



Tool Products

# OPERATOR'S MANUAL

INCLUDING: OPERATION, INSTALLATION & MAINTENANCE

SECTION M32  
MANUAL 5

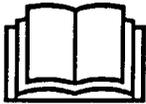
Released: 10-29-90

Revised: 10-20-95

Form: 3491-2

## 50 SERIES RIGHT-ANGLE SCREWDRIVERS/NUTSETTERS

Models: AR058A-( ), NR051B-( ), NR053B-( ),  
SR051B-( ) and SR053B-( ).



### ⚠ 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 servicer.
- 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

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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 molybdenum 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 3/32 oz. (2.7 g) of grease for double reduction. Right-angle assembly should contain approximately 1/8 oz. (3.5 g) of grease. Clutch should contain approximately 1/16 oz. (1.8 g) of grease.

## AIR SUPPLY REQUIREMENTS

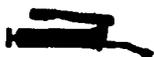
For maximum operating efficiency, the following air supply specifications should be maintained to this air tool:

- 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

## 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.

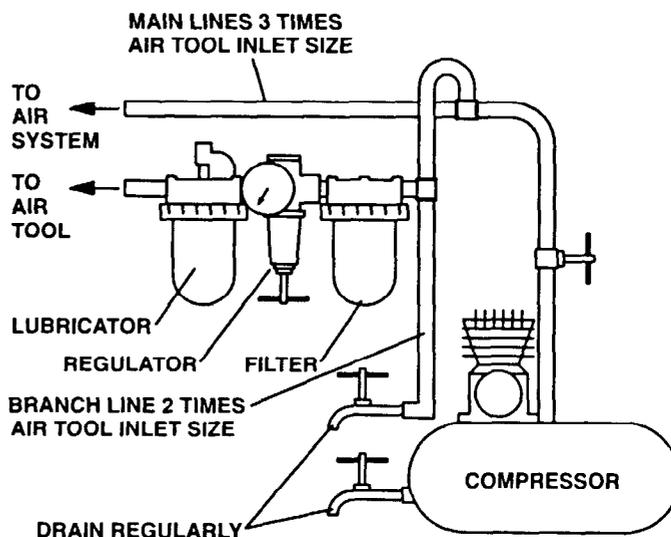
Tool maintenance and repair shall be performed by authorized, trained, competent personnel. Tools, hose and fittings shall be replaced if unsuitable for safe operation and responsibility should be assigned to be sure that all tools requiring guards or other safety devices shall be kept in legible condition.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

MODEL NUMBER	R.P.M.	ROTOR (ITEM 25)	MOTOR ASSEMBLY	GEARING REDUCTION	CLUTCH ASSEMBLY	RIGHT-ANGLE ASSEMBLY
AR058A-6H-()-()	600	46453	47726	19.36:1	48407-3	110
AR058A-9R-()	900	46453	47726	11.76:1	48407-2	111
AR058A-16R-()	1600	46469	47725	6.67:1	48407-1	111
AR058A-24R-()	2400	46453	47726	4.40:1	48407-1	111
NR051B-6H-()	600	46454	47728	19.36:1		110
NR051B-8H-()	800	46454	47728	15.09:1		110
NR051B-11H-()	1100	46454	47728	9.91:1		110
NR051B-16R-()	1600	46470	47727	6.67:1		111
NR051B-24R-()	2400	46454	47728	4.40:1		111
NR053B-6H-()	600	46454	47728	19.36:1	48397-3	110
NR053B-8H-()	800	46454	47728	15.09:1	48397-2	110
NR053B-9R-()	900	46454	47728	11.76:1	48397-2	111
NR053B-11H-()	1100	46454	47728	9.91:1	48397-2	110
NR053B-16R-()	1600	46470	47727	6.67:1	48397-1	111
SR051B-6H-()	600	46454	47728	19.36:1		110
SR051B-8H-()	800	46454	47728	15.09:1		110
SR051B-11H-()	1100	46454	47728	9.91:1		110
SR051B-16R-()-()	1600	46470	47727	6.67:1		111
SR051B-24R-()	2400	46454	47728	4.40:1		111
SR053B-6H-()	600	46454	47728	19.36:1	48397-3	110
SR053B-8H-()	800	46454	47728	15.09:1	48397-2	110
SR053B-9R-()	900	46454	47728	11.76:1	48397-2	111
SR053B-11H-()-()	1100	46454	47728	9.91:1	48397-2	110
SR053B-16R-()	1600	46470	47727	6.67:1	48397-1	111

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

DRIVE OPTION	DESCRIPTION
-F	FINDER
-H	1/4" HEX
-1	1/4" SQUARE DRIVE
-2	3/8" SQUARE DRIVE

# DISASSEMBLY/ASSEMBLY INSTRUCTIONS

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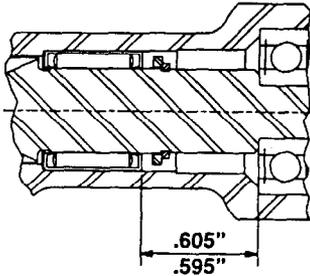
- Never apply excessive pressure by a holding device which may cause distortion of a part.
- Apply pressure evenly to parts which have a press fit.
- Apply even pressure to the bearing race that will be press fitted to the mating part.
- Use correct tools and fixtures when servicing this tool.
- Don't 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.

## RIGHT-ANGLE DISASSEMBLY

- Using wrenches on flats of clutch housing or ring gear and lock nut (102), loosen nut completely and pull right-angle assembly from tool - LEFT HAND THREADS.
- Remove lock nut (124 or 142) or finder housing (118 or 138), releasing drive assembly.
- Remove lock nut (99) from housing - LEFT HAND THREADS.
- Do not disassemble further unless damage is evident. To disassemble, pull pinion (96 or 107) from housing.
- Remove retaining ring (93 or 104) and spacer (94 or 105) to allow removal of needle bearing.

## RIGHT-ANGLE ASSEMBLY

- Lubricate bearings with ARO 33153 grease before assembly.
- Assemble bearing (95 or 106) and spacer (94 or 105) to pinion, securing with retaining ring (93 or 104). NOTE: Bearing (106) is to be located .600" from shoulder on pinion (see illustration below).



- Assemble bearing (100) to pinion, pressing on inner race of bearing.
- Assemble pinion and components to housing, pressing on outer race of bearing.
- Assemble lock nut (99) to housing - LEFT HAND THREADS - securing pinion.
- Apply approximately 3/32 oz. of grease to right-angle gearing upon assembly.
- Assemble drive assembly to lock nut (124 or 142) or finder housing (118 or 138) and assemble to right-angle - LEFT HAND THREADS.
- Assemble lock nut (102) to housing, securing with snap ring (101).
- Assemble coupling (92) to pinion and assemble right-angle housing and components to tool, securing with lock nut (102) - LEFT HAND THREADS.

## CLUTCH DISASSEMBLY

- Remove right-angle assembly from tool.
- Clamp tool in a smooth face vise, clamping on inlet adapter (2).
- Remove clutch housing using a strap type wrench - LEFT HAND THREADS.
- Remove clutch assembly from tool.

