

**HYDRAULICS INTERNATIONAL, INC.****OPERATION AND MAINTENANCE INSTRUCTIONS****FOR****AIR DRIVEN GAS BOOSTER
TWO STAGE, SINGLE AIR DRIVE****AS CHECKED BELOW:****OM-GTS-100 (7 Pages) APPLIES TO ALL MODELS BELOW**

Model	Trouble-shooting	Drawings			Model	Trouble-shooting	Drawings		
		Unit	Sub-Assy	Seal Kits			Unit	Sub-Assy	Seal Kits
<input type="checkbox"/> 5G-TS-7/14	5G-TS-7/14 5 Pages	80282	80209 80212 80217 80219 80261 80287 80289	80626 80628 80629	<input type="checkbox"/> 5G-TS-7/30	5G-TS-7/30 5 Pages	80283	80210 80213 80217 80219 80261 80287 80289	80626 80628 80630
<input type="checkbox"/> 5G-TS-7/50	5G-TS-7/50 5 Pages	80964	80217 80219 80261 80287 80289 80969 80976	80626 80628 80636	<input checked="" type="checkbox"/> 5G-TS-14/30	5G-TS-14/30 5 Pages	80206	80209 80210 80212 80213 80217 80219 80261	80626 80629 90630
<input type="checkbox"/> 5G-TS-14/50	5G-TS-14/50 5 Pages	80965	80209 80212 80217 80219 80261 80969 80976	80626 80629 80636	<input type="checkbox"/> 5G-TS-14/75	5G-TS-14/75 5 Pages	80207	80209 80211 80212 80214 80217 80219 80260	80626 80629 80631
<input type="checkbox"/> 5G-TS-30/50	5G-TS-30/50 5 Pages	80966	80210 80213 80217 80219 80260 80969 80976	80626 80630 80636	<input type="checkbox"/> 5G-TS-30/75	5G-TS-30/75 5 Pages	80208	80210 80211 80213 80214 80217 80219 80260	80626 80630 80631
<input type="checkbox"/> 5G-TS-30/92	5G-TS-30/92 5 Pages	80833	80210 80213 80217 80219 80260 80834 80835	80626 80630 80836	<input type="checkbox"/> 5G-TS-50/92	5G-TS-50/92	810195	80969 80834 80216 80217 80219 80976 80835	80626 80636 80836

☐ Supplementary Data Attached:

CONTENTS

A. GENERAL INSTRUCTIONS – OM-GTS-100

- 1.0 SAFETY INFORMATION
 - 1.1 High Pressure Gas
 - 1.1.1 Mishandling
 - 1.1.2 Misapplication
 - 1.1.2.1 Published Ratings
 - 1.1.2.2 Potential Pressures
 - 1.1.2.3 Basic Data Maximum Safe Pressures By Model
 - 1.1.2.4 Basic Formulas Potential Outlet Pressures
 - 1.1.2.5 Interstage Stall
- 2.0 LIMITED WARRANTY – RETURN GOODS AUTHORIZATION (RGA)
- 3.0 ASSEMBLY DRAWINGS AND PARTS LISTS
 - 3.1 Unit Assembly
 - 3.2 Subassembly Detail
 - 3.3 Seal Kit Assembly Detail
- 4.0 PORT CONFIGURATION DETAIL
- 5.0 THEORY OF OPERATION
 - 5.1 Drive Section
 - 5.2 Boost Section
 - 5.3 Cycling Section
 - 5.4 Operational and Area Relationships
- 6.0 STARTUP/SHUTDOWN
 - 6.1 Controls
 - 6.2 Operation
- 7.0 MAINTENANCE
 - 7.1 Periodic
 - 7.2 Special Tools

B. SPECIFIC ATTACHMENTS BY MODEL

- 8.0 TROUBLESHOOTING BY SPECIFIC MODEL
 - 8.1 Understanding How It Works
 - 8.2 The Basic Drive System
 - 8.3 The Basic Gas Boosting System
 - 8.4 The Basic Air Cycling System
 - 8.5 Chart: Symptoms and Suggested Remedies
- 9.0 TESTING
 - 9.1 Individual Stages
 - 9.2 Both Stages In Series
 - 9.3 Drive Section

A. GENERAL INSTRUCTIONS

1.0 SAFETY INFORMATION

1.1 High Pressure Gas.

These units are designed to accept shop air inlet pressures up to 150 PSI for drive and boost an independent source of clean gas to a higher pressure.

CAUTION

Compressed gas is hazardous if mishandled or misapplied. Installation and operation must always be in a well ventilated area, preferably outdoors weather permitting. All gases (except compressed air) become hazardous in a poorly ventilated area due to their potential for displacing the ambient air needed for normal respiration.

1.1.1 Mishandling.

Attempting to dismantle the unit or any part of the system without

First shutting off the incoming gas source and venting all sections of the unit and the system that have the potential to contain gas under pressure.

This can be done using vent valves if they are installed or,

Loosening appropriate tube connections to dissipate pressure at any point.

1.1.2 Misapplication.

Exceeding the published maximum pressure rating of either the gas booster unit (drive section or boost section); or downstream components such as receivers, piping, valves, or gauges.

1.1.2.1 Be aware of published ratings. If questionable, contact the applicable manufacturer.

1.1.2.2 Be aware of the maximum output (boost) pressure potential of the individual model to be used. Install pressure gauge at critical points.

Maximum can be predetermined by:

The pressure to the drive section input combined with the pressure to the boost section inlet. Ref: 1.1.2.4.

1.1.2.3 Basic Data-Maximum Safe Pressures By Model.

MODEL	GAS BOOSTING SECTION – MAXIMUM SAFE PSI		
	INLET	INTERSTAGE	OUTLET
5G-TS-7/14	2,500	2,500	4,500
5G-TS-7/30	2,500	2,500	9,000
5G-TS-7/50	2,500	2,500	15,000
5G-TS-14/30	4,500	4,500	9,000
5G-TS-14/50	4,500	4,500	15,000
5G-TS-14/75	4,500	4,500	25,000
5G-TS-30/50	9,000	9,000	15,000
5G-TS-30/75	9,000	9,000	25,000
5G-TS-30/92	9,000	9,000	25,000
5G-TS-50/92	15,000	15,000	25,000

1.1.2.4 Basic Formulas – Potential Pressures By Model.

MODEL	OUTLET	INTERSTAGE
5G-TS-7/14	(14 x Drive Air) + (2.00 x Gas Inlet)	14 x Drive Air
5G-TS-7/30	(30 x Drive Air) + (4.29 x Gas Inlet)	9.13 x Drive Air
5G-TS-7/50	(50 x Drive Air) + (7.14 x Gas Inlet)	8.10 x Drive Air
5G-TS-14/30	(30 x Drive Air) + (2.14 x Gas Inlet)	26.25 x Drive Air
5G-TS-14/50	(50 x Drive Air) + (3.57 x Gas Inlet)	19.44 x Drive Air
5G-TS-14/75	(75 x Drive Air) + (5.36 x Gas Inlet)	17.2 x Drive Air
5G-TS-30/50	(50 x Drive Air) + 1.66 x Gas Inlet)	75 x Drive Air
5G-TS-30/75	(75 x Drive Air) + (2.50 x Gas Inlet)	50 x Drive Air
5G-TS-30/92	(92 x Drive Air) + (3.06 x Gas Inlet)	44.5 x Drive Air
5G-TS-50/92	(92 x Drive Air) + (1.84 x Gas Inlet)	109.5 x Drive Air

1.1.2.5 Interstage Stall.

This is not a safety hazard. It is caused by the drive being unable to move the gas in the larger displacement first stage into the smaller displacement second stage. The basic problem is excessive inlet pressure (or low drive pressure). Throttling the gas inlet flow usually cures the problem. See current catalog GB500 for a complete discussion.

2.0 LIMITED WARRANTY

Hydraulics International manufactured products are warranted free of original defects in material and workmanship for a period of one year from date of purchase to first user. This warranty does not include O-rings, seals or failures caused by lack of proper maintenance, incompatible fluids, foreign contaminants in the drive section, in the pump section or application of pressures beyond catalog ratings. Products believed to be originally defective may be returned, freight prepaid, for repair and/or replacement to the distributor or to the factory. If upon inspection by the factory or distributor the problem is found to be originally defective material or workmanship, repair or replacement will be made at no charge for labor or materials, F.O.B. the point of repair or replacement. Permission to return under warrant should be requested before shipment and include the following: A Return Goods Authorization Number (RGA), the original purchase date, purchase order number, serial number, model number, reason for return or other pertinent data to establish warranty claim and to expedite the return or replacement to the owner.

If the unit has been disassembled and reassembled in a facility other than HYDRAULICS INTERNATIONAL without prior written authorization, warranty is void if it has been improperly reassembled or substitute parts have been used in place of factory manufactured parts.

Any modification to any HYDRAULICS INTERNATIONAL product that you have made or may make in the future has been and will be at your sole risk and responsibility, and without HYDRAULICS INTERNATIONAL's approval or consent. HYDRAULICS INTERNATIONAL disclaims any and all liability obligation, or responsibility for the modified product. And for any claims, demands or causes of action for damage or for personal injuries resulting from the modification and/or use of such a modified HYDRAULICS INTERNATIONAL product.

HYDRAULICS INTERNATIONAL obligation with respect to its products shall be limited to replacement, and in no event shall HYDRAULICS INTERNATIONAL be liable for any loss or damage, consequential or special, of whatever kind or nature, or any other expense which may arise in connection with or as a result of such products or the use or incorporation thereof in a job. This warranty is expressly made in lieu of all other warranties of merchantability and fitness for a particular purpose. No express warranty and no implies warranties whether of merchantability or fitness for a particular purpose or otherwise, other than those expressly set forth above, shall apply to HYDRAULICS INTERNATIONAL products.

3.0 ASSEMBLY, PARTS LIST, AND SUBASSEMBLY DRAWINGS

The DRAWINGS that apply are listed on the front cover page, and are also attached.

3.1 Unit Assembly Drawing.

- Lists all parts in your unit by Item No. vs Part No.
- Lists any subassemblies by their own drawing number.
- Lists all seal kits by their own drawing number.
- Provides a detailed cross section of your unit which will be the major reference in a subsequent discussion of operation, maintenance, and troubleshooting.

3.2 Subassembly Drawings provide subassembly cross section detail plus piece part item numbers whose part numbers are listed on page 1 of the subassembly drawing.

3.3 Seal Kit Drawings provide cross section detail with item numbers showing where each seal kit item fits. Part numbers are listed on both the seal kit drawing and on the unit assembly drawing, but item numbering will differ.

4.0 PORT CONFIGURATION DETAIL

Refer to current catalog GB500 under selection table and notes.

5.0 THEORY OF OPERATION

All units consist of 3 basic sections, each with their specific function;

5.1 Drive Section.

Provides the reciprocating force to the boost section.

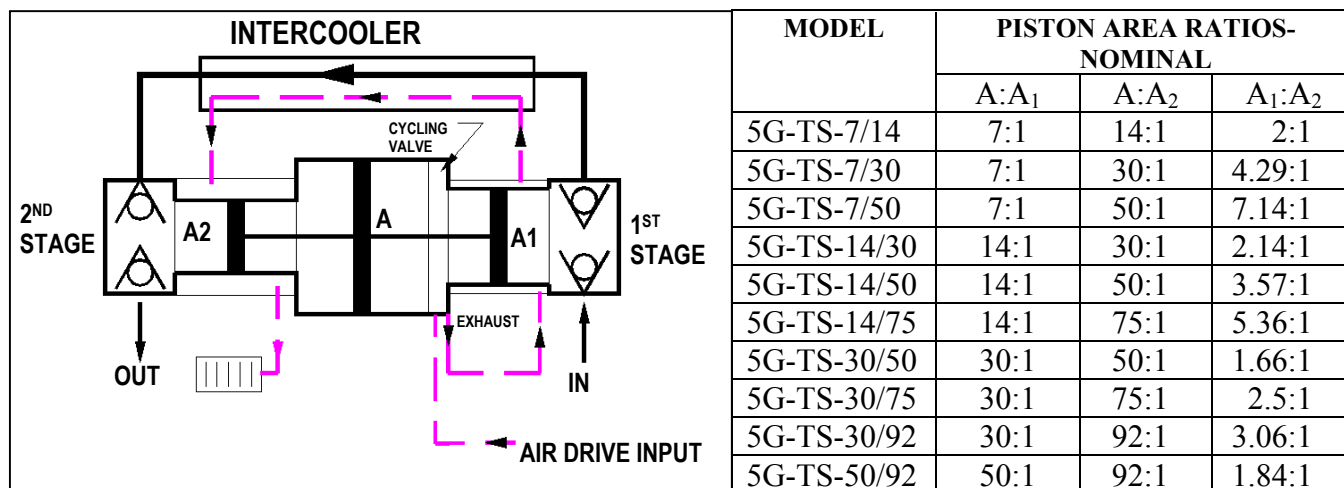
5.2 Boost Sections.

Provides the compressing (pumping) action for high pressure output.

5.3 Cycling Section.

Consists of the directional control air valving built into the drive enabling the drive to reciprocate continuously whenever air is applied to the drive input.

5.4 Operational and Area Relationships.



6.0 START UP/SHUT DOWN

Preferably, the incoming gas source should be turned on first so that incoming pressure is allowed to equalize throughout the downstream system, including any receiver tanks, before the drive on the unit is allowed to cycle. Then the drive is turned on permitting the unit to boost the downstream system to the desired pressure and stop. At shut down for overnight or longer periods, we recommend that the incoming gas and the drive air be shutoff.

6.1 Controls.

The incoming air supply may be unregulated (unless it exceeds 150 PSI). In most applications, the boosted gas from an output receiver is regulated. The incoming gas should incorporate an on/off valve and a particle filter, nominal 5 mic. The pipe size should be equivalent to the booster inlet port.

CAUTION

All installations must include a safety relief valve suitable for gas service installed immediately downstream of the booster outlet, upstream of any shut-off valves, and set at the safe working pressure of the lowest rated component in the outlet system.

