-46 | A01-46 |

* Not illustrated.

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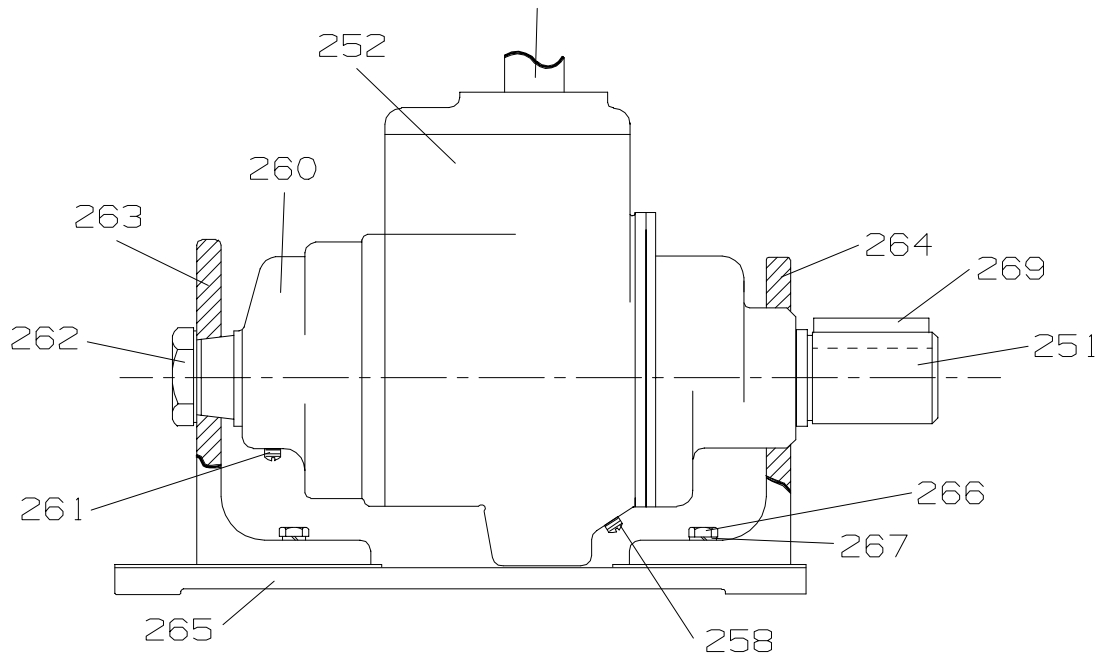
MAINTENANCE SECTION

MODEL 22N51-W/RC BASE-MOUNTED MULTI-VANE MOTOR



REMOTE CONTROL PARTS

NOTE:
SEE DRILL ILLUSTRATIONS AND
LIST OF THROTTLES AVAILABLE



(Dwg. TPB152-2)

MAINTENANCE SECTION

Parts used on Model 22N51–W/RC Base Mounted Motors are illustrated in the accompanying view and from the list below. All others are the same as corresponding parts for Drills illustrated on page 20 and should be ordered accordingly.

PART NUMBER FOR ORDERING



| | | |
|------|---|----------------|
| | Spindle Assembly | R2XN51–A8 |
| 251 | Spindle (All other parts included in the Spindle Assembly are the same as those included in the Spindle Assembly of Drills.) | E22N–8 |
| 252 | Motor Housing | |
| | for models ending in –EU | R22N51–EU–RC40 |
| | for all other models | R222N51–RC40 |
| * | Warning Label | |
| | for models ending in –EU | EU–99 |
| | for all other models | WARNING–10–99 |
| * | Nameplate | |
| | for models ending in –EU | R2H–EU–99 |
| | for all other models | R2H–99 |
| 253 | Forward Inlet Stud | R22H–471 |
| 254 | Forward Inlet Stud Lock Screw | TCCW–433 |
| 255 | 7/16” Lock Washer | D02–537 |
| 256 | Reverse Inlet Stud | R22H–472 |
| 257 | Reverse Inlet Stud Lock Screw | T05–44 |
| 258 | 1/8” Pipe Plug | R2–227 |
| 259 | Governor Valve Spring | R22F61–431 |
| 259A | Governor Valve Bushing | R22F61–429 |
| ∅ | Housing Long Stud (4) (All other parts included in the Motor Housing are the same as those included in the Motor Housing of Drills.) | R22N51–133 |
| ⊗ | Cylinder | R22H61–3 |
| 260 | Backhead | R22H–102 |
| 261 | 1/8” Pipe Plug (All other parts included in the Backhead are the same as those included in the Backhead for Drills) (See illustrated part 12) | R2–227 |
| 262 | Motor Mounting Screw | T15–278 |
| 263 | Rear Motor Mounting Bracket | R22N51–304 |
| 264 | Front Motor Mounting Bracket | R22N51–303 |
| 265 | Motor Mounting Base | R22N51–564A |
| 266 | Base Cap Screw (4) | D02–506 |
| 267 | Base Cap Screw Lock Washer (4) | D02–321 |
| 269 | Spindle Key | R2XH51–768 |

* Not illustrated.

