

BRUKSANVISNING / USER MANUAL

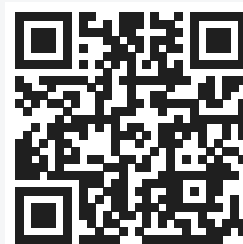
(ARO) Series 20 Screwdrivers - Operator's Manual and Parts

Ingersoll Rand SG021B-9-Q · SG023B-9-Q

Originaldokument: Ingersoll Rand

Tillhandahålls av Professional Technologies Sweden AB
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Service · Kalibrering · Originalreservdelar

Service · Calibration · Genuine spare parts

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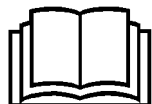
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20 SERIES SCREWDRIVERS

**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 servicerenter.
- 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.

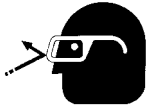
ARO Tool Products

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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



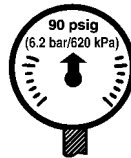
Do not use damaged, frayed or deteriorated air hoses and fittings.

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

WARNING

 Read the manual before operating this tool.
Operate at 90 psig/6.2 bar max.



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.

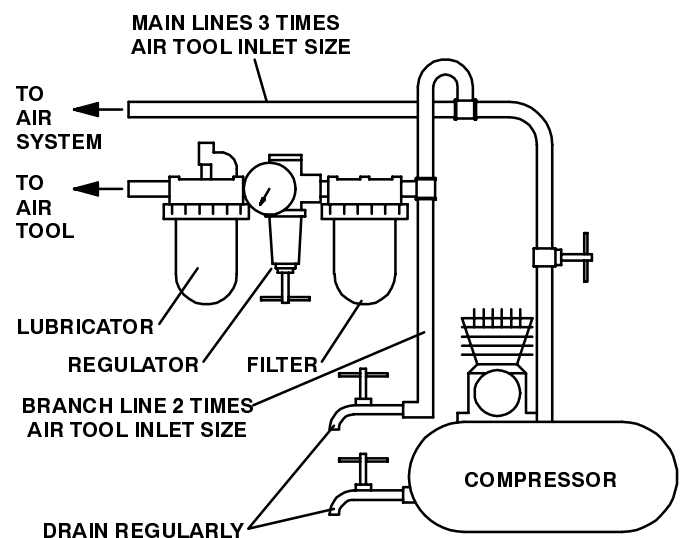
Tool maintenance and repair shall be performed by authorized, trained, competent personnel. Tools, hose and fittings shall be replaced if unsuitable for safe operation and responsibility should be assigned to be sure that all tools requiring guards or other safety devices shall be kept in legible condition. 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.

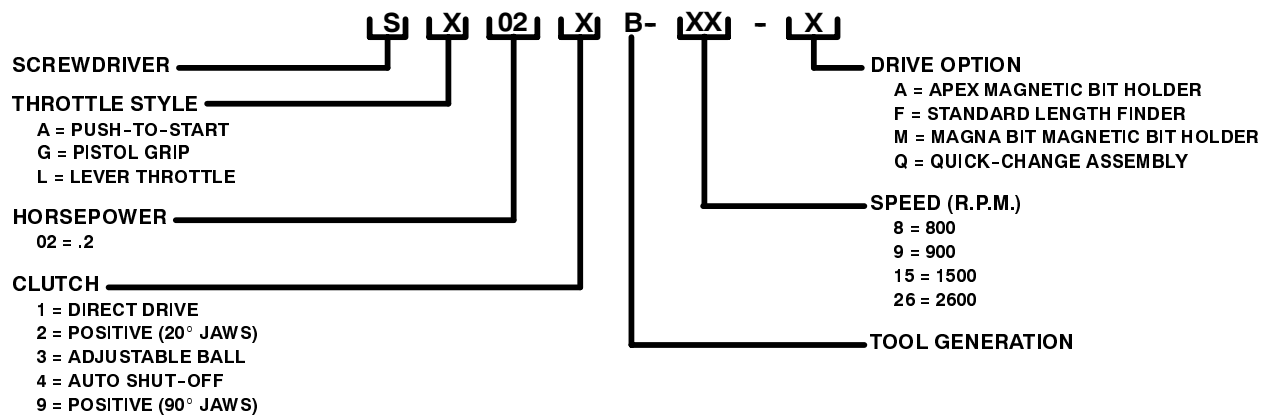
Upon reassembling, lubricate parts where required. Use 33153 grease, or equivalent, in bearings. Use 36460 lubricant for "O" ring assembly. When assembling "O" rings or parts adjacent "O" rings, care must be exercised to prevent damage to the rubber sealing surfaces. A small amount of grease will usually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

