

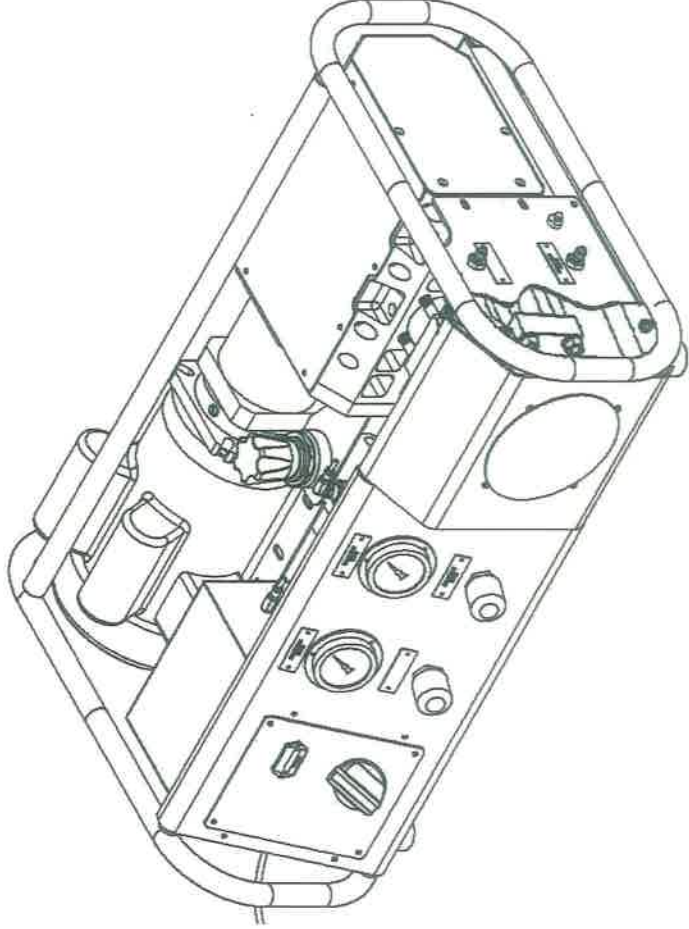


HYDRAULICS INTERNATIONAL, INC.

**OPERATION AND
MAINTENANCE INSTRUCTIONS**

FOR

**ELECTRIC GAS BOOSTER
Ratio 30:1**



HYDRAULICS INTERNATIONAL, INC

Address: 20961 Knapp St, Chatsworth, CA 91311

Website: www.hiigroup.com Phone: (818) 407-3400

MAINTENANCE INSTRUCTIONS

1-1 GENERAL

1-1.1 This chapter contains maintenance instructions for 30:30 RATIO Gas Booster system.

1-2. PERIODIC MAINTENANCE

1-2.1 BASIC SYSTEM MAINTENANCE

All components are protected by a 5-10 micron particle filters. If clean, dry supply gas can be assured, particle accumulation in these filters to the point of measurable pressure drop will not require extensive long-term daily use. Element replacement annually may be justified. This is to be more precisely determined upon inspection 12 months after startup. The Gas Booster consists of different components which are exposed to high pressure gas. Conditions such as frequency of usage, condition of the gas supply, cycle rate, pressures, or any other conditions detrimental to seal life will determine the level of maintenance required.

1-2-2. MODERATE TO HEAVY USE MAINTENANCE

When any assembly is dismantled, it is recommended it be cleaned with a residue-free, approved GAS-compatible agent to ensure they are oil, grease and dust free. See Table 1-1 for maintenance actions and Table 1-2 for troubleshooting assistance.

WARNING

Ordinary oils and greases contain hydrocarbons which may react violently in the presence of GAS. Any foreign material permitted to enter the booster circuit may also ignite spontaneously in high GAS concentrations. Cotton particles and "fluff" from cleaning rags should be prevented from remaining on components prior to reassembly. A blow gun with clean oil-free nitrogen is recommended to help prevent particles from remaining on components during reassembly.

1-3 REPAIR PROCEDURES

Only the 30:1 high pressure gas sections and inlet/outlet filters are authorized for disassembly and part replacement. Seals within the high pressure gas sections may require periodic replacement. All other components may not be replaced in the field and require that the entire Gas Booster be returned to the factory or qualified depot facility for authorized repair.

1-3.1 REMOVAL OF HIGH PRESSURE GAS SECTION(S)

Perform the following steps to remove the 30:1 high pressure gas sections and inlet/outlet filters (see Figures 1-1 and 1-2):

WARNING

1. *Make sure all power to the Gas Booster is off.*
2. *Verify the Gas Booster system has been depressurized and all gas sources have been safely removed.*
 - a) Remove the fan guard plate screws (4x) using a Phillips-head screwdriver.
 - b) Disconnect the cooling fan plug and then remove the cooling fan from the front of the unit. This exposes the 30:1 gas sections for removal.
 - c) Detach the hex nuts securing the four vent tubing connections at the top and bottom to 30:1 gas sections using a 9/16-inch wrench.
 - d) Remove each gas section using a 3/8-inch wrench to remove hex nuts (4x), and washers. The gas section should lift out from the front. Retain mounting hardware.
 - e) Place the gas section units on a workbench for disassembly.
 - f) Lift away the end plate to expose the gas seals.
 - g) Replace gas section seals in accordance with Table 1-3. Lubricate seals when reassembling booster assemblies.

1-4.1 DISASSEMBLY OF 30:1 GAS SECTION

Perform the following steps (see Figure 1-2 and reference drawing 132308-110):

- a) Remove end cap (13) and detach O-ring (33) and backup rings (34).
- b) Remove the heat sink (36) with rods (37) attached.
- c) Push the rod (15) through the gas barrel (11) and remove both from the end cap side. The following items are attached to the rod and also come out: nut (5), Belleville springs (4), spacer (6), O-ring (10), seal (7), backup seal (3), bearing (9) and piston (8).
- d) Remove cotter pin (17) from the rod (15).
- e) Remove the bracket (12) from the barrel (27) and detach O-ring (29) and backup ring (30). The following attaching items are also attached and are removed: retaining ring (14), ring (35), O-ring (28), seal (24), and bearing (2).
- f) Remove the wear ring (1), and bearings (25 and 26) from the barrel (27).