## ADJUSTABLE BALL CLUTCH

- Clamp drive end of driven jaw (69) in a smooth face vise, being careful not to damage driven jaw.
- Remove snap ring (71).

- Using a 7/8" wrench, remove adjustment nut (72).
- Remove adjustment washer (59) and clutch spring (60).
- Remove snap ring (61).
- Slide off thrust pad (62), two thrust washers (63) and thrust bearing (73).
- Remove ball carrier (64) and ten balls (66).
- Remove retaining ring (70) and pin (68), then rotate driven jaw to remove twelve balls (67). Separate driven jaw and spindle (65).

## AUTO SHUT-OFF CLUTCH

- Clamp drive end of driven jaw (88) in a smooth face vise, being careful not to damage driven jaw.
- Remove snap ring (71).
- Using a 7/8" wrench, remove adjustment nut (72).
- Remove adjustment washer (75) and clutch spring (76).
- Remove retaining rings (77).
- Slide off guide (78), spring (79), ball sleeve (80), thrust race (81) and thrust bearing (73). NOTE: Removal of ball sleeve (80) releases six balls (85) and plunger (83).
- Remove thrust race (82), releasing six balls (87).
- Remove retaining ring (89), then rotate driven jaw to remove twelve balls (86). Separate driven jaw and spindle (84), releasing eleven balls (86).

## CLUTCH ASSEMBLY

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

## ADJUSTABLE BALL CLUTCH

- Lubricate ball groove of spindle (65).
- Assemble spindle into driven jaw (69), aligning ball groove with hole in driven jaw.
- Install twelve balls (67) and pin (68) into hole, then secure with retaining ring (70).
- Lubricate ball pockets of driven jaw (69) and install ball carrier (64) and ten balls (66).
- Lubricate and assemble one thrust washer (63), thrust bearing (73), other thrust washer (63) and thrust pad (62).
- Install snap ring (61).
- Install clutch spring (60), adjustment washer (59) and adjustment nut (72).
- Install snap ring (71).
- Lubricate bearing (74) with ARO 33153 grease and assemble to driven jaw, pressing on inner race of bearing.
- Assemble clutch assembly to tool.
- Assemble clutch housing (91) to tool - LEFT HAND THREADS.
- Assemble right-angle assembly to tool - LEFT HAND THREADS.
- See clutch adjustment.

## AUTO SHUT-OFF CLUTCH

- Lubricate ball grooves of spindle (84).
- Install eleven balls (86) into groove.
- Assemble spindle into driven jaw (88), securing balls.
- Assemble twelve balls (86) into driven jaw, then secure with retaining ring (89).
- Lubricate ball pockets of driven jaw and install six balls (87) into pockets, securing with thrust race (82).
- Lubricate and assemble thrust bearing (73) and thrust race (81) to spindle.
- Coat plunger (83) with spindle oil 29665 and assemble to spindle, securing with balls (85). NOTE: Assemble two balls per hole.
- Secure balls with ball sleeve (80).
- Assemble spring (79) and guide (78) to spindle, securing with retaining rings (77).
- Install clutch spring (76).
- Lubricate face of adjustment washer (75) and install on spindle.

# DISASSEMBLY/ASSEMBLY INSTRUCTIONS

- Thread adjustment nut onto spindle, securing with snap ring (71).
- Lubricate bearing (74) with ARO 33153 grease and assemble to driven jaw, pressing on inner race of bearing.
- Assemble clutch assembly to tool.
- Assemble clutch housing (91) to tool – LEFT HAND THREADS.
- Assemble right-angle assembly to tool – LEFT HAND THREADS.
- See clutch adjustment.

## CLUTCH ADJUSTMENT

### EXTERNAL:

- Rotate sleeve (90) until opening in housing is visible.
- Rotate drive spindle of right-angle assembly until notch in adjustment washer (59 or 75) 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 and clutch assembly from tool. NOTE: Clutch housing has left hand threads.
- Clamp drive end of driven jaw in a smooth face vise, being careful not to damage driven jaw.
- Hold clutch assembly from turning, then rotate adjustment nut (72) using a 7/8" wrench.

## GEARING DISASSEMBLY

- Remove right-angle assembly and clutch assembly from tool.
- Remove ring gear using a wrench on flats.
- Remove snap ring (40) and washer (39) where applicable.
- Remove spindle(s) and gears from ring gear. NOTE: Keep gears grouped with mating spindle when disassembling double reduction gearing.
- Do not remove bearing (38) or spacer (37) unless damage is evident.
- To remove bearing (38) and spacer (37) from ring gear, press on spacer (37) from inside splined end of ring gear.
- Do not remove gear (32, 43 or 46) from carrier assembly unless damage is evident. Gears are press fit onto carrier assemblies.

## GEARING ASSEMBLY

- Assemble spacer (37) and bearing (38) into ring gear, pressing on outer race of bearing.
- Coat shafts of spindle(s) with ARO 33153 grease.
- Assemble gears and bearings (34) to shafts of mating spindle.
- Assemble carrier assembly to spindle assembly for models with double reduction gearing.
- Lubricate sets of gears liberally with ARO 33153 grease (see "Routine Lubrication Requirements", page 3).
- Assemble spindle(s) and gearing into ring gear. Rotate spindle(s) and gears to align gear teeth with splines of ring gear.
- Assemble washer (39) and snap ring (40) to spindle, where applicable.
- Thread ring gear to tool, tightening with wrench on flats.
- Assemble clutch assembly and right-angle assembly to tool.

## MOTOR DISASSEMBLY

- Remove right-angle section, clutch assembly and gearing from tool.
- Remove spacer (31), "O" ring (30) and throttle rod (21).
- Tap front edge of housing to remove motor assembly. Locating pin (29) should also come out.

- Tap splined end of rotor (25) with a soft face hammer; motor will come apart. NOTE: Bearing (28) is light press fit on rotor.
- Remove end plate (23) and bearing (22) from rotor.