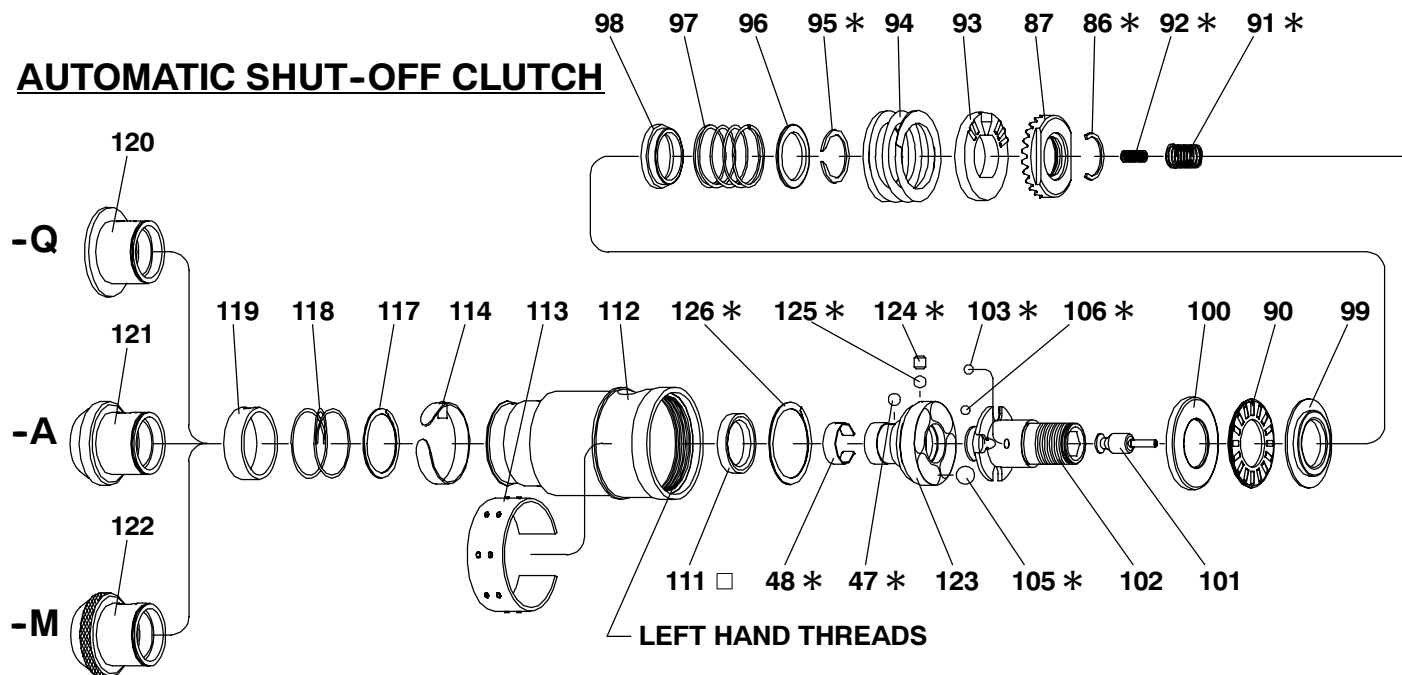
CLUTCH ADJUSTMENT

EXTERNAL:

