OPERATOR'S MANUAL

INCLUDING: OPERATION, INSTALLATION & MAINTENANCE

SECTION M30
MANUAL 2
Released: 12-8-86
Revised: 08-07-01
Form: 2941-2

20 SERIES SCREWDRIVERS

Models: SA023B-( )-( ), SA024C-( )-( ), SG021B-( )-( ), SG022B-( )-( ), SG023B-( )-( ), SG029B-( )-( ), SL021B-( )-( ), SL022B-( )-( ), SL023B-( )-( ) and SL029B-( )-( ).

⚠ WARNING

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

FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

Pneumatic tools should always be installed and used in accordance with A.N.S.I. B186.1 "Safety Code For Portable Air Tools."

⚠WARNING

- Operate this tool at 90 p.s.i.g. (6.2 bar) maximum air pressure at the air inlet of the tool.
- Disconnect air supply from tool before removing/installing bit, socket or device attached to tool or performing maintenance procedures.
- Keep hands, 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.
- Never exceed rated r.p.m. of tool.
- Wear suitable eye and hearing protection while operating tool.
- Tool shaft can 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.
- Use only accessories recommended by ARO.

⚠WARNING

Repeated prolonged operator exposure to vibrations which may be generated in the use of certain hand-held tools may produce Raynaud's phenomenon, commonly referred to as Whitefinger disease. The phenomenon produces numbness and burning sensations in the hand and may cause circulation and nerve damage as well as tissue necrosis. Repetitive users of hand-held tools who experience vibrations should closely monitor duration of use and their physical condition.

NOTICE

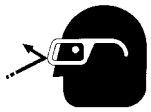
- The use of other than genuine ARO replacement parts may result in safety hazards, decreased tool performance and increased maintenance and may invalidate all warranties.
- ARO is not responsible for customer modification of tools for applications on which ARO was not consulted.
- Tool maintenance and repair should be performed by authorized, trained, competent personnel. Consult your nearest ARO authorized servicenter.
- It is the responsibility of the employer to place the information in this manual into the hands of the operator.

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) 672-0321, FAX: (615) 672-0801.

ARO Tool Products
Ingersoll-Rand Company
1725 U.S. No. 1 North • P.O. Box 8000 • Southern Pines, NC 28388-8000

FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

⚠ WARNING

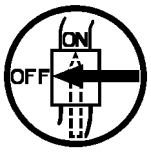


Wear eye protection when operating or performing maintenance on this tool.

⚠ WARNING

Wear hearing protection when operating this tool.

⚠ WARNING



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.

⚠ 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.

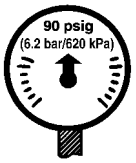
⚠ WARNING

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

⚠ WARNING

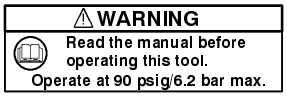
Do not overreach when operating this tool. Keep body stance balanced and firm.

⚠ WARNING

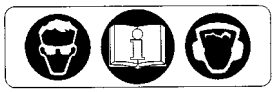


Operate at 90 p.s.i.g. (6.2 bar/620 kPa) maximum air pressure.

NOTICE



PN 48176-1 LABEL
(NON-EU MODELS)



PN 49883 LABEL
(-EU MODELS)

This label must appear on the tool at all times. If it is lost or damaged, a replacement label is available at no cost.

WARNING = Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage.

CAUTION = Hazards or unsafe practices which could result in minor personal injury or product or property damage.

NOTICE = Important installation, operation or maintenance information.

ROUTINE LUBRICATION REQUIREMENTS

Lack of or an excessive amount of lubrication will affect the performance and life of this tool. Use only recommended lubricants at below time intervals:

EVERY 8 HOURS OF TOOL OPERATION - Fill lubricator reservoir of recommended F.R.L. with spindle oil (29665). If an in line or air line lubricator is not used, apply several drops of spindle oil (29665) in air inlet.

EVERY 160 HOURS OF TOOL OPERATION - Lubricate clutch parts with grease (40036-1). Lubricate gearing. Pack bearings, coat shafts and lubricate gears with NLGI #1 "EP" grease (33153). Gearing should contain approximately 1/32 oz. (.9 g) of grease for single reduction and 3/64 oz. (1.3 g) for double reduction.

AIR SUPPLY REQUIREMENTS

For maximum operating efficiency, the following air supply specifications should be maintained to this air tool:

- AIR PRESSURE - 90 p.s.i.g. (6.2 bar)
- AIR FILTRATION - 50 micron
- LUBRICATED AIR SUPPLY
- HOSE SIZE - 5/16" (8 mm) I.D.

An ARO® model C28231-810 air line FILTER/REGULATOR/LUBRICATOR (F.R.L.) is recommended to maintain the above air supply specifications.

RECOMMENDED LUBRICANTS

After disassembly is complete, all parts, except sealed or shielded bearings, should be washed with solvent. To relubricate parts, or for routine lubrication, use the following recommended lubricants:

Where Used	ARO Part #	Description
Air Motor	29665	1 qt Spindle Oil
"O" Rings & Lip Seals	36460	4 oz. Stringy Lubricant
Gears and Bearings	33153	5 lb. "EP" - NLGI #1 Grease
Clutches	40036-1	1 lb. "EP" Molybdenum Disulfide and White Solid Lubricants in Mineral Oil

INSPECTION, MAINTENANCE AND INSTALLATION

Disconnect air supply from the tool or shut off air supply and exhaust (drain) line of compressed air before performing maintenance or service to the tool.

It is important that the tools be serviced and inspected at regular intervals for maintaining safe, trouble-free operation of the tool.

Be sure the tool is receiving adequate lubrication, as failure to lubricate can create hazardous operating conditions resulting from excessive wear.

Be sure that the air supply lines and connectors are of proper size to provide a sufficient quantity of air to the tool.

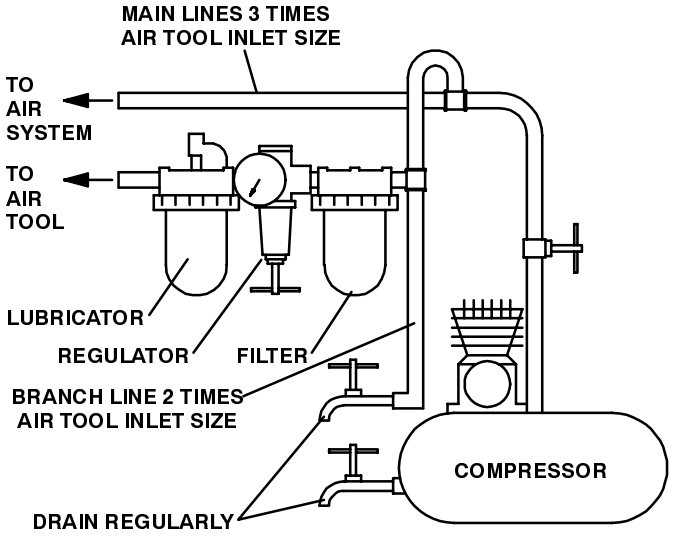
Tool maintenance and repair shall be performed by authorized, trained, competent personnel. Tools, hose and fittings shall be replaced if unsuitable for safe operation and responsibility should be assigned to be sure that all tools requiring guards or other safety devices shall be kept in legible condition. Maintenance and repair records should be maintained on all tools. Frequency of repair and the nature of the repairs can reveal unsafe application. Scheduled maintenance by competent authorized personnel should detect any mistreatment or abuse of the tool and worn parts. Corrective action should be taken before returning the tool for use.