## MOTOR ASSEMBLY

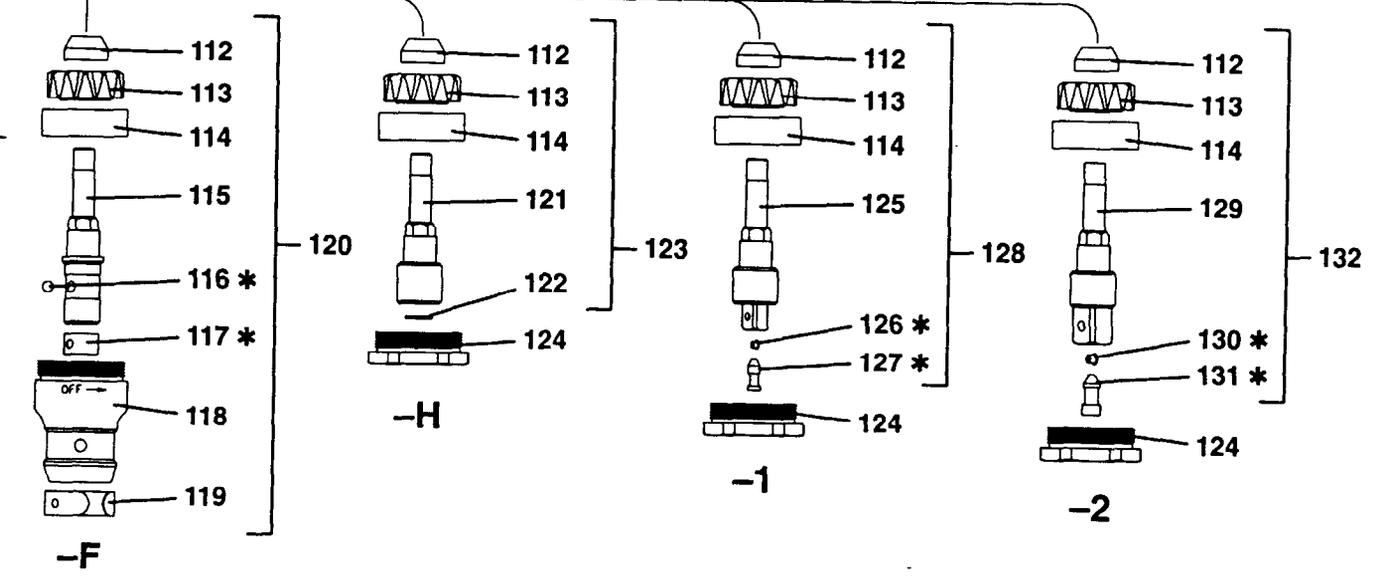
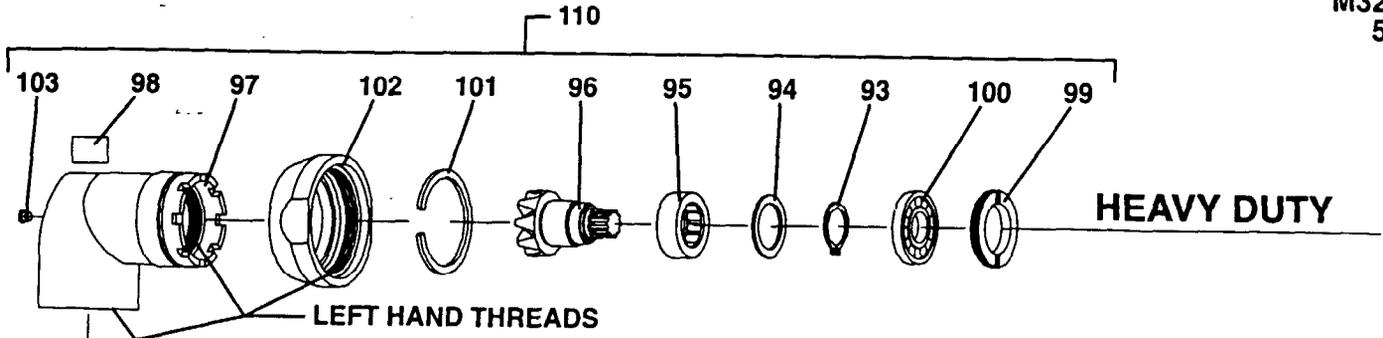
- Lubricate bearing (22) with ARO 33153 grease.
- Assemble bearing (22) to end plate (23), pressing on outer race of bearing.
- Assemble end plate (23) to rotor, pressing on inner race of bearing.
- Coat five rotor blades (24) with ARO 29665 spindle oil and assemble to rotor slots – straight side out.
- Coat i.d. of cylinder (26) with ARO 29665 spindle oil and assemble over rotor. NOTE: Air inlet slots in end of cylinder must be aligned with two air inlet holes in end plate (23).
- Assemble bearing (28) to end plate (27), pressing on outer race of bearing.
- Assemble end plate (27) to rotor, pressing on inner race of bearing. Be sure rotor turns without binding.
- Insert pin (29) into .096" 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 (29).
- Grease and assemble "O" ring (30) to end plate.
- Assemble spacer (31) to motor.
- Coat throttle rod (21) with ARO 29665 spindle oil and insert into rotor.
- Assemble gearing, clutch assembly and right-angle assembly to tool.

## HOUSING DISASSEMBLY

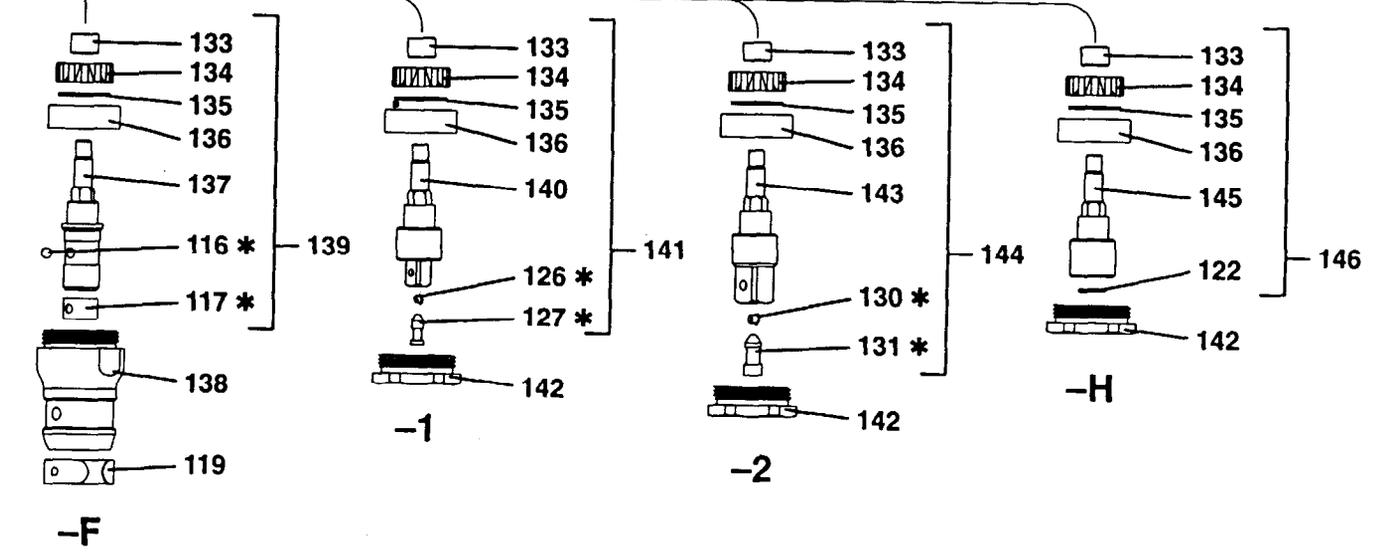
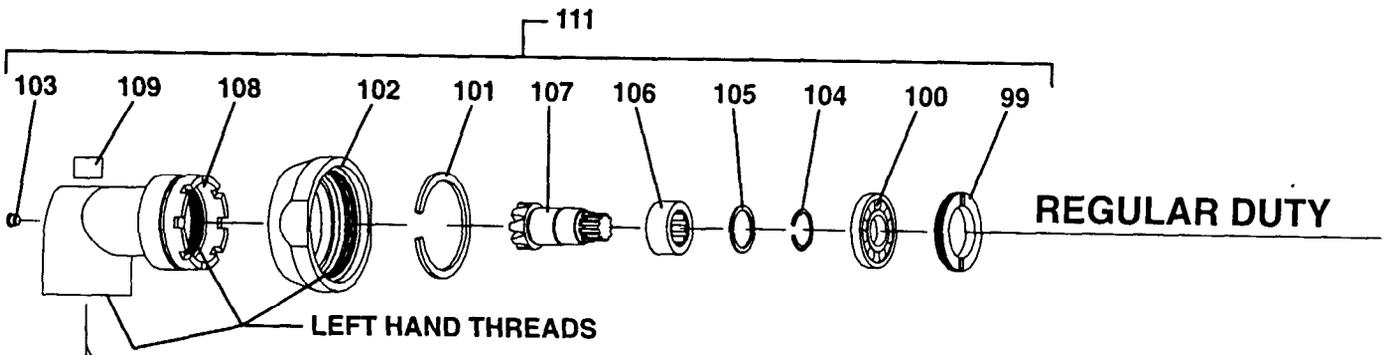
- Clamp air inlet adapter (2) in a smooth face vise.
- Unthread head (7) using a wrench on flats.
- Remove spacer (3), diffuser washer (4), exhaust cap (5) and fillers (6).
- Remove screen (1) from inlet adapter.
- Remove screw (12) and "O" ring (13), releasing spring (14) and valve stem (16).
- Clamp head (7) in a smooth face vise.
- Using a strap type wrench, unthread and remove housing (11) from head.
- Remove reverse ring (9) and "O" rings (149 and 151), allowing removal of "O" ring (10) and "O" rings (150).
- Remove valve assembly (19) and spring (20), where applicable.