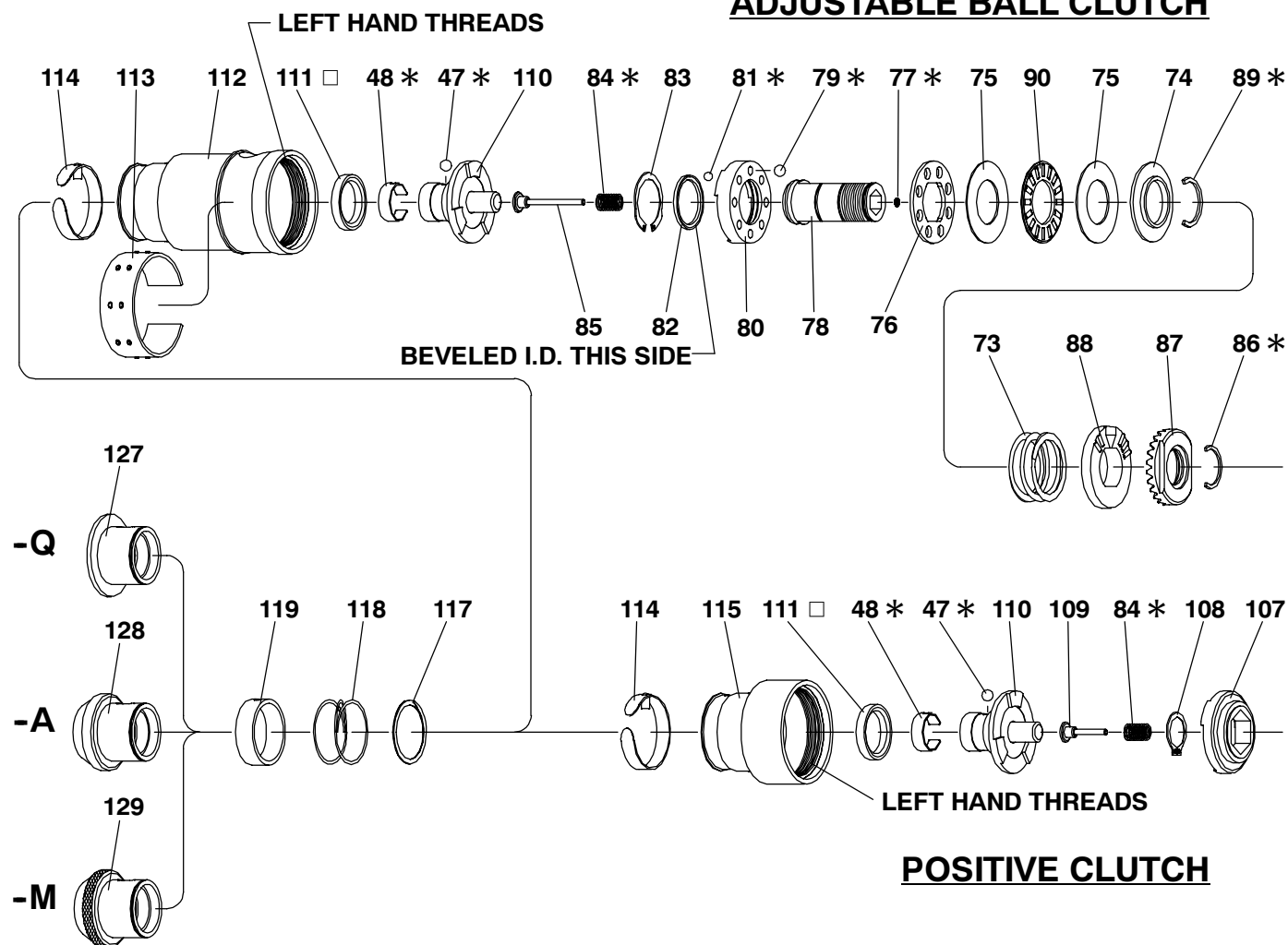
- Rotate sleeve until opening in housing is visible.
- Depress bit to engage clutch, then rotate until notch in adjustment washer (88 or 93) is visible.
- Insert no. 1 Phillips screwdriver in notch to turn gear teeth on nut (87).
- Clockwise = decrease torque.
- Counterclockwise = increase torque.

(continued on page 12)

