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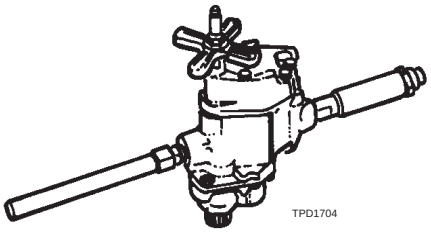
OPERATION AND MAINTENANCE MANUAL
for
MODELS 3SJ AND 3SK NONREVERSIBLE DRILLS



⚠ WARNING

IMPORTANT SAFETY INFORMATION ENCLOSED.
READ THIS MANUAL BEFORE OPERATING TOOL.
FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

- **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 3/4" (19 mm) inside diameter air supply hose.**
- **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.**
- **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.**
- **Keep hands, loose clothing and long hair away from rotating end of tool.**
- **Anticipate and be alert for sudden changes in motion during start up and operation of any power tool.**
- **Tool accessory may continue to rotate briefly after throttle is released.**
- **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.**
- **This tool can exert strong forces on the operator. Use proper support to control these forces.**
- **Use accessories recommended by Ingersoll–Rand.**
- **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.

Ingersoll–Rand is not responsible for customer modification of tools for applications on which Ingersoll–Rand was not consulted.

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

It is the responsibility of the employer to place the information in this manual into the hands of the operator.

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

Printed in U.S.A.

INGERSOLL-RAND®
PROFESSIONAL TOOLS

WARNING LABEL IDENTIFICATION

⚠ WARNING

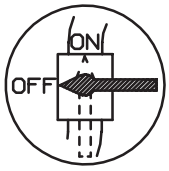
FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

⚠ WARNING

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

⚠ WARNING

Always wear hearing protection when operating this tool.



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⚠ WARNING

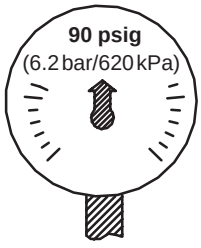
Do not carry the tool by the hose.

⚠ 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

Ingersoll–Rand No. 50

Ingersoll–Rand No. 28

Always use an air line lubricator with this tool.
We recommend the following Filter–Lubricator Unit.
For USA – No. C31–06–G00
For International – No. FRL30–C6–A29
After each eight hours of operation, unscrew the Oil Chamber Plug (14) and fill the chamber in the Backhead (10) with Ingersoll–Rand No. 50 Oil.
After each forty–eight hours of operation, inject 2 or 3 strokes of Ingersoll–Rand No. 28 Grease into the Grease Fittings (11 and 33).
Occasionally, inject 2 or 3 drops of light oil into the hole in the Throttle Sleeve (61).

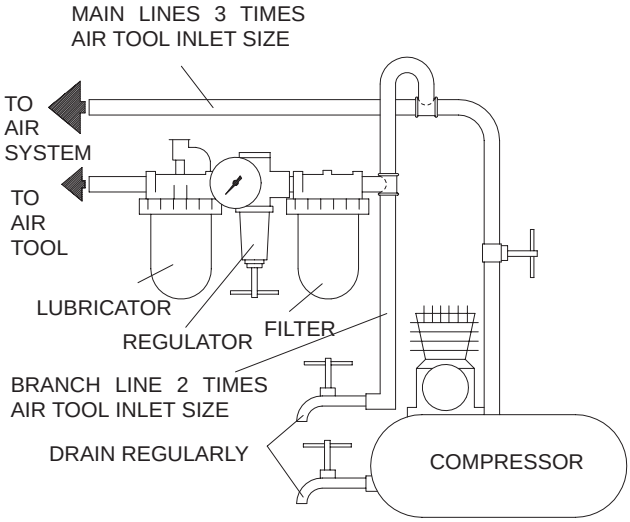
OILER ADJUSTMENT

To adjust oiler, remove the Backhead (10) and turn the Oiler Adjusting Screws (12). Turning the Screws in (clockwise) decreases the oil flow. Backing the Screws out (counterclockwise) increases the oil flow.

INSTALLATION

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.
Make sure all hoses and fittings are the correct size and are tightly secured. See Dwg. TPD905–1 for a typical piping arrangement.



