

MALABAR

INTERNATIONAL

AIRCRAFT MAINTENANCE & SUPPORT EQUIPMENT

OWNER'S MANUAL FOR MALABAR MODEL

648A

**THREE STAGE HYDRAULIC
AVIATION AXLE JACK**

**READ
AND
SAVE**

**THIS
INSTRUCTION
MANUAL**

- * GENERAL DESCRIPTION
- * OPERATION
- * SERVICE
- * PARTS BREAKDOWN

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OVER 65 YEARS OF SERVICE & EXPERIENCE

GENERAL DESCRIPTION, OPERATION, SERVICE AND PARTS BREAKDOWN

MALABAR MODEL 648A THREE STAGE HYDRAULIC AVIATION AXLE JACK

CAUTION: AIRCRAFT MANUFACTURER'S SPECIFICATIONS AND INSTRUCTIONS MUST BE FOLLOWED. IN THE EVENT OF CONTRADICTION BETWEEN AIRCRAFT MANUFACTURER'S SPECIFICATIONS AND MALABAR'S, AIRCRAFT MANUFACTURER'S SPECIFICATIONS WILL PREVAIL.

SPECIFICATIONS:

Rated Capacity-----	10 tons	(9.1 m. tons)
Side Load-----	15% of vertical load	
Low Height-----	8 inches	(203 mm)
Hydraulic Lift-----	13 inches	(330 mm)
Extension Screw-----	3.75 inches	(95 mm)
Total Extended Height-----	24.75 inches	(629 mm)
Oil Pressure at Rated Capacity-----	5140 psig	(361 kg/sq cm)
Safety Pop-off Valve set at-----	11 tons	(10.0 m. tons)
Proof Load-----	15 tons	(13.6 m. tons)
Reservoir Capacity-----	0.5 gallons	(1.9 liters)
Hydraulic Fluid-----	MIL-H-5606 or equivalent	
Approximate Jack Net Weight-----	50 lbs	(23 kg)

GENERAL DESCRIPTION:

The Malabar Axle Jack Model 648A is a 10 ton capacity three stage telescoping hydraulic jack designed primarily for use in jacking main and/or nose landing gear of various aircraft. The jack consists of a three stage cylinder assembly, hydraulic reservoir and hand pump assembly. Lifting handle is also supplied for ease of lifting the jack.

PROTECTING DEVICES:

1. A safety pop-off valve is incorporated in the jack (located in the base) to prevent lifting of loads in excess of 10 tons (9.1 m. tons).
2. The extension screw has a positive stop to prevent it from being extended beyond its safe thread engagement.

PREPARATION FOR USE:

The jack is shipped fully assembled without hydraulic fluid. Before placing jack in operation, perform the following procedures:

1. Carefully remove jack from the shipping container.
2. Remove air vent from top of reservoir.
3. Fill jack reservoir to within 1/2 inch of reservoir top surface with MIL-H-5606 hydraulic fluid or approved equivalent (reservoir capacity is approximately 0.5 gallons/1.9 liters). Jack plungers must be fully retracted before filling reservoir.
4. Open release valve located next to hand pump and operate hand pump a few strokes to bleed all air

- trapped under hand pump.
5. Close release valve and operate hand pump to raise plungers approximately 1 inch.
 6. Open release valve to retract plungers fully to bleed all air trapped under jack plungers. Close release valve.
 7. Check reservoir fluid level. Replace air vent to top of reservoir.

PRE-OPERATION INSPECTION:

Each time the jack is to be used, inspect the following:

1. Check for hydraulic fluid leaks around the base, cylinder, reservoir and hand pump.
2. Check hand pump for proper operation.
3. Check reservoir fluid level with jack plungers fully retracted.

OPERATION:

1. Position jack on a level surface under the jacking pad of the aircraft axle.
2. Raise extension screw by turning counterclockwise until screw contacts the axle jacking pad or as far as screw will travel (3.75 inches maximum).
3. Close release valve.
4. Open air vent one turn. Air vent must always be open during any phase of raising or lowering the load.
5. Operate hand pump to raise plungers until extension screw contacts the jacking pad.
6. Insure extension screw and jacking pad are correctly mated.
7. To raise the load:
 - a. The load may now be raised by operating the hand pump.
 - b. Do not lift a load greater than the rated capacity of 10 tons.
 - c. Do not attempt to raise jack plungers beyond the rated hydraulic lift (13 inches maximum).
 - d. Avoid lifting with excessive side load on jack.
 - e. Keep release valve closed at all times.
8. To lower the load:
 - a. Slowly open release valve to lower the load. The speed of lowering is controlled by the amount at which the release valve is open.
 - b. Close release valve after plungers are fully retracted.
9. Lower the extension screw by turning clockwise.
10. Close air vent. Air vent must always be closed during jack transport.
11. Cover jack when not in use to prevent entrance of contaminants and water into the cylinder.