1-4.2 ASSEMBLY OF 30:1 GAS SECTION

Perform the following steps (see Figure 1-2 and reference drawing 132308-110):

- a) Install the wear ring (1), and bearings (25 and 26) to the barrel (27).
- b) Install the O-ring (29) and backup ring (30) to the bracket (12). Install additional items between the bracket (12) and barrel (27): retaining ring (14, ring (35), O-ring (28, seal (24), and bearing (2).
- c) Install the cotter pin (17) to the rod (15).
- d) Push the rod (15) through the gas barrel (11) from the end cap side. The following attaching items also should be attached to the rod (15): nut (5), Belleville springs (4), spacer (6), O-ring (10), seal (7), backup seal (3), bearing (9) and piston (8). If replacement seals are required, install items from the seal kit referenced in Table 3-3 and section 1-5.
- e) Install the heat sink (36) with attached rods (37).
- f) Reinstall the end cap (13) with O-ring (33) and backup rings (34).

- g) Install flat washers (38), lock washers (39) and nuts (40).

NOTE

Torque nuts (40) to 30 foot-pounds in a crisscross pattern.

1-4.3 ASSEMBLY OF 30:1 INLET CHECK VALVE

Perform the following steps (see Figure 1-3 and reference drawing 132308-110):

- a) Insert O-ring (23) into cavity of the end cap (13).
- b) Assemble Cage (18) to the Ring (19) and secure spring (16) on the Cage (18)
- c) Insert complete assembly cage (18), ring (19) and spring (16) into cavity of the end cap (13) with spring (16) facing downward
- d) Carefully place small spring (20) upright into cage assembly

NOTE

Before installation of seat (22) and ball (21), make sure to tap ball (21) onto seat (22) to form a slight chamfer

- e) Carefully place ball (21) on top of small spring (20) and make sure spring (20) remains in upright position
- f) Place seat (22) onto retainer (31) by using a straight thin object such as stick to guide the seat (22) into retainer (31). Make sure seat (22) is secured. If needed, apply small amount of Krytox (or equivalent). See Figure 1-3.
- g) Tighten retainer (31) in a clock-wise rotation using tool (P/N 80844-100).

1-4.4 ASSEMBLY OF 30:1 OUTLET CHECK VALVE

Perform the following steps (see Figure 1-4 and reference drawing 132308-110):

- a) Insert O-ring (23) into cavity of the end cap (13).

- Note: Before installation of seat (22) and ball (21), make sure to tap ball (21) onto seat (22) to form a slight chamfer
- b) Carefully place ball (21) on top of the seat (22)
 - d) Assemble Cage (18) to the Ring (19) and secure spring (16) on to Cage (18)
 - e) Carefully place small spring (20) inside cage assembly, cage (18), Ring (19) and spring (16)
 - g) Use paper clip or similar to guide and position cage assembly and spring (20) into end cap (13) outlet cavity. Make sure spring (20) remains in upright position. See Figure 1-4.
 - h) Tighten retainer (32) in a clock-wise rotation using tool (P/N 80844-100).

1-4.5 DISSASSEMBLY OF 30:1 SEAL

Perform the following steps (see Figure 1-5 & 1-6 and reference drawing 132308-110):

- a) Remove Cotter Pin (17) to free Piston Nut (5)
- b) Remove Piston Nut (5) using a wide flat screw driver by rotating it counter clock wise
- c) Remove six Belleville Springs (4), spacer (6), O-ring (10), seal (7), backup (3), Rod Bearing (9) and piston (8)

1-4.6 ASSEMBLY OF 30:1 SEAL

Perform the following steps (see Figure 1-6, 1-7, 1-8, & 1-9 and reference drawing 131947-110):

- a) Slide Piston (8) into Rod (15)
- b) Insert Rod Bearing (9) and Backup (3)
- c) Carefully slide seal (7) with flat surface facing backup (3)
- d) Insert O-ring (10) inside the seal (7) inner lip and follow with spacer (6)
- e) Assemble Belleville Springs (4) in pairs with flat surface towards each other to create a spring like feature (see Figure 1-7)
- f) Repeat step (e) for the 2nd and 3rd pair of Belleville Springs (4), total of six are required
- g) While keeping Belleville Springs (4) aligned and centered with hand, place

Piston Nut (5) on top and tighten it by turning clockwise using a wide flat screw driver (see Figure 1-6)

- h) Tighten Piston Nut (5) using a wide fat screwdriver until it stops and bottoms out. Turn slightly counter clockwise to align holes in rod (15) for the cutter pin (17)
- i) Insert Cutter Pin (17) with longer pin facing up (see Figure 1-8)
- j) Use Needle Nose pliers to pull Cutter Pin (17) through the hole in rod (10). Bend long pin upward 90 degrees (see Figure 1-9) and cut it flush to the piston rod (5).

NOTE

Cutter Pin (17) should not be visible from any angle on the Piston Nut (5). All surfaces from the Piston Nut (5) must not be exposed to the cutter Pin (17)

1-5 INSTALLATION OF HIGH PRESSURE GAS SECTION(S)

Perform the following steps to install the 30:1 high pressure gas sections

- a) Re-install one or both gas sections through the front of the unit using a 3/8-inch wrench.
- b) Re-install four hex nuts and retained washers at the end mounting plate. Secure each of the nuts at the rod using a 3/8-inch wrench.
- c) Re-install metal vent tubing attaching to the gas section inlet/outlet ports using a 9/16-inch wrench.
- d) Replace the cooling fan on the unit and reattach plug.
- e) Secure the metal fan guard plate with screws and mounting hardware (4x).