(Dwg. TPD905–1)

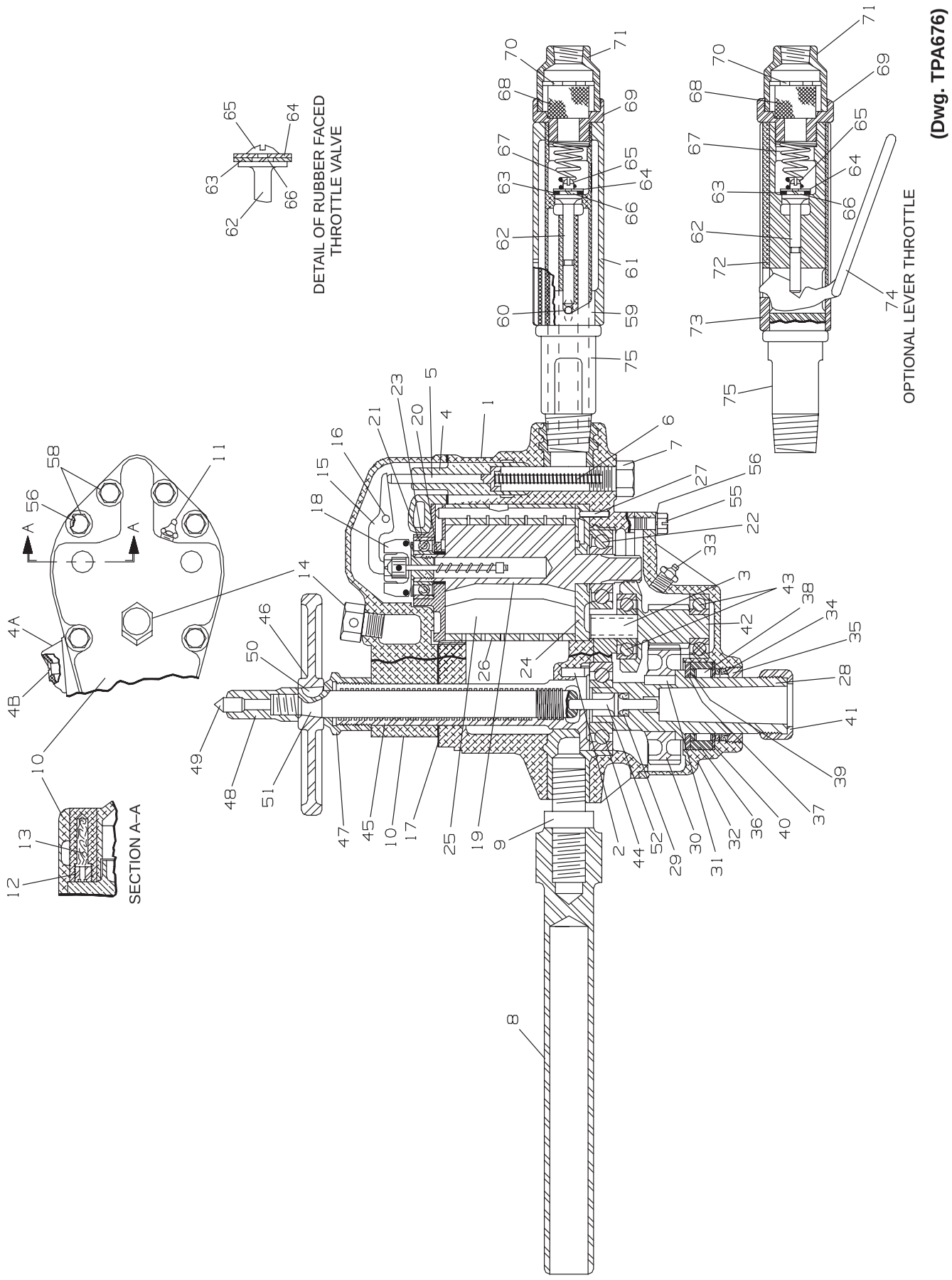
Models 3SJ and 3SK Drills are designed for heavy drilling and reaming in shipbuilding, railroad car shops, fabricated metal and construction applications.