SERVICING:

Servicing the jack consists primarily of the following:

1. When in use, the reservoir should be kept at proper level with hydraulic fluid MIL-H-5606 or approved equivalent. Always check fluid level with jack plungers fully retracted.
2. Lubricate hand pump link pins.
3. If jack has been put into storage or has not been used, the plungers must be fully extended and retracted every 90 days to exercise the seals.

DISASSEMBLY INSPECTION:

Each time the jack is disassembled, carefully inspect the following:

1. Inspect interior walls of jack cylinder, plungers and hand pump cylinder for smoothness and freedom from rust, nicks, scratches and excessive wear.
2. Inspect exterior walls of jack plungers for smoothness and freedom from rust, pits and excessive wear.
3. Check extension screw, cylinder, etc. for corrosion, wear and condition of threads.
4. Verify extension screw has a positive stop to prevent it from being extended beyond its safe thread

engagement.

5. Inspect packings, seals, gaskets and wipers in the cylinder assembly and hand pump for cuts, wear, dirt, scratches, deterioration and distortion.
6. Check oil screen located in the base for cleanliness.
7. Inspect valves and valve seats in the base for scratches, dents and proper seating of the balls.
8. Inspect all pivot pins for wear, cracks, pits or evidence of damage or pending damage.
9. Inspect all areas for excessive dirt, oil, dust and chips.

OVERHAUL INSTRUCTIONS:

No definite time schedule can be established for the overhaul of the jack for replacement of the various moving parts. The number of times the jack is raised and lowered and the amount of load raised at each operation materially affect the life of the working parts. Do not overload the jack. Overloading is dangerous, will hasten the need for overhaul and may damage the jack. During overhaul, replace all parts that do not pass disassembly inspection requirements. Regardless of apparent condition, replace all parts marked with (◆) in the parts breakdown. A repair parts kit (P/N 648APK) which contains all of the parts marked with (◆) is available and recommended to keep on hand at your facility. Coat all O-rings and back-up rings with hydraulic fluid MIL-H-5606 prior to assembly. Clean all metal parts with clean solvent and dry with compressed air. Lubricate all threads. Use teflon tape carefully on all pipe threads. Remove excess tape because it can clog valves and passages. If ball valves, located in the base, do not seat properly, they may need to be reseated by tapping the ball into the valve seat with a brass rod cupped at one end.

When necessary to disassemble/reassemble the jack, follow the instructions below for the selected components and drain all hydraulic fluid from the reservoir if necessary by removing plug (figure 1A, item 41) at end of base and turn jack on end until hydraulic fluid is completely drained.

1. Oil screen (figure 1A):
 - a. Turn jack on end opposite pump.
 - b. Remove plug (item 41) and oil screen (item 40) from base.
 - c. Check oil screen for cleanliness. Replace if necessary.
 - d. To reassemble, install oil screen and plug into base.
2. Release valve (figure 1A):
 - a. Turn jack on end opposite pump.
 - b. Remove release valve lock screw (item 39) from base.
 - c. Remove stem (item 36) and steel ball (item 31) from base. Remove and discard O-ring (item 37) from stem.
 - d. To reassemble, install O-ring on stem. Install ball, stem and release valve lock screw into base.
3. Safety pop-off valve (figure 1A):

CAUTION: THE SAFETY POP-OFF VALVE, LOCATED IN THE BASE, SHOULD NOT BE REMOVED UNLESS ABSOLUTELY NECESSARY. THE VALVE IS SET TO BY-PASS HYDRAULIC FLUID BACK TO THE RESERVOIR AT 5-10% ABOVE THE RATED CAPACITY OF 10 TONS. IF ADJUSTMENT IS REQUIRED, SEE PROCEDURE UNDER TESTING (SEE SHEET 5).