∅ See illustration No. 3 for Drills. Order by Part Number shown above.

⊗ See illustration No. 32 for Drills. Order by Part Number shown above.

MAINTENANCE TOOLS

| DESCRIPTION | OPERATION | TOOL NO. |
|------------------------------|---|----------|
| Grease Gun | Lubrication. | P25–228 |
| Throttle Body Puller | Pulling the Throttle Body (84) from the Motor Housing (1) on Series 22 Drills. | 10203 |
| Reverse Valve Bushing Reamer | Reaming the Reverse Valve Bushing (7) after pressing it into the Motor Housing (1) on Series 22 Drills. | 22733 |

MAINTENANCE SECTION

WARNING

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

Always turn off air supply and disconnect air supply hose before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool.

LUBRICATION

Each time the Models 2XJ, 2XK, 2XM, 22J, 22K, 22M, 22N and 22KW Drills and Model 22N51-W/RC Motor are disassembled for maintenance, repair or replacement of parts, lubricate the tool as follows:

1. Inject 1–2 cc of Ingersoll–Rand Impactool No. 28 Grease through the Grease Fitting (2) and (17).
2. Unscrew the Oil Chamber Plug (18) and fill the oil chamber with Ingersoll–Rand No. 50 Oil.
3. Occasionally, inject 2 – 3 drops of Ingersoll–Rand No. 50 Oil into the oil hole in the Throttle Sleeve (83).

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 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.

Maintenance Procedure

1. Keep the air strainer clean. Periodically, as experience indicates, unscrew the Air Strainer Body (94) from the Air Strainer Cap (91) and wash the Air Strainer Screen (92) in a clean, suitable, cleaning solution. Push the prongs on the Air Strainer Screen Support (93) into one end of the Screen and insert the Screen, support end first, into the Body when assembling the strainer.
2. **For Reversible Tools**, remove the throttle body set screw from the side of the Motor Housing (1 or 252) before attempting to pull the Throttle Body (84) from the Housing.

3. The thread on the Governor Assembly (21) is a **left–hand thread**; turn it **clockwise** to unscrew it from the Rotor (27)

WARNING

Never clamp the Cylinder (32) in a vise.

4. When disassembling the motor, grasp the Cylinder in one hand. Insert a 5/16" diameter rod into the bore of the Rotor (27) and drive the rotor hub out of the Rear Rotor Bearing (29). Unscrew the Rotor Pinion (35) from the Rotor and screw a 3/8"–24 thread bolt in its place. Support the Front End Plate (33) and press the rotor front hub out of the Front Rotor Bearing (34).
5. The front hub of the Rotor contains a tapered socket. The rim of the Front End Plate is flatted, one flat on Series 2X; two on Series 22. When assembling the motor, slip the Front End Plate, crescent grooved side first, over the rotor front hub and retain it by pressing the Front Rotor Bearing shielded side first, onto the rotor hub as far as possible without binding the End Plate against the rotor face. Clean and dry the tapered surfaces of the Rotor and Rotor Pinion and screw the Pinion tightly into the Rotor. Insert a Vane (31) into each vane slot in the Rotor. Place the Cylinder over the Rotor and onto the End Plate. Align the air ports and dowel hole in the Cylinder and End Plate. If they cannot be aligned, invert the Cylinder. Install the Rear End Plate (30), crescent grooved side first, and Rear Rotor Bearing (29), shielded side first.
6. When applying the Backhead (12 or 260), draw it evenly against the Backhead Gasket (11) on the face of the Motor Housing (1 or 252) by turning each Backhead Cap Screw (36) a little at a time until all are tight.