HOW TO ORDER A LARGE DRILL

SELF CLOSING ROLL THROTTLE

Model	Free Speed rpm	Capacity in Steel				Morse Taper Socket	Length of Feed	
		Drilling		Reaming				
		in.	mm	in.	mm		in.	mm
3SJA	450	1	25	15/16	24	No. 3	4–1/4	108
3SKA	300	1–1/4	32	1	25	No. 3	4–1/4	108

MAINTENANCE SECTION



		PART NUMBER FOR ORDERING
1	Motor Housing	
	for models ending in –EU	R3H–EU–40B
	for all other models	R3H–40B
*	Warning Label	
	for models ending in –EU	EU–99
	for all other models	WARNING–8–99
*	Nameplate	
	for models ending in –EU	R2H–EU–99
	for all other models	R2H–99
2	Feed Screw Dowel	R3H–527
3	Intermediate Gear Bearing Stud	R3H–502
4	Governor Valve Bushing	R3H–429A
4A	Exhaust Deflector	R33H–23
4B	Exhaust Deflector Screw	R3H–312
5	Governor Valve	R3H–425A
6	Governor Valve Spring	R3H–431
7	Governor Valve Cap	R3H–433
8	Dead Handle	TC–48
9	Dead Handle Stud	TC–364
10	Backhead	R3H–102A
11	Grease Fitting	23–188
12	Oiler Adjusting Screw (2)	JA4–71
13	Oiler Felt (8)	JA4–75
14	Oil Chamber Plug	P25–227
15	Governor Lever	R4F–436
16	Governor Lever Pin	MP1–15A
• 17	Backhead Gasket	R3H–283
18	Weight–Type Governor Assembly	R3H–A424
19	Rotor	R33H–53B
20	Rotor Bearing Spacer	R3Y–65
• 21	Rear Rotor Bearing	R3H–22
• 22	Front Rotor Bearing	R3H–24

		PART NUMBER FOR ORDERING
• 23	Rear End Plate	R3H–12
• 24	Front End Plate	R3H–11
• 25	Vane Packet (set of 5)	R3H–42A–5
• 26	Cylinder	R3H–3A
27	Cylinder Dowel	R3H–98A
	Spindle Assembly	
	for 3SJ	R3SJ–A108
	for 3SK	R3SK–A108
28	Spindle	R3SH–108
29	Ejecting Pin Packing	R3H–408
30	Spindle Gear	
	for 3SJ	R3J–9
	for 3SK	R3SK–9
31	Spindle Gear Key	TB–410
32	Gear Case	RM3H–37A
33	Grease Fitting	23–188
34	Spindle Packing (2)	R3H–14
35	Spindle Packing Nut	R3H–15
36	Spindle Bearing Race	R3H–510
37	Spindle Bearing Top Plate	R3H–511
38	Spindle Bearing Roller (16)	R3H–512
39	Spindle Bearing Cage	R3H–513
40	Spindle Bearing Bottom Plate	R3H–514
41	Protection Nut	T02–43A
42	Intermediate Gear	
	for 3SJ	R3J–82A
	for 3SK	R3SK–82A
43	Intermediate Gear Bearing (2)	TB–394
• 44	Spindle Thrust Bearing	D04–366
45	Outer Feed Screw	R3H–290A

* 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.

		PART NUMBER FOR ORDERING			PART NUMBER FOR ORDERING
	Feed Screw Assembly	R3Y–A291	*	Gear Case Bolt (3)	R3Y–103
46	Feed Handle	TC–2	*	Gear Case Bolt Nut (3)	T06–139
47	Feed Screw Cap	TC–392	55	Gear Case Cap Screw (3)	R3Y–68A
48	Feed Handle Lock Nut	TC–388A	56	1/4” Lock Washer (12)	L01–67
49	Feed Screw Center	TC–244	57	Backhead Long Cap Screw (2)	R3H–66
50	Feed Handle Key	TC–18	58	Backhead Short Cap Screw (4)	R3H–57
51	Inner Feed Screw	R3H–291	*	Grease Gun	P25–228
52	Drill Ejecting Pin	R3SH–114	*	Spindle Packing Spanner Nut Wrench	R3H–26

* Not illustrated.