- a. Turn jack on its side.
 - b. Remove plug (item 35), set screw (item 34), spring (item 33), spring guide (item 32) and steel ball (item 31).
 - c. Remove any dirt from valve seat. Inspect seat for proper seating of ball. Reseat if necessary.
 - d. To reassemble, install ball, spring guide, spring, set screw and plug.
4. Cylinder assembly (figure 1B):
 - a. Unscrew cylinder (item 12) from base.

CAUTION: PLUNGERS ARE FREE TO SLIDE OUT OF CYLINDER. DO NOT DROP PLUNGERS AND/OR CYLINDER.

- b. Remove cylinder assembly from base.
 - c. Push assembly out of cylinder.
 - d. Remove upper snap ring (item 26) from center plunger (item 14).
 - e. Push assembly out of outer plunger (item 13).
 - f. Remove upper snap ring (item 27) from inner plunger (item 15).
 - g. Push assembly out of center plunger.
 - h. Extension screw nut (item 16) is pressed fit into inner plunger. Do not remove extension screw (item 17) and extension screw nut from inner plunger unless absolutely necessary.
 - i. Remove all lower snap rings from plungers.
 - j. Remove and discard all O-rings, back-up rings and wipers from cylinder and plungers.
 - k. To reassemble, install O-rings, back-up rings, lower snap rings and wipers onto plungers. Lubricate all O-rings with MIL-H-5606 fluid or equivalent.
 - l. Slide center plunger over inner plunger. Install upper snap ring to inner plunger.
 - m. Slide outer plunger over center plunger. Install upper snap ring to center plunger.
 - n. Install wiper into cylinder and slide cylinder over outer plunger.
 - o. Install O-ring onto cylinder and screw cylinder assembly into base.
5. Intake check valve (figure 2):
- a. Turn jack on end opposite pump.
 - b. Remove plug (item 12), spring (item 14) and steel ball (item 16).
 - c. Remove and discard O-ring (item 19) from plug.
 - d. To reassembly, install O-ring to plug. Install ball, spring and plug. Verify the pin in the plug is not pressing against the ball for it can restrict the ball movement and prevent hydraulic fluid passage through the valve.
6. Discharge check valve (figure 2):
- a. Drain all hydraulic fluid.
 - b. Unscrew reservoir screw (figure 1A, item 8).
 - c. Remove reservoir screw, screw gasket (figure 1A, item 9), reservoir (figure 1A, item 4) and reservoir gasket (figure 1A, item 5).
 - d. Discard screw gasket and reservoir gasket.
 - e. Remove plug (item 12), spring (item 13) and steel ball (item 16).
 - f. Remove and discard O-ring (item 19) from plug.
 - g. To reassemble, install O-ring to plug. Install ball, spring and plug. Verify the pin in the plug is not pressing against the ball for it can restrict the ball movement and prevent hydraulic fluid passage through the valve.
 - h. Install reservoir gasket, reservoir, screw gasket and reservoir screw. Verify reservoir sits flat on reservoir gasket.
7. Hand pump assembly (figure 2):
- a. Drain all hydraulic fluid.
 - b. Remove fulcrum (item 3) from hand pump assembly by removing cotter pins (items 15) and pump link pins (items 4).
 - c. Remove pump plunger (item 2) from pump body (item 1).
 - d. Remove capscrew (item 11), split lockwasher (item 17), pump washer (item 9), O-ring (item 7) and back-up ring (item 8) from pump plunger.
 - e. Unscrew pump body from base. Remove gasket (item 10) and wiper (item 6).
 - f. Discard all cotter pins, O-ring, back-up ring, gasket and wiper.
 - g. To reassemble, install wiper into pump body.
 - h. Install gasket and pump body into base.
 - i. Install back-up ring, O-ring, pump washer, split lockwasher and capscrew onto pump plunger.
 - j. Install pump plunger into pump body.
 - k. Install fulcrum, pump link pins and cotter pins to pump plunger and the pump link.

TESTING:

Place jack in a load indicating test fixture. Make sure the test adapter is 1/2 inch male spherical radius. Operate hand pump to extend two outer plungers fully and inner plunger partially. Make sure the extension screw and the test adapter are correctly mated. Load test the jack at rated capacity of 10 tons. If jack fails to operate properly, check for trouble as indicated in the Trouble Shooting Chart (see sheet 7). With plungers extended and supporting the load, allow the jack to stand for 10 minutes. Any excess settling indicates leakage in the hand pumps, check valves or jack packing seals. Check for hydraulic fluid leaks and replace all defective parts.