The air supply to the drive input should also include a manual on/off valve and an air filter/water separator unit, nominal 20 mic ½ NPT or larger. An air regulator in this line is optional. An efficient control of maximum output pressure is an HII PCV (pilot control valve) normally open, installed in the output system adjusted to close external pilot air to the drive when desired maximum output is reached. This must be backed up by a safety relief valve set approximately 5% higher. For external pilot air porting modification “X” must be specified on new units, or it can be field-installed using kit P/N 80528-100.

6.2 Operation.

In most applications, the sequence is:

- Equalize the system with the source gas pressure.
- Turn on air to the drive (or external pilot).
- Allow unit to charge the system and stop at preselected pressure (either with PCV valve or manually shutting off drive or external pilot air).
- Regulate the boosted gas to precisely the pressure required for the job.

For a further description of various applications and suggested controls, consult current HII catalog GB500.

7.0 MAINTENANCE.

7.1 Periodic.

All HII models incorporate a spool-type directional control valve that is the heart of the cycling system for the drive. The standard valve depends on dynamic O-rings which are lubricated with light grease at original assembly*. Periodically, these valve O-rings should be wiped clean and regreased for reliable operation. The frequency will be determined by many variables such as air moisture content, contamination, cycle rates, and overall duty cycle of individual applications. All HII units are designed so that this spool/O-ring assembly is easily accessible with simple hand tools without disassembling any other sections of the drive. The typical symptom indicating need for regreasing the O-rings is slow, erratic cycling. It is suggested that a note be made of the frequency of this slow down, so that it can be predicted, and then the O-rings cleaned and regreased at a convenient shut down to insure uninterrupted operation when the unit is needed.

The detailed assembly drawing attached clearly shows the cycling spool/O-ring assembly and its accessibility.

CAUTION

Be sure the incoming air is shut off before removing any parts.

Periodic lubrication of any OTHER PARTS of the unit is NOT REQUIRED nor recommended.

* If the booster is equipped with modification “N”, a lapped, match fit spool and sleeve assembly replaces the O-ring sealed spool and is further explained on service bulletin SB02-NMOD.

7.2 Special Tools. Available at low cost from HII Service Dept.

P/N 80273-100 - Sleeve Extractor. Used for pulling the valve sleeve 80028-1 (Item 1, Drawing 80217) out of end cap assembly 80217. This is done only if it is necessary to replace the 4 each O-rings, Item 8 on the sleeve O.D., or the bumper, Item 7 behind the sleeve.

P/N 80844-100 - Spanner Wrench. Used for removal or installation of check valve retainer nuts 80248, 80247, Items 9 and 10 on the Gas Section End Cap Assembly Drawing.

B. SPECIFIC ATTACHMENTS BY MODEL

8.0 TROUBLESHOOTING. Model 5G-TS-14/30 Gas Booster – 5 Pages

8.1 Understanding How It Works.

NOTE: For consistency, all item numbers in this text will refer to assembly drawings (not seal kit drawings).

8.2 The Basic Drive System. Refer to Pages 3 and 4, Drawing 80206.

There are two drive chambers: Left and right. The left chamber is enclosed by end cap item (26) (Page 4) and piston (22). The right chamber is enclosed by end cap (24) (Page 4) and piston (22).

The cycling valve (30), (Drawing 80217) alternately pressurizes and exhausts these two chambers causing the piston (22) and its connecting rods to reciprocate in drive barrel (29).

8.3 The Basic Gas Boosting System. Refer to Page 4, then Page 2, Drawing 80206.

Page 4 shows the mechanical connecting rod arrangement between the first stage gas section item (20), the –7 ratio; and the second stage gas section item (21), the –30 ratio. Page 2 shows the interstage cooler assembly, item (33). This assembly consists of the high pressure tube run from the first stage to the second stage surrounded by a low pressure air exhaust tube connected to the cooling sleeves on each gas section (Ref. Drawings 80212 and 80213). Note: Page 2 and Page 4, Drawing 80206, are opposite assembly views. Therefore, on Page 2, the first stage is on the left; the second stage on the right; Page 4, vise versa. Note also the basic operational schematic, Paragraph 5.4.

8.4 The Basic Air Cycling System. Refer to Drawing 80217 and Page 3, Drawing 80206.

View D-D shows flow tube (31). This tube pressurizes or exhausts the left drive chamber, Page 4 depending on the position of the cycling valve (30), Drawing 80217.

NOTE: View D-D and E-E are the reverse (backside) of Page 4. Therefore, the valve end cap (24), is on the left and the opposite cap (26) is on the right in view D-D and E-E.

When the cycling valve (30) is pressurizing the flow tube (31) and the left drive chamber, Page 4, it is simultaneously connecting the right drive chamber to the exhaust system.

When valve (30) connects the flow tube (31) to exhaust, it simultaneously pressurizes the right drive chamber.

The cycling spool valve (30) receives input drive air at its center (Ref. Drawing 80217) from which it directs drive air left or right. Drawing 80217 shows that when it shifts right, drive air flows left to the flow tube (31); when it shifts left, drive air flows right directly to the right drive chamber. Drawing 80217 and Page 3, Drawing 80283 both show the valve shifted left.

The cycling spool shifts right or left due to the action of the air pilot poppet valves (2), Drawing 80217 and (1) 80219. Note also that a small passage, off the drive-air-in channel Drawing 80217 provides constant air pressure to a small chamber on the left hand end of the spool (30). Therefore, as soon as drive air is turned on, spool (30) is biased to shift to the right. In this position, drive air flows left to flow tube (31) and the left drive chamber

driving the piston (22) and both gas piston assemblies right. This unseats pilot poppet (2) Drawing 80217. This pilot poppet (2) receives a constant supply of pilot air either from the upper internal passage connected to the drive-air-in channel, Drawing 80217; or, if modification "X" is used, the external pilot port, plug (5), Page 3, Drawing 80206.

When the drive piston (22) opens the pilot poppet (2) in the end cap, pilot air is injected into the large pilot chamber on the right hand end of the spool. This chamber provides the force necessary to shift the spool valve (30) to the left overcoming the bias from the small air chamber on the left hand end of the spool.


With spool valve (30) shifted left, drive air is connected to the right drive chamber Page 4 Drawing 80206 and the left drive chamber is connected to exhaust. Thus the piston (22) and the gas piston assemblies move left; pilot valve (2) (Ref. B-B) springs closed. Pilot air is now trapped in the large pilot chamber, right hand end of spool valve (30), and in the pilot tube (32) Page 3, Drawing 80206. This tube connects the large pilot chamber to the opposite pilot poppet (1) Drawing 80219. The spool valve remains shifted left due to the trapped pilot air. The drive piston (22) then reaches the opposite pilot poppet (1), and opens it. This connects the pilot tube (31) and the large pilot chamber to a pilot vent port (not shown) in end cap, Drawing 80219.

With the large pilot chamber, right hand end of spool valve, now vented, the spool valve shifts right (due to the bias force from the small left hand chamber). In the shifted-right position, drive air pressurizes flow tube (31) and the cycle described above repeats.

8.5 Chart: Symptoms vs Suggested Remedies.

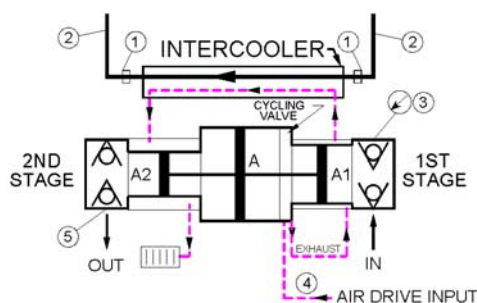
Symptom	Possible Cause	Suggested Remedy
1. Unit will not cycle after gas pressure is equalized (no sound).	<p>A) Drive shut off.</p> <p>B) "X" Mod. Not plumbed.</p> <p>C) Spool valve (30) stuck due to friction of swollen O-rings due to chemical carry-over from shop compressor oil.</p> <p>D) Unlikely, but possible: Poppet valves (1) or (2) may be short or springs (4) or (6) broken. Ref. Drawings 80217, 80219.</p>	<p>A) Open drive valve.</p> <p>B) Connect external pilot port to air source.</p> <p>C) See Drawing 80206, Page 3. Disconnect exhaust tube from fitting (44). Unscrew retainer (32), Drawing 80217; then remove (30) spool and inspect 8 O-rings, item (22). If swollen, they will be longer (not fatter) and droop down off the spool. Replace with Viton O-rings (seal kit SK5GAV, Drawing 80626). Apply light grease. Reassemble.</p> <p>CAUTION: Retainer (32) should not be highly torqued.</p> <p>D) Remove hex caps (2) or (3). Inspect springs and poppets. Replace as needed.</p>

Symptom	Possible Cause	Suggested Remedy
2. Unit will not cycle and air bleeds out exhaust muffler.	A) Insufficient internal air pilot volume due to long, small air drive line. B) Spool valve (30) stuck in center position due to friction of swollen or dry O-rings (see 1-C above).	A) Increase size of air drive line. B) See 1-C above.
3. Unit cycles but bleeds air out exhaust muffler at stall or at shut off external pilot ("X" modification).	A) Drive piston O-ring (12) or barrel (29), Page 4, Drawing 80206, damaged, or shrinkage of drive O-ring (12).	A) Remove drive tie rod nuts (3), pull drive end caps (24), (26) apart. Inspect (12) and (29). If damaged, remove cotters (17) and pins (30) and gas section connecting rods to be able to install new (12) or (29). NOTE: Always test O-ring (12) new or used, for shrinkage: Remove all grease from (12) and (29). Place (12) on flat surface. Put (29) down over (12). Lift (27). If (12) does not pick up inside (29), <u>discard it as undersize</u> . Lightly regrease (12) and (29) before reassembly. Review integrity of air drive filtration.
4. Unit stops or "hunts" and air bleeds out pilot vent passage in air cap (26), Page 4, Drawing 80206.	A) Drive air leaking into large pilot chamber on right end of spool valve (30) and pilot vent poppet (1) cannot dissipate it.	A) Remove retainer (32) Ref 1-C above, and valve (30) and replace the 8 th (far right) item (22) O-ring, Drawing 80217. Grease. Reinstall valve and retainer and test. If not cured, remove (32), (30) and sleeve (1) (using HII extractor tool P/N 80273-100). Replace all 4 O-rings, item (8) on sleeve. Grease. Reinstall.
5. Audible air bleeds out 1/8 NPT breathers (35), Page 2, Drawing 80206 at stall, or pilot air shut off.	A) Gas piston rod seal wear due to contaminated air source. Ref (20) Drawing 80213, (20) Drawing 80212.	A) Remove drive tie rod nuts (3), Page 4, Drawing 80206. Pull unit apart to expose drive piston (22). Remove cotters (17) and pins (30). Remove eight gas section tie rod nuts (41) and end caps (20) (21). See Gas Section Drawings 80213 and 80212. Push gas section rods (16) (14) past seals (22) (20). Remove seal retainers. Inspect rods for scratches. Polish or replace rods. Reassemble with new seals (20) (22). Review air source filtration.

Symptom	Possible Cause	Suggested Remedy
6. Unit cycles but output performance is questionable. Audible gas leakage from breathers (36) Page 2, Drawing 80206, when unit is stopped with gas supply on.	A) Ref. Drawings 80212, 80213. Worn gas piston seals (20) (18) or scored barrels (14) (12), due to contaminated gas source.	A) Disassemble per 5-A above. Inspect and replace all worn parts. Review gas source filtration and/or source of contaminants.
<div style="text-align: center;">  <p>Ref. Drawings 80212, 80213, 80629, 80630. Gas piston seals & supporting parts must be confined inside gas barrel <u>before</u> tightening piston nut and installing cotter pin.</p> </div>		
6a. Questionable output performance, yet not audible gas breather (36) leakage.	A) Check valves, Drawing 80209 & 80210 hanging up due to failed springs or contamination.	A) Remove interstage line assy (33) Page 2, Drawing 80206. Test 1 st and 2 nd stages <u>individually</u> per Paragraph 9.0. If under performing, remove check cartridge parts on under performing stage (Ref. Para 7.2). Inspect all parts. Clean and/or replace as needed. Reassemble.
7. Unit false cycles (short strokes).	<p>A) Pilot air venting prematurely due to damage or contamination of pilot vent poppet (1) in air cap (14), Drawing 80219; or external pilot air leaks from static O-rings sealing the pilot tube (32), Drawing 80283, Page 3, or the pilot poppet hex cap (2) in air cap (14), or leakage at threaded plugs (27) ½ NPT, Drawing 80217 or (13) 1/8 NPT, Drawing 80219.</p> <p>B) Pilot valve stem seal assembly with retaining ring has vibrated loose resulting in nonconcentric valve action.</p> <p>C) Drive air leaking into the pilot chamber.</p>	<p>A) Inspect pilot vent poppet, spring and seat in air cap. Replace if damaged. Check pilot tube ends and hex cap (2) in end cap (14), Drawing 80219, with soap solution for external leaks. Replace static seal O-rings if soap bubbles are detected. Check NPT plugs with soap solution. Tighten or retape if leaking.</p> <p>B) Disassemble drive cylinder and look for loose parts items 2, 3, and 28 (seal kit drawing 80626). Replace items 2, 3, and 28. To insure concentricity, use pilot valve as a centering tool and, by tapping with a light hammer, a tool to evenly deflect the legs of retainer 28, P/N 80101-4.</p> <p>C) Ref item 4 above.</p>

9.0 TESTING. Use Ambient Air only. Do not use compressed gas or air at “IN” port.

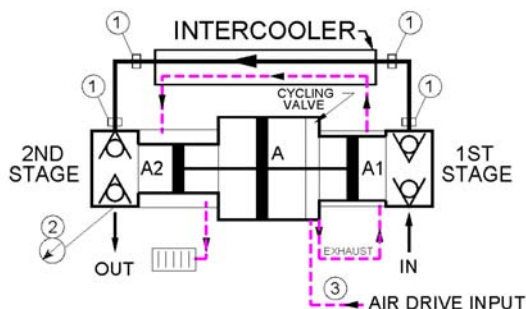
9.1 Individual Stages.