AUTOMATIC SHUT-OFF CLUTCH



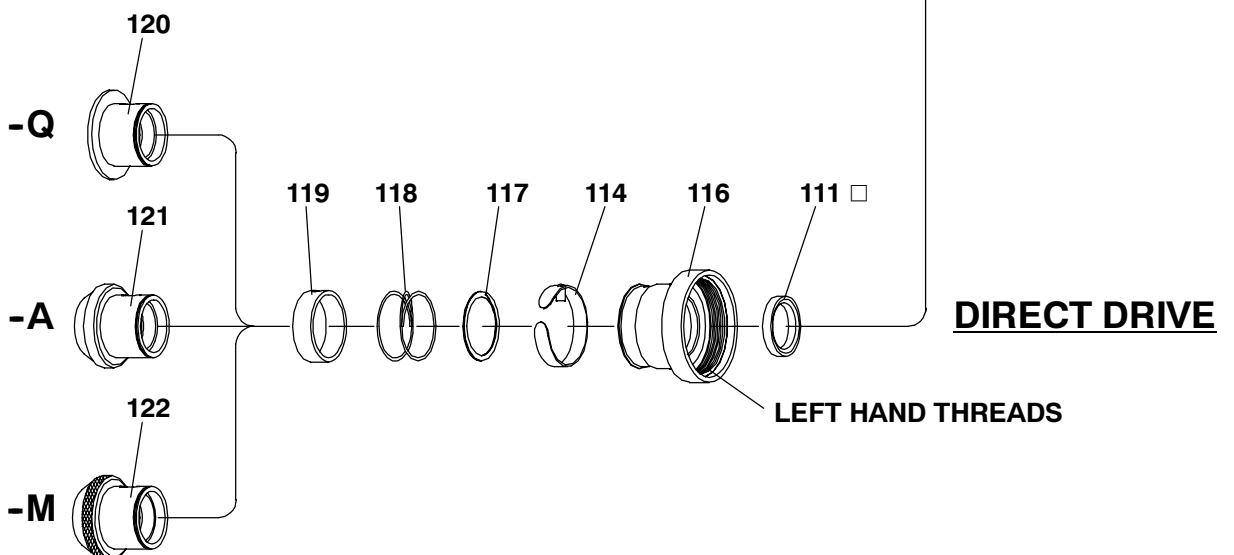
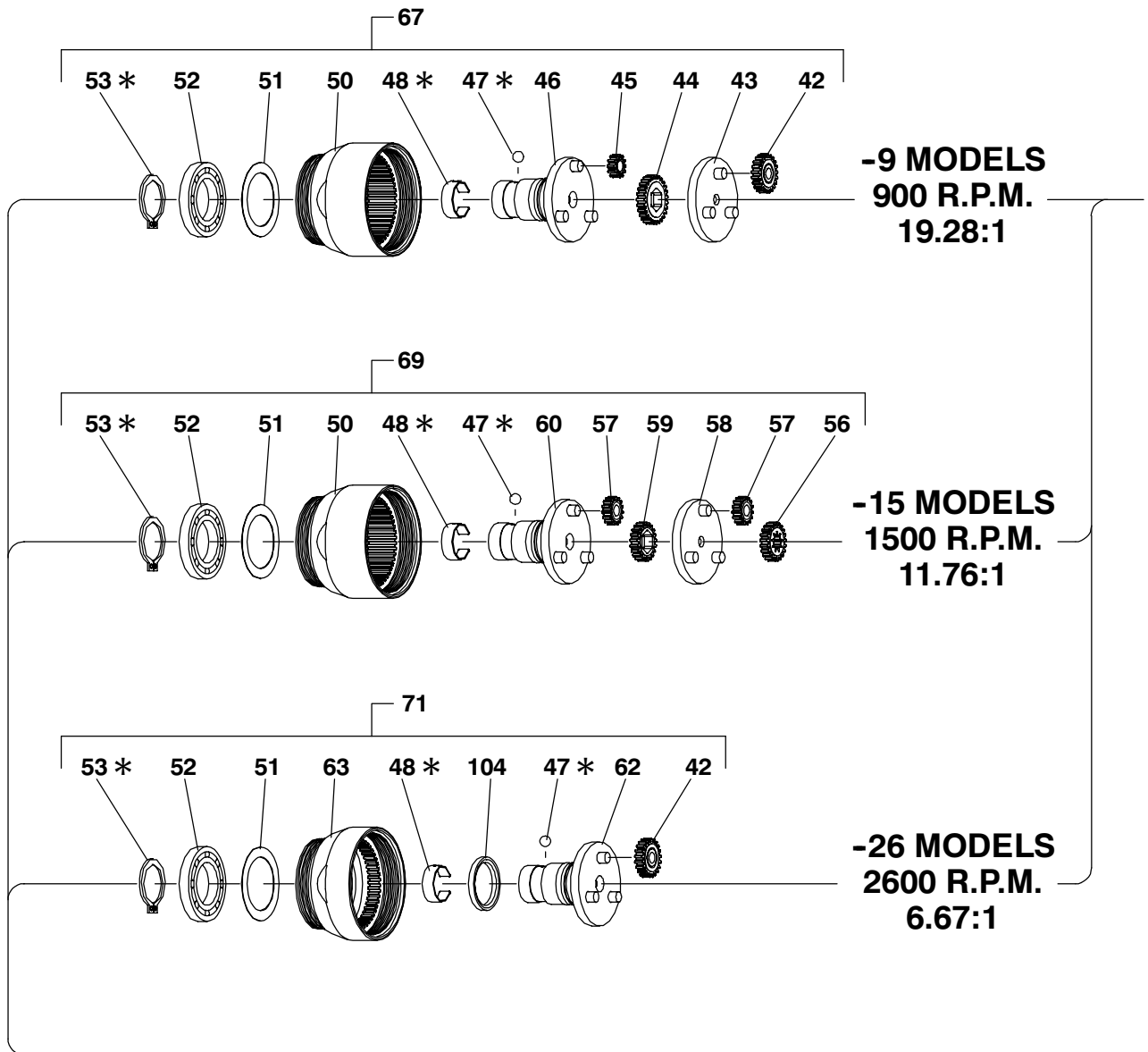
ADJUSTABLE BALL CLUTCH