If adjustment is required for the safety pop-off valve, perform the following procedure:

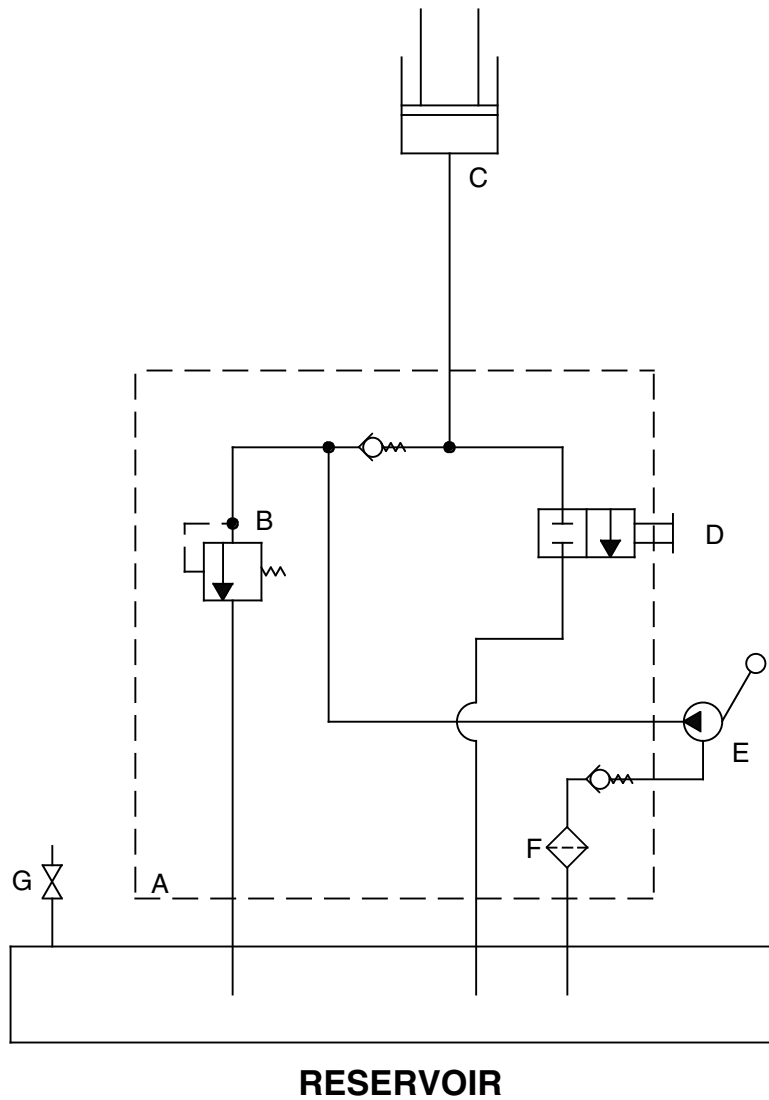
1. Remove plug (figure 1A, item 35). Close release valve (figure 1A, item 49).
2. Place jack in a load indicating test fixture. Make sure the test adapter is 1/2 inch male spherical radius. Operate hand pump to extend two outer plungers fully and inner plunger partially. Make sure the extension screw and the test adapter are correctly mated.
3. While operating hand pump, adjust set screw (figure 1A, item 34) until safety pop-off valve by-passes hydraulic fluid back to the reservoir at 10.5 to 11.0 tons.
4. Install plug (figure 1A, item 35). Once more operate hand pump to verify correct setting.
5. Open release valve to relieve pressure.

RECOMMENDED SPARE PARTS:

The following spare parts are recommended and available upon request.