## HOUSING ASSEMBLY

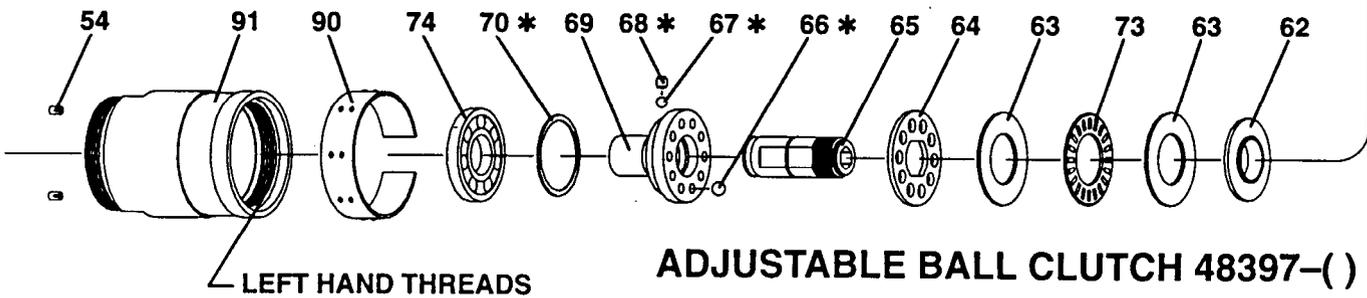
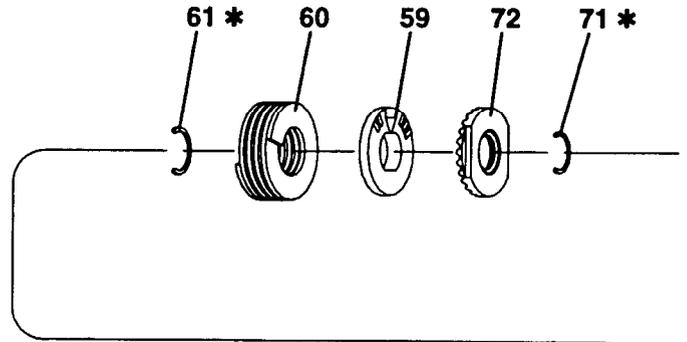
- Grease "O" ring of valve assembly (19) and assemble spring (20) and valve assembly to housing (11), where applicable.
- Grease and assemble "O" rings (10 and 150) to housing.
- Grease and assemble "O" rings (149 and 151) to reverse ring (9) and assemble reverse ring to housing.
- Grease and assemble "O" ring (8) to head.
- Assemble housing (11) to head (7), tightening with a wrench on flats of head and a strap wrench on housing.
- Grease and assemble "O" ring (15) to valve stem (16).
- Lubricate valve stem (16) with ARO 29665 spindle oil and assemble to head (7).
- Assemble spring (14) to head, securing with "O" ring (13) and screw (12).
- Install two fillers (6) to exhaust cap (5).
- Assemble exhaust cap (5) to head, aligning lever with valve stem (16).
- Assemble diffuser washer (4) and spacer (3) to head, securing with inlet adapter (2).
- Clean and replace screen (1) in inlet adapter.



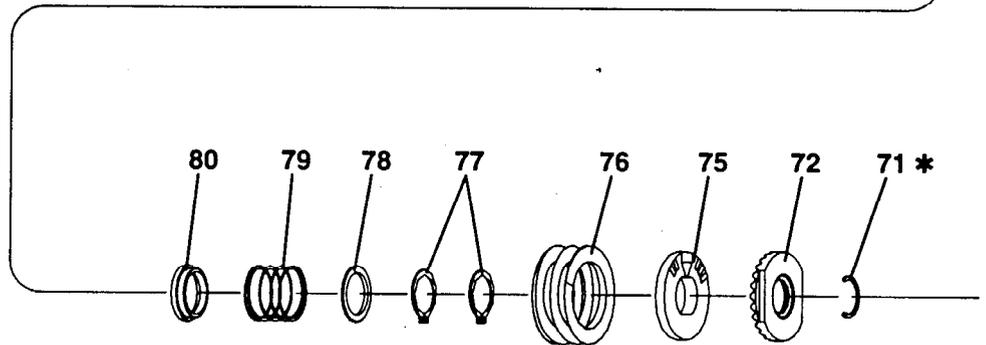
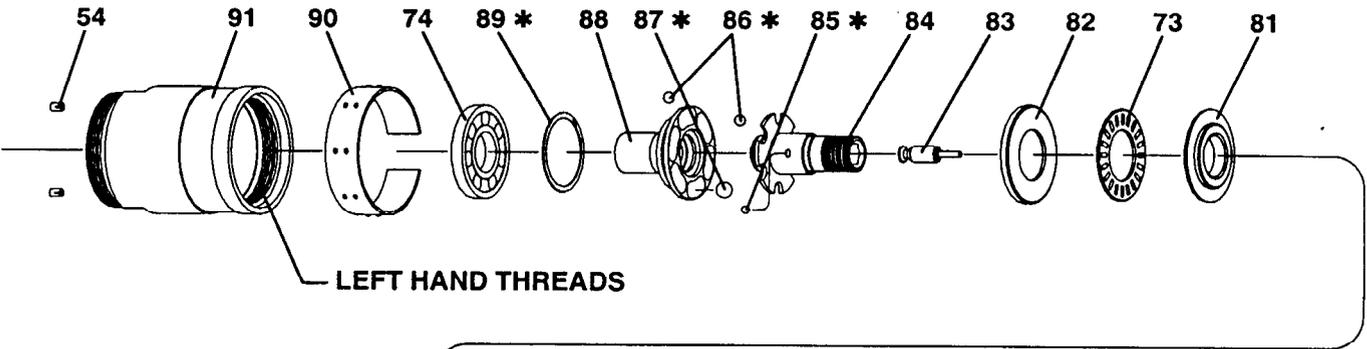
\* ITEMS INCLUDED IN SERVICE KIT NO. 48804-1.