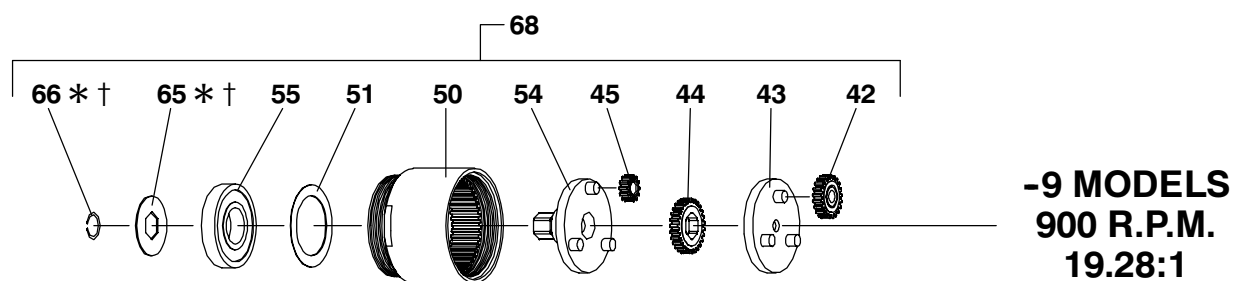
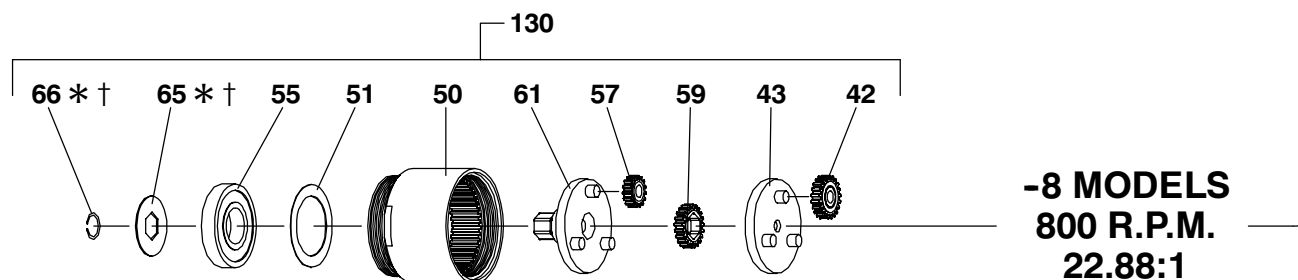
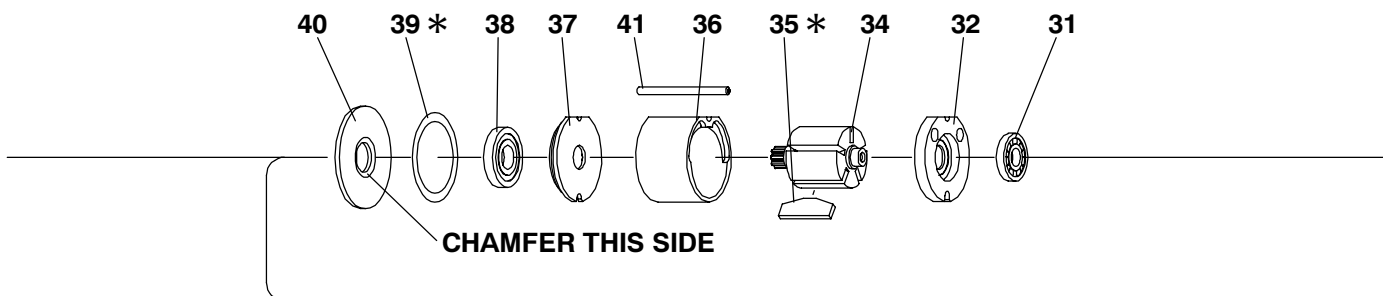


□ OIL IMPREGNATED BRONZE BUSHING, DO NOT WASH, WIPE CLEAN ONLY.

M30
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* ITEMS INCLUDED IN SERVICE KIT NO. 46992.

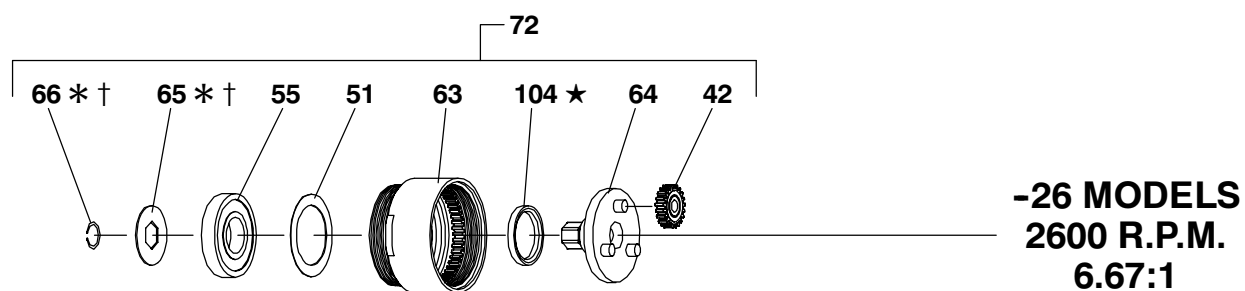
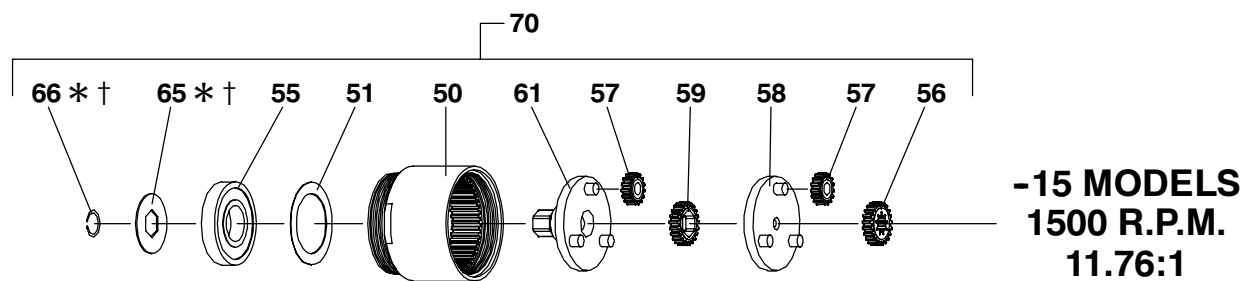