<u>Part No.</u>	<u>Description</u>	<u>Qty</u>
648APK	Repair parts kit-----	1
55360	Pump assembly -----	1
55120	Air vent-----	1
55997-2	Nameplate -----	1
55989-2	Placard, tonnage, 10 ton -----	1
55490	Placard, air vent -----	1
55998-1	Sticker, Malabar -----	1
55994	Sticker, fluid -----	1
55155	Safety pop-off valve assembly-----	1
100	Release valve assembly -----	1

HYDRAULIC DIAGRAM

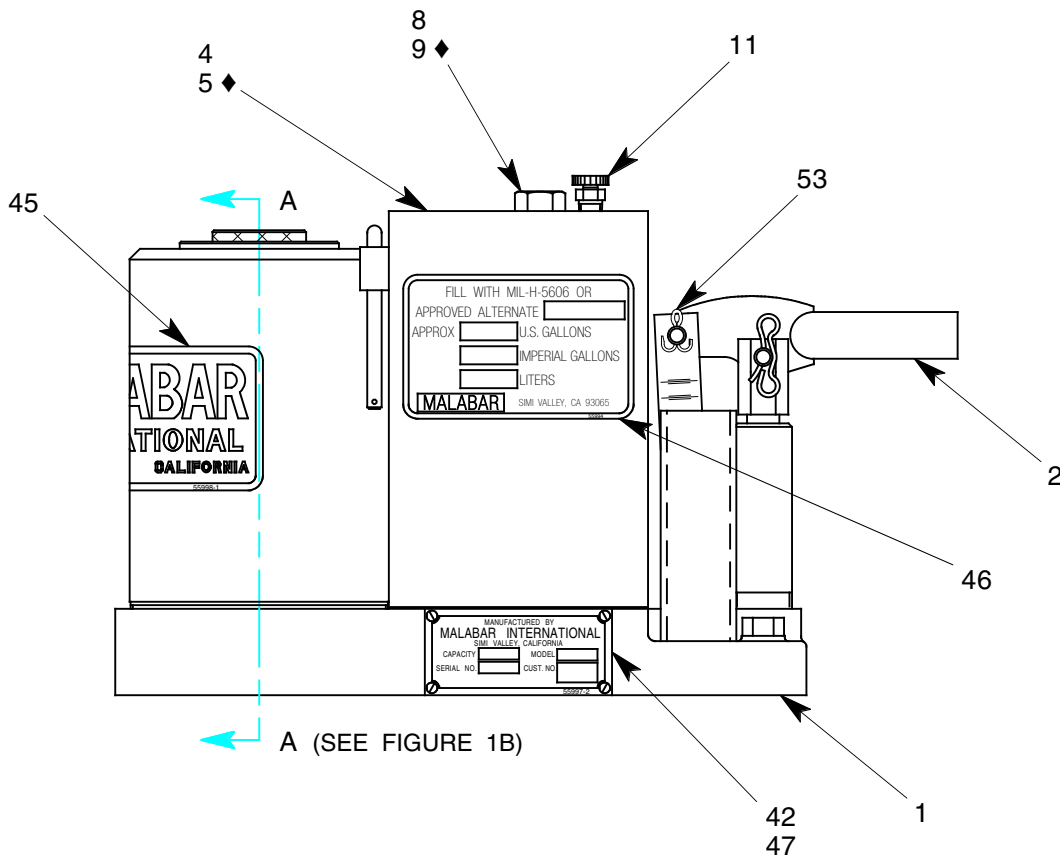
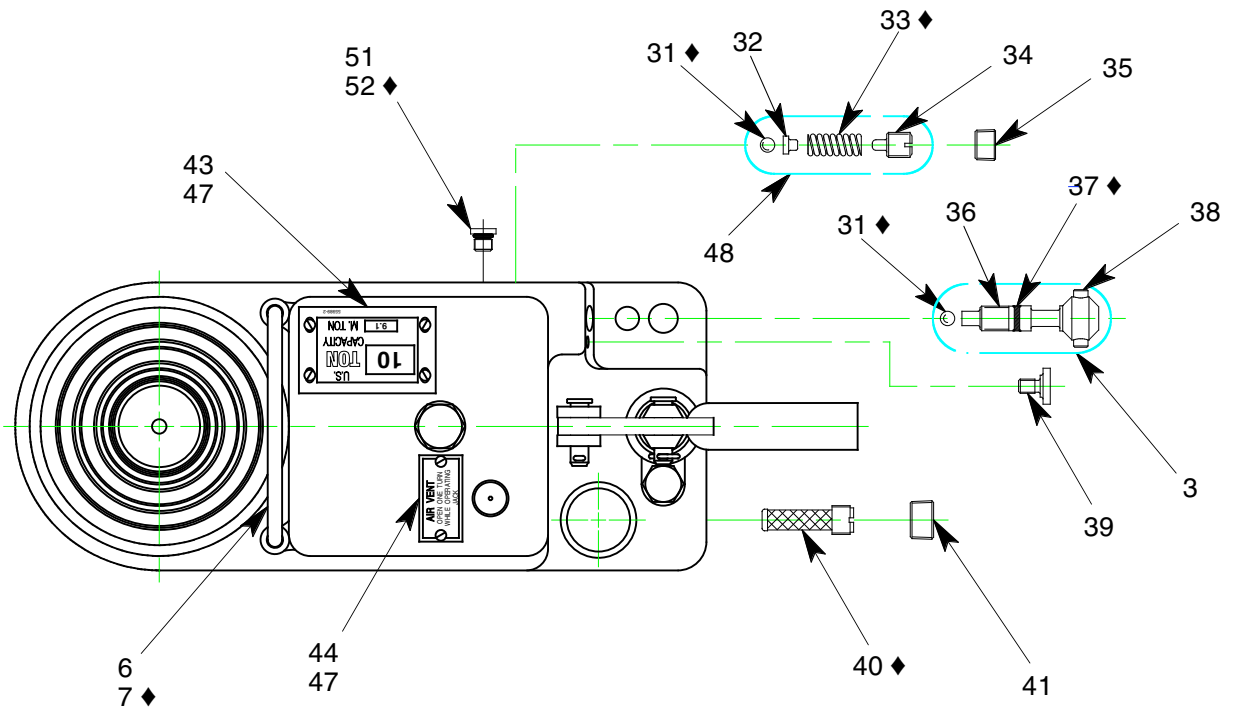


