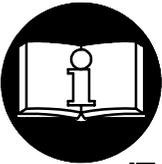


50 SERIES SCREWDRIVERS

Models: SA053B-() -(), SA054C-() -(), SG051B-() -(),
SG052B-() -(), SG053B-() -(), SG059B-() -(),
SL051B-() -(), SL052B-() -(), SL053B-() -()
and SL059B-() -().

NOTICE

ARO is not responsible for customer modification of tools for applications on which ARO 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 5/16" (8 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 (6.2 bar/620 kPa) 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 accessories may continue to rotate briefly after throttle is released.

(Continued on page 2)

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.

Repairs should be made only by authorized trained personnel. Consult your nearest ARO Tool Products Authorized Servicer.

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

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WARNING LABEL IDENTIFICATION

▲ WARNING

FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

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

	▲ WARNING
	Always wear hearing protection when operating this tool.

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

	▲ WARNING
	Air powered tools can vibrate in use. Vibration, repetitive motions or uncomfortable positions may be harmful to your hands and arms. Stop using any tool if discomfort, tingling feeling or pain occurs. Seek medical advice before resuming use.

	▲ WARNING
	Do not carry the tool by the hose.

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

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

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

USING THE TOOL (Continued)

- 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 ARO.
- This tool is not designed for working in explosive atmospheres.
- This tool is not insulated against electric shock.

PLACING TOOL IN SERVICE

LUBRICATION



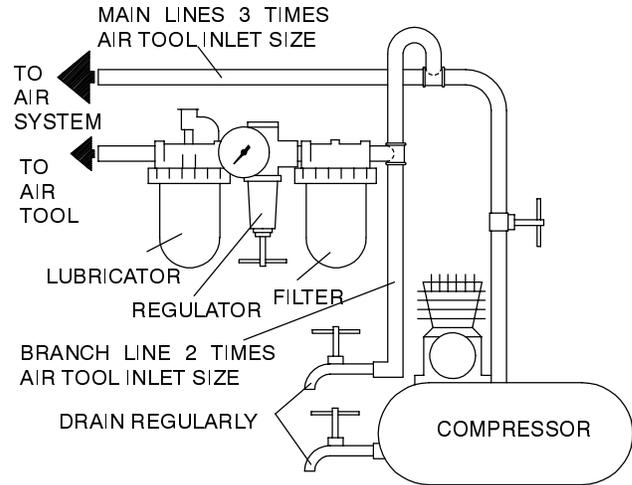
Where Used	ARO Part #	Description
Air Motor	29665	1 qt. Spindle Oil
"O" Rings & Lip Seals	36460	4 oz. Stringy Lubricant
Gears and Bearings	33153	5 lb. "EP" - NLGI #1 Grease
Clutches	40036-1	1 lb "EP" Molybdenum Disulfide

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

ARO Model C28231-810

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 molybdenum grease (40036-1). Lubricate gearing, pack bearings, coat shafts and lubricate gears with NLGI #1 "EP" grease (33153). Gearing should contain approximately 3/64 oz. (1.3 g) for single reduction and 1/16 oz. (1.8 g) of grease for double reduction. Auto shut-off and adjustable ball clutches should contain approximately 1/16 oz. (1.8 g) of grease. Positive clutches should contain approximately 1/33 oz. (.9 g) of grease.



(Dwg. TPD905-1)

MODEL IDENTIFICATION

MODEL NUMBER	THROTTLE TYPE	R.P.M.	ROTOR (ITEM 36)	MOTOR ASSEMBLY	GEARING RED.	CLUTCH
SA053B-8-()-()	PUSH-TO-START	800	46453	47726	19.36:1	ADJUSTABLE BALL
SA053B-10-()-()	PUSH-TO-START	1000	46453	47726	15.09:1	ADJUSTABLE BALL
SA053B-17-()-()	PUSH-TO-START	1700	46453	47726	9.91:1	ADJUSTABLE BALL
SA053B-25-()-()	PUSH-TO-START	2500	46469	47725	6.67:1	ADJUSTABLE BALL
SA054C-8-()-()	PUSH-TO-START	800	46453	47726	19.36:1	AUTOMATIC SHUT-OFF
SA054C-10-()-()	PUSH-TO-START	1000	46453	47726	15.09:1	AUTOMATIC SHUT-OFF
SA054C-17-()-()	PUSH-TO-START	1700	46453	47726	9.91:1	AUTOMATIC SHUT-OFF
SA054C-25-()-()	PUSH-TO-START	2500	46469	47725	6.67:1	AUTOMATIC SHUT-OFF
SG051B-8-()-()	PISTOL GRIP	800	46454	47728	19.36:1	DIRECT DRIVE
SG051B-10-()-()	PISTOL GRIP	1000	46454	47728	15.09:1	DIRECT DRIVE
SG051B-17-()-()	PISTOL GRIP	1700	46454	47728	9.91:1	DIRECT DRIVE
SG051B-25-()-()	PISTOL GRIP	2500	46470	47727	6.67:1	DIRECT DRIVE
SG052B-8-()-()	PISTOL GRIP	800	46454	47728	19.36:1	20° POSITIVE CLUTCH
SG052B-10-()-()	PISTOL GRIP	1000	46454	47728	15.09:1	20° POSITIVE CLUTCH
SG052B-17-()-()	PISTOL GRIP	1700	46454	47728	9.91:1	20° POSITIVE CLUTCH
SG052B-25-()-()	PISTOL GRIP	2500	46469	47725	6.67:1	20° POSITIVE CLUTCH
SG053B-8-()-()	PISTOL GRIP	800	46454	47728	19.36:1	ADJUSTABLE BALL
SG053B-10-()-()	PISTOL GRIP	1000	46454	47728	15.09:1	ADJUSTABLE BALL
SG053B-17-()-()	PISTOL GRIP	1700	46454	47728	9.91:1	ADJUSTABLE BALL
SG053B-25-()-()	PISTOL GRIP	2500	46470	47727	6.67:1	ADJUSTABLE BALL
SG059B-8-()-()	PISTOL GRIP	800	46454	47728	19.36:1	90° POSITIVE CLUTCH
SG059B-10-()-()	PISTOL GRIP	1000	46454	47728	15.09:1	90° POSITIVE CLUTCH
SG059B-17-()-()	PISTOL GRIP	1700	46454	47728	9.91:1	90° POSITIVE CLUTCH
SG059B-25-()-()	PISTOL GRIP	2500	46469	47725	6.67:1	90° POSITIVE CLUTCH

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

DRIVE OPTION	DESCRIPTION
-A	APEX MAGNETIC BIT HOLDER
-F	STANDARD LENGTH FINDER
-M	MAGNA BIT MAGNETIC BIT HOLDER
-Q	QUICK-CHANGE ASSEMBLY