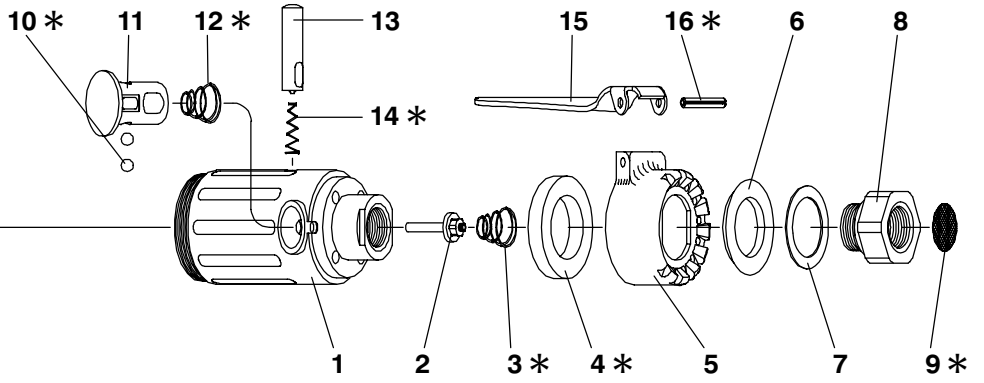
† USED ONLY WITH AUTO SHUT-OFF AND ADJUSTABLE BALL CLUTCH MODELS.

* ITEMS INCLUDED IN SERVICE KIT NO. 46992.

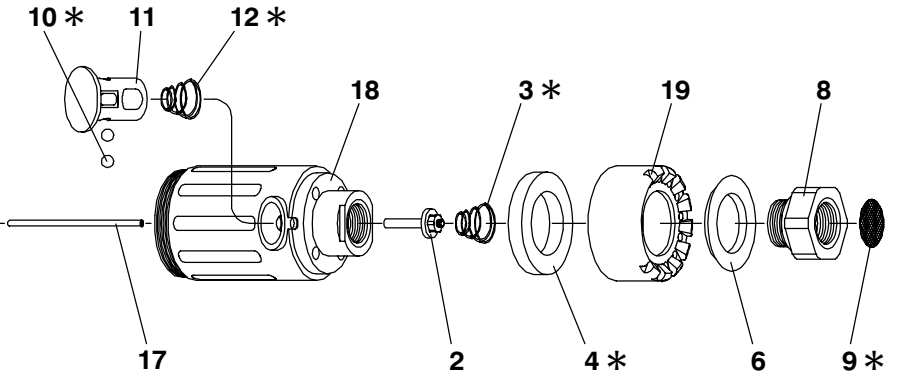
★ USED WITH 2600 R.P.M. POSITIVE CLUTCH MODELS ONLY.



SL02()B-()