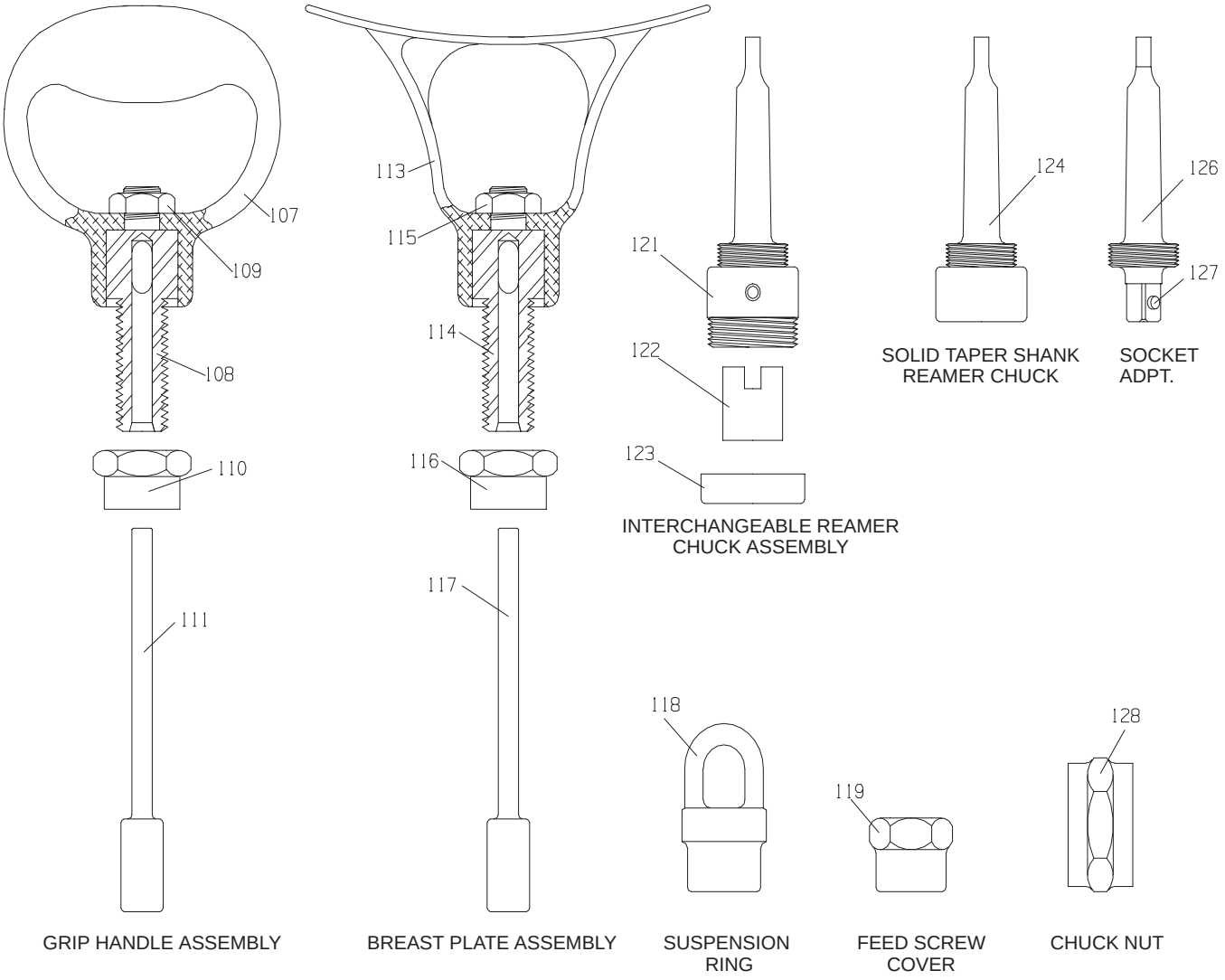
MAINTENANCE SECTION

USE–EM–UP SPINDLES AND EXTENSION SPINDLES

Order a Use–Em–Up Spindle or an Extension Spindle by the part number shown in the table below.
With the exception of the Spindle, the same parts are included in a Use–Em–Up Spindle Assembly or an Extension Spindle Assembly as in a standard Spindle Assembly.
The following table also lists the Use–Em–Up Ejecting Pins that must be used with Use–Em–Up Spindles.