Setup and Steps:

- 9.1.1 Loosen compression nuts on high pressure interstage tube.
- 9.1.2 Disconnect tube from first stage outlet port and second stage inlet port and rotate it back out of the way.
- 9.1.3 Install 0-500 PSI (minimum) pressure gauge at outlet of first stage.
- 9.1.4 Cycle Booster. If check valves and piston in the first stage are operating properly, it should be able to boost **AMBIENT AIR** to 250-300 PSI.
- 9.1.5 Install same gauge at outlet of second stage. Cycle booster. This stage also should be able to boost **AMBIENT AIR** to 250-300 PSI if check valves and piston are operating properly.

9.2 Both Stages In Series.



Setup and Steps:

- 9.2.1 Reconnect interstage line and tighten compression nuts.
- 9.2.2 Install 0-2000 PSI (minimum) gauge at outlet of second stage.
- 9.2.3 Cycle Booster. It should be able to boost **AMBIENT AIR** (coming into first stage) up to 1200-1500 PSI on outlet gauge using 90-100 PSI air drive.
- 9.2.4 Shutoff and trap drive air. Using soap solution or “Leak Tec”, check all external connections and breathers for leakage. All connections, except breathers, must be bubble tight.

9.3 Drive Section.

Setup per above 9.2.3 but reduce drive air pressure to 15 PSI. Bleed air at gauge. Unit should cycle smoothly.

8

7

6

5

4

3

DWG. NO. 80206

SH 1

REV. B

1

REV. B

DESCRIPTION

DATE

APPROVED

A

SEE DCN

02-99

B

SEE DCN

12-03

1

1

1

1

80493-1

ELBOW

40

8

8

8

8

80308-2

FLAT WASHER

39

4

4

4

4

80307-2

LOCK WASHER

38

1

1

1

1

80269-1

TUBE

37

2

2

2

2

80266-2

BREATHER

36

2

2

2

2

80266-1

BREATHER

35

1

1

1

1

80265-1

MUFFLER

34

1

1

1

1

80262-100

INTERSTAGE COOLER ASSY.

33

1

1

1

1

80257-1

FLOW TUBE

32

1

1

1

1

80257-2

PILOT TUBE

31

2

2

2

2

80242-1

PIN

30

1

1

1

1

80227-1

BARREL

29

8

8

8

8

80226-1

TIE ROD

28

2

2

2

2

80222-1

HANDLE

27

1

1

80219-200

CAP ASSY.

26

1

1

80219-100

CAP ASSY.

25

1

1

80217-200

VALVE CAP ASSY.

24

1

1

80217-100

VALVE CAP ASSY.

23

1

1

1

1

80216-100

AIR PISTON ASSY.

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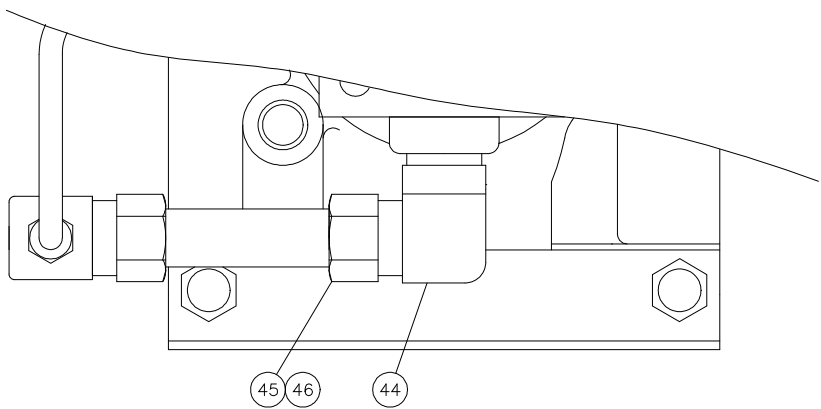
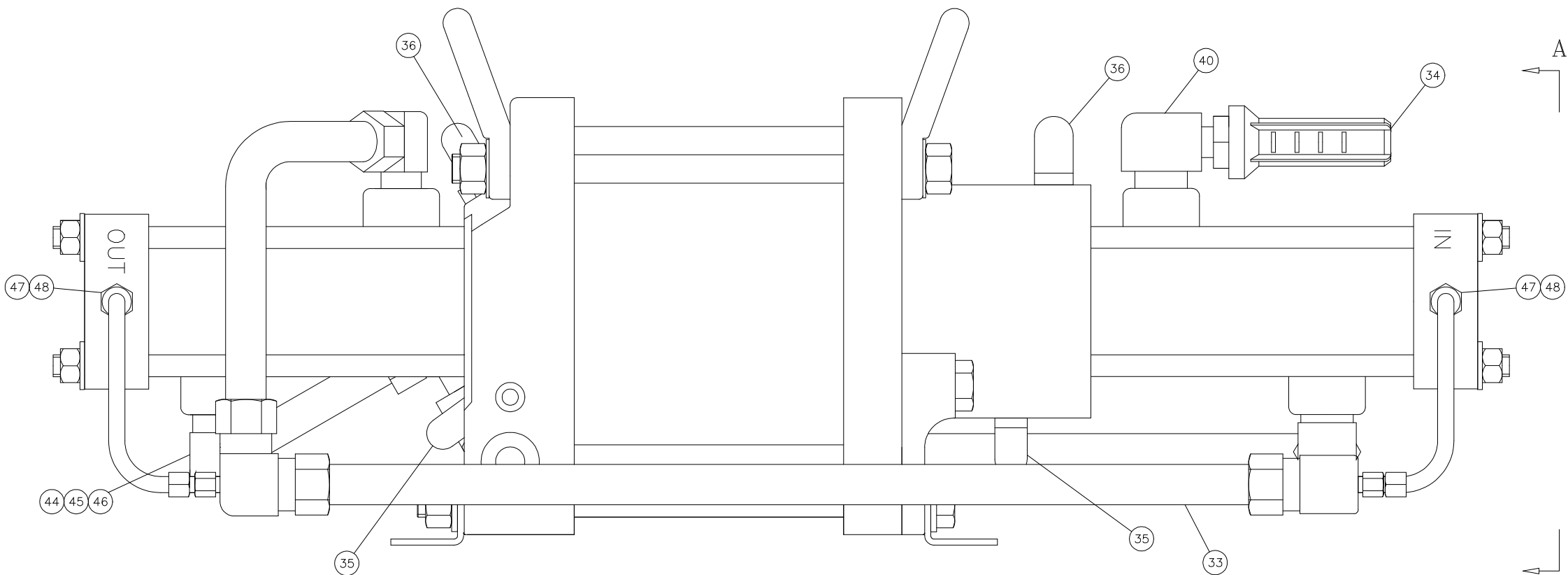
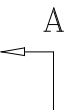
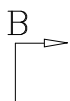
O-RING

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DWG. NO.	80206	SH 2	REV. B
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REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED



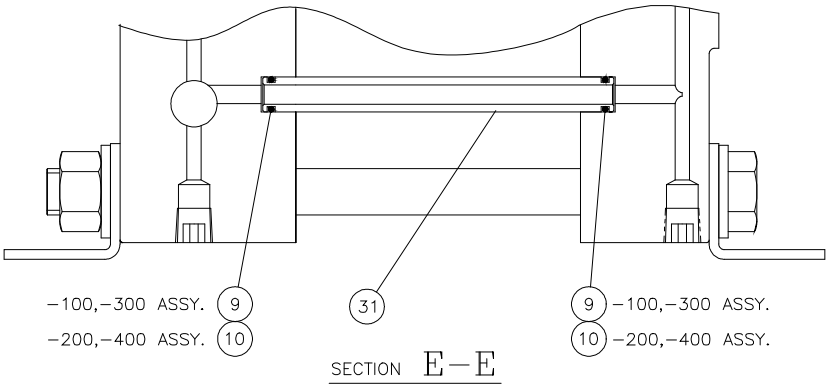
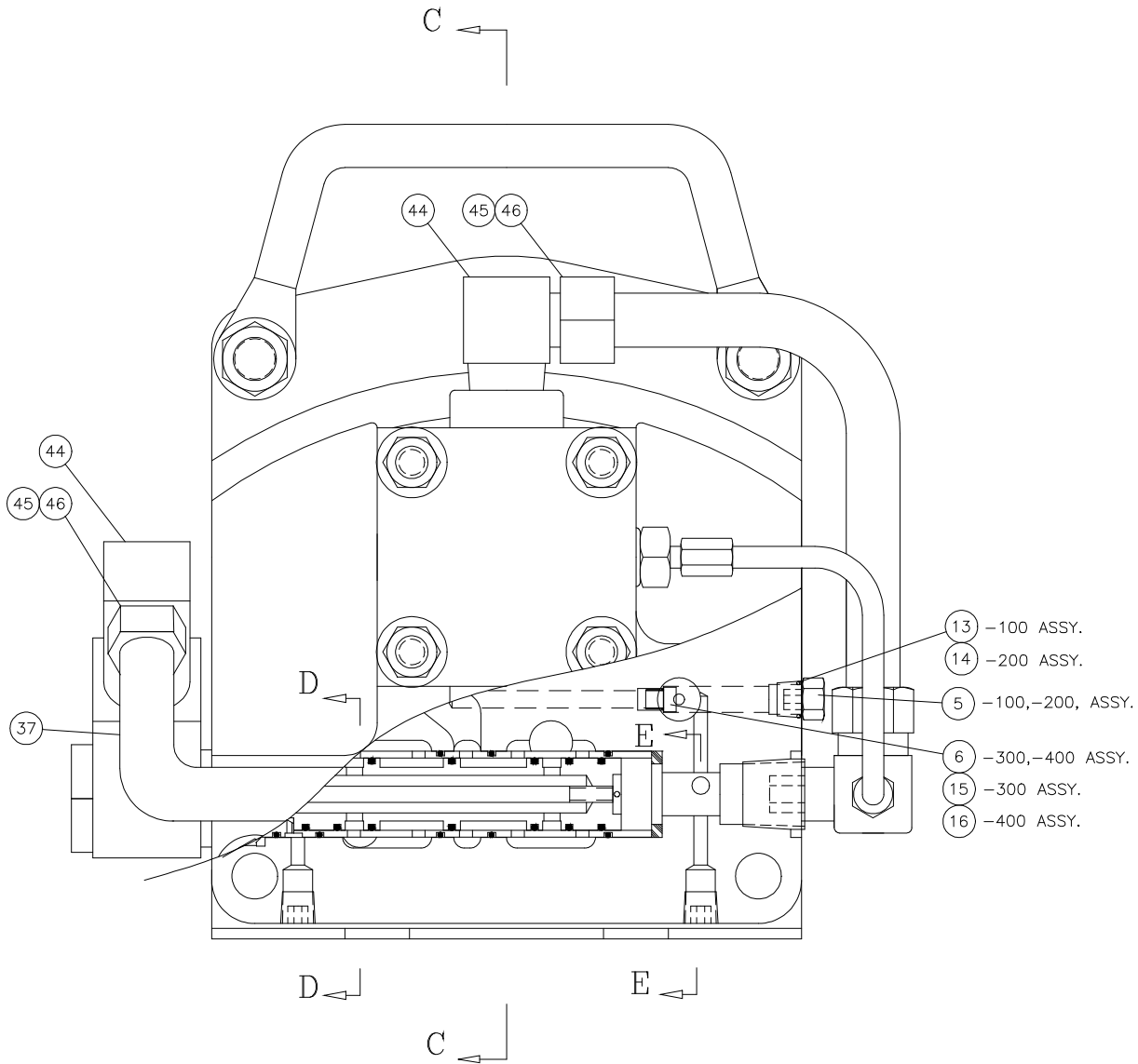
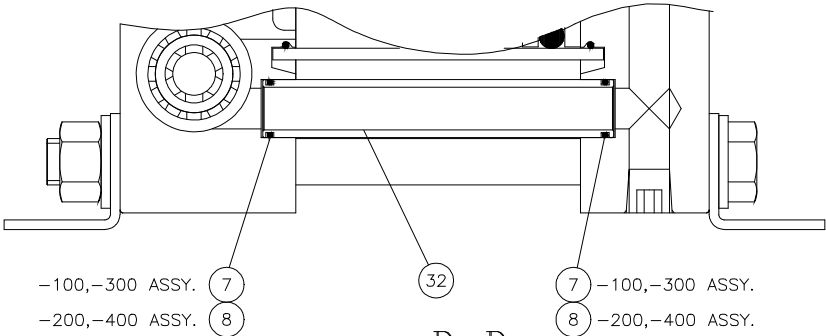
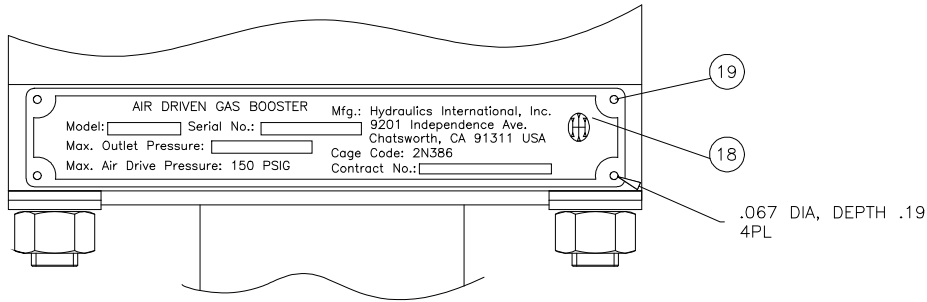
VIEW A—A

QTY REQD		PART No.		DESCRIPTION		MATERIAL		SPECIFICATION		ITEM			
UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES, TOLERANCES ARE FRACTION DECIMALS ANGLES ±1/16 .XX ±.03 .XXX ±.010 ±2"		CONTRACT No.		 HYDRAULICS INTERNATIONAL, INC. CHATSORTH, CALIFORNIA		5 INCH GAS BOOSTER TWO-STAGE, SINGLE AIR DRIVE, 14/30R							
		APPROVALS										DATE	
		DRAWN M.A.G.										2-99	
		FINISH:		CHECKED		SIZE D		FSCM No.		DWG. No.			
				ISSUED		2N386		80206		REV. B			
NEXT ASSY		USED ON		ENGR.		SCALE		WT.		SHEET 2 OF 4			
APPLICATIONS		DO NOT SCALE DWG.											