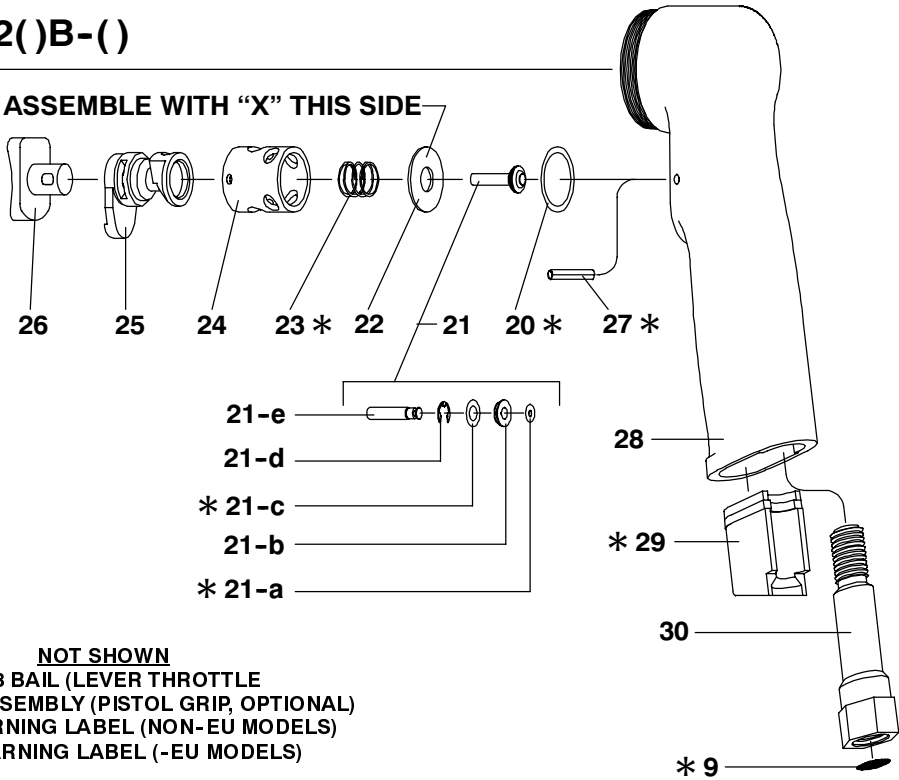
SA02()B-()



* ITEMS INCLUDED IN SERVICE KIT NO. 46992.

SG02()B-()