A - BASE
B - SAFETY POP-OFF VALVE
C - CYLINDER ASSEMBLY
D - RELEASE VALVE

E - HAND PUMP
F - OIL SCREEN
G - AIR VENT

TROUBLE SHOOTING CHART

TROUBLE	PROBABLE CAUSE	REMEDY
Jack will not raise.	Release valve open. (Oil passing back into reservoir.)	Close valve firmly.
	Intake valve open. (Oil passing back into reservoir.)	Pump rapidly to flush dirt off.
	Discharge valve open. (Oil passing back into pump chamber.)	Pump rapidly to flush dirt off.
	Sticking intake valve.	Remove pump from jack base. Unscrew valve block. Clean or replace valve.
	Clogged screen.	Remove and clean.
	Lack of oil. Air under plunger.	Refill. Check for leaks. Bleed air out by opening release valve. Pump rapidly a few times and close release valve.
Jack will not raise to full height.	Lack of oil.	Refill, check for leaks.
	Sticking intake valve.	Remove pump from jack base. Unscrew valve block. Clean or replace ball valves. Re-tighten or repair.
Jack will not raise capacity load.	High pressure leaks. (At pump or release valve.)	Reseat valve.
	Leaky release valve.	Reseat valve and clean valve block.
Jack raises and falls during each stroke.	Leaky discharge valve.	Tighten or replace ball valve or packing.
Jack will not hold up load.	Leaky release valve.	Reseat valve.
	Defective "O" ring and back up ring.	Remove plunger and replace "O" ring and back up ring.
Jack will not lower the load.	Damaged release valve.	Remove and replace parts as needed.
	Bent plunger.	Replace.
Jack will not close completely.	Air under plunger.	Bleed air out. Open release valve and pump rapidly several times. Close valve.
Handle stroke only partly effective.	Air in pump chamber.	Open release valve and pump rapidly several times. Close valve.
	Sticking intake valve.	Remove pump and clean valve block.
	Clogged screen.	Remove and clean.
Handle raises without effort.	Leaky intake valve.	Remove pump and clean valve block.
Handle snaps back.	Sticking intake valve.	Open release valve. Pump rapidly several times. close valve.
	Clogged screen.	Remove and clean.



