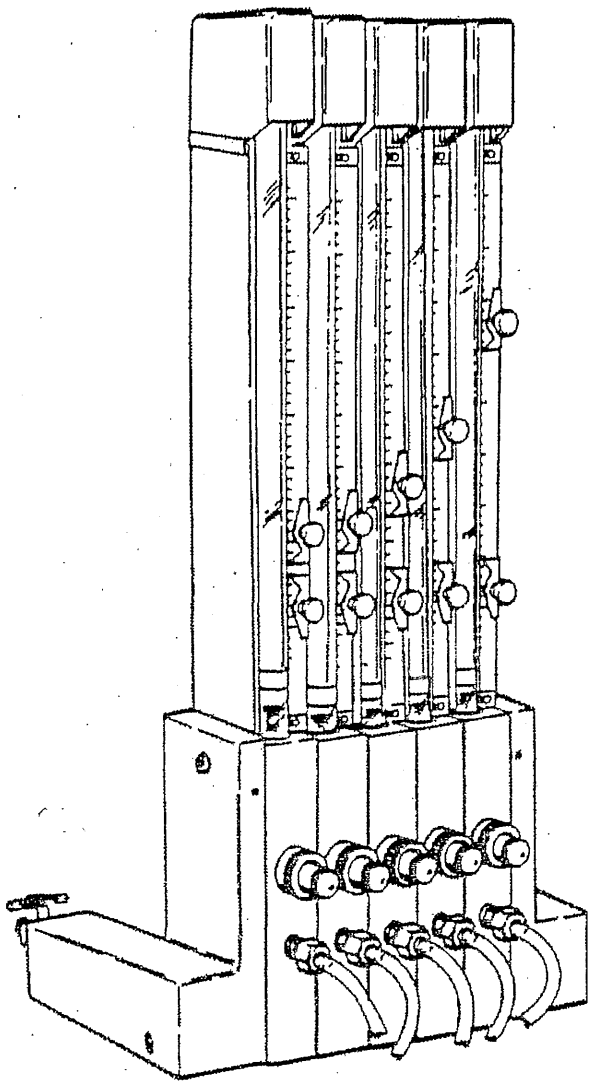
Modular Precisionaire® Column
Instruction Manual



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We reserve the right to make changes to the product which may not be reflected in this manual.

It is recommended that this document be read in its entirety before any attempt is made to operate or make any adjustment to the equipment.

Although every attempt has been made to present information which is both complete and current, variations either in equipment configuration or in equipment application, or both, make it impossible to cover all contingencies in a single document.

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SECTION 1. INTRODUCTION

GENERAL INFORMATION

The Modular Precisionaire® Column Instrument is a versatile, accurate and reliable air gage. Precise amplification and linearity are built in. The only moving part is a float supported on a column of air. Dimensions and tolerances can be read at a glance from an easy-to-read scale.

The modular design of the Precisionaire® Column Instrument allows either single or multiple column configurations to be used, depending on your inspection requirements. The instrument can be used to check one or two dimensions or complex geometrical relationships.