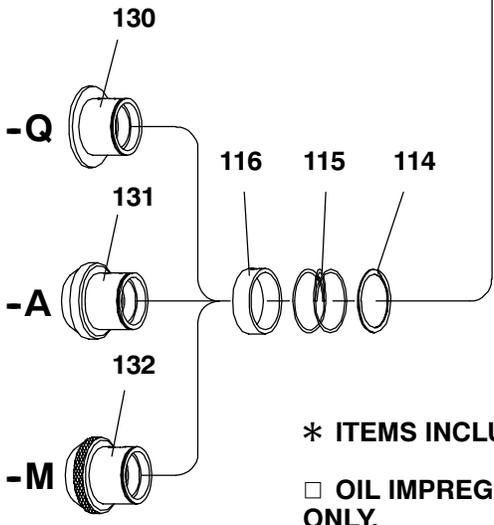
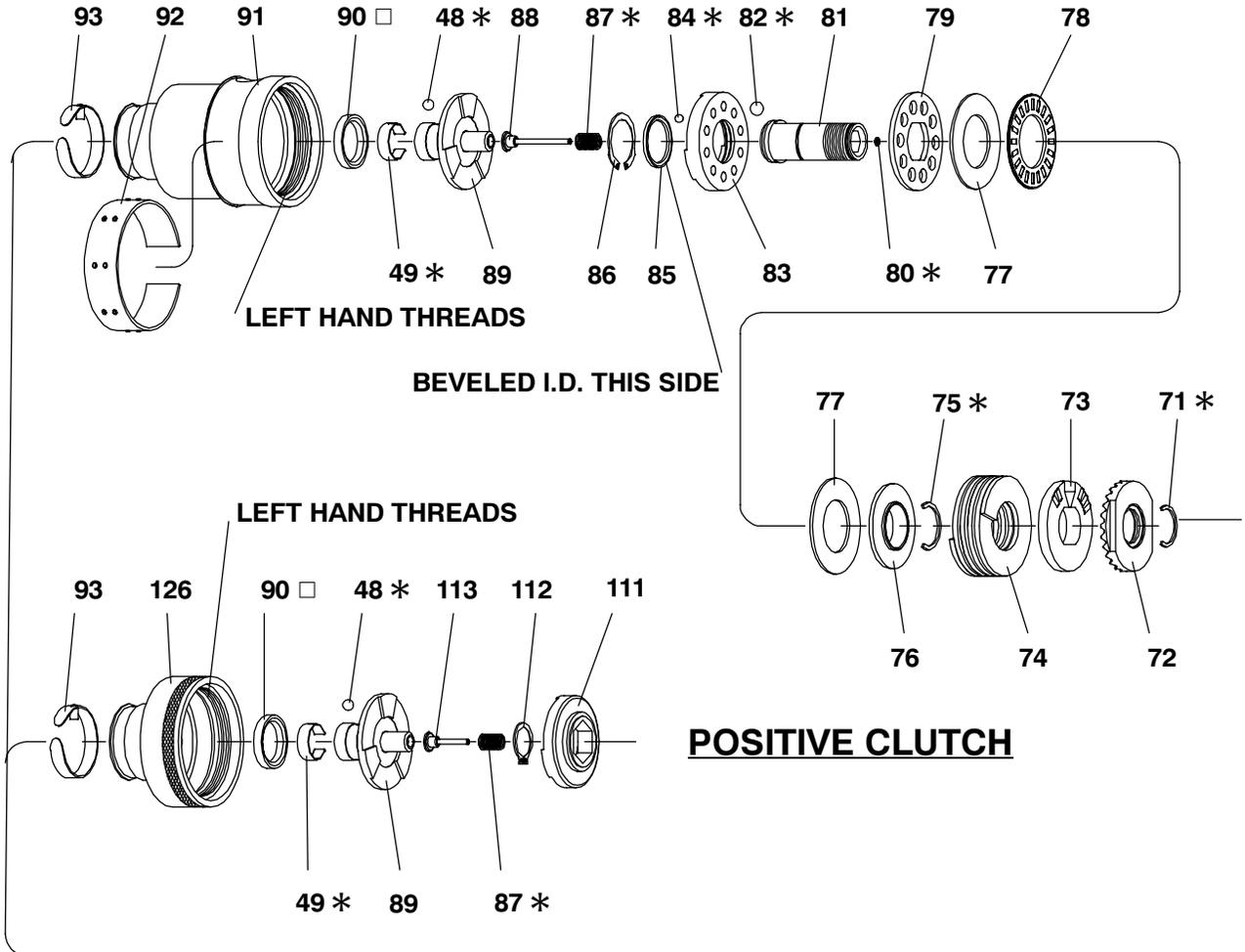
MODEL IDENTIFICATION

MODEL NUMBER	THROTTLE TYPE	R.P.M.	ROTOR (ITEM 36)	MOTOR ASSEMBLY	GEARING RED.	CLUTCH
SL051B-8-()-()	LEVER THROTTLE	800	46454	47728	19.36:1	DIRECT DRIVE
SL051B-10-()-()	LEVER THROTTLE	1000	46454	47728	15.09:1	DIRECT DRIVE
SL051B-17-()-()	LEVER THROTTLE	1700	46454	47728	9.91:1	DIRECT DRIVE
SL051B-25-()-()	LEVER THROTTLE	2500	46470	47727	6.67:1	DIRECT DRIVE
SL052B-8-()-()	LEVER THROTTLE	800	46454	47728	19.36:1	20° POSITIVE CLUTCH
SL052B-10-()-()	LEVER THROTTLE	1000	46454	47728	15.09:1	20° POSITIVE CLUTCH
SL052B-17-()-()	LEVER THROTTLE	1700	46454	47728	9.91:1	20° POSITIVE CLUTCH
SL052B-25-()-()	LEVER THROTTLE	2500	46469	47725	6.67:1	20° POSITIVE CLUTCH
SL053B-8-()-()	LEVER THROTTLE	800	46454	47728	19.36:1	ADJUSTABLE BALL
SL053B-10-()-()	LEVER THROTTLE	1000	46454	47728	15.09:1	ADJUSTABLE BALL
SL053B-17-()-()	LEVER THROTTLE	1700	46454	47728	9.91:1	ADJUSTABLE BALL
SL053B-25-()-()	LEVER THROTTLE	2500	46470	47727	6.67:1	ADJUSTABLE BALL
SL059B-8-()-()	LEVER THROTTLE	800	46454	47728	19.36:1	90° POSITIVE CLUTCH
SL059B-10-()-()	LEVER THROTTLE	1000	46454	47728	15.09:1	90° POSITIVE CLUTCH
SL059B-17-()-()	LEVER THROTTLE	1700	46454	47728	9.91:1	90° POSITIVE CLUTCH
SL059B-25-()-()	LEVER THROTTLE	2500	46469	47725	6.67:1	90° POSITIVE CLUTCH

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

DRIVE OPTION	DESCRIPTION
-A	APEX MAGNETIC BIT HOLDER
-F	STANDARD LENGTH FINDER
-M	MAGNA BIT MAGNETIC BIT HOLDER
-Q	QUICK-CHANGE ASSEMBLY

ADJUSTABLE BALL CLUTCH



* ITEMS INCLUDED IN SERVICE KIT NO. 47353.