♦ PART OF REPAIR PARTS KIT

FIGURE 1A

MODEL 648A 10 TON AXLE JACK

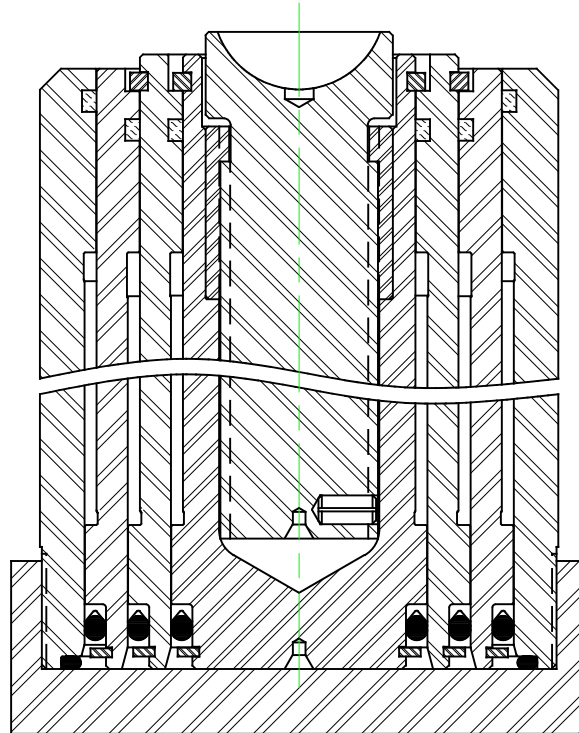
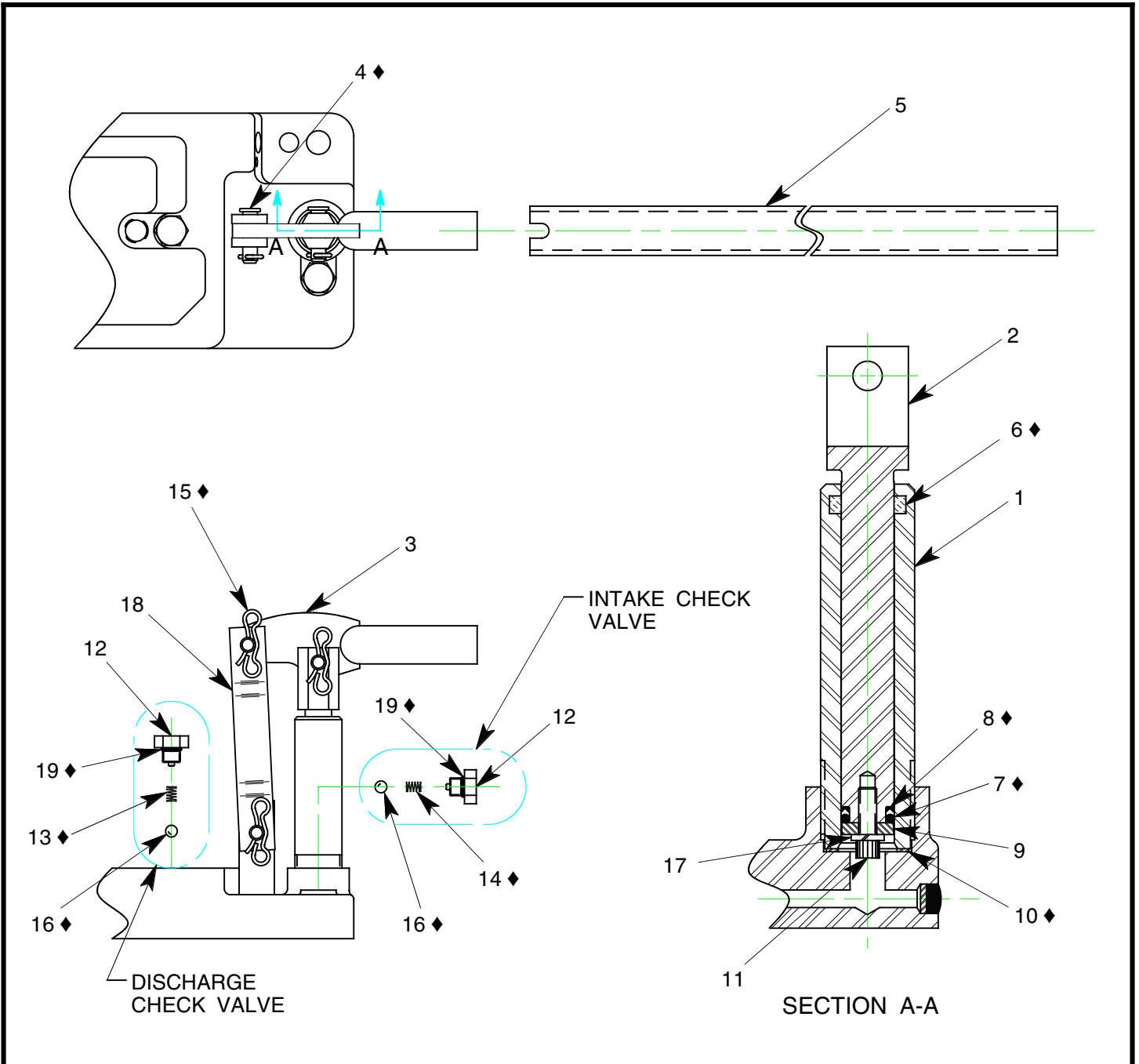