1-6 CLEANING

Clean exterior of gas booster with alcohol to remove any oil, grease, or dirt. Minor scratches may be removed with a non-abrasive polishing compound.

1-7 INSPECTION AND REPAIR

- a) Inspect polished surfaces of gas barrel and bearing for scratches or corrosion.

- b) Inspect all fittings for damaged threads, cracks, or nicks. Report any damaged fittings to manufacturer for disposition.
- c) The O-ring manufacturer recommends all O-rings be replaced after disassembly to ensure proper sealing and operation. Seal kits are listed with individual assembly parts lists. If it is necessary to use existing O-rings, inspect for cuts, nibbling, or distortion before installing

1-8 RECOMMENDED SEAL KITS

In general, periodic seal replacement without symptoms indicating excessive wear or leakage is not recommended. See Table 3-3 for recommended seal kits.

1-9 RETURN OF DEFECTIVE PARTS

If disassembly and repair is indicated for any component including tubing, fittings, hoses or booster pumping sections, check valves or interstage tubing, the user should contact HII for current recommended cleaning compounds and procedures for GAS level cleanliness, or call for a return material authorization number (RMA) and ship the entire unit to HII, Chatsworth, California, 91311. Attention: Service Dept.

TABLE 1-1. MAINTENANCE ACTIONS (MODERATE TO HEAVY USE)

PERFORMANCE INTERVAL	MAINTENANCE ACTION
Before/after each use	<ol style="list-style-type: none"> 1. Perform overall visual check of system. 2. Clean GAS cylinder connections
Every 3-6 months	<ol style="list-style-type: none"> 1. Check high pressure boost system for GAS leaking from vents, external leakage, and overall performance. 2. Check tie rod bolts, relief valve and pressure switch lock nuts for loosening.
Every 6-months	<ol style="list-style-type: none"> 1. Test all pressure gauges 2. Inspect and clean/replace GAS filters
Every 12-months	<ol style="list-style-type: none"> 1. Inspect piping at full system pressure 2. Test relief valve
Every 500 hrs of use (severe usage)	<ol style="list-style-type: none"> 1. Reseal high pressure boost system
Every 2,000 hrs of use (normal usage)	

TABLE 1-2. TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	MAINTENANCE ACTION
Audible gas leak detected	<ol style="list-style-type: none"> 1. Gas seal damage 	<ol style="list-style-type: none"> 1. Place finger over open inlet/outlet port to verify gas leak (or use soapy water). 2. Detach vent lines from gas section. 3. Remove gas section and replace faulty seals. 4. Replace inlet or outlet filters, as required
Output less than expected	<ol style="list-style-type: none"> 1. Inlet or outlet check valve leakage 2. Gas piston seals worn 	<ol style="list-style-type: none"> 1. Examine O-ring seals, ball, and seat for damage or contamination. Replace damaged parts 2. Inspect bearing and gas barrel for scoring