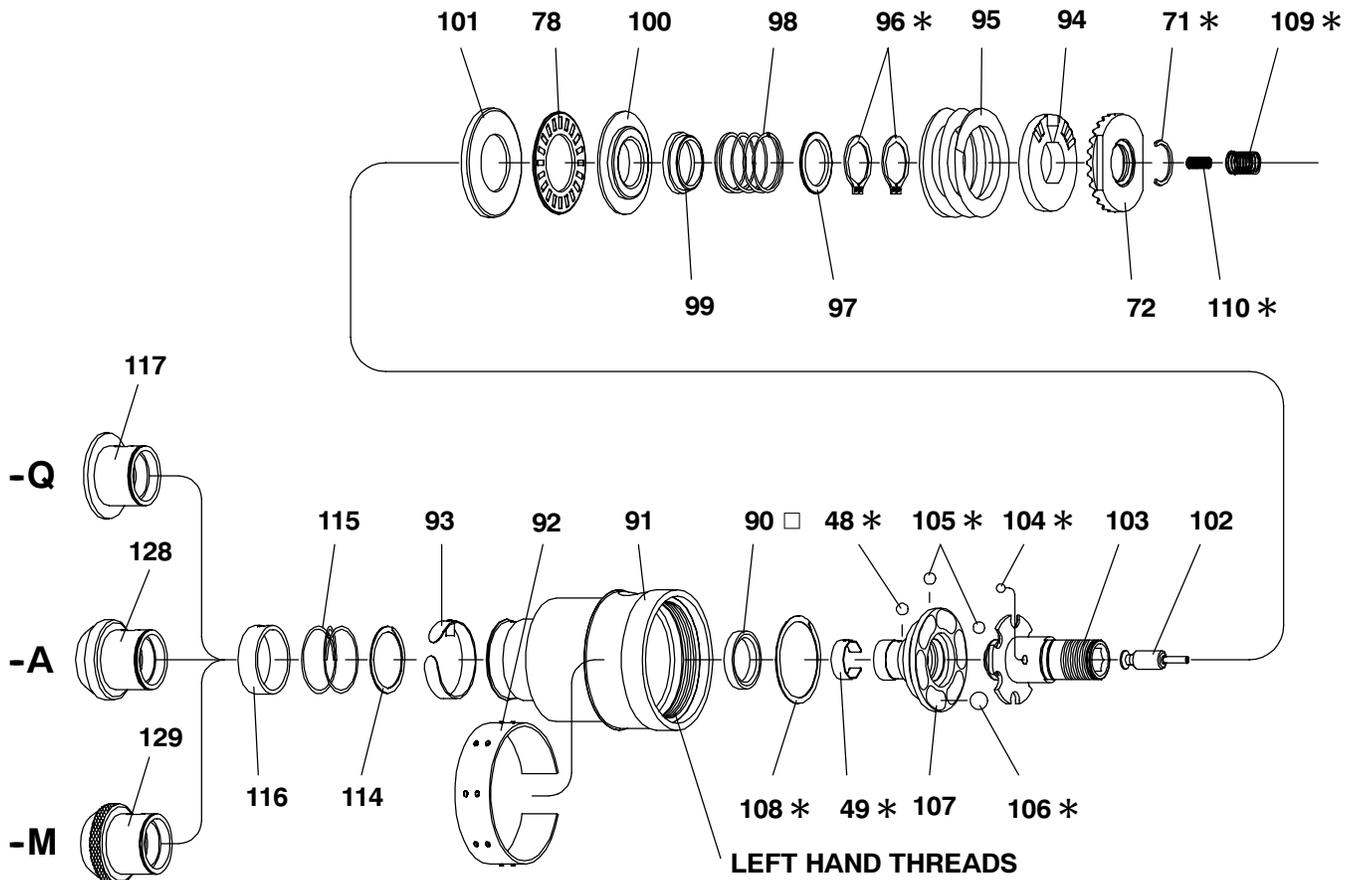
□ OIL IMPREGNATED BRONZE BUSHING. DO NOT WASH, WIPE CLEAN ONLY.

(Dwg. ATP-438)

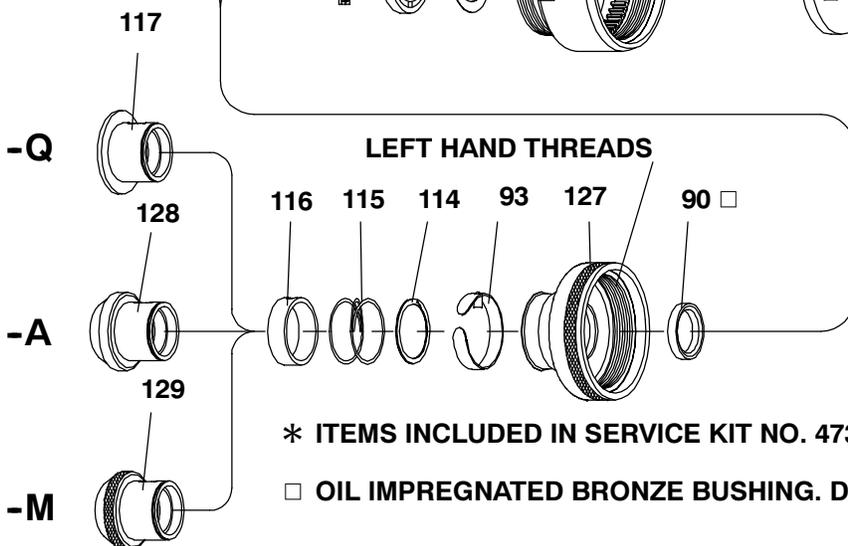
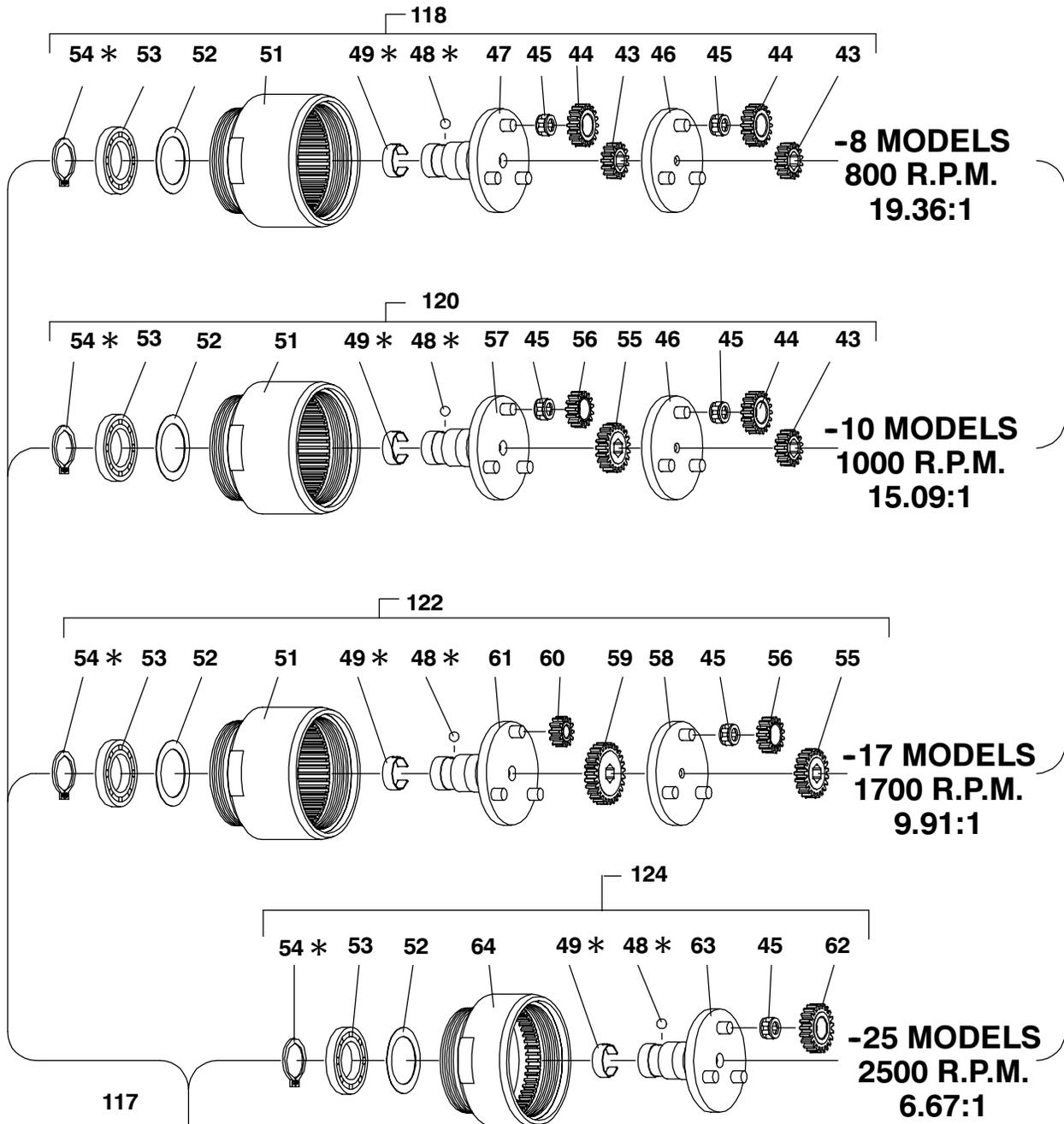
AUTOMATIC SHUT-OFF CLUTCH