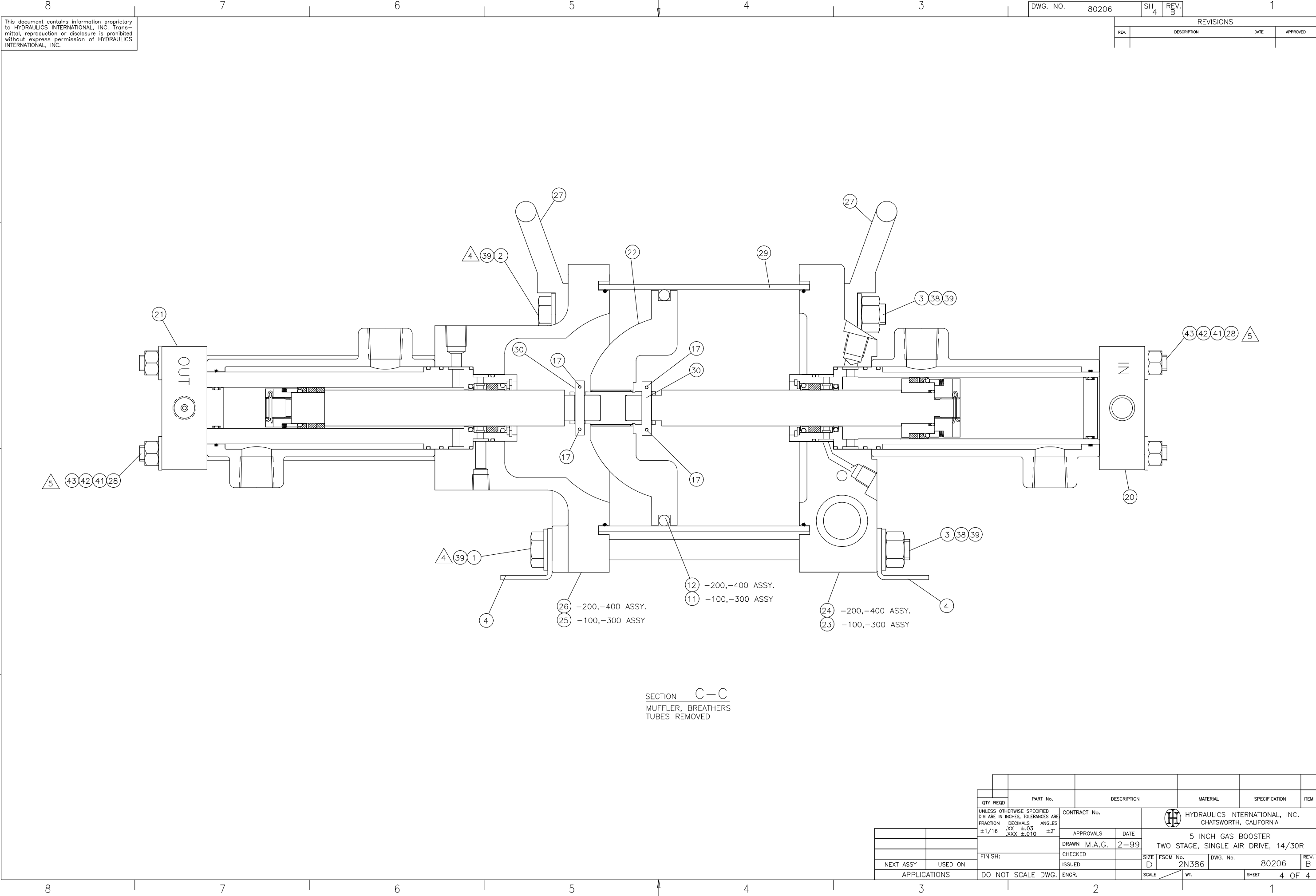
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DWG. NO. 80206 SH. 3 REV. B

REVISIONS			
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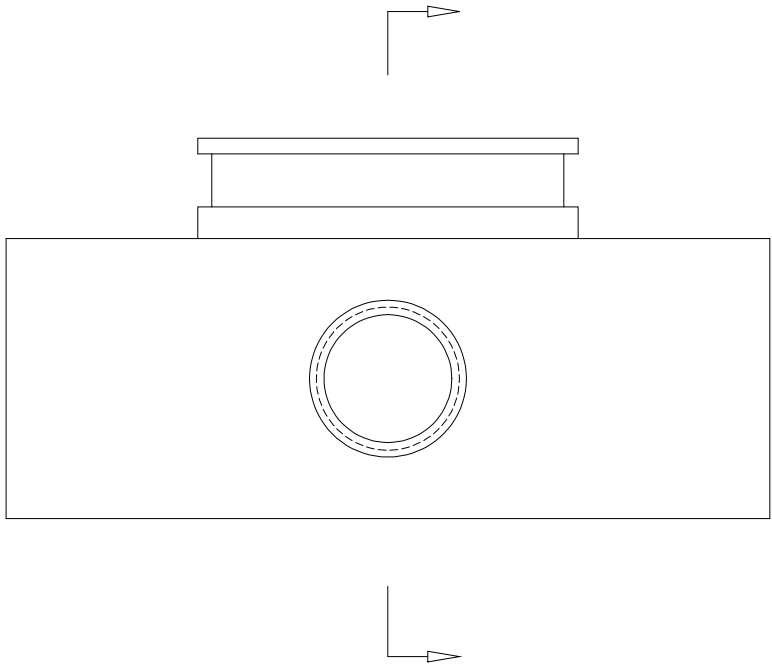
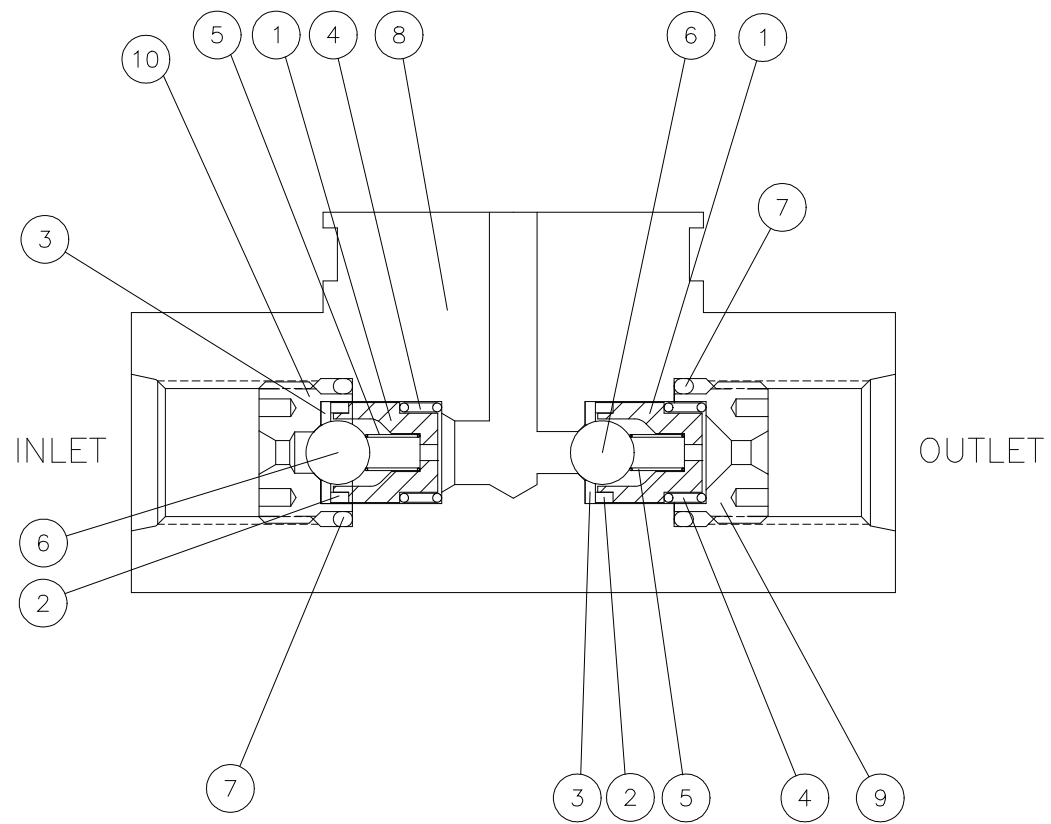


QTY REQD	PART No.	DESCRIPTION	MATERIAL	SPECIFICATION	ITEM
UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES. TOLERANCES ARE FRACTION DECIMALS ANGLES ±1/16 .XX ±.03 ±2° .XXX ±.010		CONTRACT No.	HYDRAULICS INTERNATIONAL, INC. CHATSORTH, CALIFORNIA		
FINISH:		APPROVALS	DATE	5 INCH GAS BOOSTER TWO STAGE, SINGLE AIR DRIVE, 14/30R	
NEXT ASSY		DRAWN M.A.G.	2-99	SIZE D	FSCM No. 2N386
USED ON		CHECKED		DWG. No.	80206
APPLICATIONS		ISSUED		REV. B	
DO NOT SCALE DWG.		ENGR.		SCALE	WT.
				SHEET	3 OF 4



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REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	SEE DCN	06-99	



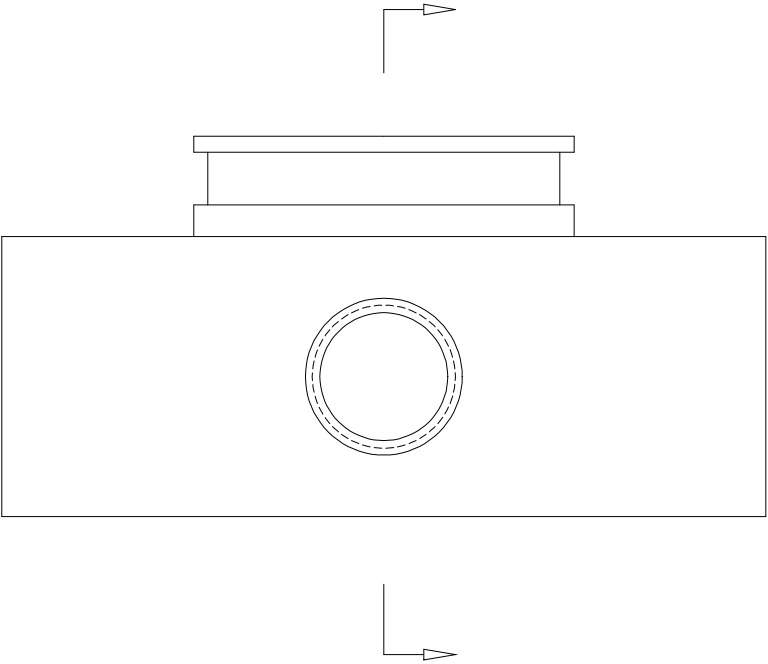
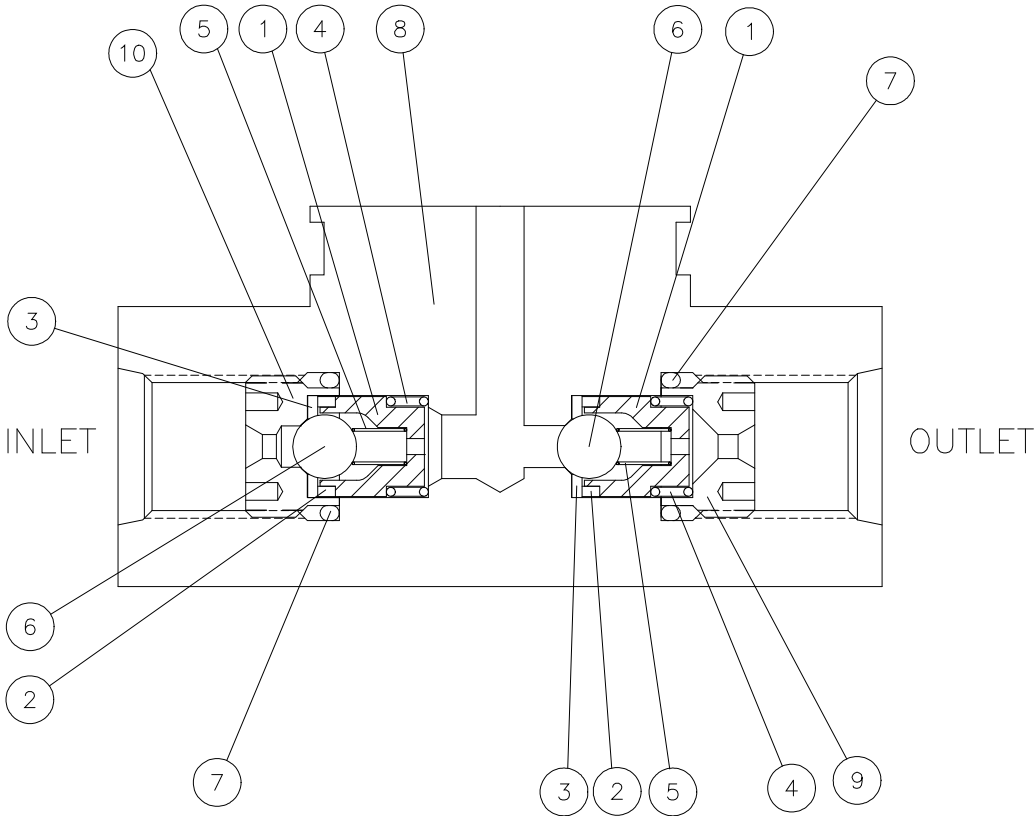
1	80248-2	RETAINER			10
1	80247-2	RETAINER			9
1	80245-14	END CAP			8
2	80086-906	O-RING			7
2	80072-8	BALL			6
2	80052-1	SPRING			5
2	80050-1	SPRING			4
2	80046-1	SEAT			3
2	80045-1	RING			2
2	80044-1	CAGE			1

QTY REQD	PART NO.	DESCRIPTION	MATERIAL	SPECIFICATION	ITEM NO.
UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES, TOLERANCES ARE: FRACTION DECIMALS ANGLES ±1/16 .XX ±.03 ±2° XXX ±.010		CONTRACT No.		HYDRAULICS INTERNATIONAL, INC. CHATSWORTH, CALIFORNIA	
		APPROVALS	DATE	END CAP ASSEMBLY 14 RATIO	
		DRAWN M.A.G.	3-99		
		CHECKED A.G.	3-99		
FINISH:		ISSUED		SIZE C	FSCM No. 2N386
NEXT ASSY		USED ON		DWG. No. 80209	REV. A
APPLICATIONS		DO NOT SCALE DWG.	ENGR.	SCALE 1/1	SHEET