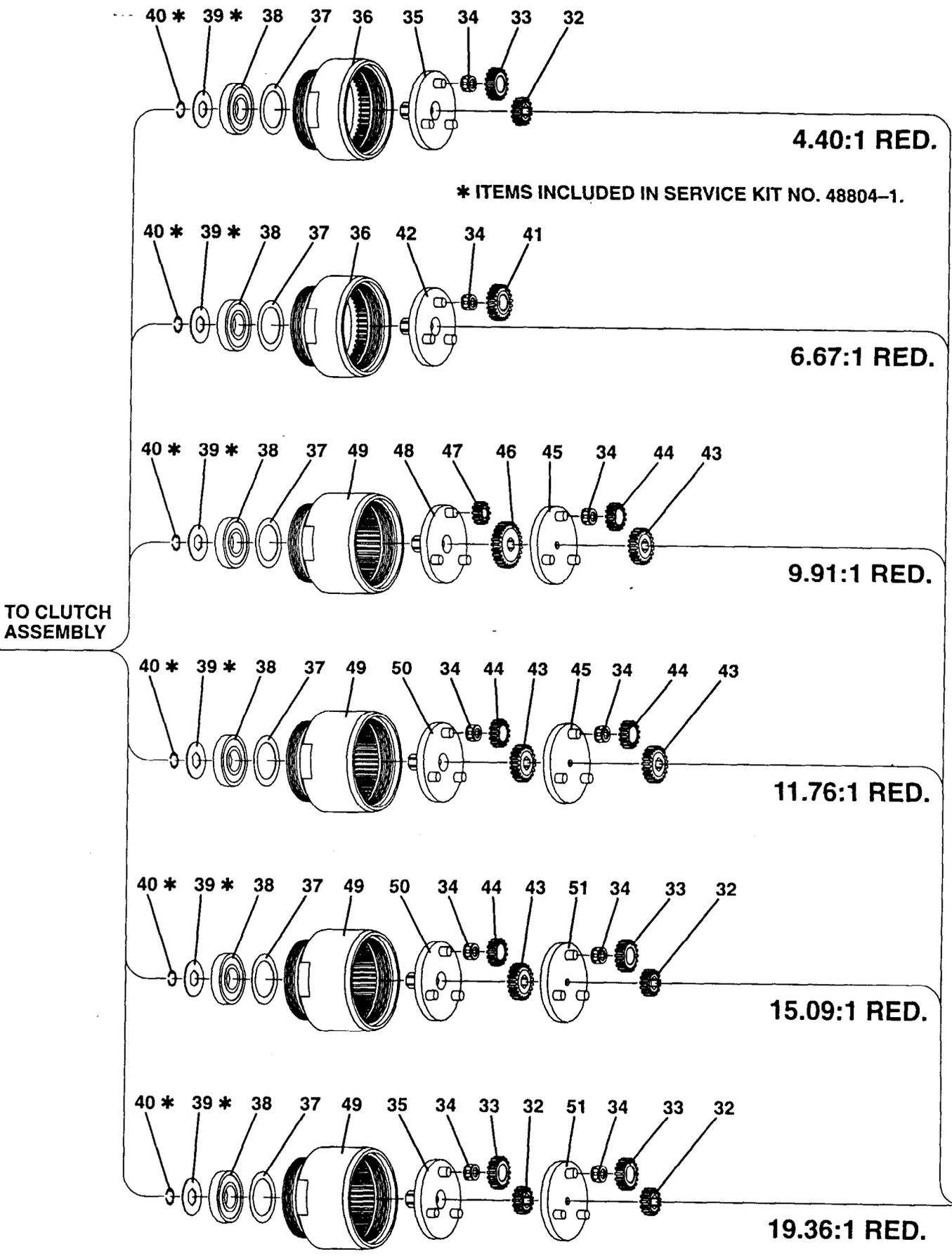


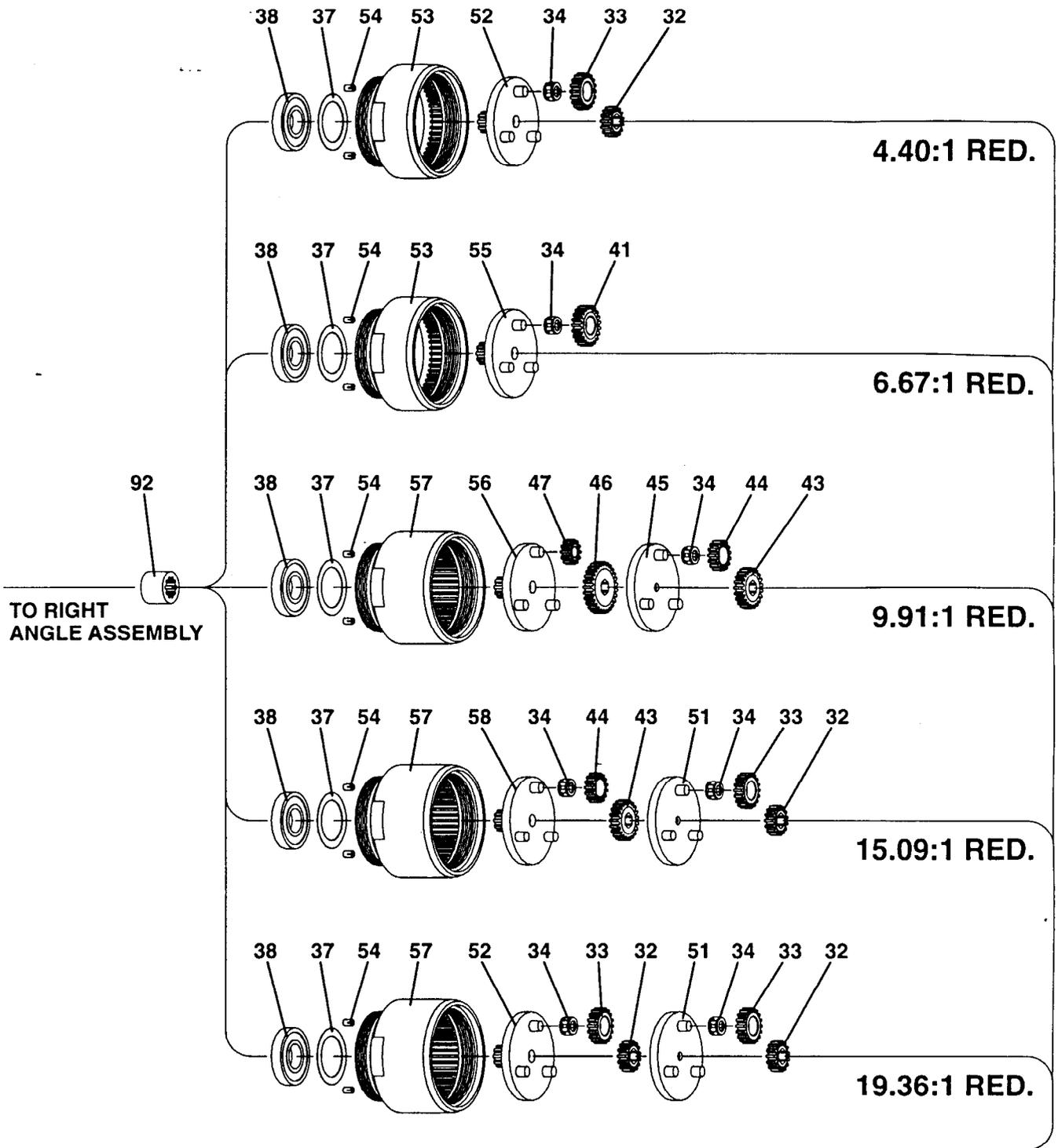
\* ITEMS INCLUDED IN SERVICE KIT NO. 48804-1.