TABLE 1-3. RECOMMENDED SEAL KITS

Part No.	Ref. Dwgs	Description	Qty
SK2G-34V	132308-111	Gas section	2

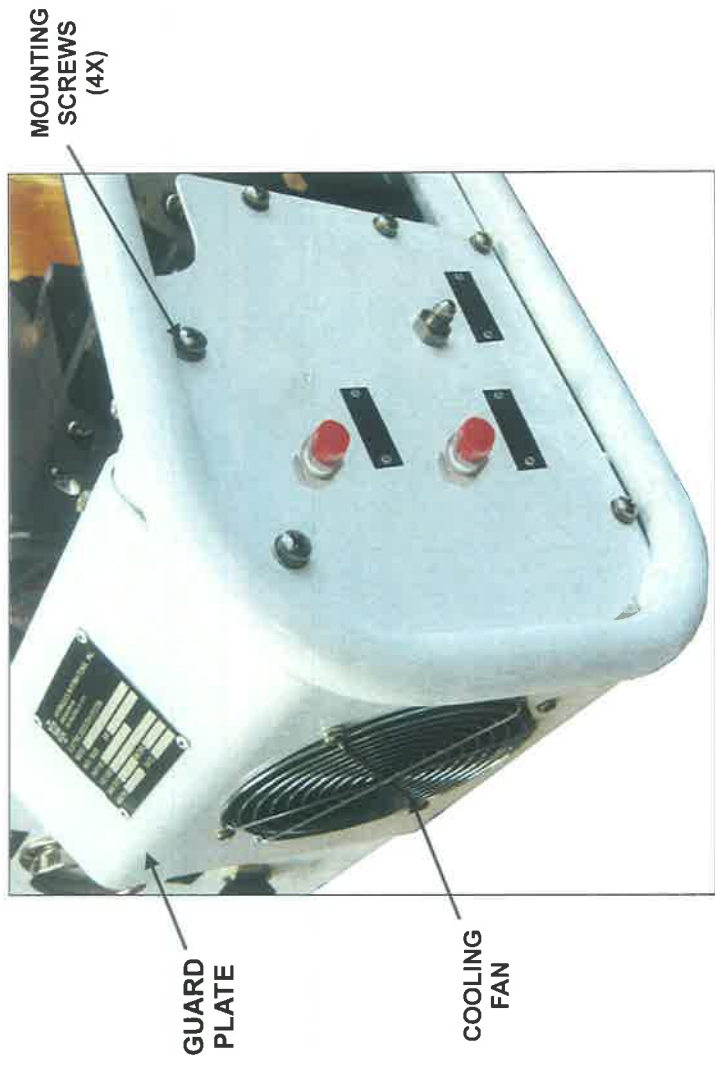


FIGURE 1-1. COOLING FAN REMOVAL

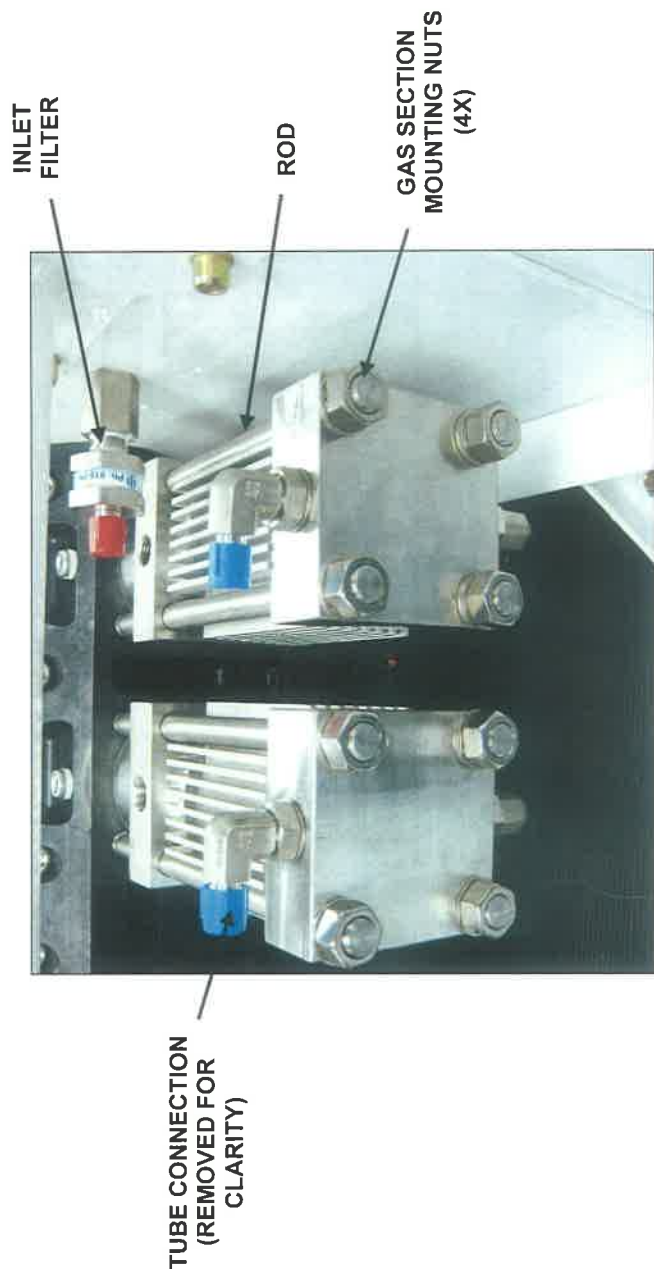
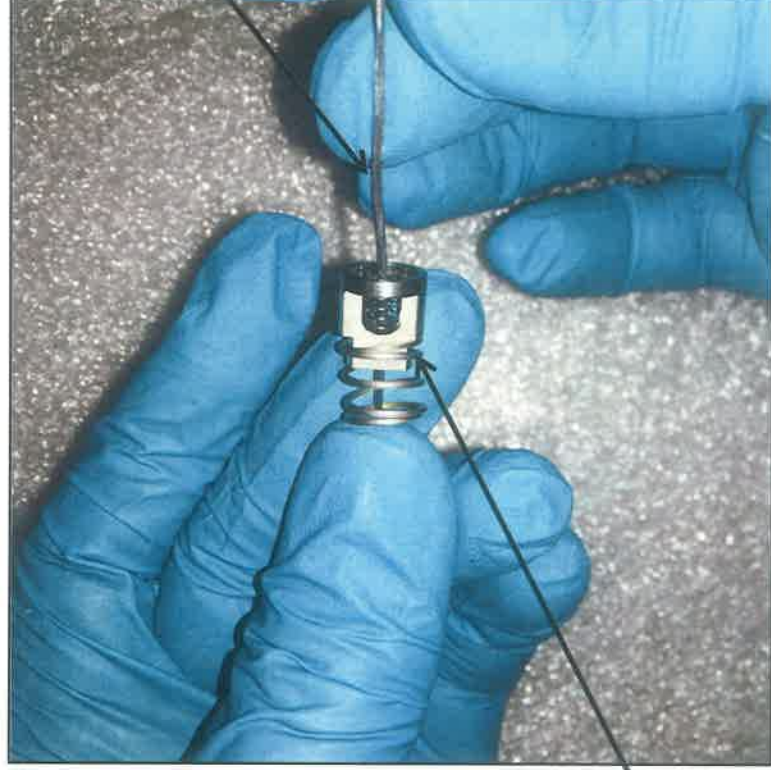


FIGURE 1-2. GAS SECTION REMOVAL (TUBES REMOVED FOR CLARITY)