PART NUMBER FOR ORDERING

	3SJ	3SK
Use–Em–Up Spindle Assembly	R3SJ–A294	R3SK–A294
Use–Em–Up Spindle	R3SH–294	R3SH–294
Extension Spindle Assembly	R3SJ–A327	R3SK–A327
Extension Spindle	R3SH–327	R3SJ–327



(Dwg. TPA1424–1)

PART NUMBER FOR ORDERING

		Roll Throttle		
		★ Manual–Closing	Self–Closing	
	Throttle Assembly	★ R3H–A401	R3H–A417	R3H–AL401
59	Throttle–Cam	★ T01–307A	T01–317A	—
60	Throttle Valve Lift Pin	TCC–306A	TCC–306A	—
61	Throttle Sleeve	TCL–305	TCL–305	—
62	Rubber–Faced Throttle Valve	R3H–402	R3H–402	R3H–402
• 63	Throttle Valve Face	8000–159A	8000–159A	8000–159A
64	Throttle Valve Face Cap	8000–157	8000–157	8000–157
65	Throttle Valve Face Retaining Screw	R4–158	R41	R4–158
66	Retaining Screw Lock Washer	H54U–352	H54U–352	H54U–352
67	Throttle Valve Spring	T01–308	TAA–418	T01–308
	Air Strainer Assembly	R3H–A565	R3H–A565	R3H–A565
68	Air Strainer Screen	R3H–61	R3H–61	R3H–61
69	Air Strainer Cap	R3H–566	R3H–566	R3H–566
70	Air Strainer Screen Support	R3H–567	R3H–567	R3H–567
71	Air Strainer Body	R3H–565	R3H–565	R3H–565
72	Lever Throttle Sleeve	—	—	R2J–269
73	Throttle Lever Spacer	—	—	R2J–270
74	Throttle Lever	—	—	R2J–273
75	Throttle Body	R3H–401	R3H–401	R3H–401
*	Rotational Label (non reversible)	R2H–100	R2H–100	R2H–100

* 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.

★ In compliance with the Willaims–Steiger Occupational Safety and Health Act, Manual–Closing Throttle Assemblies and parts used exclusively for Manual–Closing Throttles will be furnished only in international orders.

PART NUMBER FOR ORDERING

106	Grip Handle Assembly	TC–A41
107	Grip Handle	TA–41
108	Grip Handle Stud	TC–448
109	Grip Handle Stud Nut	B12–249
110	Grip Handle Nut	TC–447
111	Grip Handle Ejecting Pin	R3H–50
112	Breast Plate Assembly	TC–A79
113	Breast Plate	TC–79
114	Breast Plate Stud	TC–448
115	Breast Plate Stud Nut	B12–249
116	Breast Plate Nut	TC–447
117	Breast Plate Ejecting Pin	R3H–50
118	Suspension Ring	TC–365
119	Feed Screw Cover	TC–461
120	Intert hangeable Reamer Chuck Assembly (specify size bushing required)	
121	Taper Shank Reamer Chuck for Interchangeable Bushing	T02–45A
122	Interchangeable Reamer Chuck Bushing (5/8”, 11/16”, 3/4”, 13/16”, 7/8” or 1” square drive hole as specified)	T01–38
123	Interchangeable Reamer Chuck Cap	T01–54
124	Solid Taper Shank Reamer Chuck (5/8”, 3/4”, 7/8”, or 1” square drive hole as specified)	T02–255A
125	Square Socket Chuck, Threaded Type (5/8”, 3/4”, 7/8”, or 1” square drive hole as specified)	T02–342
128	Chuck Nut	T12–347
214	Socket Adapter (No. 3 Morse Taper to 3/4” square drive)	R41–2J4
*	Male Hose Nipple (3/4” hose to 1/2” male pipe)	A03–46
*	Male Hose Nipple (1/2” hose to 1/2” male pipe)	D02–455

* Not illustrated.

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. Failure to do so could result in injury.

LUBRICATION

Each time a Model 3SJ or 3SK Drill is disassembled for maintenance, repair or replacement of parts, lubricate the tool as follows:
Pour approximately 3 cc of Ingersoll–Rand No. 50 Oil into the air inlet. Remove the Oil Chamber Plug (14) and fill the chamber with Ingersoll–Rand No. 50 Oil.

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.

Air Strainer

Periodically, as experience indicates, unscrew the Air Strainer Body (71) from the Air Strainer Cap (69) and wash the Air Strainer Screen (68) in a clean, suitable cleaning solution. Enter the prongs on the Screen Support (70) into one end of the Screen and insert the Screen, support end first into the Body when assembling the strainer.

Feed Screw Cap

NOTICE

The external thread on the Outer Feed Screw (45) is left–hand; rotate the Feed Screw Cap (47) clockwise to remove.