ASSEMBLE WITH "X" THIS SIDE



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

PART NUMBER FOR ORDERING

1	Head and Bushing Assembly (lever throttle)	46341	61	Spindle Assembly 3.43:1 ratio	See chart
2	Valve Rod Assembly	46354	62	Spindle Assembly 6.67:1 ratio (direct drive)	47263
3	Spring	41654	63	Ring Gear (single reduction)	See chart
4	Filler	46375	64	Spindle Assembly 6.67:1 ratio	See chart
5	Exhaust Cap (lever throttle)	46366-1	65	Washer	47694
6	Diffuser Washer	46371	66	Snap Ring	Y142-2
7	Spacer	47205	67	Gearing Assembly, direct drive (900 r.p.m.)	See chart
8	Inlet Adapter	46377	68	Gearing Assembly (900 r.p.m.)	See chart
9	Screen	33911	69	Gearing Assembly, direct drive (1500 r.p.m.)	See chart
10	Ball (2 req'd)	Y16-204	70	Gearing Assembly (1500 r.p.m.)	See chart
11	Valve Body	46293	71	Gearing Assembly, direct drive (2600 r.p.m.)	See chart
12	Spring	41654	72	Gearing Assembly (2600 r.p.m.)	See chart
13	Throttle Pin	46296-1	73	Clutch Spring (Adjustable Ball Clutch)	
14	Spring	46374		for 900 r.p.m. models (Blue, 10 - 30 in. lbs)	46349
15	Lever	46326		for 1500 r.p.m. models (Yellow, 4 - 15 in. lbs) . . .	36512
16	Roll Pin	Y178-28		for 2600 r.p.m. models (Yellow, 4 - 12 in. lbs) . . .	36512
17	Throttle Rod	See chart	74	Thrust Pad	46332
18	Head and Bushing Assembly (push-to-start)	46342	75	Thrust Washer (2 req'd)	42364
19	Exhaust Cap (push-to-start)	46352	76	Ball Carrier	46499
20	"O" Ring	Y325-15	77	"O" Ring	Y325-1
21	Valve Stem Assembly	46848-1	78	Spindle	47253
21-a	"O" Ring	Y325-3	79	Ball (8 req'd)	Y16-204
21-b	Valve	45473-1	80	Driven Jaw	46340
21-c	"O" Ring	Y325-7	81	Ball (16 req'd)	Y16-203
21-d	Retaining Ring	Y180-13	82	Ball Race	46502
21-e	Valve Stem	46847-1	83	Retaining Ring	46507
22	Washer	46379-1	84	Spring	46854
23	Spring	41100	85	Pin Assembly	46855
24	Valve Bushing	46381	86	Snap Ring	Y110-105
25	Reverse Valve	46299	87	Adjustment Nut	46294
26	Trigger	46298	88	Adjustment Washer	46295
27	Spiral Pin	46849	89	Snap Ring	Y110-106
28	Pistol Grip Housing	47630	90	Thrust Bearing	42363
29	Muffler Assembly	46388		ADJUSTABLE BALL CLUTCH ASSEMBLY	
30	Inlet Adapter	46385		(includes items 73 thru 90)	
31	Ball Bearing	41643		for 900 r.p.m. models using BLUE spring	47252-3
32	Rear End Plate	46245		for 1500 r.p.m. models using YELLOW spring . . .	47252-1
34	Rotor	See chart		for 2600 r.p.m. models using YELLOW spring . . .	47252-1
35	Blade (5 req'd)	46301	91	Spring	47709
36	Cylinder	46244	92	Spring	48333-1
37	Front End Plate	47718	93	Adjustment Washer	48089
38	Ball Bearing	Y65-10	94	Clutch Spring (Auto Shut-Off Clutch)	
	MOTOR ASSEMBLY (includes items 31 thru 38) . .	See chart		for 800 r.p.m. models (Brown, 12 - 40 in. lbs) . . .	48291-1
39	"O" Ring	Y325-116		for 900 r.p.m. models (Brown, 10 - 30 in. lbs) . . .	48291-1
40	Spacer			for 1500 r.p.m. models (Green, 8 - 20 in. lbs) . . .	48290-1
	for pistol grip models	47632		for 2600 r.p.m. models (Red, 5 - 10 in. lbs)	48289-1
	for lever throttle and push-to-start models	46305	95	Snap Ring	48480-1
41	Locating Pin		96	Guide	48295-1
	for pistol grip models	47719-1	97	Spring	47064
	for lever throttle and push-to-start models	47719-2	98	Ball Sleeve	48294-1
42	Planet Gear (3 req'd) 6.67:1 ratio (21 teeth)	46875	99	Thrust Race	48085
43	Carrier Assembly 6.67:1 ratio	46336	100	Thrust Race	48297-1
44	Sun Gear 2.89:1 ratio (27 teeth)	46320	101	Plunger	48293-1
45	Planet Gear (3 req'd) 2.89:1 ratio (12 teeth)	46318	102	Spindle	48288-1
46	Spindle Assembly 2.89:1 ratio (direct drive)	47265	103	Ball (6 req'd)	Y16-203
47	Ball (included with items 46, 60, 62 and 110)	Y16-204	104	Spacer (used with 2600 r.p.m. Positive	
48	Retaining Clip (included with items 46,			Clutch and Direct Drive models only) . . .	47821
	60, 62 and 110)	47695	105	Ball (4 req'd)	Y16-206
50	Ring Gear (double reduction)	See chart	106	Ball (10 req'd)	Y16-203
51	Spacer	46496	107	Jaw	
52	Ball Bearing	46243		for 20° Positive Clutch models	47373
53	Retaining Ring	38339		for 90° Positive Clutch models	47375
54	Spindle Assembly 2.89:1 ratio	See chart	108	Retaining Ring	Y145-3
55	Ball Bearing	See chart	109	Pin Assembly	47182
56	Sun Gear 3.43:1 ratio (21 teeth)	46561	110	Bit Holder Assembly (includes items 47 and 48)	
57	Planet Gear (3 or 6 req'd) 3.43:1 ratio (15 teeth) . .	46904		for Adjustable Ball and 90° Positive Clutch models	47262
58	Carrier Assembly 3.43:1 ratio	46493		for 20° Positive Clutch models	47266
59	Sun Gear 3.43:1 ratio (21 teeth)	46560	111	Bushing	46360
60	Spindle Assembly 3.43:1 ratio (direct drive)	47264			

PART NUMBER FOR ORDERING

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112	Clutch Housing (includes items 111 and 113) lever throttle and push-to-start models used on -A, -M and -Q models	47744	124	Pin	48080
	used on -F models	47783	125	Ball (9 req'd)	Y16-204
	pistol grip models used on -A, -M and -Q models	48897	126	Retainer Ring	48084
	used on -F models	48898		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
113	External Adjustment Sleeve	46390		for 900 r.p.m. models with BROWN spring	48302-1
114	Retaining Clip and Pin	47782		for 1500 r.p.m. models with GREEN spring	48302-2
115	Clutch Housing (includes item 111) used on -A, -M and -Q models	47791		for 2600 r.p.m. models with RED spring	48302-3
	used on -F models	47789	127	Sleeve	47702-1
116	Clutch Housing (includes item 111)	47787	128	Magnetic Guide	47776-1
117	Retaining Ring	47779	129	Magnetic Guide	47777-1
118	Spring	47778		GUIDE ASSEMBLY (Adjustable Ball and Positive Clutch models) Quick-Change Sleeve Assembly (includes items 117, 118, 119 and 127)	46884-1
119	Bushing	47775		Apex Magnetic Bit Holder Guide Assembly (includes items 117, 118, 119 and 128)	46885-1
120	Sleeve	47702		Magna Bit Magnetic Bit Holder Guide Assembly (includes items 117, 118, 119 and 129)	46886-1
121	Magnetic Guide	47776	130	Gearing Assembly (800 r.p.m.)	See chart
122	Magnetic Guide	47777		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
	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			

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).