GUIDE FOR
SEAT &
RETAINER

FIGURE 1-3. INLET CHECK VALVE ASSEMBLY



GUIDE FOR
CAGE
ASSEMBLY

CAGE
ASSEMBLY

FIGURE 1-4. OUTLET CHECK VALVE ASSEMBLY

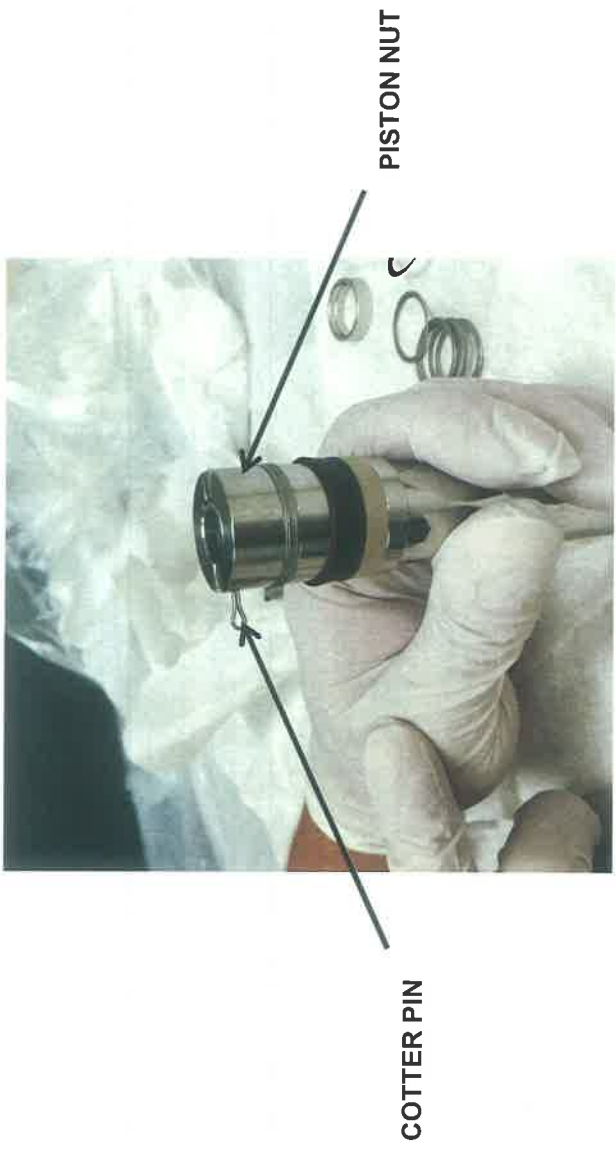


FIGURE 1-5. REMOVAL OF COTTER PIN

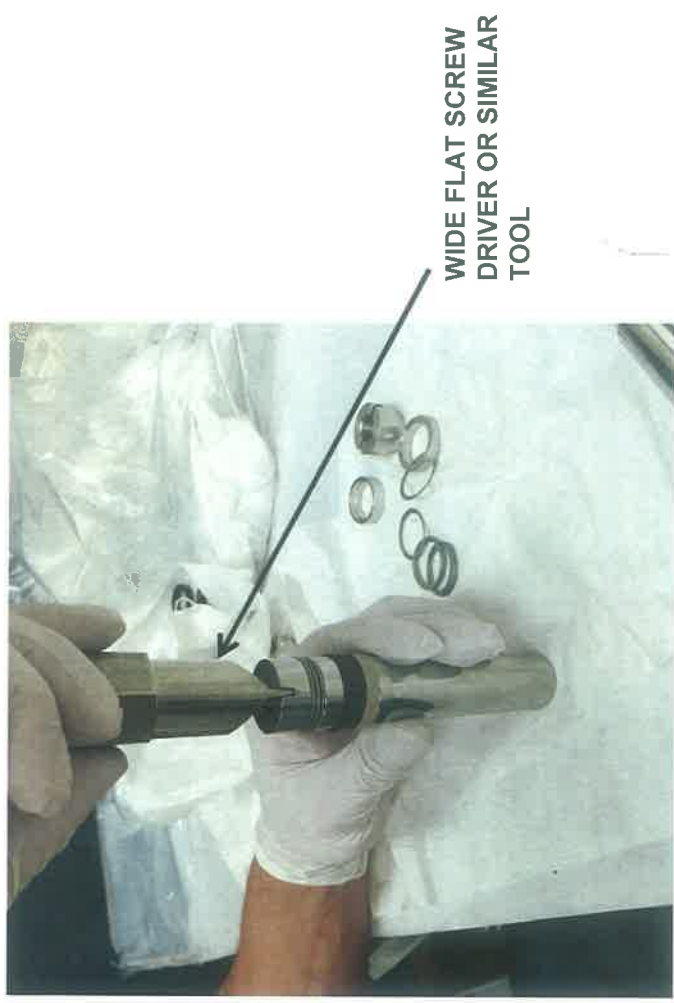