DWG. NO. 80209
REV. A

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REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED



1	80248-2	RETAINER			10
1	80247-2	RETAINER			9
1	80245-30	END CAP			8
2	80086-906	O-RING			7
2	80072-8	BALL			6
2	80052-1	SPRING			5
2	80050-1	SPRING			4
2	80046-1	SEAT			3
2	80045-1	RING			2
2	80044-1	CAGE			1

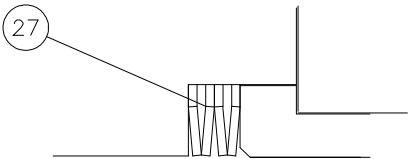
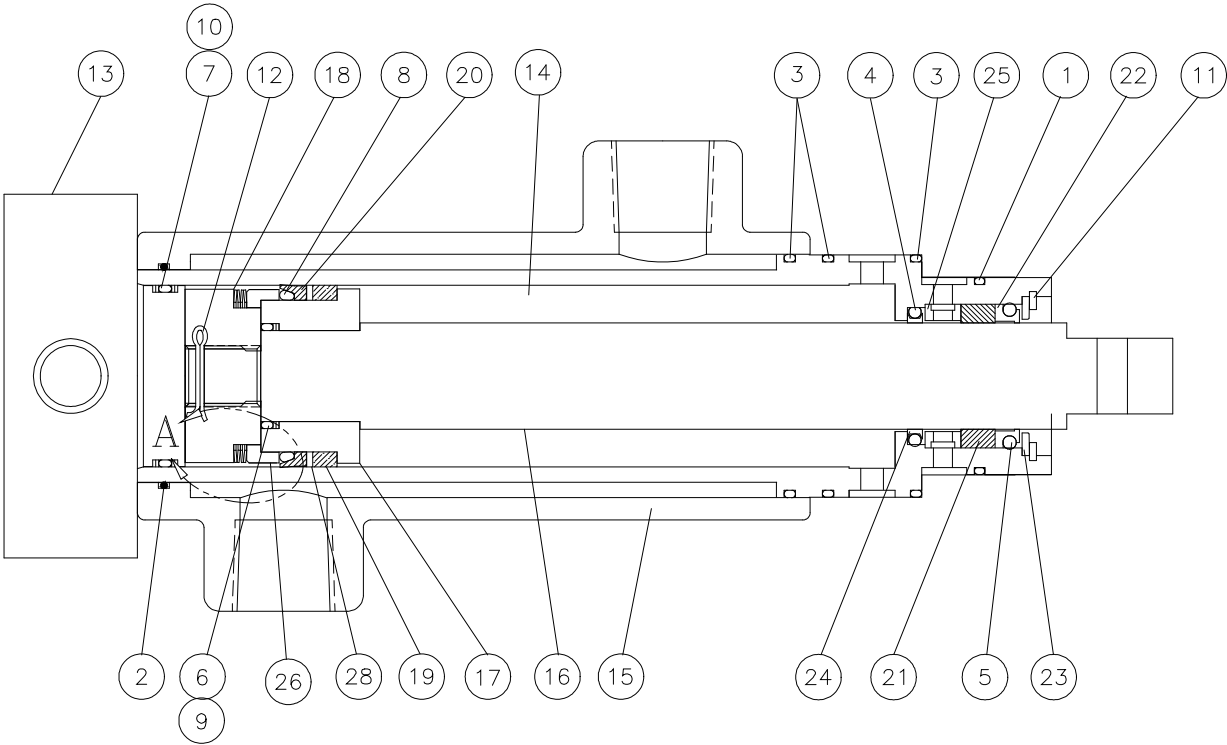
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		FRACTION	DECIMALS	ANGLES	HYDRAULICS INTERNATIONAL, INC.	
		±1/16	.XX ±.03	±2°	CHATSORTH, CALIFORNIA	
				APPROVALS	DATE	
				DRAWN	M.A.G.	3-99
				CHECKED	A.G.	3-99
				ISSUED		
				ENGR.		
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				SHEET		

NEXT ASSY	USED ON
APPLICATIONS	

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REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	SEE DCN	1-99	
B	SEE DCN	8-99	
C	SEE DCN	05-02	



VIEW A

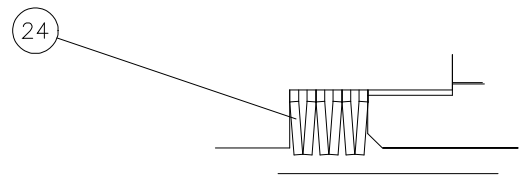
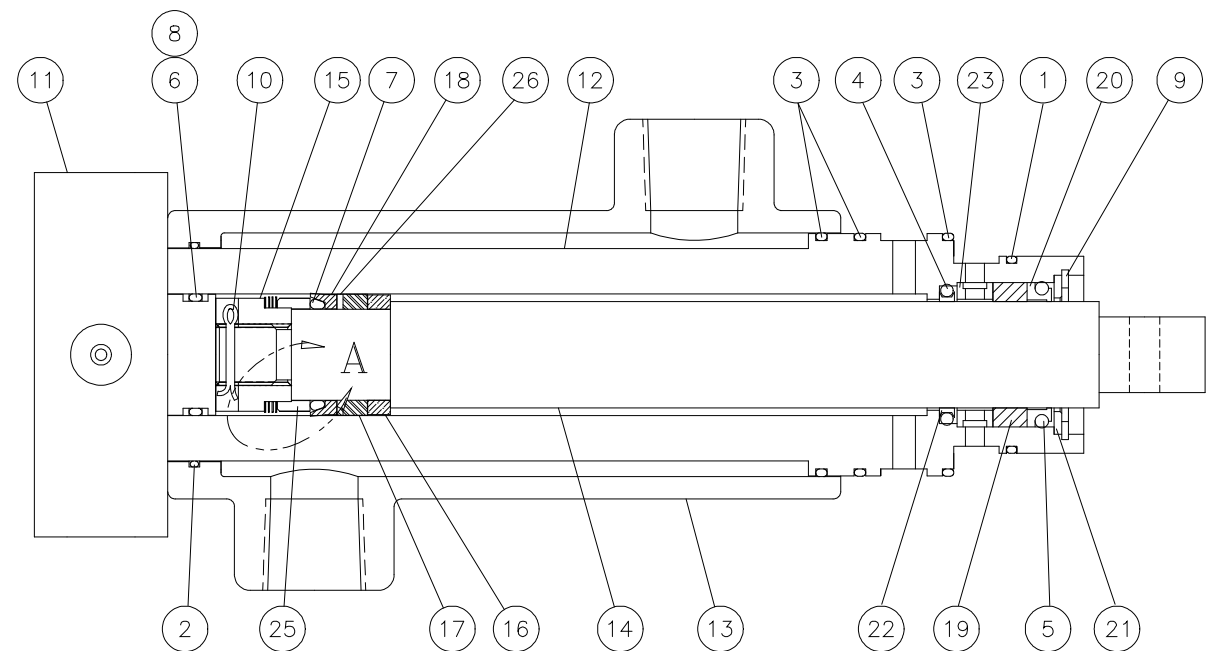
1	80264-14	BACK-UP			28
4	80225-14	SPRING-BELLEVILLE			27
1	80249-14	SPACER			26
1	80241-1	SPACER			25
1	80240-1	RING			24
1	80239-1	RING			23
1	80238-1	SEAL			22
1	80237-1	BEARING			21
1	80236-14	SEAL			20
1	80235-14	BEARING			19
1	80233-14	NUT			18
1	80232-14	PISTON			17
1	80230-1	ROD			16
1	80229-1	COOLING SLEEVE			15
1	80228-14	BARREL			14
1	80209-100	END CAP ASSY			13
1	80102-1	COTTER PIN			12
1	80101-3	RETAINING RING			11
2	80100-028	BACKUP RING			10
1	80100-018	BACKUP RING			9
1	80086-124	O-RING			8
1	80086-028				7
1	80086-018				6
1	80086-120				5
1	80086-119				4
3	80086-032				3
1	80086-031				2
1	80086-029	O-RING			1

DWG. No. 80212
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REV. C

-100 QTY REQD		PART NO.	DESCRIPTION	MATERIAL	SPECIFICATION	ITEM NO.
UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES. TOLERANCES ARE: FRACTION DECIMALS ANGLES ±1/16 .XX ±.03 .XXX ±.010 ±2°		CONTRACT No.		HYDRAULICS INTERNATIONAL, INC. CHATSWORTH, CALIFORNIA		
		APPROVALS	DATE	GAS SECTION ASSY. - 14 RATIO		
		DRAWN M.A.G.	07-98			
		CHECKED A.G.	05-02	SIZE C	FSCM No. 2N386	DWG. No. 80212
		ISSUED				REV. C
NEXT ASSY		USED ON		SCALE		SHEET
APPLICATIONS		DO NOT SCALE DWG.				

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REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	SEE DCN	1-99	
B	SEE DCN	7-99	
C	SEE DCN	8-99	
D	SEE DCN	05-02	



VIEW A

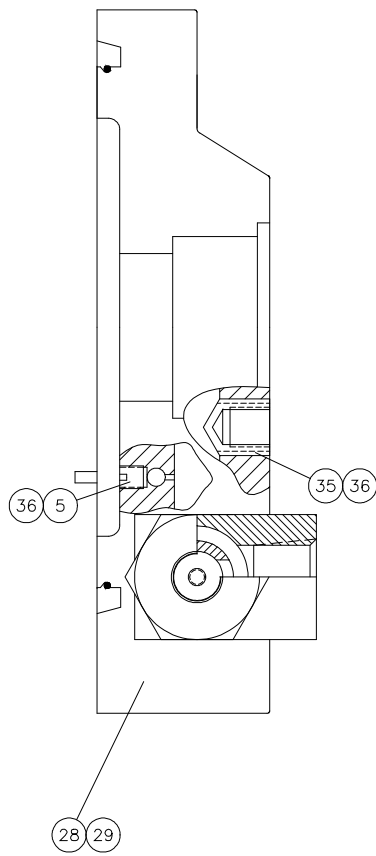
1	80264-30	BACK-UP			26
1	80249-30	SPACER			25
6	80225-30	SPRING - BELLEVILLE			24
1	80241-1	SPACER			23
1	80240-1	RING			22
1	80239-1	RING			21
1	80238-1	SEAL			20
1	80237-1	BEARING			19
1	80236-30	SEAL			18
1	80235-30	BEARING			17
1	80234-30	PISTON			16
1	80233-30	NUT			15
1	80230-1	ROD			14
1	80229-1	COOLING SLEEVE			13
1	80228-30	BARREL-GAS			12
1	80210-100	END CAP ASSY.			11
1	80102-1	COTTER PIN			10
1	80101-3	RETAINING RING			9
2	80100-020	BACKUP RING			8
1	80086-116	O-RING			7
1	80086-020				6
1	80086-120				5
1	80086-119				4
3	80086-032				3
1	80086-031				2
1	80086-029	O-RING			1

DWG. NO.	80213
SH	
REV.	D

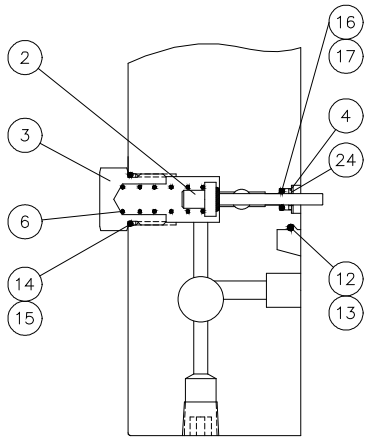
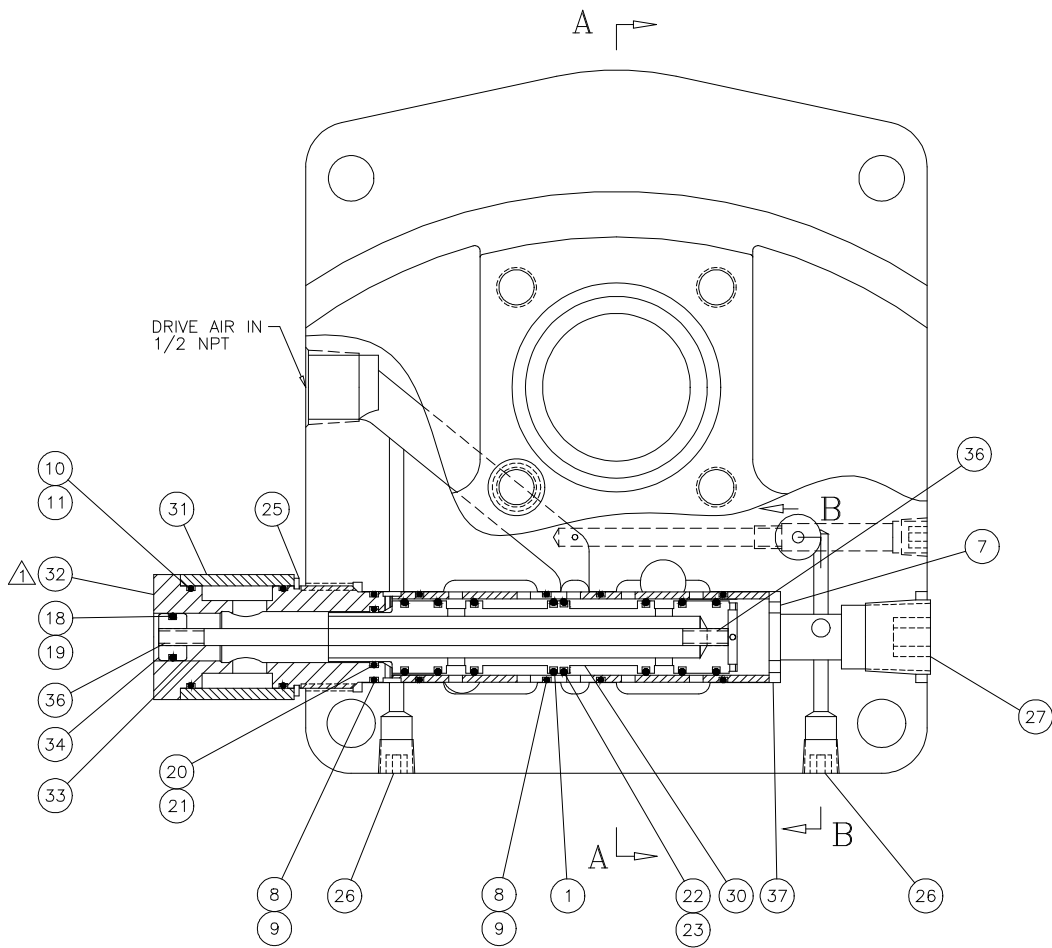
-100 QTY REQD		PART NO.	DESCRIPTION	MATERIAL	SPECIFICATION	ITEM NO.
UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES, TOLERANCES ARE: FRACTION DECIMALS ANGLES ±1/16 .XX ±.03 .XXX ±.010 ±2°		CONTRACT No.		HYDRAULICS INTERNATIONAL, INC. CHATSWORTH, CALIFORNIA		
		APPROVALS	DATE	GAS SECTION ASSY - 30 RATIO		
		DRAWN M.A.G.	9-98			
		CHECKED A.G.	05-02	SIZE C	FSCM No. 2N386	DWG. No. 80213
NEXT ASSY		USED ON	ISSUED			REV. D
APPLICATIONS		DO NOT SCALE DWG.	ENGR.	SCALE		SHEET

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DWG. NO.		80217	SH	REV.	D	1		
		REVISIONS						
REV.	DESCRIPTION					DATE	APPROVED	
A	SEE DCN					09-96		
B	SEE DCN					03-99		
C	SEE DCN					10-01		
D	SEE DCN					01-05		



SECTION A-A



SECTION B-B

NOTE:

1. TORQUE TO 10 - 15 INCH POUND

2.