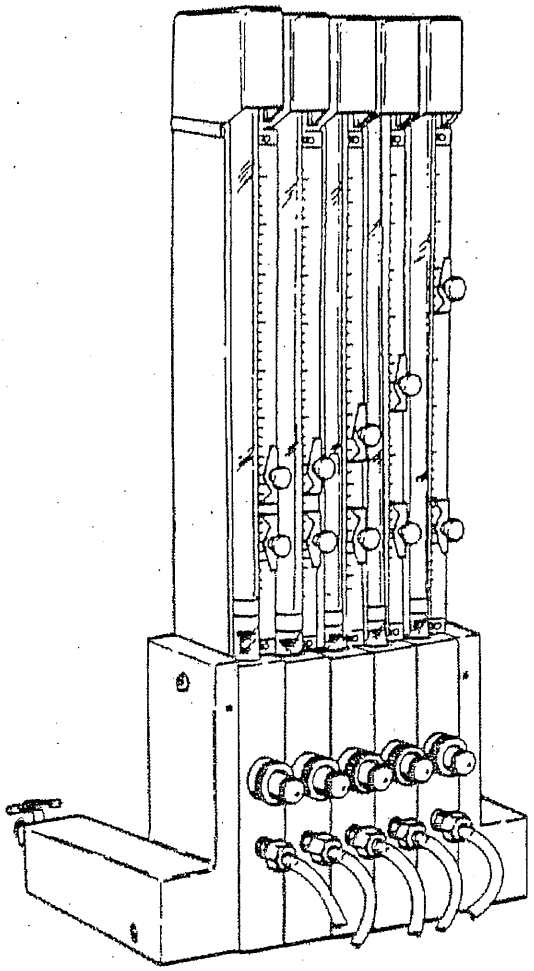

Figure 1. Modular Precisionaire® Column Instrument

COMPONENT PARTS

The component parts of the Precisionaire® Column Instrument are as follows:

1. Left-hand Panel (with attached Shut-Off Valve)

2. Modular Column (one or more columns are required) - shipped completely assembled with Regulator, Column, Float, Float Bumper, Scale, and Pointers

3. Right-hand Panel

UNPACKING

When you receive your column instrument, the shipping carton will normally contain the following items:

1. Modular Precisionaire® Column Instrument (completely assembled)
2. Air filter and bushing
3. Five foot length of rubber hose
4. Instrument cover
5. User's Manual

NOTE

If ordered with the instrument, smaller tooling and set-up masters may be included in the same shipping carton.

As you unpack the shipping carton, check the items and quantities against the packing list. If the carton shows no sign of tampering and you find that one or more items are missing, immediately notify the Precision Gage & Tool Co., 375 Gargrave Road, Dayton, Ohio 45449.

If the carton shows signs of tampering and you find that items are missing or if the equipment appears to have been damaged in transit, call the transportation company immediately and file a claim for damages. The transportation company is responsible for the shipment after it leaves the Precision Gage & Tool Co. until it arrives at your receiving dock.

SECTION 2. COLUMN INSTRUMENT SETUP

SETUP PROCEDURES

The Modular Precisionaire® Column Instrument, whether it is a single or multiple column instrument, is shipped completely assembled and ready to connect to the air supply for immediate use (see Figure 2).

Connecting the Instrument

1. Connect the inlet side of the air filter to an air supply line that can provide pressure from 275.86 to 862.125 kPa (40 to 125 psi).

NOTE

An air filter must always be used to provide clean, dry air to the instrument. To trap water and oil effectively, the filter must be approximately 45.72 cm (18 in.) below the level of the column instrument.

2. Connect the outlet side of the filter to the rear of the Precisionaire® instrument. Use the hose supplied with the instrument.