Disassembly should be done on a clean work bench with a clean cloth spread to prevent the loss of small parts. After disassembly is completed, all parts should be thoroughly washed in a clean solvent, blown dry with air and inspected for wear levels, abuse and contamination. Double sealed or shielded bearings should never be placed in solvent unless a good method of re-lubricating the bearing is available. Open bearings may be washed but should not be allowed to spin while being blown dry.

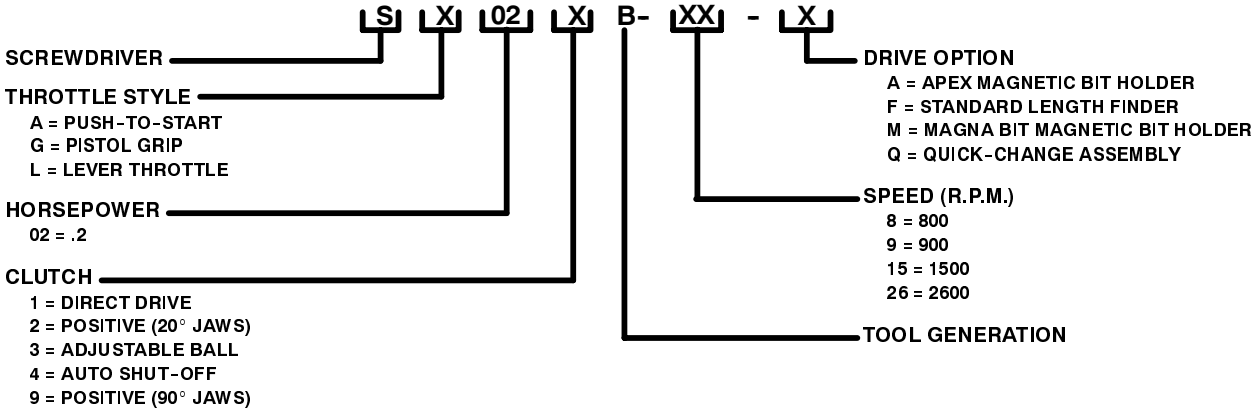
Upon reassembling, lubricate parts where required. Use 33153 grease, or equivalent, in bearings. Use 36460 lubricant for "O" ring assembly. When assembling "O" rings or parts adjacent "O" rings, care must be exercised to prevent damage to the rubber sealing surfaces. A small amount of grease will usually hold steel balls and other small parts in place while assembling.

When replacement parts are necessary, consult drawing containing the part for identification.

Always use clean, dry air. Dust, corrosive fumes and/or excessive moisture can damage the motor of an air tool. An air line filter can greatly increase the life of an air tool. The filter removes rust, scale, moisture and other debris from the air lines. Low air pressure (less than 90 p.s.i.g.) reduces the speed of the air tool. High air pressure (more than 90 p.s.i.g.) raises performance beyond the rated capacity of the tool and could cause injury. Shown below is a typical piping arrangement.



MODEL NUMBER IDENTIFICATION



MODEL NUMBER	R.P.M.	THROTTLE ROD (ITEM 17)	ROTOR (ITEM 34)	MOTOR ASSEMBLY	RING GEAR (ITEMS 50 AND 63)	SPINDLE ASS'Y (ITEMS 54, 61 AND 64)	BEARING (ITEM 55)	GEARING ASS'Y (ITEMS 67 THRU 72 AND 130)	GEARING RED.
SA023B-9-( )-( )	900	46511-2	46338-1	47720	46323	47743	Y65-13	46891-16	19.28:1
SA023B-15-( )-( )	1500	46511-2	46338-1	47720	46323	47742	Y65-13	46891-17	11.76:1
SA023B-26-( )-( )	2600	46511-1	46338-1	47720	46322	47741	Y65-13	46891-18	6.67:1
SA024C-8-( )-( )	800	46511-341	46338-1	47720	46323	47742	Y65-13	46891-22	22.88:1
SA024C-9-( )-( )	900	46511-341	46338-1	47720	46323	47743	Y65-13	46891-16	19.29:1
SA024C-15-( )-( )	1500	46511-341	46338-1	47720	46323	47742	Y65-13	46891-17	11.76:1
SA024C-26-( )	2600	46511-301	46338-1	47720	46322	47741	Y65-13	46891-18	6.67:1
SG021B-9-( )-( )	900		46338-2	47721	47634			46891-1	19.28:1
SG021B-15-( )-( )	1500		46338-2	47721	47634			46891-2	11.76:1
SG021B-26-( )-( )	2600		46338-2	47721	47633			46891-3	6.67:1
SG022B-9-( )-( )	900		46338-1	47720	47634	47803	46243	46891-4	19.28:1
SG022B-15-( )-( )	1500		46338-1	47720	47634	47802	46243	46891-5	11.76:1
SG022B-26-( )	2600		46338-1	47720	47633	47801	46243	46891-6	6.67:1
SG023B-9-( )-( )	900		46338-2	47721	47634	47743	Y65-13	46891-7	19.28:1
SG023B-15-( )-( )	1500		46338-2	47721	47634	47742	Y65-13	46891-8	11.76:1
SG023B-26-( )-( )	2600		46338-2	47721	47633	47741	Y65-13	46891-9	6.67:1
SG029B-9-( )	900		46338-1	47720	47634	47803	46243	46891-4	19.28:1
SG029B-15-( )	1500		46338-1	47720	47634	47802	46243	46891-5	11.76:1
SG029B-26-( )	2600		46338-1	47720	47633	47801	46243	46891-6	6.67:1
SL021B-9-( )-( )	900		46338-2	47721	46323			46891-10	19.28:1
SL021B-15-( )-( )	1500		46338-2	47721	46323			46891-11	11.76:1
SL021B-26-( )	2600		46338-2	47721	46322			46891-12	6.67:1
SL022B-9-( )	900		46338-1	47720	46323	47803	46243	46891-13	19.28:1
SL022B-15-( )	1500		46338-1	47720	46323	47802	46243	46891-14	11.76:1
SL022B-26-( )	2600		46338-1	47720	46322	47801	46243	46891-15	6.67:1
SL023B-9-( )-( )	900		46338-2	47721	46323	47743	Y65-13	46891-16	19.28:1
SL023B-15-( )-( )	1500		46338-2	47721	46323	47742	Y65-13	46891-17	11.76:1
SL023B-26-( )-( )	2600		46338-2	47721	46322	47741	Y65-13	46891-18	6.67:1
SL029B-9-( )	900		46338-1	47720	46323	47803	46243	46891-13	19.28:1
SL029B-15-( )	1500		46338-1	47720	46323	47802	46243	46891-14	11.76:1
SL029B-26-( )	2600		46338-1	47720	46322	47801	46243	46891-15	6.67:1

MODELS WITH -EU SUFFIX ARE "EC" COMPLIANT MODELS.

- Never apply excessive pressure by a holding device which may cause distortion of a part.
- Apply pressure evenly to parts which have a press fit.
- Apply even pressure to the bearing race that will be press fitted to the mating part.
- Use correct tools and fixtures when servicing this tool.
- Don't damage "O" rings when servicing this tool.
- Use only genuine ARO® replacement parts for this tool. When ordering, specify part number, description, tool model number and serial number.