* ITEMS INCLUDED IN SERVICE KIT NO. 47353.

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



(Dwg. ATP-439)

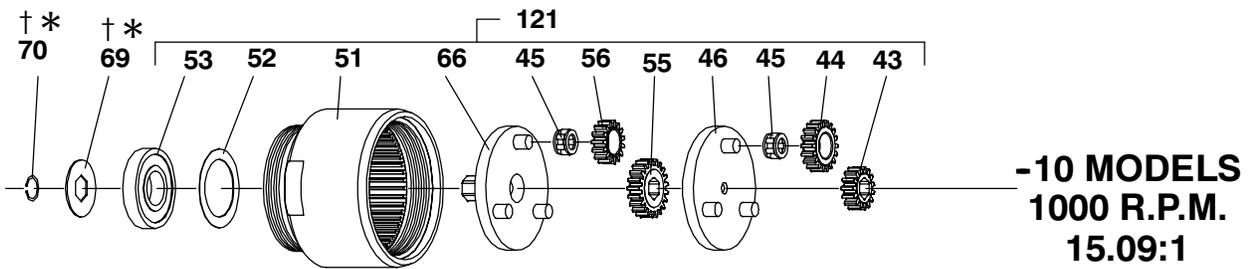
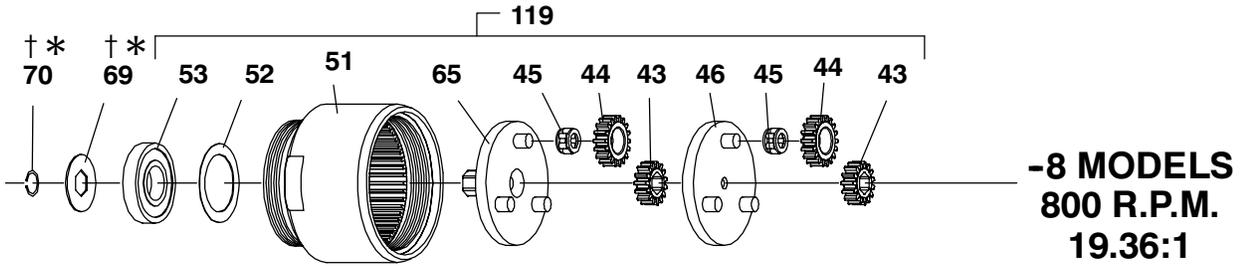
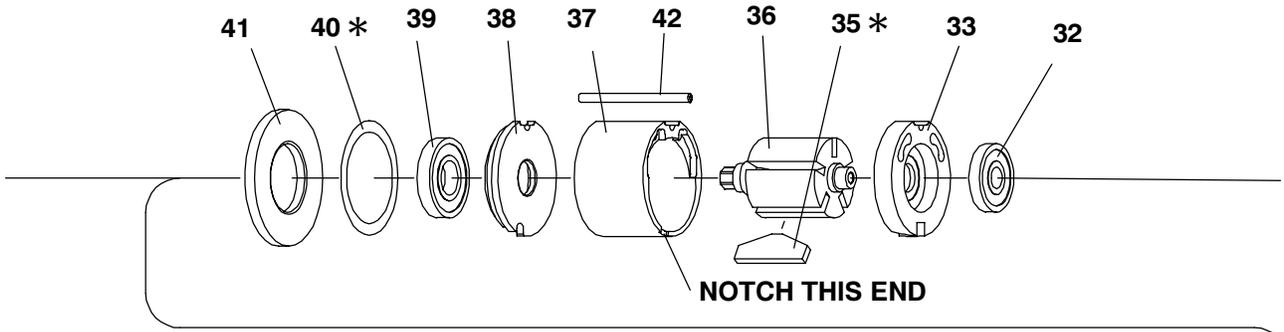