**AUTO SHUT-OFF CLUTCH 48407-()**

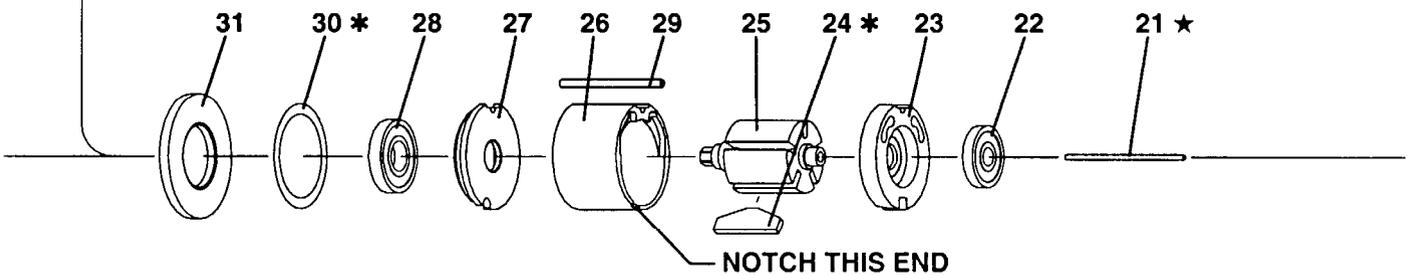






\* ITEMS INCLUDED IN SERVICE KIT NO. 48804-1.

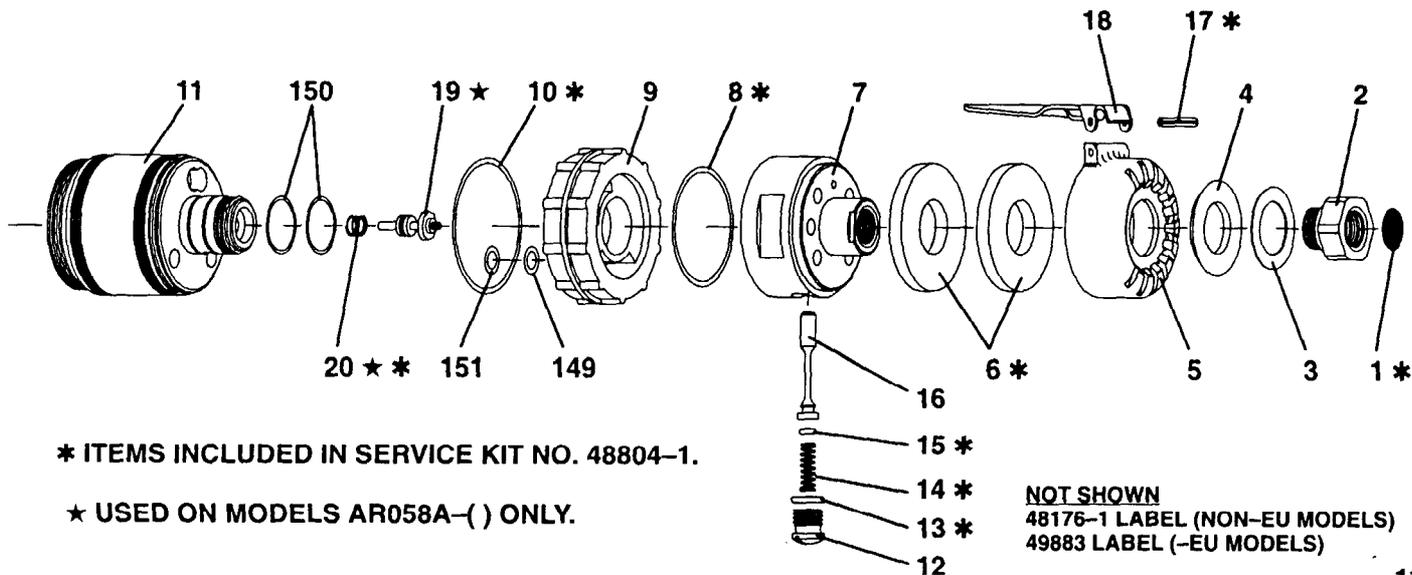
★ USED ON MODELS AR058A-( ) ONLY.