Disassembly of the Motor

1. Remove the Backhead Long Cap Screws (57) and Backhead Short Cap Screws (58).

NOTICE

Do not pry the Backhead (10) from the Motor Housing (1).

2. If the Backhead cannot be lifted off with the fingers, grasp the Oil Chamber Plug (14) in a leather–covered or copper–covered vise and pull on the Housing.

NOTICE

The Rotor (19) is tapped left–hand: rotate the Governor Assembly (18) clockwise to remove.

NOTICE

Never clamp the Cylinder (26) in a vise.

3. Grasp the Cylinder in one hand. Insert a small rod into the rotor bore and drive the hub on the Rotor (19) out of the Rear Rotor Bearing (21). Support the Front End Plate (24) and press the front hub of the Rotor out of the Front Rotor Bearing (22).

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 pressing the bearing into 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 a clean, suitable, cleaning solution and dry with a clean cloth. **Sealed or shielded bearing should never be cleaned.** Work grease thoroughly into every open bearing before installation.

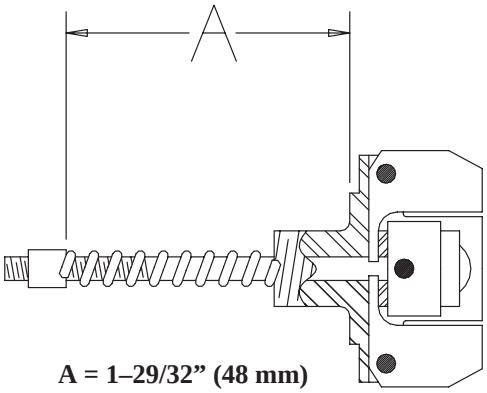
Assembly of the Motor

1. Press the Rear Rotor Bearing (21), shielded side first, into the recess in the Rear End Plate (23) with an arbor that will contact only the outer ring of the bearing.
2. Press on the inner ring of the Bearing when installing this assembly on the hub of the Rotor.

3. Press the Front Rotor Bearing (22), shielded side first, onto the front hub of the Rotor with a sleeve that will clear the pinion and contact only the inner ring of the Bearing.
4. After installing one End Plate (23 or 24) and Rotor Bearing (21 or 22) on the rotor hub, insert a Vane (25) into each vane slot in the Rotor.
5. Place the Cylinder (26) over the Rotor and against the installed End Plate.
6. Align the air ports and dowel hole in the Cylinder and End Plate. If they cannot be aligned, the Cylinder is inverted: remove and turn end–for–end before installing the second End Plate and Rotor Bearing.
7. Note the stamping **"THRUST HERE"** on one side of the Spindle Thrust Bearing (44). Install the Bearing **unstamped** side first on the spindle hub.
8. Draw the Backhead (10) evenly against the Backhead Gasket (17) on the face of the Motor Housing (1) by turning each Backhead Cap Screw (57 or 58) a little at a time until all are tight.

GOVERNOR ADJUSTMENT

When installing a new Governor, screw the governor adjusting nut onto the governor stem until dimension "A" equals 1–29/32" (48.4 mm). This will usually result in the proper governed free speed. However, this is only an approximate setting. Further adjustment may be necessary. Screw the nut further onto the stem to increase the speed; back it off to decrease the speed. The correct governed free speed of the various sizes at the Spindle is:



A = 1–29/32" (48 mm)

(Dwg. TPD497)

Model	RPM at 90 psig (6.2 bar/620 kPa)
3SJ	450
3SK	300

Before starting a reassembled tool, refer to the **Lubrication Instructions.**

TROUBLESHOOTING GUIDE

Trouble	Probable Cause	Solution
Low power or low free speed	Dirty Inlet Bushing or Air Strainer Screen	Using a clean, suitable ,cleaning solution in a well–ventilated area, clean the Air Strainer Screen. Allow to air dry.
	Worn or broken Vanes	Replace the **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 Low power 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 as instructed in this manual.
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 or Front Rotor Bearing	Examine each bearing. Replace if worn or damaged.
	Worn or broken gear teeth	Check for a worn or broken gearing or if a replacement is necessary.
Air leaks	Worn Throttle Valve Face or Throttle Valve Face Cap	Replace worn parts.
	Oil Chamber Plug worn or not tight	Tighten the Plug. If the problem persists, replace the Plug.

NOTICE

SAVE THESE INSTRUCTIONS. DO NOT DESTROY.