FIGURE 1-6. REMOVAL OF PISTON NUT



FIGURE 1-7. ASSEMBLY OF BELLEVILLE SPRINGS

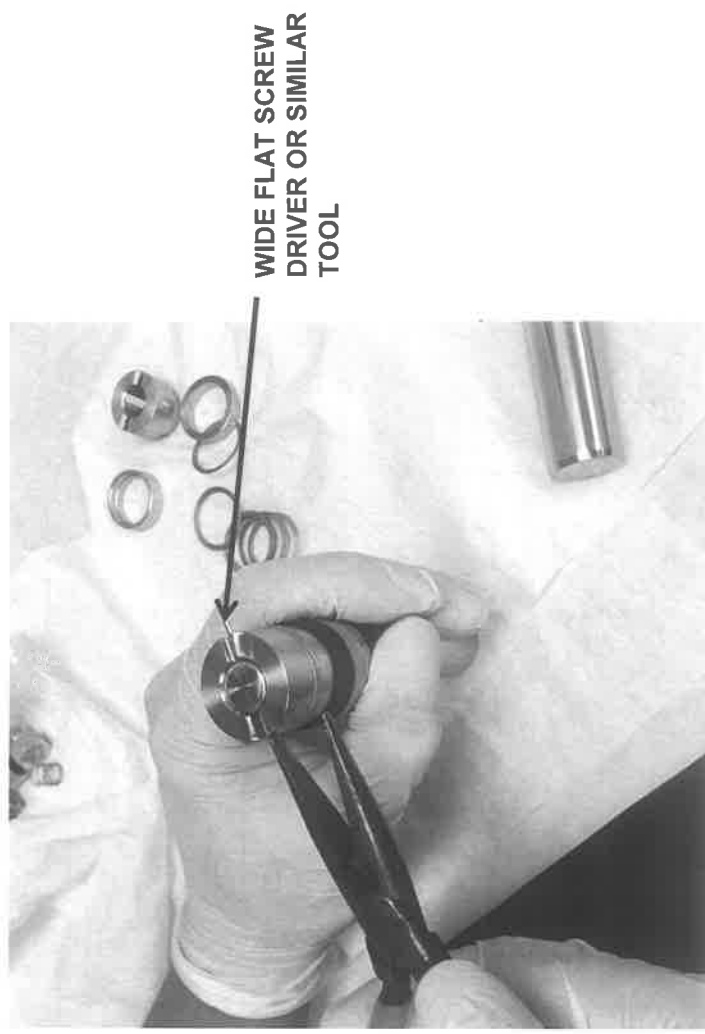


FIGURE 1-8. ASSEMBLY OF COTTER PIN WITH LONGER PIN FACING UP



FIGURE 1-9. COTTER PIN BENT UPWARD 90 DEGREES