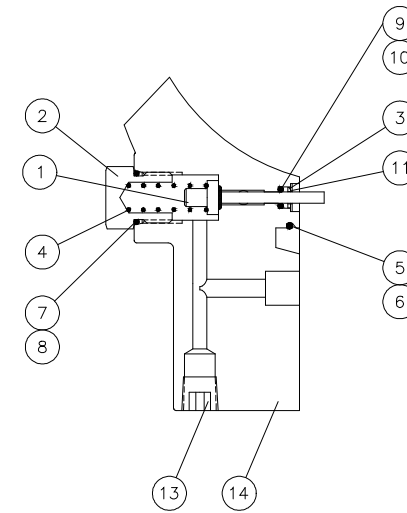
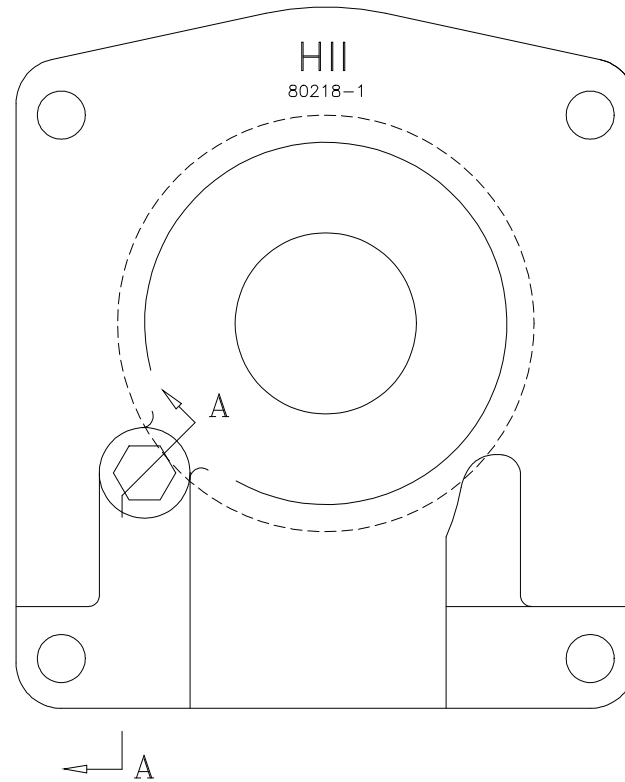
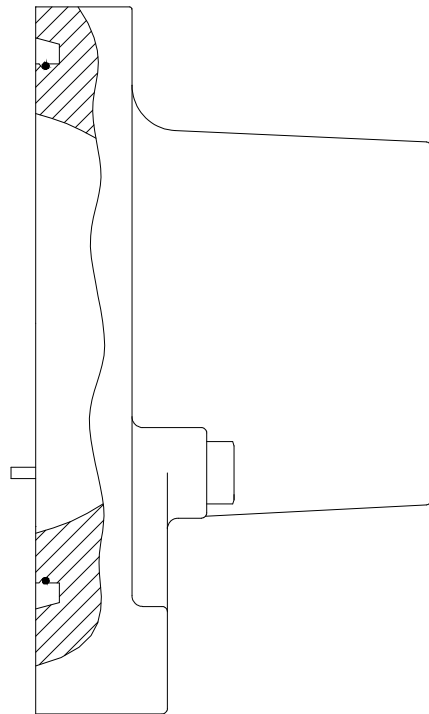
ASSY.	SEALS	USED ON
-100	BUNA	5G-SS, 5G-SD
-200	VITON	5G-DS, 5G-TS
-300	BUNA	5G-DD
-400	VITON	5G-TD

1	1	1	1	80028-2	SLEEVE			37
AR	AR	AR	AR	262	ADHESIVE		LOCTITE CORP. ROCKY HILL, CT	36
1	1	1	1	80256-1	INSERT			35
1	1	1	1	80255-1	PISTON			34
1	1	1	1	80254-1	ROD			33
1	1	1	1	80253-1	RETAINER			32
1	1	1	1	80252-1	FITTING			31
1	1	1	1	80029-2	SPOOL			30
1	1			80223-2	VALVE END CAP			29
		1	1	80223-1	VALVE END CAP			28
1	1	1	1	80139-5	PLUG			27
2	2	2	2	80139-2	PLUG			26
1	1	1	1	80101-5	RETAINING RING			25
1	1	1	1	80101-4	RETAINING RING			24
	8		8	80085-017	O-RING			23
8		8		80086-017	O-RING			22
	1		1	80085-015	O-RING			21
1		1		80086-015	O-RING			20
	1		1	80085-013	O-RING			19
1		1		80086-013	O-RING			18
	1		1	80085-006	O-RING			17
1		1		80086-006	O-RING			16
	1		1	80084-906	O-RING			15
1		1		80086-906	O-RING			14
	1		1	80083-050	O-RING			13
1		1		80086-050	O-RING			12
	2		2	80083-022	O-RING			11
2		2		80086-022	O-RING			10
	5		5	80083-020	O-RING			9
5		5		80086-020	O-RING			8
1	1	1	1	80069-1	BUMPER			7
1	1	1	1	80068-1	SPRING			6
1	1	1	1	80043-1	SET SCREW			5
1	1	1	1	80042-1	BEARING			4
1	1	1	1	80041-1	CAP			3
1	1	1	1	80302-100	POPPET			2
1	1	1	1	80028-1	SLEEVE			1

QTY REQD		PART No.	DESCRIPTION	MATERIAL	SPECIFICATION	ITEM
UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES, TOLERANCES ARE FRACTION DECIMALS ANGLES XX ±.03 ±2° ±1/16 .XXX ±.010		CONTRACT No.		HYDRAULICS INTERNATIONAL, INC. CHATSWORTH, CALIFORNIA		
		APPROVALS	DATE	VALVE CAP ASSEMBLY		
		DRAWN M.A.G.	3-99			
		CHECKED		SIZE D	FSCM No. 2N386	DWG. No. 80217
		ISSUED		SCALE	WT.	REV. D
NEXT ASSY USED ON		FINISH:		SHEET		
APPLICATIONS		DO NOT SCALE DWG.	ENGR.			

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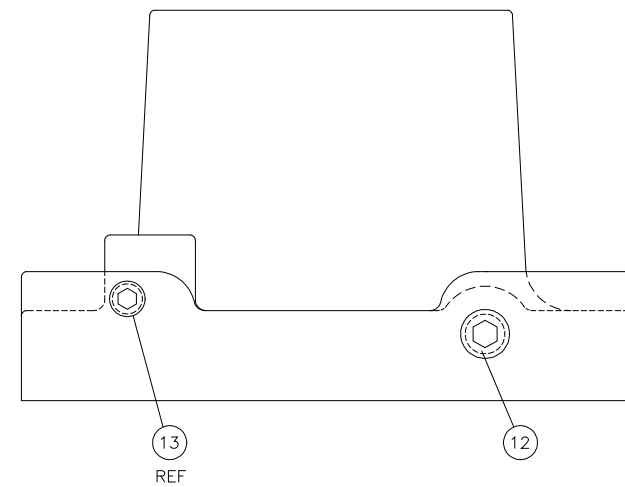
DWG. NO.	80219	SH	REV. C	1
REVISIONS				
REV.	DESCRIPTION	DATE	APPROVED	
A	SEE DCN	06-96		
B	SEE DCN	05-99		
C	SEE DCN	10-01		




SECTION A-A

NOTE:

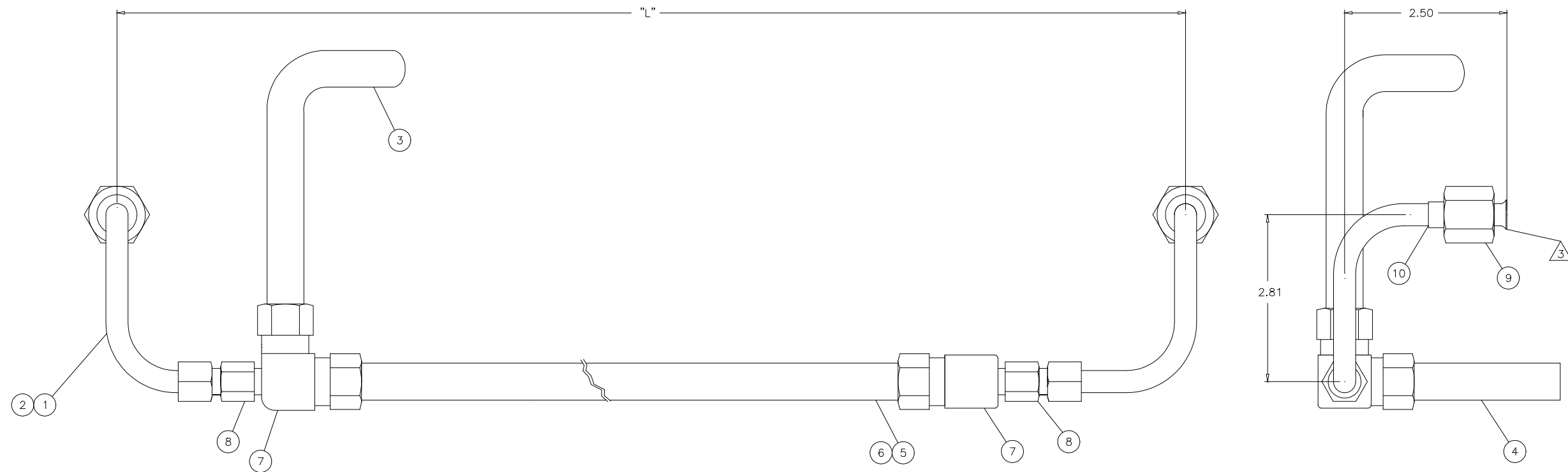
1. -100 ASSY. BUNA SEALS
-200 ASSY. VITON SEALS



1	1	80224-1	END CAP			14
1	1	80139-2	PLUG			13
1	1	80139-3	PLUG			12
1	1	80101-4	RETAINER			11
1		80086-006	O-RING			10
	1	80085-006	O-RING			9
1		80086-906	O-RING			8
	1	80084-906	O-RING			7
1		80086-050	O-RING			6
	1	80083-050	O-RING			5
1	1	80068-1	SPRING			4
1	1	80042-1	BEARING			3
1	1	80041-1	CAP			2
1	1	80302-100	POPPET			1

-200-100	QTY REQD	PART No.	DESCRIPTION		MATERIAL	SPECIFICATION	ITEM
UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES. TOLERANCES ARE FRACTION DECIMALS ANGLES ±1/16 .XX ±.03 .XXX ±.010 ±2'			CONTRACT No.		 HYDRAULICS INTERNATIONAL, INC. CHATSWORTH, CALIFORNIA		
			APPROVALS	DATE	END CAP ASSY		
			DRAWN M.A.G.	3-99			
FINISH:			CHECKED		SIZE D FSCM No. 2N386 DWG. No. 80219 REV. C		
			ISSUED				
DO NOT SCALE DWG.			ENGR.		SCALE 1/1 WT.		SHEET

		±1/16	.XX .XXX	±.03 ±.010	±2
		FINISH:			
NEXT ASSY	USED ON				
APPLICATIONS		DO NOT SCALE DWG			




P/N	"L"	USED ON
-1	22.90	5G-TS-7/14 5G-TS-7/30
-2	29.73	5G-TD-14/60

NOTE:

1. REMOVE ALL BURRS AND SHARP EDGES
2. COMM. EQUIVALENT ACCEPTABLE
3. FLARE PER MS33584

<div style="text-align: center;"> \triangle 2 \triangle </div>	2	2	MS51533B6S	SLEEVE			10
	2	2	MS51531B6S	NUT			9
	2	2	810226-100	CONNECTOR			8
	2	2	810224-100	ELBOW			7
	1		80270-5	TUBE			6
		1	80270-4	TUBE			5
	1	1	80269-5	TUBE			4
	1	1	80269-4	TUBE			3
	1		-2	TUBE	3/8X.049 TUBE SMLS 304 S.S.	ASTM-A-269	2
		1	-1	TUBE	3/8X.049 TUBE SMLS 304 S.S.	ASTM-A-269	1

		-200	-100	PART No.		DESCRIPTION		MATERIAL		SPECIFICATION		ITEM
		QTY REQD		UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES, TOLERANCES ARE FRACTION DECIMALS ANGLES		CONTRACT No.		 HYDRAULICS INTERNATIONAL, INC. CHATSWORTH, CALIFORNIA				
				1/16 .XX ±.03 ±2° .XXX ±.010		APPROVALS		DATE		INTERSTAGE COOLER ASSY.		
						DRAWN E.N		11-03				
						CHECKED A.G.		01-06				
				FINISH:		SIZE D		FSCM No.		DWG. No.		REV. A
NEXT ASSY		USED ON				ISSUED		2N386		80261		
APPLICATIONS		DO NOT SCALE DWG.		ENGR.		SCALE		WT.		SHEET		

8
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DWG. NO.		80626	SH 1	REV. A	1
REVISIONS					
REV.	DESCRIPTION			DATE	APPROVED
A	SEE DCN			09-01	

2	2	80101-4	RETAINER			28
2		80086-906	O-RING			27
	2	80084-906	O-RING			26
1		80086-904	O-RING			25
	1	80084-904	O-RING			24
1		80086-431	O-RING			23
	1	80085-431	O-RING			22
2		80086-050	O-RING			21
	2	80083-050	O-RING			20
2		80086-022	O-RING			19
	2	80083-022	O-RING			18
5		80086-020	O-RING			17
	5	80083-020	O-RING			16
8		80086-017	O-RING			15
	8	80085-017	O-RING			14
1		80086-015	O-RING			13
	1	80085-015	O-RING			12
2		80086-014	O-RING			11
	2	80083-014	O-RING			10
1		80086-013	O-RING			9
	1	80085-013	O-RING			8
2		80086-010	O-RING			7
	2	80083-010	O-RING			6
1		80086-009	O-RING			5
	1	80083-009	O-RING			4
2		80086-006	O-RING			3
	2	80085-006	O-RING			2
1	1	80069-1	BUMPER			1

NOTE:

1.