PART NUMBER FOR ORDERING

PART NUMBER FOR ORDERING

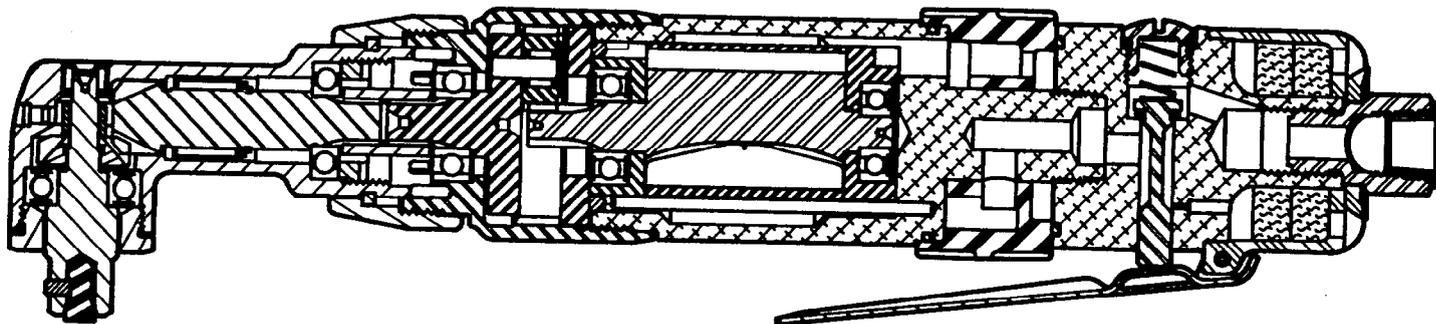
1	Screen	33911	39	Washer	47694
2	Inlet Adapter	46377	40	Snap Ring	Y142-2
3	Spacer	47139	41	Planet Gear (3 req'd) 6.67:1 ratio (21 teeth)	46901
4	Diffuser Washer	46449	42	Spindle Assembly 6.67:1 ratio	47750
5	Exhaust Cap	46448	43	Sun Gear (1 or 2 req'd) 3.43:1 ratio (21 teeth)	46465
6	Filler (2 req'd)	46452	44	Planet Gear (3 or 6 req'd) 3.43:1 ratio (teeth)	46899
7	Head	48387-1	45	Carrier Assembly 3.43:1 ratio	46521
8	"O" Ring	Y325-27	46	Sun Gear 2.89:1 ratio (27 teeth)	46464
9	Reverse Ring	48229-1	47	Planet Gear (3 req'd) 2.89:1 ratio (12 teeth)	46460
10	"O" Ring	Y325-29	48	Spindle Assembly 2.89:1 ratio	47751
11	Motor Housing (includes Roll Pin Y178-19) for standard models		49	Ring Gear (double reduction)	46467
	models AR058A-( )	48394-1	50	Spindle Assembly 3.43:1 ratio	47752
	models NR05( )B-( ) and SR05( )B-( ) for "-EU" models	48394-2	51	Carrier Assembly 4.40:1 ratio	46522
	models AR058A-( )	49950-1	52	Spindle Assembly 4.40:1 ratio	48223-1
	models NR05( )B-( ) and SR05( )B-( )	49950-2	53	Ring Gear (single reduction)	46468-1
12	Screw	37776	54	Pin (2 req'd)	Y124-61
13	"O" Ring	Y325-13	55	Spindle Assembly 6.67:1 ratio	48224-1
14	Spring	47709	56	Spindle Assembly 2.89:1 ratio	48406-1
15	"O" Ring	Y325-7	57	Ring Gear (double reduction)	46467-1
16	Throttle Valve Stem	36602	58	Spindle Assembly 3.43:1	48222-1
17	Roll Pin	Y178-28	59	Adjustment Washer	46896
18	Lever	48246-1	60	Clutch Spring (Adjustable Ball Clutch) for 600 r.p.m. models (Gray, 40 - 135 in. lbs)	46473
19	Valve Assembly (includes "O" Ring Y325-6)	48411-1		for 800 r.p.m. models (Blue, 25 - 100 in. lbs)	46728
20	Spring	47587		for 900 r.p.m. models (Blue, 25 - 90 in. lbs)	46728
21	Throttle Rod for 600 and 900 r.p.m. models (4.080" long)	46511-408		for 1100 r.p.m. models (Blue, 20 - 70 in. lbs)	46728
	for 1600 and 2400 r.p.m. models (3.570" long)	46511-357		for 1600 r.p.m. models (Yellow, 25 - 58 in. lbs)	47066
22	Ball Bearing	47724	61	Snap Ring	Y110-106
23	Rear End Plate	46312-1	62	Thrust Pad	46516
24	Blade (5 req'd)	46413	63	Thrust Washer (2 req'd)	46892
25	Rotor (see chart, page 4)		64	Ball Carrier	46515
26	Cylinder	46311	65	Spindle	48382-1
27	Front End Plate	47722	66	Ball (10 req'd)	Y16-205
28	Ball Bearing	Y65-13	67	Ball (12 req'd)	Y16-204
	MOTOR ASSEMBLY (includes items 22 thru 28)(see chart, page 4)		68	Pin	48080
29	Locating Pin	47723-1	69	Driven Jaw	48384-1
30	"O" Ring	Y325-214	70	Retaining Ring	47739
31	Spacer	46412	71	Snap Ring	Y110-105
32	Sun Gear (1 or 2 req'd) 4.40:1 ratio (15 teeth)	46466	72	Adjustment Nut	46895
33	Planet Gear (3 or 6 req'd) 4.40:1 ratio (18 teeth)	46900	73	Thrust Bearing	38995
34	Needle Bearing (3 or 6 req'd)	42315	74	Ball Bearing	Y65-12
35	Spindle Assembly 4.40:1 ratio	47753		ADJUSTABLE BALL CLUTCH ASSEMBLY (includes items 59 thru 74) for 600 r.p.m. models with GRAY spring	48397-3
36	Ring Gear (single reduction)	46468		for 800, 900 and 1100 r.p.m. models with BLUE spring	48397-2
37	Spacer	46496		for 1600 r.p.m. models with YELLOW spring	48397-1
38	Ball Bearing	Y65-13	75	Adjustment Washer	48093