CLUTCH DISASSEMBLY

_ Clamp tool in a smooth face vise - pistol grip models, clamp on handle - straight models, clamp on inlet adapter.
_ Remove clutch housing with a strap type wrench - LEFT HAND THREADS.
_ Remove clutch assembly from tool.

ADJUSTABLE BALL CLUTCH

_ Clamp 1/4" hex wrench in a vise, then place bit holder (110) and clutch assembly on it.
_ Remove snap ring (86).
_ Remove adjustment nut (87) using 5/8" wrench.
_ Remove adjustment washer (88) and clutch spring (73).
_ Remove snap ring (89).
_ Slide off thrust pad (74), two thrust washers (75) and thrust bearing (90).
_ Remove ball carrier (76) and eight balls (79).
_ Remove retaining ring (83).
_ Slide jaw back and remove ball race (82) and sixteen balls (81) then remove driven jaw (80).
_ Remove "O" ring and push pin (85) out of spindle (78).
_ Remove spring (84).

POSITIVE CLUTCH

_ Remove pin assembly (109) and spring (84) from jaw.
_ Remove retaining ring (108).

AUTO SHUT-OFF CLUTCH

_ Clamp 1/4" hex wrench in a vise, then place bit holder (123) and clutch assembly on it.
_ Remove snap ring (86).
_ Remove adjustment nut (87) using 5/8" wrench.
_ Remove adjustment washer (93) and clutch spring (94).
_ Remove snap ring (95).
_ Slide off guide (96), spring (97), ball sleeve (98), thrust race (99) and thrust bearing (90). NOTE: Removal of ball sleeve (98) releases six balls (103).
_ Remove thrust race (100), releasing four balls (105).
_ Remove retaining ring (126) and pin (124), then rotate bit holder to remove nine balls (125). Separate bit holder (123) and spindle (102), releasing ten balls (106).

CLUTCH ASSEMBLY

_ For clutch part lubrication, use 40036-1 grease on parts as pointed out in this section.

ADJUSTABLE BALL CLUTCH

_ Lubricate ball groove of clutch spindle (78).
_ Install sixteen balls (81) in groove.
_ Slide driven jaw (80) on spindle (78) from threaded end until it seats over balls (81).
_ Assemble ball race (82), beveled i.d. toward balls.
_ Assemble retaining ring (83).
_ Lubricate ball pockets of driven jaw (80) and install ball carrier (76) and eight balls (79).
_ Lubricate and assemble one thrust washer (75), thrust bearing (90), other thrust washer (75) and thrust pad (74).
_ Install snap ring (89).
_ Install clutch spring (73), adjustment washer (88) and adjustment nut (87).
_ Install snap ring (86).
_ Coat pin (85) with spindle oil 29665 then slide spring (84) over pin.
_ Install pin (85) and spring (84) into spindle.
_ Assemble "O" ring (77) to pin (85).
_ Lubricate spindle, jaw face and ball (47) of bit holder (110), then install on clutch assembly and assemble both to tool.
_ Assemble clutch housing (112) onto tool - LEFT HAND THREADS.
_ See "Clutch Adjustment".

POSITIVE CLUTCH

_ Assemble jaw (107) to gearing spindle and secure with retaining ring (108).
_ Coat pin assembly (109) with spindle oil 29665, then slide spring (84) over pin assembly.
_ Install pin assembly (109) and spring (84) into spindle.
_ Lubricate spindle, jaw face and ball (47) of bit holder (110) and assemble to tool.
_ Assemble clutch housing (115) onto tool - LEFT HAND THREADS.

AUTO SHUT-OFF CLUTCH

_ Lubricate ball grooves of clutch spindle (102).
_ Install ten balls (106) into groove.
_ Slide spindle into bit holder, securing balls.
_ Assemble nine balls (125) and pin (124) into bit holder, then secure with retaining ring (126).
_ Lubricate ball pockets of bit holder and install four balls (105) into pockets, securing with thrust race (100).
_ Lubricate and assemble thrust bearing (90) and thrust race (99) to spindle.
_ Coat plunger (101) with spindle oil 29665 and assemble spring (92) to plunger. Assemble plunger and spring to spindle, securing with balls (103). NOTE: Assemble two balls per hole.
_ Secure balls with ball sleeve (98).
_ Assemble spring (97) and guide (96) to spindle, securing with snap ring (95).
_ Install clutch spring (94).
_ Lubricate face of adjustment washer (93) and install on spindle.
_ Thread adjustment nut (87) onto spindle, securing with snap ring (86).
_ Lubricate ball (47) of bit holder.
_ Assemble spring (91) into spindle. NOTE: Assemble spring with large diameter into spindle first.
_ Assemble clutch assembly to tool.
_ Assemble clutch housing (112) to tool - LEFT HAND THREADS.
_ See "Clutch Adjustment".

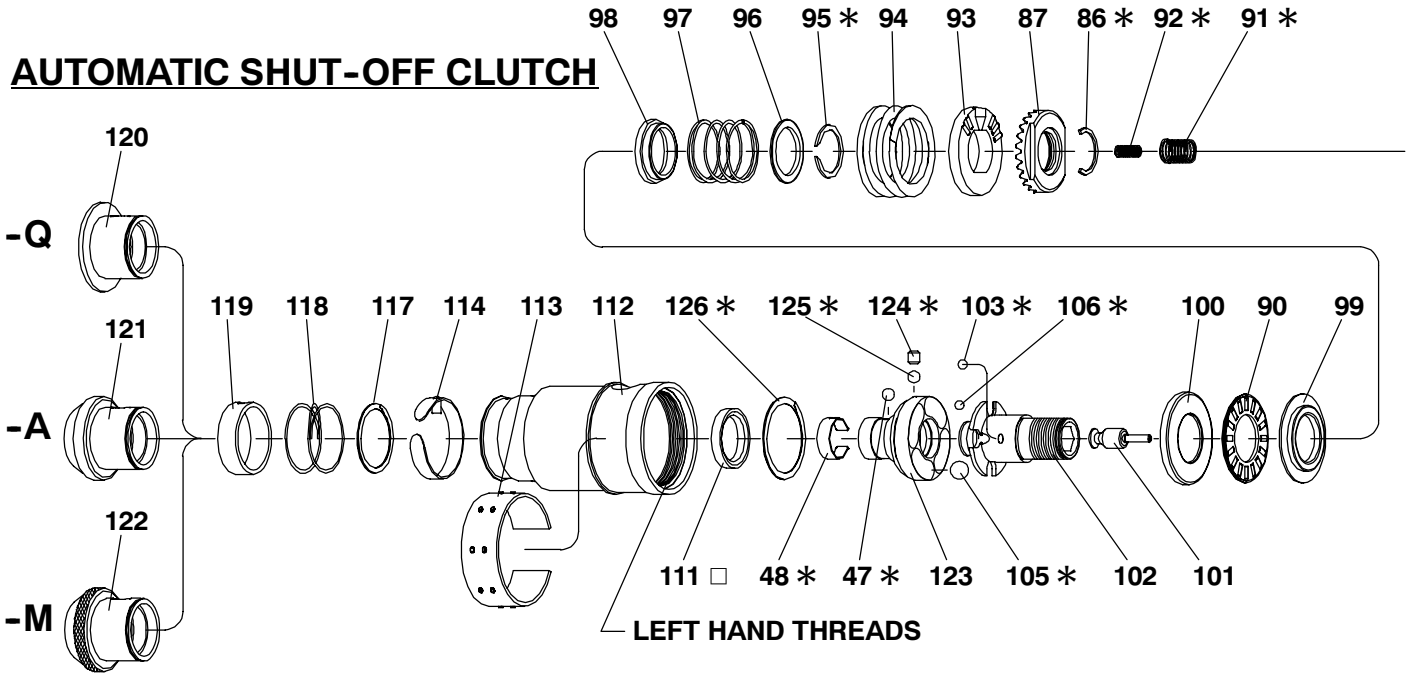
CLUTCH ADJUSTMENT

EXTERNAL:

_ Rotate sleeve until opening in housing is visible.
_ Depress bit to engage clutch, then rotate until notch in adjustment washer (88 or 93) is visible.
_ Insert no. 1 Phillips screwdriver in notch to turn gear teeth on nut (87).
_ Clockwise = decrease torque.
_ Counterclockwise = increase torque.