ASSY.	AIR SECTION SEALS	MODEL
-100	BUNA	SK5GA
-200	VITON	SK5GAV

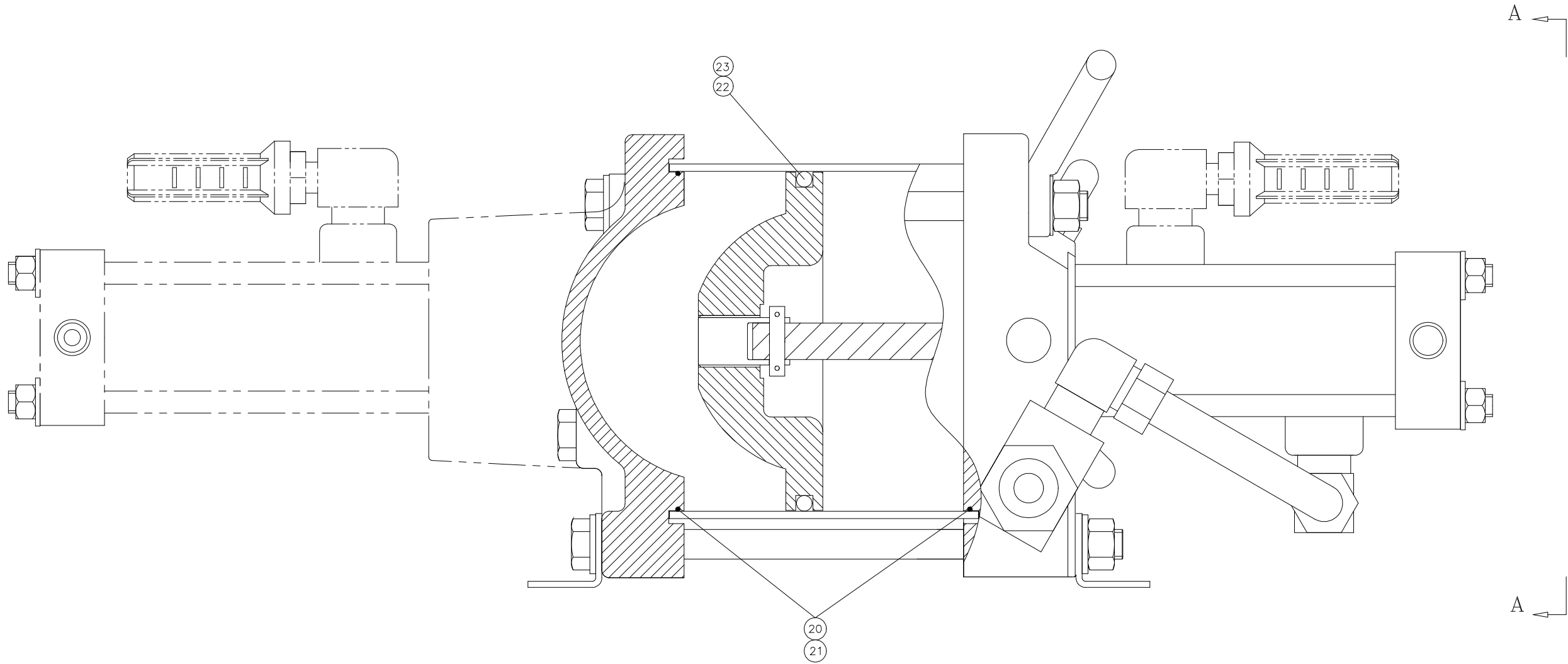
UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES, TOLERANCES ARE: FRACTION DECIMALS ANGLES ±1/16 .XX ±.03 .XXX ±.010 ±2°		CONTRACT No.		 HYDRAULICS INTERNATIONAL, INC. CHATSWORTH, CALIFORNIA	
APPROVALS		DATE		SEAL KIT - GAS BOOSTER	
DRAWN M.A.G.		8-98		AIR SECTION - SINGLE AIR DRIVE	
CHECKED E.N		09-01		SIZE D	FSCM No. 2N386
ISSUED				DWG. No.	80626
SCALE		WT.		REV. A	3
SHEET		1 OF			

NEXT ASSY	USED ON
APPLICATIONS	

DO NOT SCALE DWG.
ENGR.

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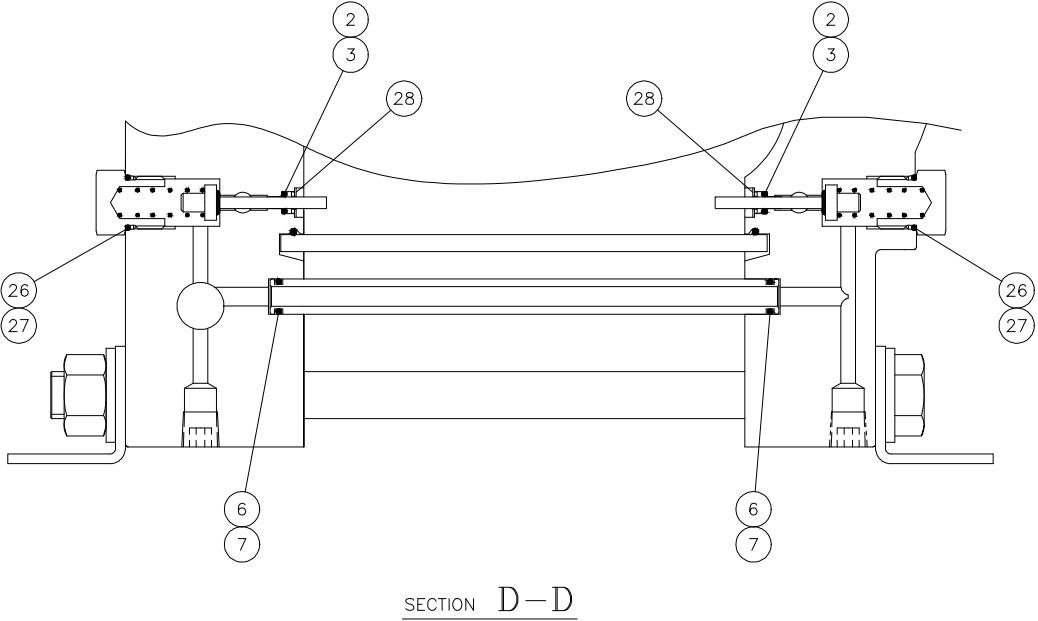
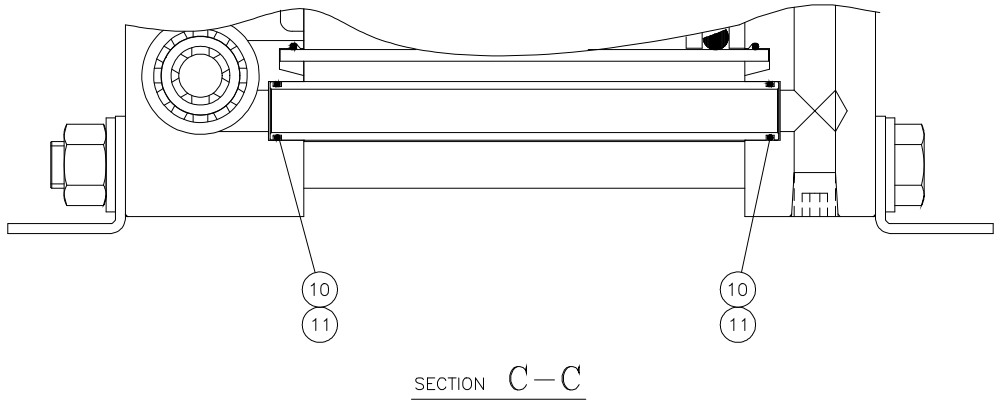
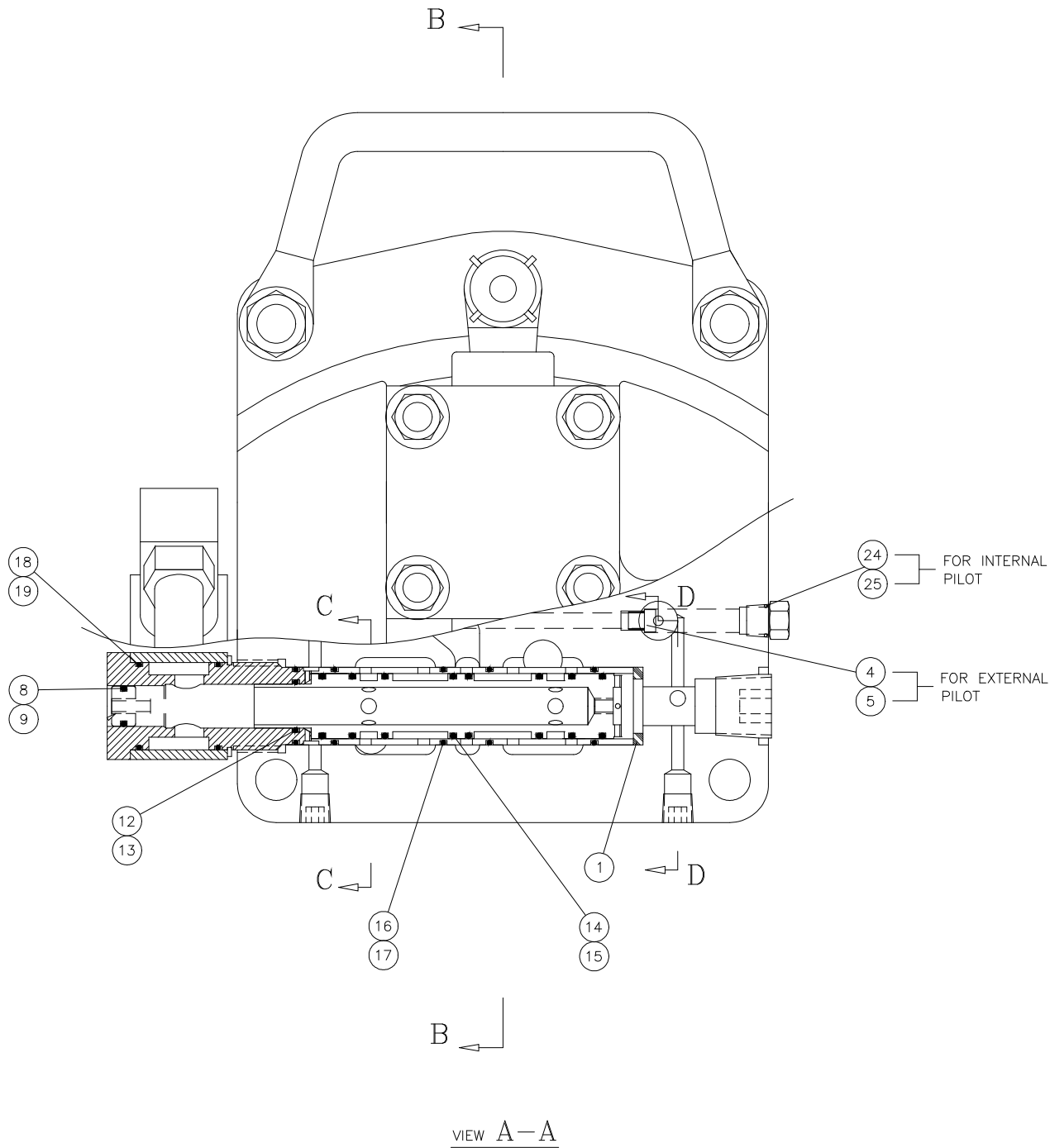
DWG. NO.		80626	SH	2	REV.	A	1
REVISIONS							
REV.	DESCRIPTION				DATE	APPROVED	



QTY REQD		PART No.	DESCRIPTION		MATERIAL	SPECIFICATION	ITEM
UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES, TOLERANCES ARE:		CONTRACT No.		HYDRAULICS INTERNATIONAL, INC. CHATSWORTH, CALIFORNIA			
FRACTION .XX ±.03		APPROVALS		DATE	SEAL KIT - GAS BOOSTER		
±1/16 .XXX ±.010 ±2"		DRAWN M.A.G.		8-98	AIR SECTION - SINGLE AIR DRIVE		
FINISH:		CHECKED E.N.		09-01	SIZE D	FSCM No. 2N386	DWG. No. 80626
NEXT ASSY		USED ON		ISSUED	SCALE	WT.	REV. A
APPLICATIONS		DO NOT SCALE DWG.		ENGR.	SHEET		2 OF 3