3. Open the SHUT-OFF valve on the left end panel of the instrument by turning it fully counterclockwise.

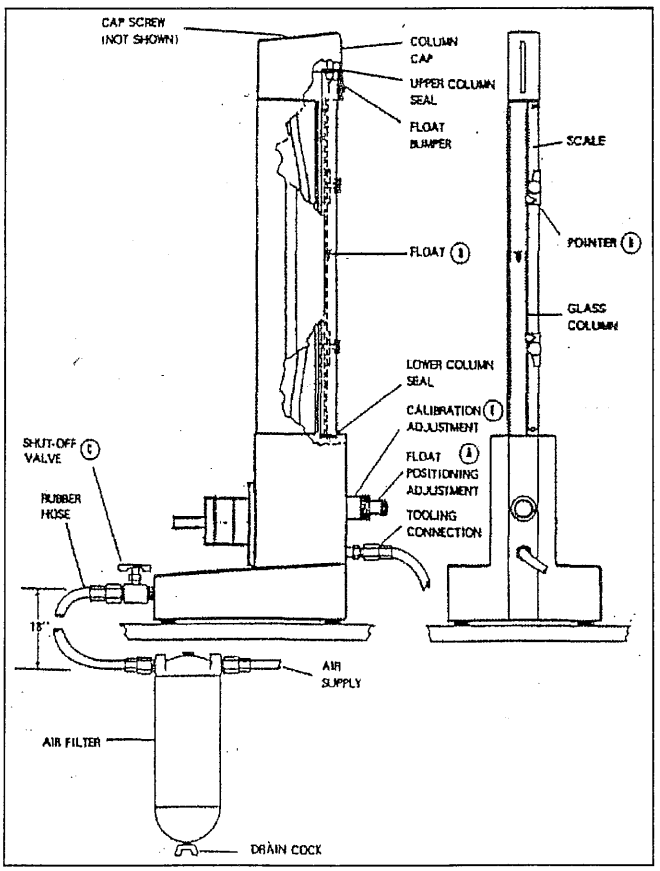

Figure 2. Principal Parts and Adjustments

Checking the Pressure Regulator Setting

Check the pressure regulator setting with an air pressure indicator (Part No. 60060456 or equivalent) using the following procedure (see Figure 2):

NOTE

The pressure regulator is preset at the factory to provide 68.97 kPa (10 psi) of air pressure which is common for most Precisionaire® tooling. Balljet tooling requires 137.93 kPa (20 psi) of regulated air pressure for operation.

1. Close the calibration adjustment (E) and the float positioning adjustment (A) by turning the two knobs fully clockwise.

2. Open the float positioning adjustment (A) by turning the knob counterclockwise three complete revolutions.

3. Connect the air pressure indicator to the tooling hose. When you cover the air bleed hole on the air pressure indicator with your thumb, the pressure setting of the air regulator is indicated on the dial. Refer to PRESSURE SETTING for the procedure to change the regulator setting.

Testing Connections

Spindles and fixtures, with the components and fittings needed to connect them to the front of the column instrument, are normally shipped with the Precisionaire® instrument.

NOTE

Spindles and setting masters are usually covered with an oil impregnated coating to protect the surface finish. Remove the protective coating and use an inorganic solvent to clean these items before testing the connections on the column instrument.

1, Connect and securely tighten the spindle or fixture to the Precisionaire® column instrument.

2. Turn the float positioning adjustment (A) fully clockwise.

3. Cover the air jets with your fingers to stop the air from escaping and observe that the float drops to the bottom of the air column.

4. Remove your fingers from the air jets suddenly and observe that the float rises abruptly.

5. Repeat steps 3 and 4 several times to observe the action of the float. If the float flutters and does not drop to the bottom of the column when the air jets are closed, an air leak is indicated at some point between the tooling and the glass column. Retighten all the fittings and test again.

CALIBRATION

After the Modular Precisionaire® Column Instrument is installed and all connections have been tested, the instrument must be calibrated. The frequency of subsequent calibration will vary depending on the requirements of the inspection operations. However, the calibration should be checked at the beginning of each work period or when work resumes after a rest period.

Check the calibration more frequently when inspecting to close tolerances, when there are significant temperature changes in the inspection area, or when the temperature of parts to be inspected are appreciably different from the temperature of the masters used for calibration.

Use the following calibration procedures (refer to Figures 2, 3, and 4):

1. Make sure that the shut-off valve (C) is fully open.

2. Set the scale pointers (D) to the tolerance limits, reflecting the difference between the minimum master and the maximum master.

3. Place the minimum flow master in position on the tooling.

NOTE

The minimum flow master is the minimum master for a spindle and the maximum master for an air ring.

The maximum flow master is the maximum master for a spindle and the minimum master for an air ring.