For All Models Except 22N

1. Insert a small screwdriver through one of the holes in the Spindle Gear (62) and pry the Bearing Retainer (61) out of the groove in the Gear Case (54) before attempting to withdraw the Spindle Assembly from the Gear Case.
2. Press the Spindle (55) out of the Spindle Gear and remove the Spindle Gear Key (63) from the Spindle before attempting to press the Spindle out of the Thrust Bearing (60), Spindle Bearing Spacer (59) and Spindle Bearing (58).
3. Press the Intermediate Gear Front Bearing (68) into the Gear Case before installing the Spindle Assembly.
4. In the order named, press the Spindle Bearing, sealed side first, Spindle Bearing Spacer and Thrust Bearing, shielded side first, onto the Spindle.
5. Lay the Bearing Retainer on the web of the recessed hub side of the Spindle Gear and press the Spindle into the Spindle Gear.

MAINTENANCE SECTION

6. Slide the Spindle Assembly into the Gear Case and install the Bearing Retainer in the groove in the Gear Case with a small screwdriver inserted through one of the holes in the Spindle Gear.

For Model 22N

1. Rotate the Spindle Gear (71) until one of the holes in the gear web aligns with the notch in the gear case wall. Insert a small screwdriver into the notch and pry the Bearing Retainer (73) out of the groove in the Gear Case before attempting to remove the Spindle Gear Shaft (70) from the Gear Case.
2. Press the Spindle Gear Shaft out of the Spindle Gear and remove the Spindle Gear Key (72) from the Shaft before attempting to press the Shaft out of the Spindle Gear Bearing (69).
3. Support the short hub end of the Spindle (55 or 251) and press on the front end of the Planet Gear Shafts (64) when removing the Shafts from the spindle gear head. The Planet Gear Rollers (66) and Roller Retaining Plates (67) are free to drop out when the Gears are removed from the Spindle. Use care to prevent loss of these small parts.
4. When assembling the Spindle, coat the inner wall of the Planet Gears (65) with the recommended grease and insert a Planet Gear Shaft through each gear bore. Slide twenty-one Planet Gear Rollers into the space between the gear wall and Shaft. Slip a Roller Retaining Plate over each end of the Shaft and against the Rollers. Carefully withdraw the Shafts and insert the Gears into the gear frame on the Spindle.
5. Install the Spindle Bearing shielded side first on the Spindle. On the shielded side, the face of the bearing inner ring is slightly lower than that of the outer ring. On the opposite side of the Bearing the faces are flush.
6. Press the Intermediate Gear Front Bearing into the Gear Case before installing the assembled Spindle Gear Shaft.
7. Lay the Bearing Retainer on the web of the recessed hub side of the Spindle Gear and press the Spindle Gear Shaft into the Spindle Gear. Slide the assembled Spindle Gear Shaft into the Gear Case. Insert a small screwdriver through the holes in the Spindle Gear and install the Bearing Retainer in the gear case groove.

MAINTENANCE SECTION

TROUBLESHOOTING GUIDE

| Trouble | Probable Cause | Solution |
|-----------------------------|--|---|
| Low power or low free speed | Dirty Inlet Bushing or Air Strainer Screen and/or Exhaust Silencer | Using a clean, suitable, cleaning solution in a well-ventilated area, clean the Air Strainer Screen, Inlet Bushing and Exhaust Silencer. Allow to air dry. |
| | Worn or broken Vanes | Replace complete set of Vanes. |
| | Worn or broken Cylinder and/or scored End Plates. | Examine Cylinder and replace it if it is worn or broken or if bore is scored or wavy. Replace End Plates if they are scored. |
| | Dirty motor parts. | Disassemble the tool and clean all parts with a clean, suitable, cleaning solution, in a well-ventilated area. Reassemble the tool. |
| | Improper positioning of Reverse Valve. | Make certain Reverse Valve is fully engaged to left or right. |
| Motor will not run | Incorrect assembly of motor. | Disassemble motor, replace worn or broken parts and reassemble as instructed. |
| Rough operation | Worn or broken Rear Rotor Bearing Assembly or Front Rotor Bearing | Examine each bearing. Replace if worn or damaged. |
| | Worn or broken Bevel Gear or Bevel Pinion | Examine the Bevel Gear and Bevel Pinion. If either is worn or damaged, replace both the Gear and the Pinion because they are a matched set and must not be used separately. |
| Air leaks | Worn Valve Face or Valve Face Cap | Replace worn parts. |
| | Oil Chamber Plug worn or not tight | Tighten the Plug. If the problem persists, replace the Plug. |
| Gear Case gets hot | Insufficient grease | Clean and inspect the Gear Case gearing parts and lubricate as instructed in LUBRICATION . |
| | Worn or damaged parts | Clean and inspect the Gear Case and gearing. Replace worn or broken components. |

NOTICE

SAVE THESE INSTRUCTIONS. DO NOT DESTROY.