DIRECT DRIVE

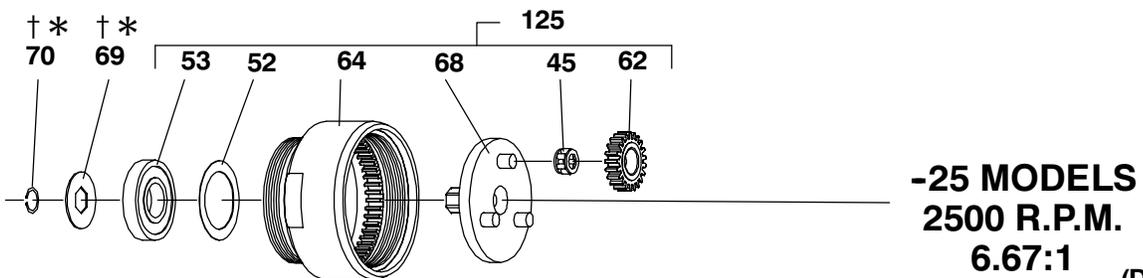
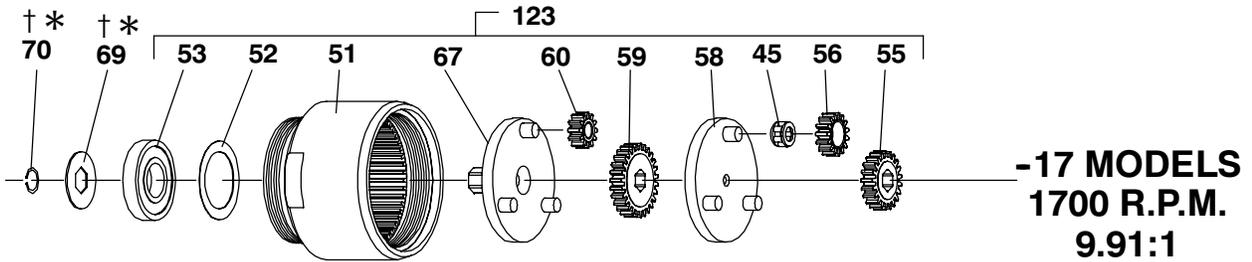
* ITEMS INCLUDED IN SERVICE KIT NO. 47353.

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

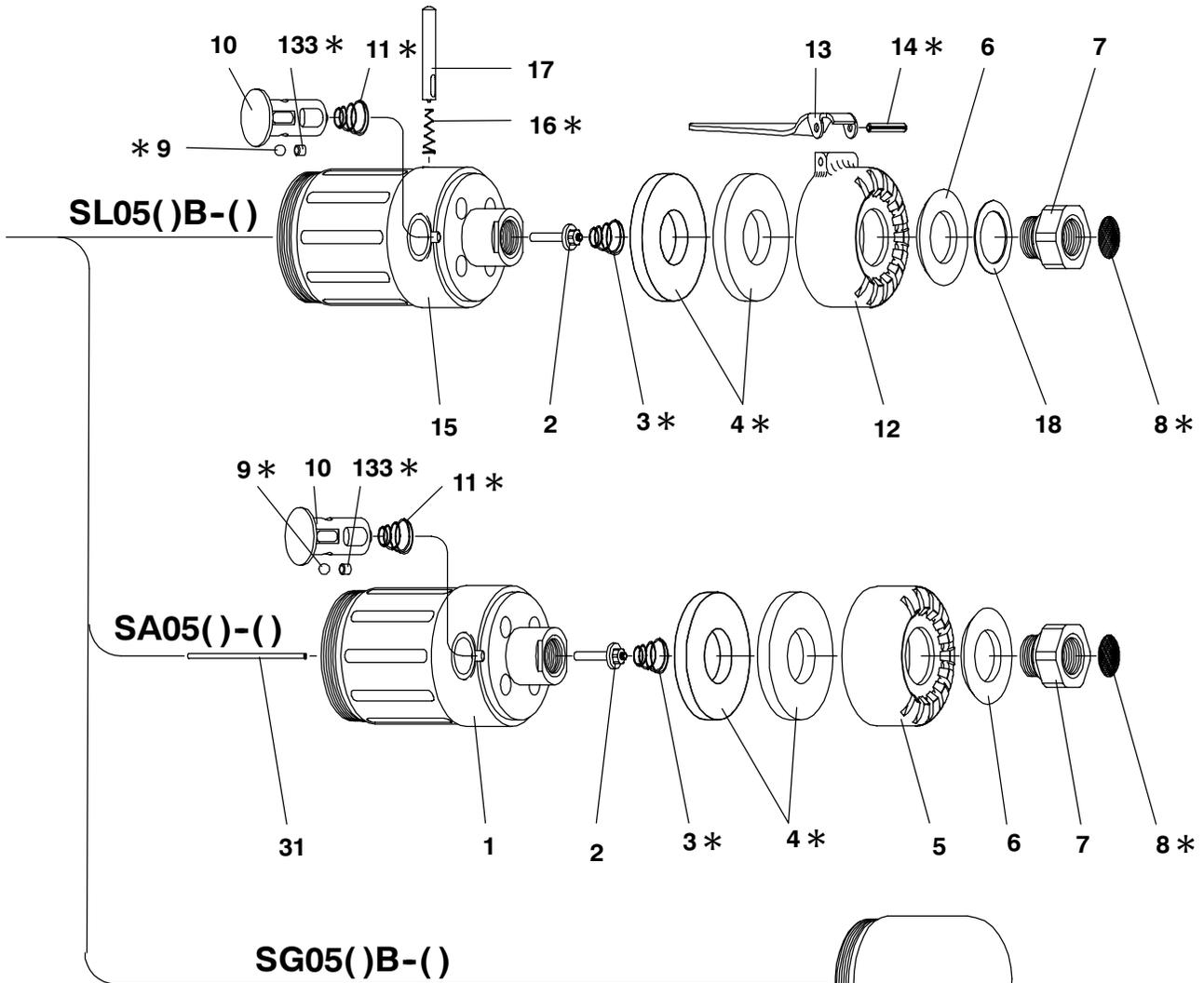
(Dwg. ATP-440)



* ITEMS INCLUDED IN SERVICE KIT NO. 47353.
 † USED ONLY WITH AUTO SHUT-OFF AND ADJUSTABLE BALL CLUTCH MODELS.

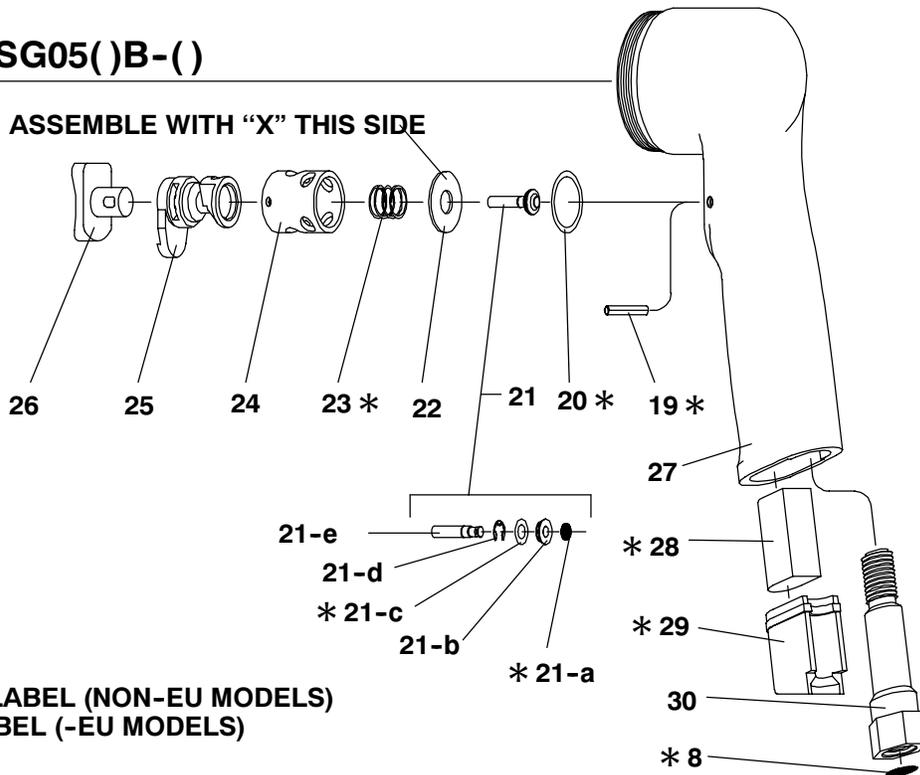


(Dwg. ATP-441)