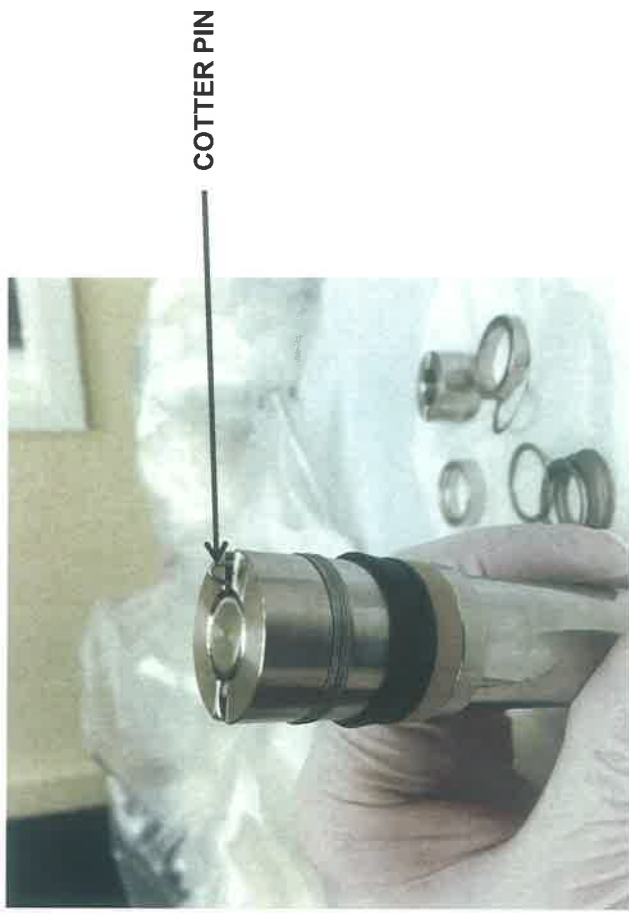


FIGURE 1-10. COTTER PIN BENT INTO A LOOP



FIGURE 1-11. REMOVAL OF INLET GAS FILTER



FIGURE 1-12. REMOVAL OF OUTLET GAS FILTER

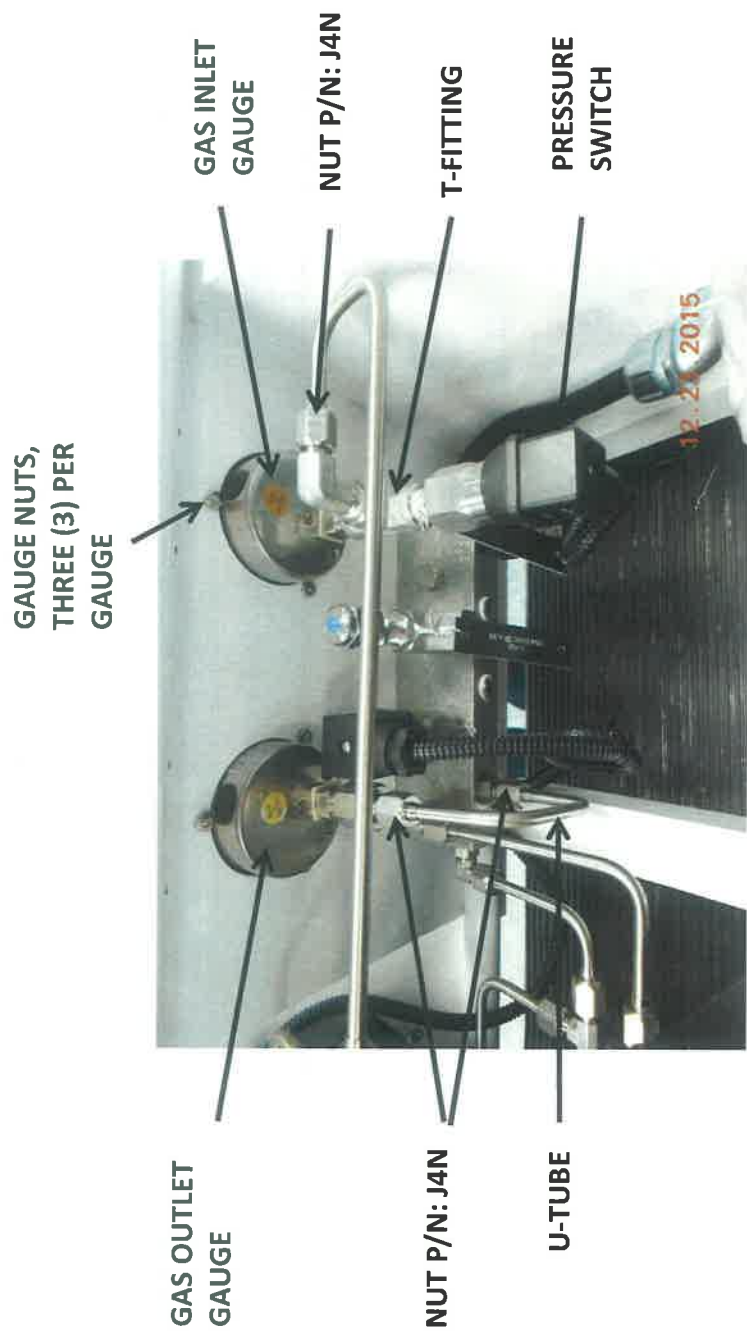
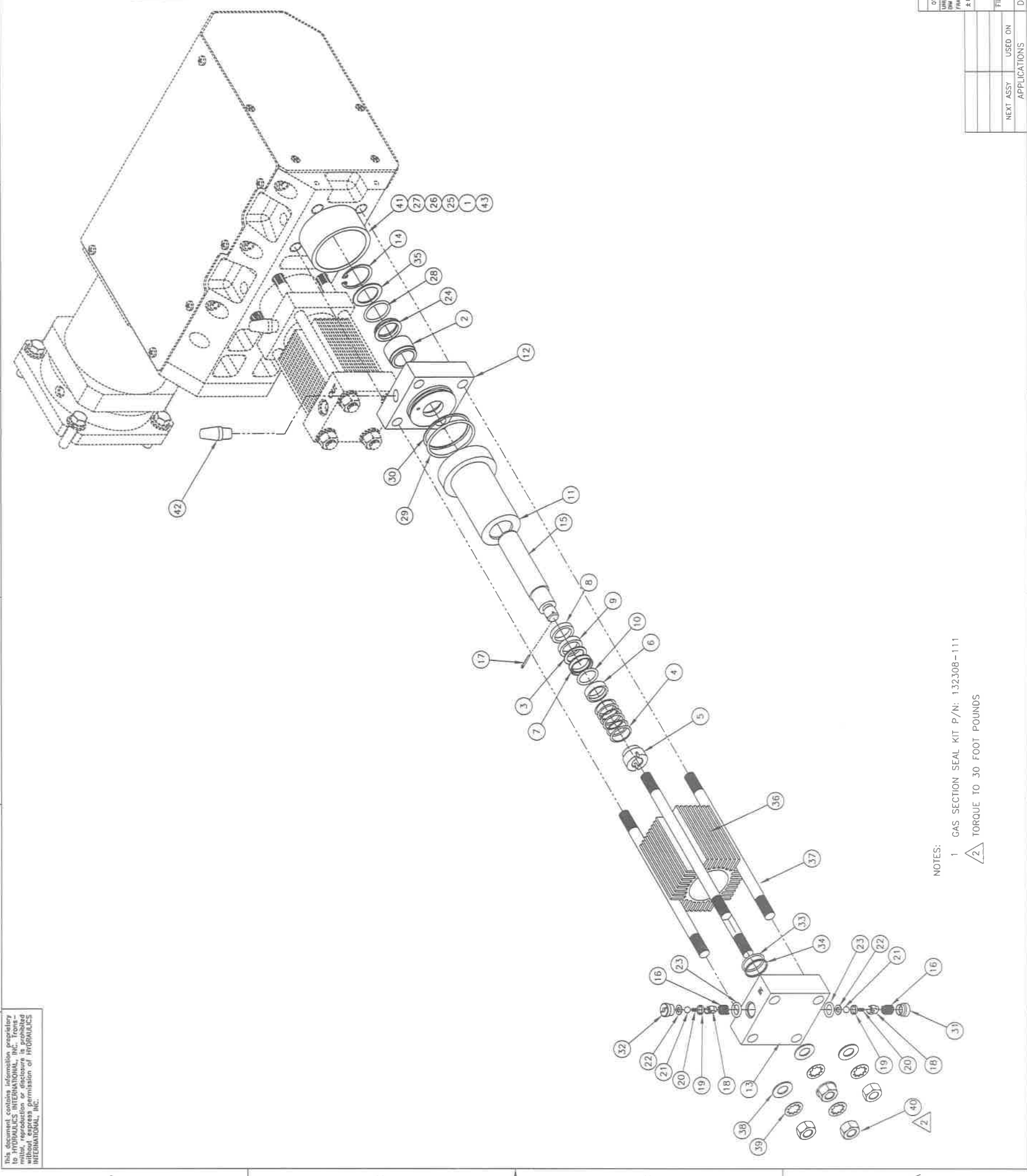