(continued on page 12)

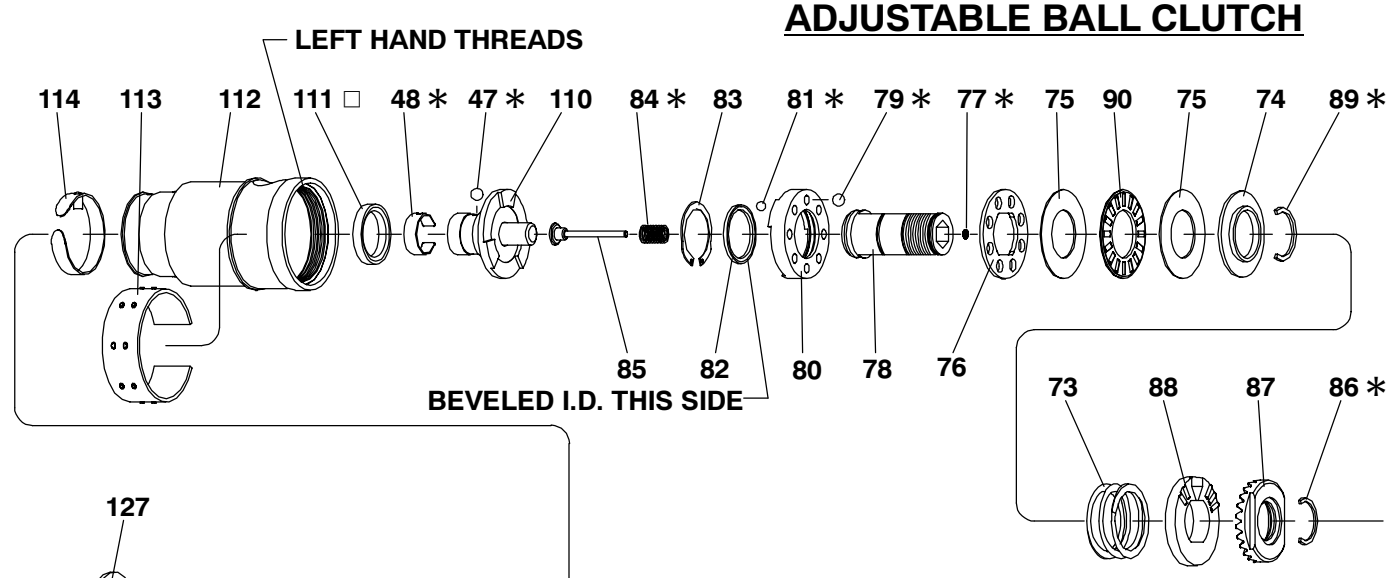
AUTOMATIC SHUT-OFF CLUTCH

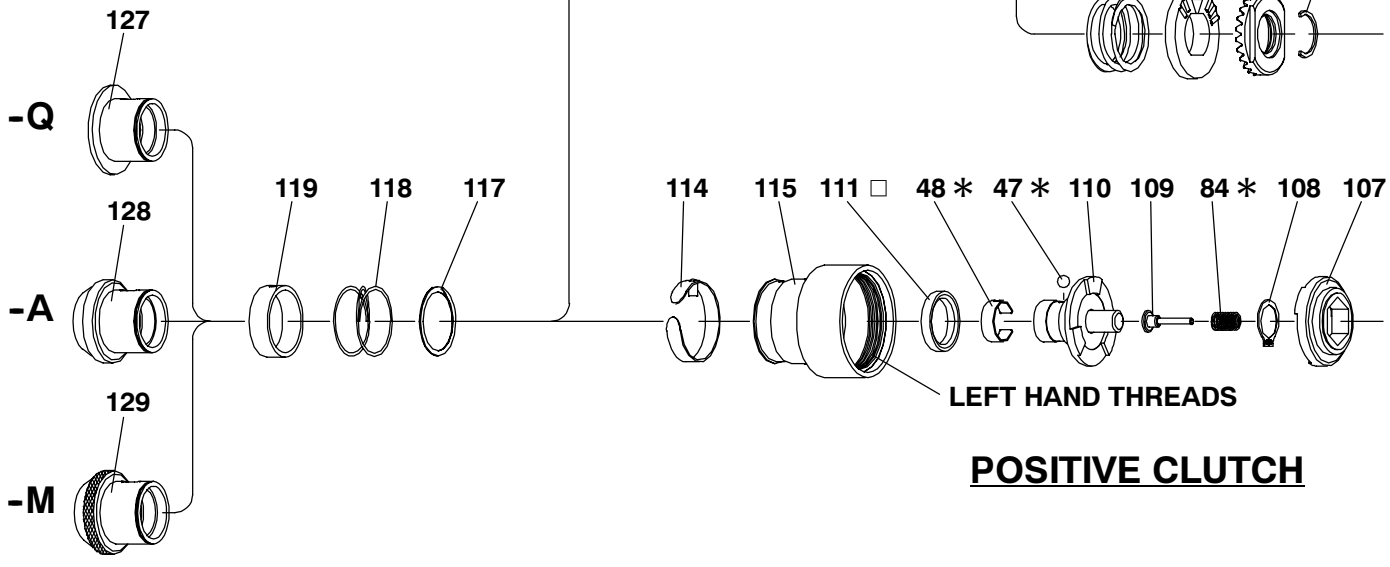


□ OIL IMPREGNATED BRONZE BUSHING, DO NOT WASH, WIPE CLEAN ONLY.

* ITEMS INCLUDED IN SERVICE KIT NO. 46992.