SG05()B-()

ASSEMBLE WITH "X" THIS SIDE



NOT SHOWN
 48176-1 WARNING LABEL (NON-EU MODELS)
 49883 WARNING LABEL (-EU MODELS)

(Dwg. ATP-443)

PART NUMBER FOR ORDERING

PART NUMBER FOR ORDERING

1	Head and Bushing Assembly (push-to-start)	46487	39	Ball Bearing	Y65-13
2	Valve Rod Assembly	46354		MOTOR ASSEMBLY (includes items 32 thru 39)	See chart
3	Spring	41654	40	"O" Ring	Y325-214
4	Filler (2 req'd)	46452	41	Spacer	46412
5	Exhaust Cap (push-to-start)	46447	42	Locating Pin Pistol Grip models	47723-1
6	Diffuser Washer	46449		Lever and Push-to-Start models	47723-2
7	Inlet Adapter	46377	43	Sun Gear (1 or 2 req'd) 4.4:1 ratio (15 teeth)	46466
8	Screen	33911	44	Planet Gear (3 or 6 req'd) 4.4:1 ratio (18 teeth)	46900
9	Ball	Y16-204	45	Needle Bearing (3 or 6 req'd)	42315
10	Valve Body	46476	46	Carrier Assembly 4.4:1 ratio	46522
11	Spring	41654	47	Spindle Assembly 4.4:1 ratio (direct drive)	47270
12	Exhaust Cap (lever throttle)	46448	48	Ball (included with items 47, 57, 61, 63 and 89)	Y16-204
13	Lever	46326	49	Retaining Clip (included with items 47, 57, 61, 63 and 89)	47695
14	Roll Pin	Y178-28	51	Ring Gear (double reduction) for models SG053B- ()	48904
15	Head and Bushing Assembly (lever throttle)	46486		for all other models	46467
16	Spring	46374	52	Spacer	46496
17	Throttle Pin	46296-2	53	Ball Bearing for Adjustable Ball and Auto Shut-Off clutch models	Y65-13
18	Spacer	47205		for Direct Drive and Positive clutch models	46243
19	Spirol Pin	46849	54	Retaining Ring	38339
20	"O" Ring	Y325-15	55	Sun Gear 3.43:1 ratio (21 teeth)	46465
21	Valve Stem Assembly	46848-2	56	Planet Gear (3 req'd) 3.43:1 ratio (15 teeth)	46899
21-a	"O" Ring	Y325-3	57	Spindle Assembly 3.43:1 ratio (direct drive)	47269
21-b	Valve	45473-1	58	Carrier Assembly 3.43:1 ratio	46521
21-c	"O" Ring	Y325-7	59	Sun Gear 2.89:1 ratio (27 teeth)	46464
21-d	Retaining Ring	Y180-13	60	Planet Gear (3 req'd) 2.89:1 ratio (12 teeth)	46460
21-e	Valve Stem	46847-2	61	Spindle Assembly 2.89:1 ratio (direct drive)	47268
22	Washer	46379-1	62	Planet Gear (3 req'd) 6.67:1 ratio (21 teeth)	46901
23	Spring	41100	63	Spindle Assembly 6.67:1 ratio (direct drive)	47271
24	Valve Bushing	46381	64	Ring Gear for models SG053B- ()	48905
25	Reverse Valve	46299		for all other models	46468
26	Trigger	46298	65	Spindle Assembly 4.4:1 ratio for Adjustable Ball and Auto Shut-Off clutch models	47753
27	Pistol Grip Housing	47367		for Positive clutch models	47799
28	Filler	46851			
29	Muffler Assembly	46857			
30	Inlet Adapter	46385			
31	Throttle Rod for models SA053B-25 (4.180" long)	46511-3			
	for models SA053B-8, -10 and -17 (4.690" long)	46511-4			
	for models SA054C-25 (4.235" long)	46511-423			
	for models SA054C-8, -10 and -17 (4.740" long)	46511-474			
32	Ball Bearing	47724			
33	Rear End Plate	46312-1			
35	Blade (5 req'd)	46413			
36	Rotor	See chart			
37	Cylinder	46311			
38	Front End Plate	47722			

PART NUMBER FOR ORDERING

PART NUMBER FOR ORDERING

66	Spindle Assembly 3.43:1 ratio for Adjustable Ball and Auto Shut-Off clutch models	47752	90	Bushing	46360
	for Positive clutch models	47798	91	Clutch Housing (includes items 90 and 92) straight models used with -A, -M and -Q models	47749
67	Spindle Assembly 2.89:1 ratio for Adjustable Ball and Auto Shut-Off clutch models	47751		used with -F models	47784
	for Positive clutch models	47797		pistol grip models used with -A, -M and -Q models	48901
68	Spindle Assembly 6.67:1 ratio for Adjustable Ball and Auto Shut-Offclutch models	47750		used with -F models	48903
	for Positive clutch models	47800	92	External Adjustment Sleeve	46534
69	Washer	47694	93	Retaining Clip and Pin	47782
70	Snap Ring	Y142-2	94	Adjustment Washer	48093
71	Snap Ring	Y110-105	95	Clutch Spring (Auto Shut-Off Clutch) for 800 r.p.m. models (Yellow, 35 - 100 in. lbs)	48047
72	Adjustment Nut	46895		for 1000 r.p.m. models (Yellow, 35 - 80 in. lbs)	48047
73	Adjustment Washer	46896		for 1700 r.p.m. models (Brown, 25 - 60 in. lbs)	48095
74	Clutch Spring (Adjustable Ball Clutch) for 800 and 1000 r.p.m. models (Blue, 15 - 80 in. lbs)	46728		for 2500 r.p.m. models (Green, 15 - 40 in. lbs)	48096
	for 1700 r.p.m. models (Blue, 15 - 60 in. lbs)	46728	96	Retaining Ring (2 req'd)	Y145-18
	for 2500 r.p.m. models (Yellow, 10 - 40 in. lbs)	47066	97	Guide	48295-1
	Clutch Spring (Gray, 45 - 100 in. lbs)	46473	98	Spring	47064
75	Snap Ring	Y110-106	99	Ball Sleeve	48294-1
76	Thrust Pad	46516	100	Thrust Race	48094
77	Thrust Washer (2 req'd)	46892	101	Thrust Race	48301-1
78	Thrust Bearing	38995	102	Plunger	48293-2
79	Ball Carrier	46515	103	Spindle	48299-1
80	"O" Ring	Y325-1	104	Ball (6 req'd)	Y16-203
81	Spindle	47255	105	Ball (23 req'd)	Y16-204
82	Ball (10 req'd)	Y16-205	106	Ball (6 req'd)	Y16-206
83	Driven Jaw	46441	107	Bit Holder	48298-1
84	Ball (16 req'd)	Y16-203	108	Retaining Ring	48300-1
85	Ball Race	46502	109	Spring	47709
86	Retaining Ring	46507	110	Spring	48333-1
87	Spring	46854		AUTO SHUT-OFF CLUTCH ASSEMBLY (includes items 48, 49, 71, 72, 78 and 94 thru 110) for 800 and 1000 r.p.m. models with YELLOW spring	48303-1
88	Pin Assembly	46855		for 1700 r.p.m. models with BROWN spring	48303-2
	ADJUSTABLE BALL CLUTCH ASSEMBLY (includes items 71 thru 88) for 800, 1000 and 1700 r.p.m. models, BLUE spring	47254-1		for 2500 r.p.m. models with GREEN spring	48303-3
	for 2500 r.p.m. models, YELLOW spring	47254-3	111	Jaw for 20° Positive clutch models	47176-1
89	Bit Holder Assembly (includes items 48 and 49) for Adjustable Ball and 90° Positive clutch models	47267		for 90° Positive clutch models	47177
	for 20° Positive clutch models	47272	112	Retaining Ring	Y145-3
			113	Pin Assembly	47182