FIGURE 1-13. REMOVAL OF INLET/OUTLET PRESSURE GAUGES



FIGURE 1-14. CONTROL PANEL

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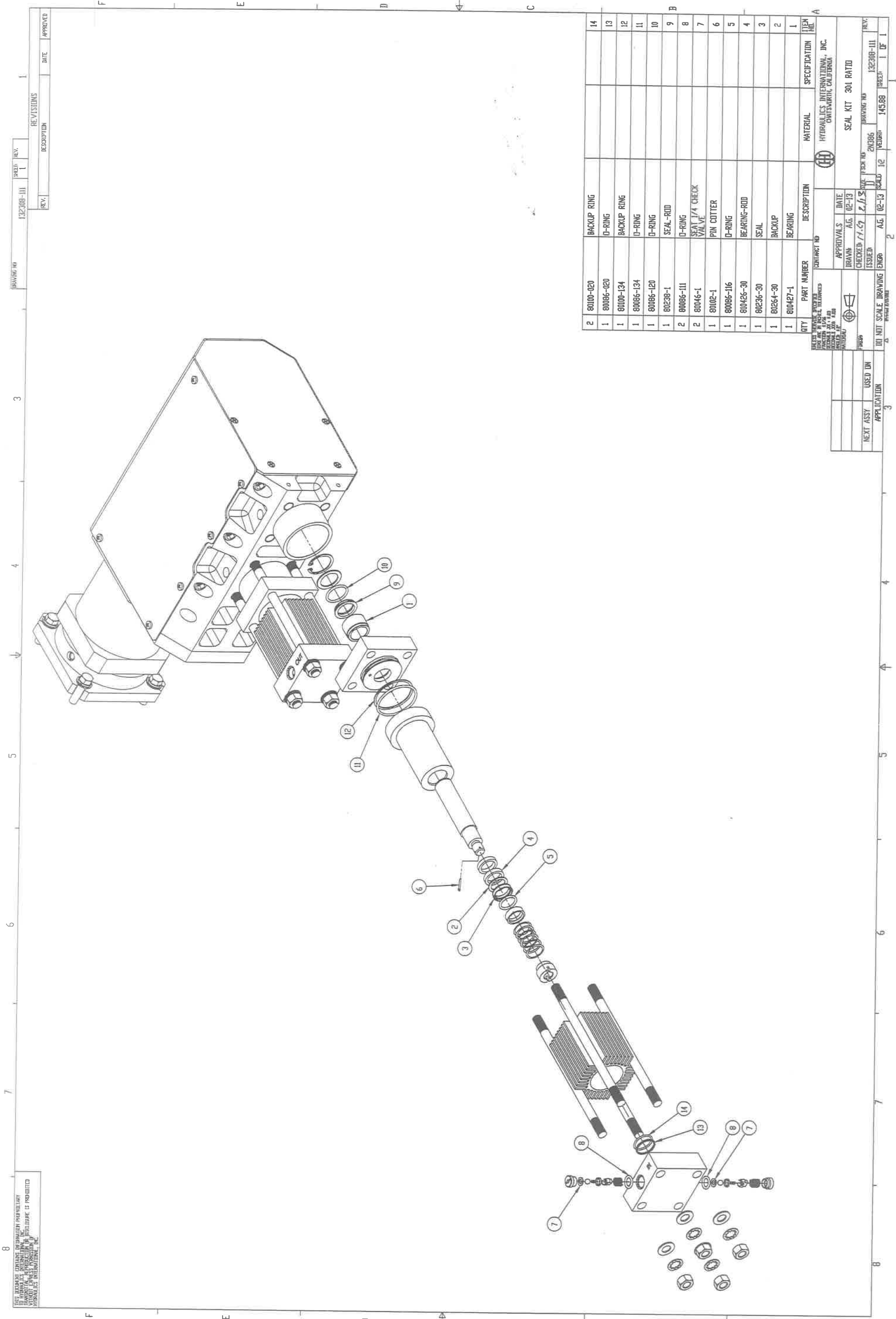
NOTES:
 1 GAS SECTION SEAL KIT P/N: 132308-111
 2 TORQUE TO 30 FOOT POUNDS

QTY	REC'D	PART No.	DESCRIPTION	MATERIAL	SPECIFICATION	ITEM
1		91580A171	SNAP RING			43
1		80266-2	BREATHER			42
1		19085-223-1	PISTON			41
4		80494-1	NUT			40
4		80495-1	WASHER LOCK			39
4		80496-1	WASHER FLAT			38
4		19085-219-1	TIE ROD			37
1		19085-239-1	HEAT SINK			36
1		80239-1	RING			35
2		80100-020	BACKUP RING			34
1		80086-020	O-RING			33
1		80247-2	RETAINER OUTLET			32
1		80248-2	RETAINER INLET			31
1		80100-134	BACKUP RING			30
1		80086-134	O-RING			29
1		80086-120	O-RING			28
1		19085-224-1	BARREL			27
1		19085-217-2	BEARING			26
1		19085-217-1	BEARING			25
1		80238-1	SEAL-ROD			24
2		80086-111	O-RING			23
2		80046-1	SEAT 1/4 CHECK VALVE			22
2		80072-8	BALL 1/4 CHECK VALVE			21
2		80052-1	SPRING			20
2		80045-1	RING			19
2		80044-1	CAGE			18
1		80102-1	PIN COTTER			17
2		80050-1	SPRING			16
1		19085-222-1	ROD 30 RATIO			15
1		80101-3	RETAINING RING			14
1		80245-30	END CAP			13
1		19085-212-1	BRACKET			12
1		19085-218-1	GAS BARREL			11
1		80086-116	O-RING			10
1		810426-30	BEARING-ROD PEEK			9
1		80234-30	PISTON			8
1		80236-30	SEAL			7
1		80249-30	SPACER			6
1		80233-30	NUT-PISTON			5
6		80225-30	SPRING BELLEVILLE			4
1		80264-30	BACKUP			3
1		810427-1	BEARING			2
1		19085-245-1	WEAR RING			1

REV.	DESCRIPTION	DATE	APPROVED

CONTRACT No.	HYDRAULICS INTERNATIONAL, INC. CHATSORTH, CALIFORNIA
APPROVALS	DATE
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GAS SECTION ASSEMBLY - 30 RATIO
 FIRST STAGE.
 DWG. No. 132308-110
 SHEET 1 OF 1



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DRAWING NO		132308-111	
REV.	REV.	DESCRIPTION	DATE
REVISED		APPROVED	

QTY	PART NUMBER	DESCRIPTION	MATERIAL	SPECIFICATION	ITEM NO
2	8000-020	BACKUP RING			14
1	80086-020	O-RING			13
1	8000-134	BACKUP RING			12
1	80086-134	O-RING			11
1	80086-120	O-RING			10
1	80230-1	SEAL-ROD			9
2	80086-111	O-RING			8
2	80046-1	SEAT 1/4 CHECK VALVE			7
1	80002-1	PIN CUTTER			6
1	80086-116	O-RING			5
1	80426-30	BEARING-ROD			4
1	80236-30	SEAL			3
1	80264-30	BACKUP			2
1	80427-1	BEARING			1

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 CHATSWORTH, CALIFORNIA
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 SEAL KIT 301 RATIO
 DRAWING NO: 132308-111
 SHEET: 1 OF 1
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