FIGURE 1B

MODEL 648A 10 TON AXLE JACK

NO.	QTY	PART NO.	DESCRIPTION	NO.	QTY	PART NO.	DESCRIPTION
1	1	64207	BASE	28	1	64211	WIPER
2	1	55360	PUMP ASSEMBLY	29	1	64231	WIPER
3	1	100	RELEASE VALVE ASSEMBLY	30	1	64251	WIPER
4	1	64803	RESERVOIR	31	2	412-004	STEEL BALL, 1/4 DIA
5	1	64205	RESERVOIR GASKET	32	1	55153	SPRING GUIDE
6	1	64288	LIFTING HANDLE	33	1	55154H	SPRING
7	2	MS16562-14	ROLL PIN, 5/64 x 7/16 LG	34	1	55148	SET SCREW
8	1	64882	RESERVOIR SCREW	35	1	717-006	PLUG, 1/4 NPT
9	1	61889	SCREW GASKET	36	1	101	STEM
10	1	55917-187	RETAINING RING	37	1	55925-011	O-RING
11	1	55120	AIR VENT	38	1	390-001	DOWEL PIN, 1/4 x 1" LG
12	1	64806	CYLINDER	39	1	870225	RELEASE VALVE LOCKSCREW
13	1	64810	OUTER PLUNGER	40	1	55567	OIL SCREEN
14	1	64830	CENTER PLUNGER	41	1	717-007	PLUG, 3/8 NPT
15	1	64851	INNER PLUNGER	42	1	55997-2	NAMEPLATE
16	1	64852	EXTENSION SCREW NUT	43	1	55989-2	PLACARD, TONNAGE, 10 TON
17	1	64853	EXTENSION SCREW	44	1	55490	PLACARD, AIR VENT
18	1	371-039	ROLL PIN, 1/4 x 1/2 LG	45	1	55998-1	STICKER, MALABAR
19	1	55925-241	O-RING	46	1	55994	STICKER, FLUID
20	1	55925-340	O-RING	47	10	397-005	SELF TAPPING SCREW, #4
21	1	55902-43	BACK-UP RING	48	1	55155	SAFETY POP-OFF VALVE
22	1	55925-334	O-RING	49	1	55917-262	RETAINING RING
23	1	55902-37	BACK-UP RING	50	1	55924-337	RETAINING RING
24	1	55925-328	O-RING	51	1	717-076	PLUG, 1/8 SAE SOCKET HEAD
25	1	55902-31	BACK-UP RING	52	1	MS28778-2	O-RING
26	1	64043	SNAP RING	53	1	372-001	COTTER PIN, 3/32 x 3/4 LG
27	1	64063	SNAP RING				



◆ PART OF REPAIR PARTS KIT

FIGURE 2

55360 PUMP ASSEMBLY

NO.	QTY	PART NO.	DESCRIPTION	NO.	QTY	PART NO.	DESCRIPTION
1	1	55362	PUMP BODY	11	1	323-016	SHCS, #10-32UNF x 1/2 LG
2	1	55364	PUMP PLUNGER	12	2	64889	PLUG
3	1	55001	FULCRUM	13	1	64198	SPRING
4	3	55002	PUMP LINK PIN	14	1	64197	SPRING
5	1	61878	PUMP HANDLE	15	3	372-028	BOWTIE COTTER PIN
6	1	55363	WIPER	16	2	412-004	STEEL BALL, 1/4 DIA
7	1	55925-110	O-RING	17	1	363-009	SPLIT LOCKWASHER, #10
8	1	55900-8	BACK-UP RING	18	1	55615	PUMP LINK
9	1	55367	PUMP WASHER	19	2	55908-3	O-RING (PART OF ITEM 12)
10	1	55361	GASKET				