PART NUMBER FOR ORDERING

PART NUMBER FOR ORDERING

114	Retaining Ring	47779	127	Clutch Housing (includes item 90)	47788
115	Spring	47778	128	Magnetic Guide	47776
116	Bushing	47775	129	Magnetic Guide	47777
117	Sleeve	47702		GUIDE ASSEMBLY (Direct Drive and Auto Shut-Off Clutch models) Quick-Change Sleeve Assembly (includes items 114 thru 117)	46884
118	Gearing Assembly (800 r.p.m.) direct drive	47350-1		Apex Magnetic Bit Holder Guide Assembly (includes items 114, 115, 116 and 128)	46885
119	Gearing Assembly (800 r.p.m.) for Positive clutch models	47350-5		Magna Bit Magnetic Bit Holder Guide Assembly (includes items 114, 115, 116 and 129)	46886
	for Adjustable Ball and Auto Shut-Off clutch models [except SG053B- ()]	47350-9			
120	Gearing Assembly (1000 r.p.m.) direct drive	47350-2	130	Sleeve	47702-1
121	Gearing Assembly (1000 r.p.m.) for Positive clutch models	47350-6	131	Magnetic Guide	47776-1
	for Adjustable Ball and Auto Shut-Off clutch models [except SG053B- ()]	47350-10	132	Magnetic Guide	47777-1
122	Gearing Assembly (1700 r.p.m.) direct drive	47350-3		GUIDE ASSEMBLY (Adjustable Ball and Positive Clutch models) Quick-Change Sleeve Assembly (includes items 114, 115, 116 and 130)	46884-1
123	Gearing Assembly (1700 r.p.m.) for Positive clutch models	47350-7		Apex Magnetic Bit Holder Guide Assembly (includes items 114, 115, 116 and 131)	46885-1
	for Adjustable Ball and Auto Shut-Off clutch models [except SG053B- ()]	47350-11		Magna Bit Magnetic Bit Holder Guide Assembly (includes items 114, 115, 116 and 132)	46886-1
124	Gearing Assembly (2500 r.p.m.) direct drive	47350-4	133	Pin	49983
125	Gearing Assembly (2500 r.p.m.) for Positive clutch models	47350-8		SERVICE KIT: includes items 3, 4, 8, 9, 11, 14, 16, 19, 20, 21-a, 21-c, 23, 28, 29, 35, 40, 48, 49, 54, 69, 70, 71, 75, 80, 82, 84, 87, 96, 104, 105, 106, 108, 109, 110 and 133	47353
	for Adjustable Ball and Auto Shut-Off clutch models [except SG053B- ()]	47350-12			
126	Clutch Housing (includes item 90) used with -A, -M and -Q models ..	47792			
	used with -F models	47790			

DISASSEMBLY/ASSEMBLY INSTRUCTIONS

NOTICE

- 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 (27) - straight models, clamp on inlet adapter (7).
- Remove clutch housing, using 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 (89) and clutch assembly on it.
- Remove snap ring (71).
- Remove adjustment nut (72), using a 7/8" wrench.
- Remove adjustment washer (73) and clutch spring (74).
- Remove snap ring (75).
- Slide off thrust pad (76), two thrust washers (77) and thrust bearing (78).
- Remove ball carrier (79) and ten balls (82).
- Remove retaining ring (86).
- Slide jaw back and remove ball race (85), sixteen balls (84) then remove driven jaw (83).
- Remove "O" ring (80) and push pin (88) out of spindle (81).
- Remove spring (87).

POSITIVE CLUTCH

- Remove pin assembly (113) and spring (87) from jaw.
- Remove retaining ring (112).

AUTO SHUT-OFF CLUTCH

- Clamp 1/4" hex wrench in a vise, then place bit holder (107) and clutch assembly on it.
- Remove snap ring (71).
- Remove adjustment nut (72), using a 7/8" wrench.
- Remove adjustment washer (94) and clutch spring (95).
- Remove retaining rings (96).
- Slide off guide (97), spring (98), ball sleeve (99), thrust race (100) and thrust bearing (78). **NOTE:** Removal of ball sleeve releases six balls (104).
- Remove thrust race (101), releasing six balls (106).
- Remove retaining ring (108), then rotate bit holder to remove twelve balls (105). Separate bit holder (107) and spindle (103), releasing eleven balls (105).

CLUTCH ASSEMBLY

- For clutch lubrication, use ARO 40036-1 clutch lube on parts as pointed out in this section.

ADJUSTABLE BALL CLUTCH

- Lubricate ball groove of clutch spindle (81).
- Install sixteen balls (84) in groove.

- Slide driven jaw (83) on spindle (81) from threaded end until it seats over balls (84).
- Assemble ball race (85), beveled i.d. toward balls.
- Assemble retaining ring (86).
- Lubricate ball pockets of driven jaw (83) and install ball carrier (79) and ten balls (82).
- Lubricate and assemble one thrust washer (77), thrust bearing (78), other thrust washer (77) and thrust pad (76).
- Install snap ring (75).
- Install clutch spring (74), adjustment washer (73) and adjustment nut (72).
- Install snap ring (71).
- Coat pin (88) with spindle oil 29665 then slide spring (87) over pin.
- Install pin (88) and spring (87) into spindle.
- Assemble "O" ring (80) to pin (88).
- Lubricate spindle, jaw face and ball (48) of bit holder (89), then install on clutch assembly and assemble both to tool.
- Assemble clutch housing (91) onto tool - **LEFT HAND THREADS.**
- See "Clutch Adjustment".