ADJUSTABLE BALL CLUTCH

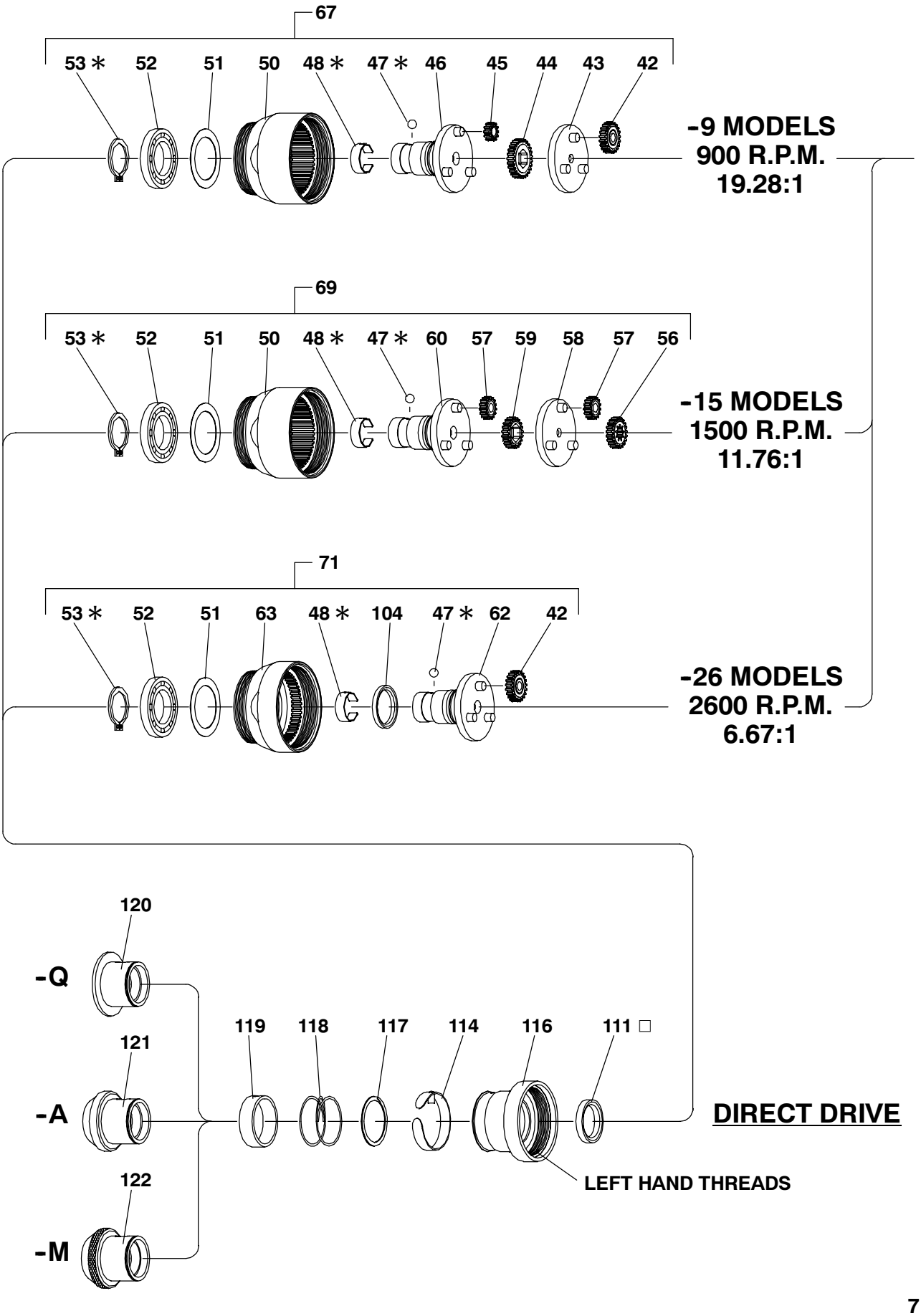


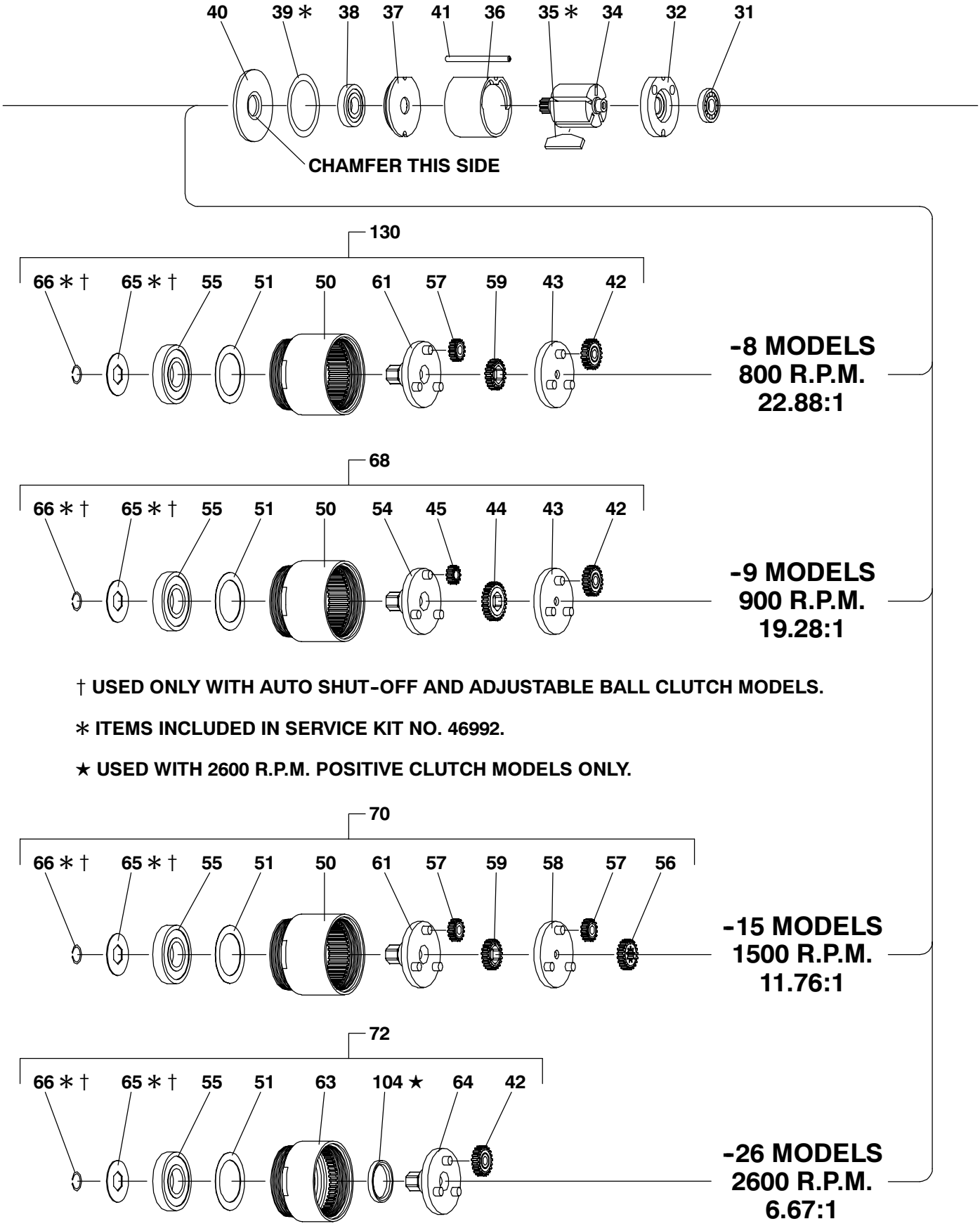


POSITIVE CLUTCH

□ OIL IMPREGNATED BRONZE BUSHING, DO NOT WASH, WIPE CLEAN ONLY.

∗ ITEMS INCLUDED IN SERVICE KIT NO. 46992.