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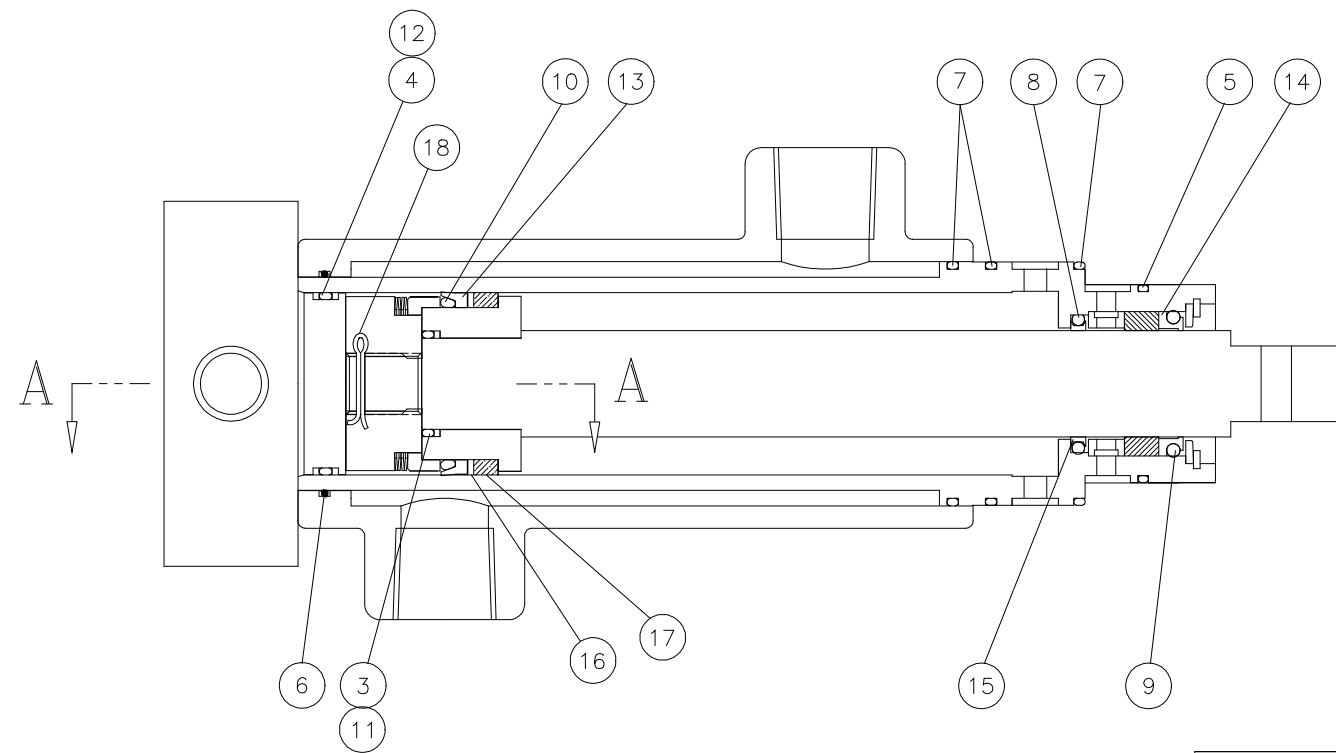
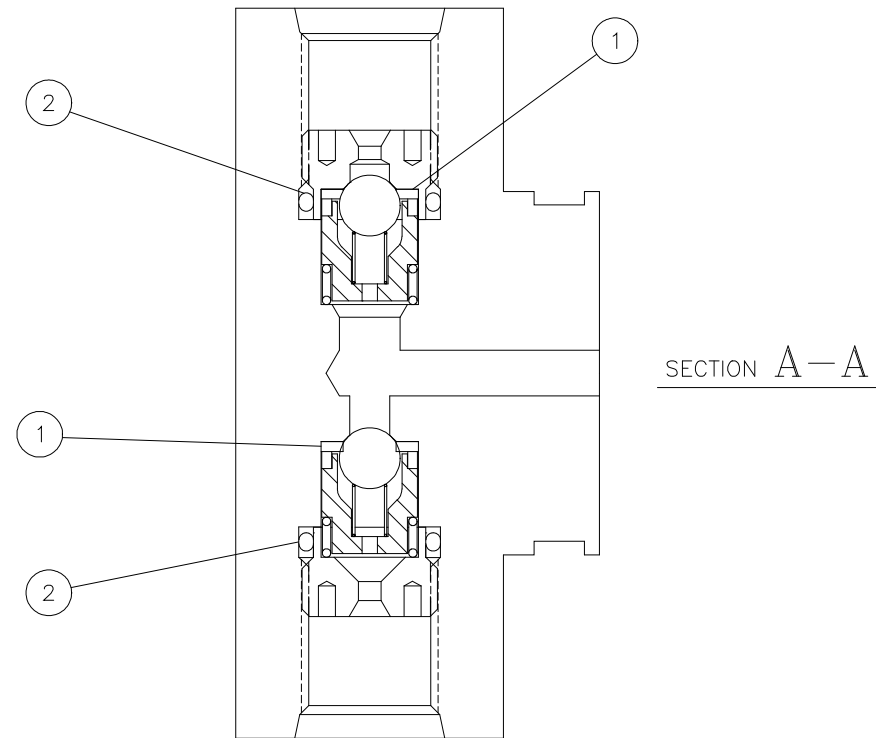
DWG. NO.		80626	SH	3	REV.	A	1
REVISIONS							
REV.	DESCRIPTION				DATE	APPROVED	



QTY REQD		PART No.	DESCRIPTION		MATERIAL	SPECIFICATION	ITEM
UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES, TOLERANCES ARE FRACTION DECIMALS ANGLES ±1/16 .XX ±.03 ±2° XXX ±.010 ±2°		CONTRACT No.		HYDRAULICS INTERNATIONAL, INC. CHATSWORTH, CALIFORNIA			
APPROVALS		DATE		SEAL KIT - GAS BOOSTER AIR SECTION - SINGLE AIR DRIVE			
DRAWN M.A.G.		8-98		SIZE D			
CHECKED E.N.		09-01		FSCM No. 2N386			
ISSUED				DWG. No. 80626			
DO NOT SCALE DWG.		ENGR.		SCALE			
NEXT ASSY		USED ON		WT.			
APPLICATIONS				SHEET 3 OF 3			

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REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	SEE DCN	05-02	



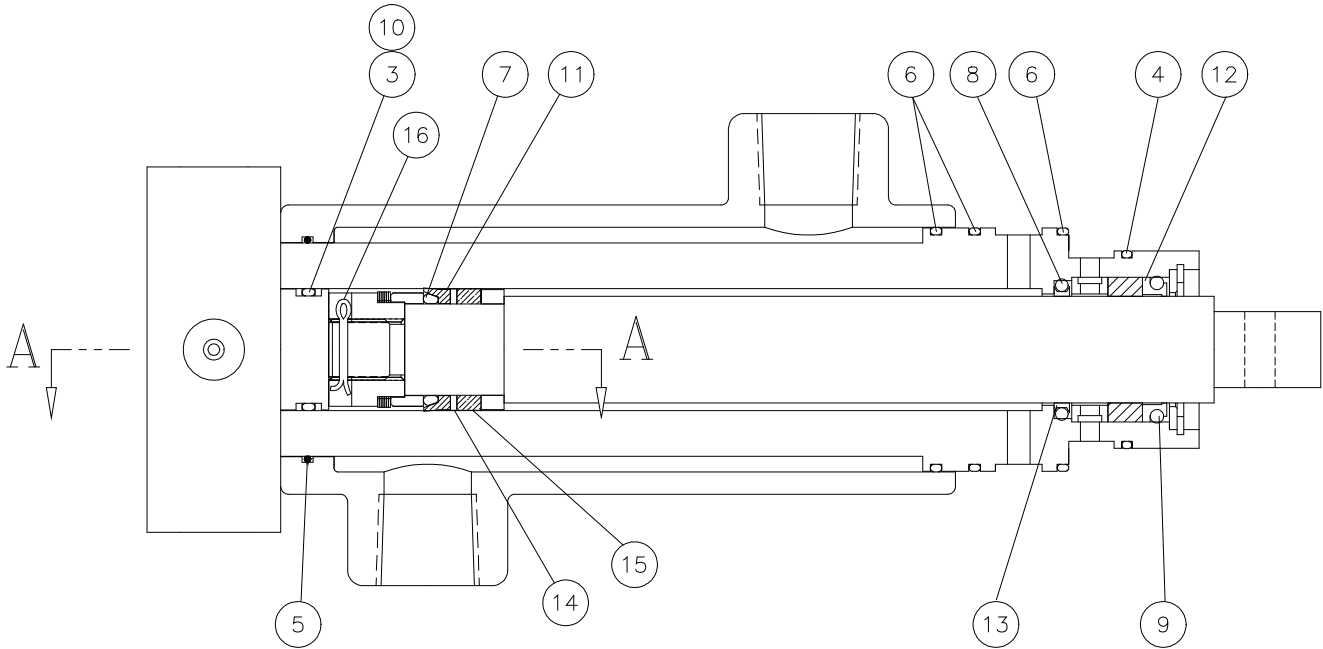
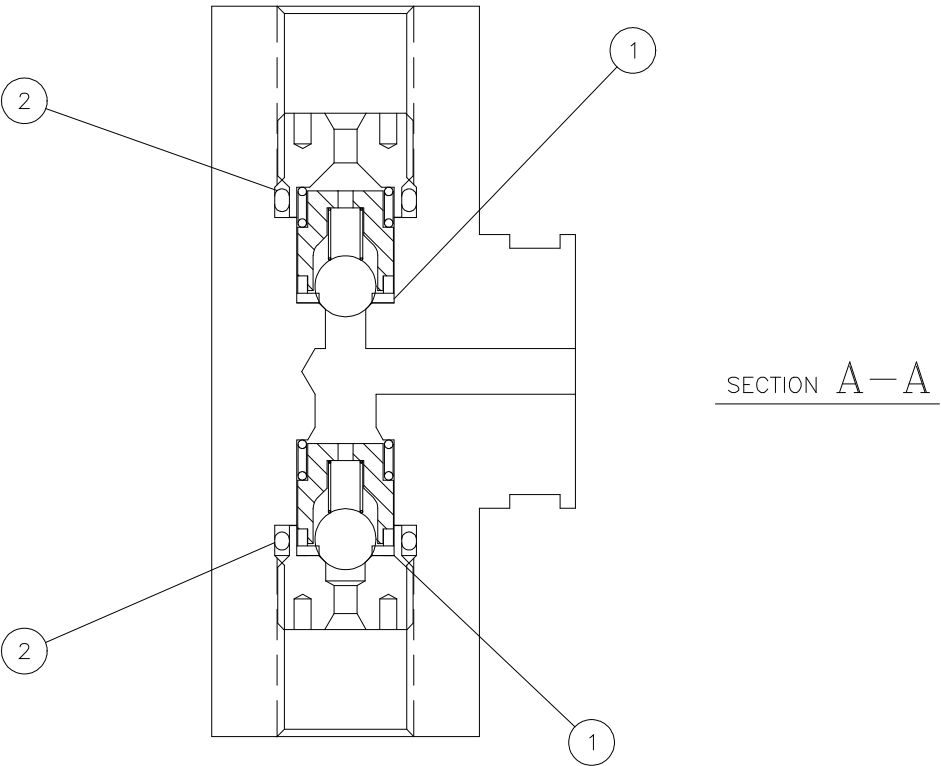
1	80102-1	COTTER PIN			18
1	80235-14	BEARING			17
1	80264-14	BACK-UP			16
1	80240-1	RING-GLIDER			15
1	80238-1	SEAL-ROD			14
1	80236-14	SEAL			13
2	80100-028	BACKUP RING			12
1	80100-018	BACKUP RING			11
1	80086-124	O-RING			10
1	80086-120				9
1	80086-119				8
3	80086-032				7
1	80086-031				6
1	80086-029				5
1	80086-028				4
1	80086-018				3
2	80086-906	O-RING			2
2	80046-1	SEAT			1

100	QTY REQD	PART NO.	DESCRIPTION	MATERIAL	SPECIFICATION	ITEM NO.
UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES, TOLERANCES ARE: FRACTION DECIMALS ANGLES ±1/16 .XX ±.03 ±2° .XXX ±.010 ±2°		CONTRACT No.		HYDRAULICS INTERNATIONAL, INC. CHATSWORTH, CALIFORNIA		
		APPROVALS	DATE	SEAL KIT - GAS SECTION, 14R SK5G-14V		
		DRAWN M.A.G.	3-99			
		CHECKED				
		ISSUED				
		FINISH:				
		DO NOT SCALE DWG.	ENGR.			
				SIZE C	FSCM No. 2N386	DWG. No. 80629
						REV. A
				SCALE		SHEET

DWG. No. 80629
SH
REV. A

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REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	SEE DCN	09-01	
B	SEE DCN	05-02	



1	80102-1	COTTER PIN			16
1	80235-30	BEARING			15
1	80264-30	BACK-UP			14
1	80240-1	RING			13
1	80238-1	SEAL			12
1	80236-30	SEAL			11
2	80100-020	BACKUP RING			10
1	80086-120	O-RING			9
1	80086-119				8
1	80086-116				7
3	80086-032				6
1	80086-031				5
1	80086-029				4
1	80086-020				3
2	80086-906	O-RING			2
2	80046-1	SEAT			1

DWG. NO.	80630
REV.	B

100	QTY REQD	PART NO.	DESCRIPTION	MATERIAL	SPECIFICATION	ITEM NO.
UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES, TOLERANCES ARE: FRACTION DECIMALS ANGLES ±1/16 .XX ±.03 .XXX ±.010 ±2°		CONTRACT No.		HYDRAULICS INTERNATIONAL, INC. CHATSWORTH, CALIFORNIA		
		APPROVALS	DATE	SEAL KIT - GAS SECTION, 30R SK5G-30V		
		DRAWN M.A.G.	3-99			
		CHECKED		SIZE C	FSCM No. 2N386	DWG. No. 80630
		ISSUED				REV. B
		ENGR.		SCALE		SHEET

NEXT ASSY	USED ON
APPLICATIONS	DO NOT SCALE DWG.