POSITIVE CLUTCH

- Assemble jaw (111) to gearing spindle and secure with retaining ring (112).
- Coat pin assembly (113) with spindle oil 29665, then slide spring (87) over pin assembly.
- Install pin assembly (113) and spring (87) into spindle.
- Lubricate spindle, jaw face and ball (48) of bit holder (89) and assemble to tool.
- Assemble clutch housing (126) onto tool - **LEFT HAND THREADS.**

AUTO SHUT-OFF CLUTCH

- Lubricate ball grooves of clutch spindle (103).
- Install eleven balls (105) into groove.
- Slide spindle into bit holder, securing balls.
- Assemble twelve balls (105) into bit holder, then secure with retaining ring (108).
- Lubricate ball pockets of bit holder and install six balls (106) into pockets, securing with thrust race (101).
- Lubricate and assemble thrust bearing (78) and thrust race (100) to spindle.
- Coat plunger (102) with spindle oil 29665 and assemble spring (110) to plunger. Assemble plunger and spring to spindle, securing with balls (104). **NOTE:** Assemble two balls per hole.
- Secure balls with ball sleeve (99).
- Assemble spring (98) and guide (97) to spindle, securing with retaining rings (96).
- Install clutch spring (95).
- Lubricate face of adjustment washer (94) and install on spindle.
- Thread adjustment nut (72) onto spindle, securing with snap ring (71).
- Lubricate ball (48) of bit holder.
- Assemble spring (109) into spindle. **NOTE:** Assemble spring with large diameter into spindle first.
- Assemble clutch assembly to tool.
- Assemble clutch housing (91) to tool - **LEFT HAND THREADS.**
- See "Clutch Adjustment".

DISASSEMBLY/ASSEMBLY INSTRUCTIONS

CLUTCH ADJUSTMENT

EXTERNAL:

- Rotate sleeve until opening in housing is visible.
- Depress bit to engage clutch, then rotate until notch in adjustment washer (73 or 94) is visible.
- Insert No. 1 Phillips screwdriver in notch to turn gear teeth on nut (72).
- Clockwise = decrease torque.
- Counterclockwise = increase torque.

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 (72) with 7/8" wrench.

GEARING DISASSEMBLY

- Remove clutch from tool (see "Clutch Disassembly").
- Remove ring gear (51 or 64), using a wrench on flats.
- **DIRECT DRIVE only** - Remove retaining ring (54) from spindle.
- **AUTO SHUT-OFF and ADJUSTABLE BALL clutch models** - Remove snap ring (70) and washer (69).
- Remove spindle(s) and gears from ring gear (51 or 64). **NOTE:** Keep gears grouped with mating spindle when disassembling 800, 1000 and 1700 r.p.m. gearing.
- Do not remove bearing (53) or spacer (52) unless damage is evident.
- To remove bearing (53) and spacer (52) from ring gear, press on spacer (52) from inside splined end of ring gear.
- Do not remove gears (43, 55 or 59) from carrier assembly unless damage is evident. Gears are press fit onto carrier assembly.

GEARING ASSEMBLY

- Lubricate bearings with ARO 33153 grease upon assembly.
- Assemble spacer (52) into ring gear.
- Press bearing (53) into ring gear (51 or 64). **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, 1000 and 1700 r.p.m. gearing.
- Assemble spindle(s) and gearing into ring gear. Rotate spindle and gears to align gear teeth with splines of ring gear.
- Thread ring gear (51 or 64) to tool and tighten with wrench on flats.
- Assemble clutch to tool.

MOTOR DISASSEMBLY

- Remove clutch and gearing from tool.
- Remove spacer (41) and "O" ring (40).
- **PUSH-TO-START models** - Remove throttle rod (31).
- Tap front edge of housing to remove motor assembly. Locating pin (42) should also come out.
- Tap drive end of rotor (36) with a soft face hammer; motor will come apart. **NOTE:** Bearings are press fit on rotor.
- Remove end plate (33) and bearing (32) from rotor.

MOTOR ASSEMBLY

- Lubricate bearing (32) with ARO 33153 grease and assemble to end plate (33), pressing on outer race of bearing.
- Assemble end plate (33) 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 (37) with ARO 29665 spindle oil and assemble over rotor. **NOTE:** Air inlet slots in end of cylinder must be aligned with two air inlet slots in end plate (33).
- Assemble bearing (39) to end plate (38), pressing on outer race of bearing.
- Assemble end plate (38) to rotor, pressing on inner race of bearing. Be sure rotor turns without binding.
- Insert locating pin (42) into .096" blind hole at bottom of motor cavity in housing.
- Align notches of end plates and cylinder and install motor into housing, aligning notches with locating pin (42).
- Grease and assemble "O" ring (40) to end plate.
- Assemble spacer (41) to motor.
- **PUSH-TO-START models** - Coat throttle rod (31) with ARO 29665 spindle oil and insert into rotor.
- Assemble gearing and clutch to tool.

PISTOL GRIP HOUSING DISASSEMBLY

- Remove pin (19), driving it out the 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 (8).
- Remove muffler (29) and filler (28).

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 (27), aligning .102" diameter holes in housing and bushing.
- Assemble trigger (26) to reverse valve (25).
- Install pin (19), pressing in from left side of housing.
- Install filler (28), muffler (29) and inlet adapter (30).
- Clean and install screen (8) in inlet adapter (30).

DISASSEMBLY/ASSEMBLY INSTRUCTIONS

PUSH-TO-START AND LEVER THROTTLE HOUSING DISASSEMBLY

- Clamp air inlet adapter (7) in a smooth face vise.
- Unthread housing (1 or 15), using a strap type wrench.
- Remove diffuser washer (6), exhaust cap (5 or 12), two fillers (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 pin (133), ball (9), valve body (10) and spring (11).
- Remove screen (8) from inlet adapter (7).
- **LEVER THROTTLE models** - Remove throttle pin (17) and spring (16).

PUSH-TO-START AND LEVER THROTTLE HOUSING ASSEMBLY

- Install spring (11) and valve body (10) to housing. **NOTE:** Align ball slot in valve body with slot in housing.
- **LEVER THROTTLE models** - Install spring (16) and throttle pin (17), 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 (10). **NOTE: LEVER STYLE tools** - Throttle pin (17) should not pull out when valve rod (2) is seated properly.
- Assemble ball (9) and pin (133) into slots of housing and valve body (10).
- Install two fillers (4) to exhaust cap.
- Install exhaust cap (5 or 12) to housing, being certain ball (9) and pin (133) remain properly positioned in housing and reverse valve.
- Assemble diffuser washer (6), spacer (18) where applicable and inlet adapter (7).
- Clean and install screen (8) in inlet adapter (7).