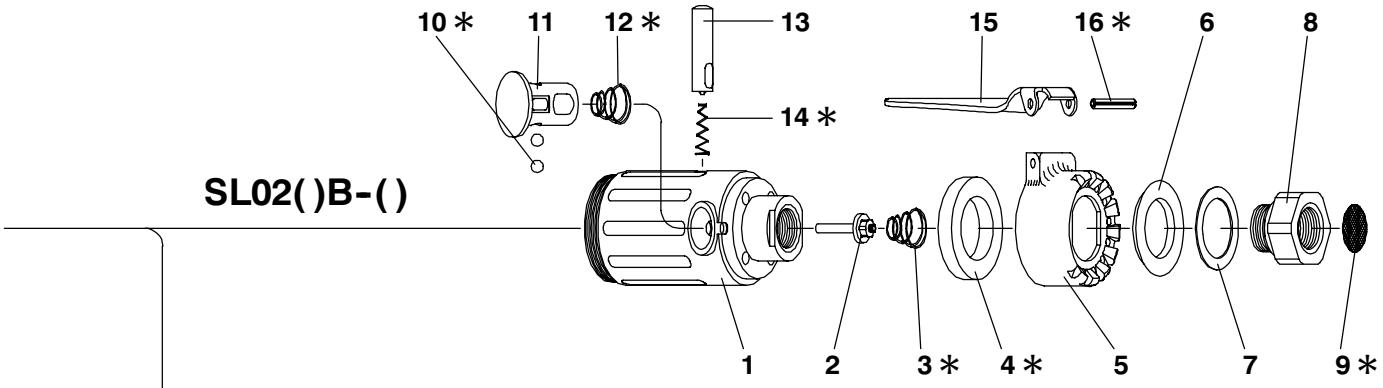


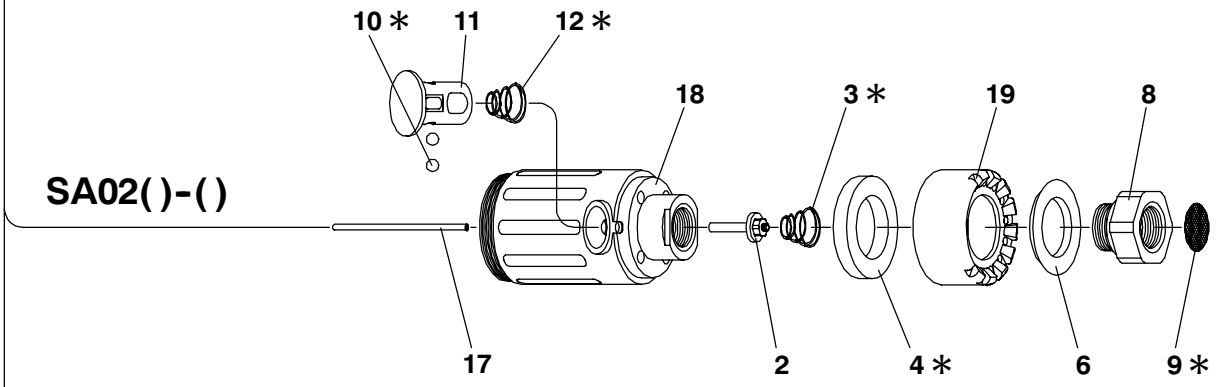


† USED ONLY WITH AUTO SHUT-OFF AND ADJUSTABLE BALL CLUTCH MODELS.

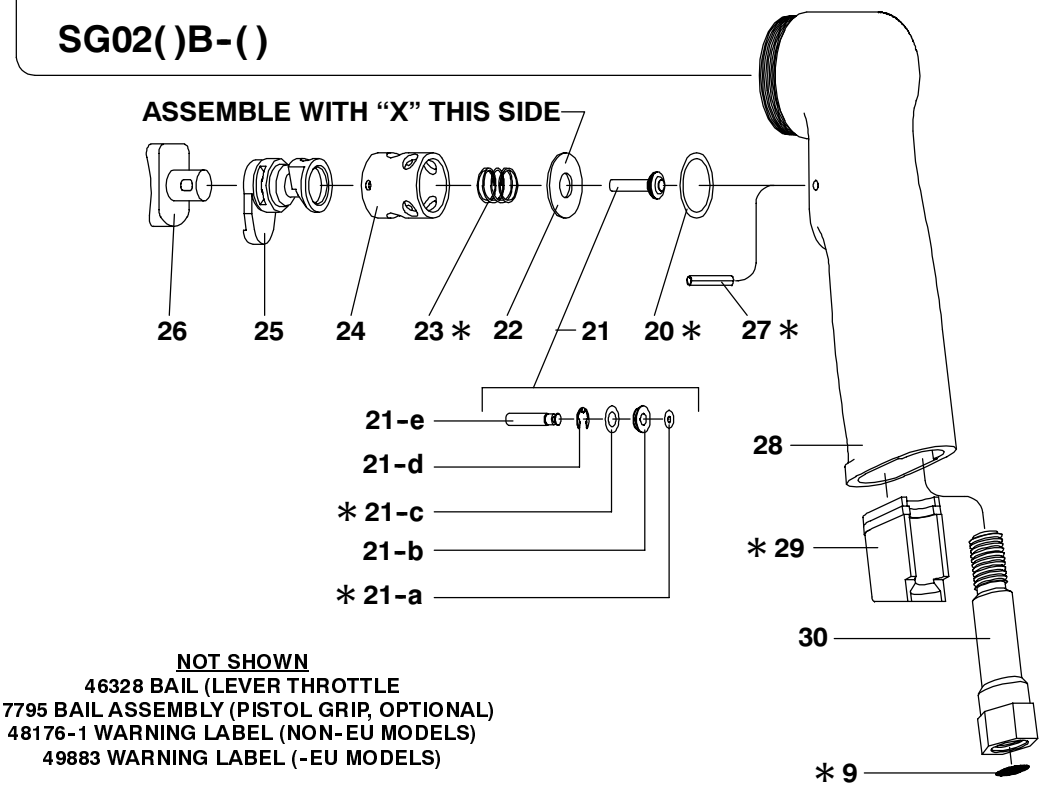
* ITEMS INCLUDED IN SERVICE KIT NO. 46992.

★ USED WITH 2600 R.P.M. POSITIVE CLUTCH MODELS ONLY.





* ITEMS INCLUDED IN SERVICE KIT NO. 46992.



NOT SHOWN
46328 BAIL (LEVER THROTTLE
47795 BAIL ASSEMBLY (PISTOL GRIP, OPTIONAL)
48176-1 WARNING LABEL (NON-EU MODELS)
49883 WARNING LABEL (-EU MODELS)