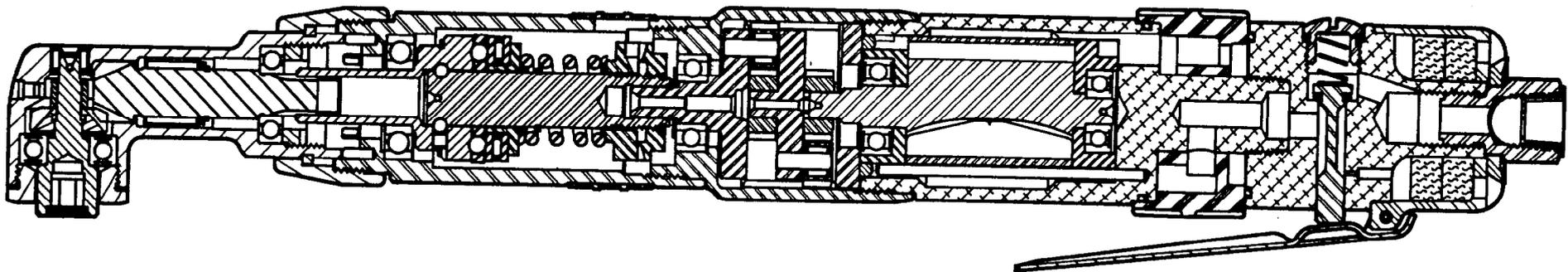
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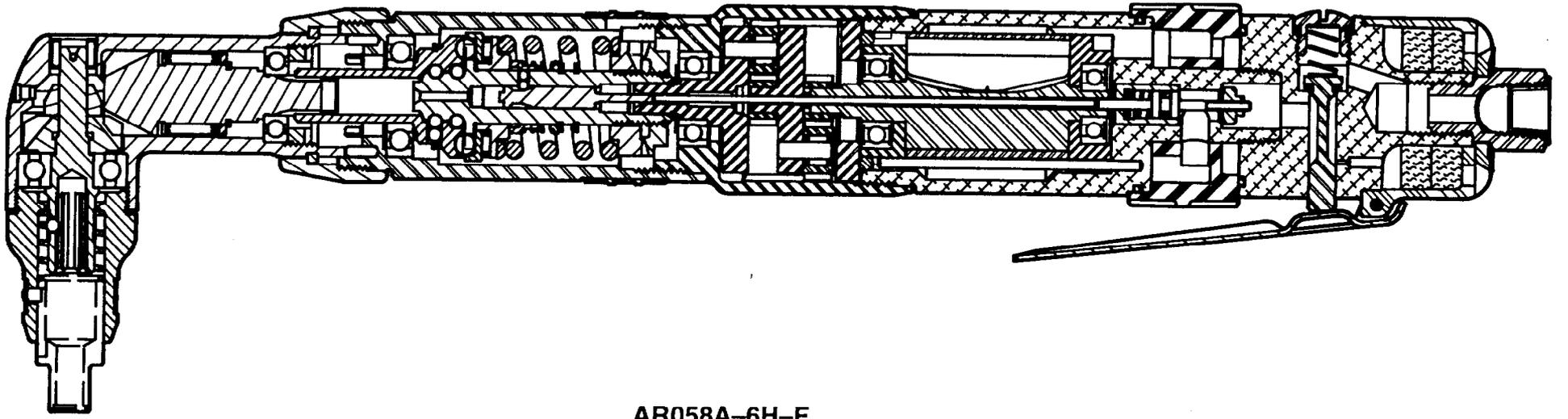
76	Clutch Spring (Auto Shut-Off Clutch) for 600 r.p.m. models (Yellow, 35 - 130 in. lbs) . . .	48047	112	Sleeve . . . . .	47601
	for 900 r.p.m. models (Brown, 25 - 90 in. lbs) . . .	48095	113	Bevel Gear . . . . .	46736
	for 1600 r.p.m. models (Green, 25 - 58 in. lbs) . . .	48096	114	Ball Bearing . . . . .	31824
	for 2400 r.p.m. models (Green, 20 - 40 in. lbs) . . .	48096	115	Spindle (1/4" hex drive) . . . . .	48379-1
77	Retaining Ring (2 req'd) . . . . .	Y145-18	116	Ball . . . . .	Y16-204
78	Guide . . . . .	48295-1	117	Ball Clip . . . . .	47695
79	Spring . . . . .	47064	118	Finder Housing . . . . .	48380-1
80	Ball Sleeve . . . . .	48294-1	119	Clip Assembly . . . . .	47782
81	Thrust Race . . . . .	48094	120	Spindle Assembly (1/4" hex drive) . . . . .	48402-1
82	Thrust Race . . . . .	48301-1	121	Spindle (1/4" hex drive) . . . . .	48375-1
83	Plunger . . . . .	48293-2	122	Retaining Ring . . . . .	38790
84	Spindle . . . . .	48299-1	123	Spindle Assembly (1/4" hex drive) . . . . .	48403-1
85	Ball (6 req'd) . . . . .	Y16-203	124	Lock Nut . . . . .	48378-1
86	Ball (23 req'd) . . . . .	Y16-204	125	Spindle (1/4" hex square drive) . . . . .	48376-1
87	Ball (6 req'd) . . . . .	Y16-206	126	Pin . . . . .	47028
88	Driven Jaw . . . . .	48386-1	127	Insert . . . . .	46749
89	Retaining Ring . . . . .	48300-1	128	Spindle Assembly (1/4" square drive) . . . . .	48404-1
	<b>AUTO SHUT-OFF CLUTCH ASSEMBLY</b> (includes items 71 thru 89)		129	Spindle (3/8" square drive) . . . . .	48377-1
	for 600 r.p.m. models with YELLOW spring . . . . .	48407-3	130	Pin . . . . .	30889
	for 900 r.p.m. models with BROWN spring . . . . .	48407-2	131	Insert . . . . .	30890
	for 1600 and 2400 r.p.m. models with GREEN spring . . . . .	48407-1	132	Spindle Assembly (3/8" square drive) . . . . .	48405-1
90	External Adjustment Sleeve . . . . .	46534	133	Sleeve . . . . .	47600
91	Housing Assembly (includes items 54 and 90) . . . . .	48396-1	134	Bevel Gear . . . . .	46735
92	Coupling . . . . .	46741	135	Washer . . . . .	47694
93	Retaining Ring . . . . .	Y145-18	136	Ball Bearing . . . . .	Y65-13
94	Spacer . . . . .	46748	137	Spindle (1/4" hex drive) . . . . .	48238-1
95	Needle Bearing . . . . .	46747	138	Finder Housing . . . . .	48239-1
96	Pinion . . . . .	46738	139	Spindle Assembly (1/4" hex drive) . . . . .	48236-1
97	Right-Angle Housing . . . . .	48230-1	140	Spindle (1/4" square drive) . . . . .	48237-1
98	Needle Bearing . . . . .	37110	141	Spindle Assembly (1/4" hex drive) . . . . .	48235-1
99	Bearing Lock Nut . . . . .	37105	142	Lock Nut . . . . .	48187-1
100	Ball Bearing . . . . .	32850	143	Spindle (3/8" square drive) . . . . .	48233-1
101	Snap Ring . . . . .	Y110-11	144	Spindle Assembly (3/8" square drive) . . . . .	48234-1
102	Lock Nut . . . . .	46745	145	Spindle (1/4" hex drive) . . . . .	48231-1
103	Grease Fitting . . . . .	35967	146	Spindle Assembly (1/4" hex drive) . . . . .	48232-1
104	Snap Ring . . . . .	Y110-5	147	Sleeve (not shown)(included in item 110) . . . . .	48193-1
105	Spacer . . . . .	46742	148	Sleeve (not shown)(included in item 111) . . . . .	48194-1
106	Needle Bearing . . . . .	48202-1	149	"O" Ring . . . . .	Y325-9
107	Pinion . . . . .	46733	150	"O" Ring (2 req'd) . . . . .	48882
108	Right-Angle Housing . . . . .	48205-1	151	"O" Ring . . . . .	Y328-9
109	Needle Bearing . . . . .	46750			
110	Right-Angle Assembly 1.33:1 ratio (includes item 147) . . . . .	48399-1		SERVICE KIT: includes items 1, 6, 8, 10, 13, 14, 15, 17, 20, 24, 30, 39, 40, 61, 66, 67, 68, 70, 71, 85, 86, 87, 89, 116, 117, 126, 127, 130 and 131 . . . . .	48804-1
111	Right-Angle Assembly 1.44:1 ratio (includes item 148) . . . . .	48212-1			



NR051B-16R-2



SR053B-24R-H



AR058A-6H-F





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