		PART NUMBER FOR ORDERING
1	Head and Bushing Assembly (lever throttle)	46341
2	Valve Rod Assembly	46354
3	Spring	41654
4	Filler	46375
5	Exhaust Cap (lever throttle)	46366-1
6	Diffuser Washer	46371
7	Spacer	47205
8	Inlet Adapter	46377
9	Screen	33911
10	Ball (2 req'd)	Y16-204
11	Valve Body	46293
12	Spring	41654
13	Throttle Pin	46296-1
14	Spring	46374
15	Lever	46326
16	Roll Pin	Y178-28
17	Throttle Rod	See chart
18	Head and Bushing Assembly (push-to-start)	46342
19	Exhaust Cap (push-to-start)	46352
20	"O" Ring	Y325-15
21	Valve Stem Assembly	46848-1
21-a	"O" Ring	Y325-3
21-b	Valve	45473-1
21-c	"O" Ring	Y325-7
21-d	Retaining Ring	Y180-13
21-e	Valve Stem	46847-1
22	Washer	46379-1
23	Spring	41100
24	Valve Bushing	46381
25	Reverse Valve	46299
26	Trigger	46298
27	Spirol Pin	46849
28	Pistol Grip Housing	47630
29	Muffler Assembly	46388
30	Inlet Adapter	46385
31	Ball Bearing	41643
32	Rear End Plate	46245
34	Rotor	See chart
35	Blade (5 req'd)	46301
36	Cylinder	46244
37	Front End Plate	47718
38	Ball Bearing	Y65-10
	MOTOR ASSEMBLY (includes items 31 thru 38)	See chart
39	"O" Ring	Y325-116
40	Spacer	
	for pistol grip models	47632
	for lever throttle and push-to-start models	46305
41	Locating Pin	
	for pistol grip models	47719-1
	for lever throttle and push-to-start models	47719-2
42	Planet Gear (3 req'd) 6.67:1 ratio (21 teeth)	46875
43	Carrier Assembly 6.67:1 ratio	46336
44	Sun Gear 2.89:1 ratio (27 teeth)	46320
45	Planet Gear (3 req'd) 2.89:1 ratio (12 teeth)	46318
46	Spindle Assembly 2.89:1 ratio (direct drive)	47265
47	Ball (included with items 46, 60, 62 and 110)	Y16-204
48	Retaining Clip (included with items 46, 60, 62 and 110)	47695
50	Ring Gear (double reduction)	See chart
51	Spacer	46496
52	Ball Bearing	46243
53	Retaining Ring	38339
54	Spindle Assembly 2.89:1 ratio	See chart
55	Ball Bearing	See chart
56	Sun Gear 3.43:1 ratio (21 teeth)	46561
57	Planet Gear (3 or 6 req'd) 3.43:1 ratio (15 teeth)	46904
58	Carrier Assembly 3.43:1 ratio	46493
59	Sun Gear 3.43:1 ratio (21 teeth)	46560
60	Spindle Assembly 3.43:1 ratio (direct drive)	47264

		PART NUMBER FOR ORDERING
61	Spindle Assembly 3.43:1 ratio	See chart
62	Spindle Assembly 6.67:1 ratio (direct drive)	47263
63	Ring Gear (single reduction)	See chart
64	Spindle Assembly 6.67:1 ratio	See chart
65	Washer	47694
66	Snap Ring	Y142-2
67	Gearing Assembly, direct drive (900 r.p.m.)	See chart
68	Gearing Assembly (900 r.p.m.)	See chart
69	Gearing Assembly, direct drive (1500 r.p.m.)	See chart
70	Gearing Assembly (1500 r.p.m.)	See chart
71	Gearing Assembly, direct drive (2600 r.p.m.)	See chart
72	Gearing Assembly (2600 r.p.m.)	See chart
73	Clutch Spring (Adjustable Ball Clutch)	
	for 900 r.p.m. models (Blue, 10 - 30 in. lbs)	46349
	for 1500 r.p.m. models (Yellow, 4 - 15 in. lbs)	36512
	for 2600 r.p.m. models (Yellow, 4 - 12 in. lbs)	36512
74	Thrust Pad	46332
75	Thrust Washer (2 req'd)	42364
76	Ball Carrier	46499
77	"O" Ring	Y325-1
78	Spindle	47253
79	Ball (8 req'd)	Y16-204
80	Driven Jaw	46340
81	Ball (16 req'd)	Y16-203
82	Ball Race	46502
83	Retaining Ring	46507
84	Spring	46854
85	Pin Assembly	46855
86	Snap Ring	Y110-105
87	Adjustment Nut	46294
88	Adjustment Washer	46295
89	Snap Ring	Y110-106
90	Thrust Bearing	42363
	ADJUSTABLE BALL CLUTCH ASSEMBLY (includes items 73 thru 90)	
	for 900 r.p.m. models using BLUE spring	47252-3
	for 1500 r.p.m. models using YELLOW spring	47252-1
	for 2600 r.p.m. models using YELLOW spring	47252-1
91	Spring	47709
92	Spring	48333-1
93	Adjustment Washer	48089
94	Clutch Spring (Auto Shut-Off Clutch)	
	for 800 r.p.m. models (Brown, 12 - 40 in. lbs)	48291-1
	for 900 r.p.m. models (Brown, 10 - 30 in. lbs)	48291-1
	for 1500 r.p.m. models (Green, 8 - 20 in. lbs)	48290-1
	for 2600 r.p.m. models (Red, 5 - 10 in. lbs)	48289-1
95	Snap Ring	48480-1
96	Guide	48295-1
97	Spring	47064
98	Ball Sleeve	48294-1
99	Thrust Race	48085
100	Thrust Race	48297-1
101	Plunger	48293-1
102	Spindle	48288-1
103	Ball (6 req'd)	Y16-203
104	Spacer (used with 2600 r.p.m. Positive Clutch and Direct Drive models only)	47821
105	Ball (4 req'd)	Y16-206
106	Ball (10 req'd)	Y16-203
107	Jaw	
	for 20° Positive Clutch models	47373
	for 90° Positive Clutch models	47375
108	Retaining Ring	Y145-3
109	Pin Assembly	47182
110	Bit Holder Assembly (includes items 47 and 48)	
	for Adjustable Ball and 90° Positive Clutch models	47262
	for 20° Positive Clutch models	47266
111	Bushing	46360

		PART NUMBER FOR ORDERING
112	Clutch Housing (includes items 111 and 113)	
	lever throttle and push-to-start models	
	used on -A, -M and -Q models	47744
	used on -F models	47783
	pistol grip models	
	used on -A, -M and -Q models	48897
	used on -F models	48898
113	External Adjustment Sleeve	46390
114	Retaining Clip and Pin	47782
115	Clutch Housing (includes item 111)	
	used on -A, -M and -Q models	47791
	used on -F models	47789
116	Clutch Housing (includes item 111)	47787
117	Retaining Ring	47779
118	Spring	47778
119	Bushing	47775
120	Sleeve	47702
121	Magnetic Guide	47776
122	Magnetic Guide	47777
	GUIDE ASSEMBLY (Direct Drive and Auto Shut-Off Clutch models)	
	Quick-Change Sleeve Assembly (includes items 117 thru 120)	46884
	Apex Magnetic Bit Holder Guide Assembly (includes items 117, 118, 119 and 121)	46885
	Magna Bit Magnetic Bit Holder Guide Assembly (includes items 117, 118, 119 and 122)	46886
123	Bit Holder	
	for 800 r.p.m. models	49051
	for 900, 1500 and 2600 r.p.m. models	48287-1

		PART NUMBER FOR ORDERING
124	Pin	48080
125	Ball (9 req'd)	Y16-204
126	Retainer Ring	48084
	AUTO SHUT-OFF CLUTCH ASSEMBLY (includes items 47, 48, 86, 87, 90 thru 103, 105, 106 and 123 thru 126)	
	for 800 r.p.m. models with BROWN spring	49093-1
	for 900 r.p.m. models with BROWN spring	48302-1
	for 1500 r.p.m. models with GREEN spring	48302-2
	for 2600 r.p.m. models with RED spring	48302-3
127	Sleeve	47702-1
128	Magnetic Guide	47776-1
129	Magnetic Guide	47777-1
	GUIDE ASSEMBLY (Adjustable Ball and Positive Clutch models)	
	Quick-Change Sleeve Assembly (includes items 117, 118, 119 and 127)	46884-1
	Apex Magnetic Bit Holder Guide Assembly (includes items 117, 118, 119 and 128)	46885-1
	Magna Bit Magnetic Bit Holder Guide Assembly (includes items 117, 118, 119 and 129)	46886-1
130	Gearing Assembly (800 r.p.m.)	See chart
	SERVICE KIT: includes items 3, 4, 9, 10, 12, 14, 16, 20, 21-a, 21-c, 23, 27, 29, 35, 39, 47, 48, 53, 65, 66, 77, 79, 81, 84, 86, 89, 91, 92, 95, 103, 105, 106, 124, 125 and 126	46992

DISASSEMBLY/ASSEMBLY INSTRUCTIONS

INTERNAL:

- _ Remove clutch housing, bit holder and clutch assembly from tool. NOTE: Clutch housing has left hand threads.
- _ With bit in bit holder, clamp bit in vise.
- _ Place clutch assembly on bit holder.
- _ Engage jaws, hold clutch assembly from turning then rotate adjustment nut (87) with 5/8" wrench.

GEARING DISASSEMBLY

- _ Remove clutch from tool (see "Clutch Disassembly").
- _ Remove ring gear (50 or 63) using a wrench on flats.
- _ DIRECT DRIVE only - Remove retaining ring (53) from spindle.
- _ AUTO SHUT-OFF and ADJUSTABLE BALL clutch models - Remove snap ring (66) and washer (65).
- _ Remove spindle(s) and gears from ring gear (50 or 63). NOTE: Keep gears grouped with mating spindle when disassembling 800, 900 and 1500 r.p.m. gearing.
- _ Do not remove bearing (52 or 55) or spacer (51) unless damage is evident.
- _ To remove bearing (52 or 55) and spacer (51) from ring gear, press on spacer (51) inside ring gear from splined end.
- _ Do not remove gears (44 or 59) from carrier assembly unless damage is evident. Gears are press fit onto carrier assembly.

GEARING ASSEMBLY

- _ Assemble spacer (51) into ring gear.
- _ Press bearing (52 or 55) into ring gear (50 or 63). NOTE: Press on outer race of bearing and press to shoulder of ring gear.
- _ Coat shafts of spindle with ARO 33153 grease.
- _ Assemble gears to shafts of mating spindle.
- _ Assemble carrier assembly to spindle assembly of 800, 900 and 1500 r.p.m. gearing.
- _ Assemble spacer (104) to spindle (2600 r.p.m. gearing only).
- _ Assemble spindle(s) and gearing into ring gear. Rotate spindle and gears to align gear teeth with splines of ring gear.
- _ Thread ring gear (50 or 63) to tool and tighten with wrench on flats.
- _ Assemble clutch to tool.

MOTOR DISASSEMBLY

- _ Remove clutch and gearing from tool.
- _ Remove spacer (40) and "O" ring (39).
- _ PUSH-TO-START models - Remove throttle rod (17).
- _ Tap front edge of housing to remove motor assembly. Locating pin (41) should also come out.
- _ Tap drive end of rotor (34) with a soft face hammer; motor will come apart. NOTE: Bearings are light press fit in end plates. Bearing (31) is press fit on rotor.
- _ Remove end plate (32) and bearing (31) from rotor.

MOTOR ASSEMBLY

- _ Lubricate bearing (31) with ARO 33153 grease and assemble to end plate (32), pressing on outer race of bearing.
- _ Assemble end plate (32) to rotor, pressing on inner race of bearing.
- _ Coat five rotor blades (35) with ARO 29665 spindle oil and assemble to rotor slots - straight side out.
- _ Coat i.d. of cylinder (36) with ARO 29665 spindle oil and assemble over rotor, aligning air inlet slots of cylinder with air inlet slots in end plate (32).
- _ Assemble bearing (38) to end plate (37), pressing on outer race of bearing.
- _ Assemble end plate (37) to rotor, pressing on inner race of bearing. Be sure rotor turns without binding.
- _ Insert locating pin (41) into .081" diameter blind hole at bottom of motor cavity in housing.
- _ Align notches of end plates and cylinder and install motor into housing, aligning notches with pin (41).
- _ Grease and assemble "O" ring (39) to end plate.
- _ Assemble spacer (40) to motor.
- _ PUSH-TO-START models - Coat throttle rod (17) with ARO 29665 spindle oil and insert into rotor.
- _ Assemble gearing and clutch to tool.

PISTOL GRIP HOUSING DISASSEMBLY

- _ Drive pin (27) out left side of housing.
- _ Remove trigger (26), reverse valve (25), valve bushing (24), spring (23), washer (22), valve assembly (21) and "O" ring (20).
- _ Remove "O" ring (21-a), valve (21-b), "O" ring (21-c) and retaining ring (21-d).
- _ Remove inlet adapter (30) and screen (9).
- _ Remove muffler (29).

PISTOL GRIP HOUSING ASSEMBLY

- _ Grease and install "O" ring (20).
- _ Install retaining ring (21-d) to valve stem (21-e).
- _ Grease and assemble "O" ring (21-c) to valve (21-b).
- _ Assemble valve (21-b) to valve stem, with smallest diameter of valve going on valve stem first.
- _ Grease and assemble "O" ring (21-a) to valve stem (21-e).
- _ Assemble washer (22) and spring (23) over valve stem (21-e). NOTE: Assemble washer (22) with "X" facing "O" ring (20).
- _ Assemble reverse valve (25) into valve bushing (24). NOTE: Position .102" diameter hole thru bushing to align with slot thru side of reverse valve (25).
- _ Assemble valve stem and components thru reverse valve (25) and bushing (24).
- _ Install valve bushing (24), with valve components and reverse valve (25), into pistol grip housing (28), aligning .102" diameter holes in housing and bushing.
- _ Assemble trigger (26) to reverse valve (25).
- _ Install pin (27) into left side of housing.
- _ Install muffler (29) and inlet adapter (30).
- _ Clean and install screen (9) in inlet adapter (30).

PUSH-TO-START AND LEVER THROTTLE HOUSING DISASSEMBLY

- _ Clamp air inlet adapter (8) in a smooth face vise.
- _ Unthread housing (1 or 18) with a strap type wrench.
- _ Remove diffuser washer (6), exhaust cap (5 or 19), filler (4), spring (3) and valve rod (2). CAUTION: Do not remove or adjust rubber portion of valve rod (2), as it is preset at the factory.
- _ Remove two balls (10), valve body (11) and spring (12).
- _ Remove screen (9) from inlet adapter.
- _ LEVER THROTTLE models - Remove throttle pin (13) and spring (14).

PUSH-TO-START AND LEVER THROTTLE HOUSING ASSEMBLY

- _ Install spring (12) and valve body (11) in housing. NOTE: Align ball slot in valve body with slot in housing.
- _ LEVER THROTTLE models - Install spring (14) and throttle pin (13), aligning slot in throttle pin with air inlet holes in housing.
- _ Install valve rod assembly (2) into housing so it passes thru open slot in valve body (11). NOTE: LEVER STYLE tools - Throttle pin (13) should not pull out when valve rod (2) is seated properly.
- _ Assemble two balls (10) into slots of housing and valve body (11).
- _ Install filler (4) to exhaust cap.
- _ Install exhaust cap (5 or 19) to housing, being certain balls (10) remain properly positioned in housing and reverse valve.
- _ Assemble diffuser washer (6), spacer (7) where applicable and inlet adapter (8).
- _ Clean and install screen (9) in inlet adapter (8).