5. Use the float positioning adjustment (A) to position the top of the float (B) opposite the lower scale pointer.

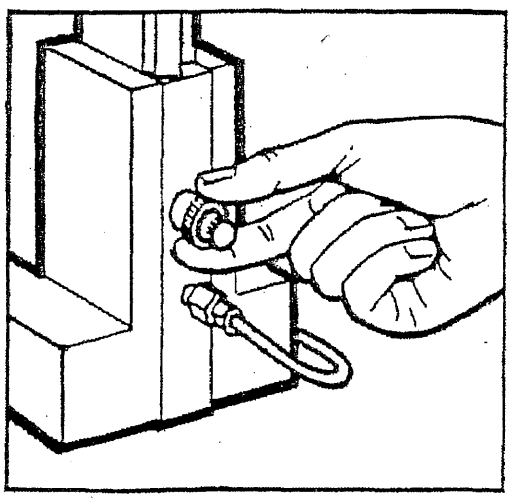

Figure 3. Adjusting Calibration

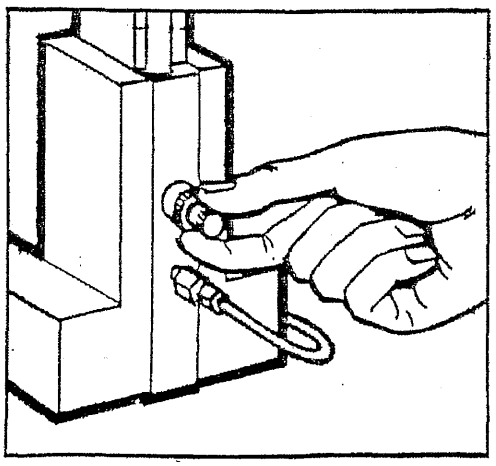

Figure 4. Positioning Float

5. Replace the minimum flow master with the maximum flow master on the tooling. The top of the float should rise to a position opposite the upper scale pointer. If it does not, adjust the float position.

   a. When the Float Rises Above the Upper Scale Pointer

      (1) Note the distance that the float is above the pointer.

      (2) Lower the float to four times that distance below the upper scale pointer by turning the calibration adjustment (E) counterclockwise.

      (3) Use the float positioning adjustment (A) to raise the float until the top of the float is opposite the upper pointer.

   b. When the Float Rises to a Point Below the Upper Scale Pointer

      (1) Note the distance that the float is below the pointer.

      (2) Raise the float to an equal distance above the upper pointer by turning the calibration adjustment (E) clockwise.

      (3) Use the float positioning adjustment (A) to lower the float until the top of the float is opposite the upper pointer.

6. Repeat steps 3, 4, and 5 until the float rises or falls to the exact pointer position when the masters are alternately positioned in the tooling.

7. Remove the master from the tooling, and the gage is ready for part inspection.

Tension Setting

By means of a tension adjustment nut and washer, the float positioning (bleeder) screw is set to turn with a slight "drag" and to eliminate side play. If the float positioning screw is too tight or too loose, correct it as follows (see Figure 5):

1. Turn the calibration adjustment screw "in" toward the Precisionaire® body and turn the float positioning screw out until the tension adjustment nut and washer are exposed and accessible.

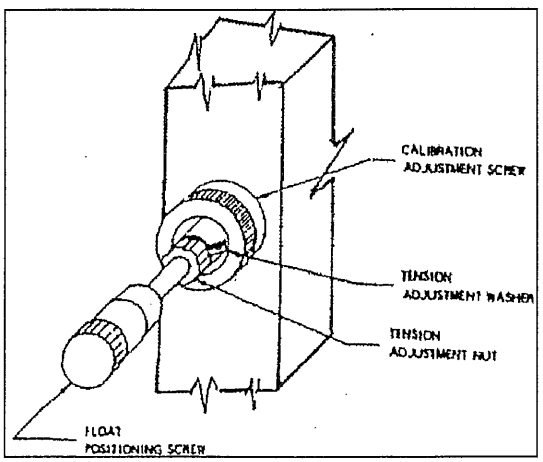

Figure 5. Tension Adjustment

2. Bend the tab on the tension adjustment washer away from the nylon tension adjustment nut and turn the nut manually until there is a slight drag and no side play on the float positioning screw when it is turned.

3. Back the nut off until the washer tab can be bent down into a slot and the float positioning screw can be turned in again without interference from the nut or washer.

AMPLIFICATION

The standard Modular Precisionaire® Column Instruments have amplification ratings based on Airjet Spindles with standard air jets and diameters within a 7.518 to 101.600 mm (.296 to 4.000 in.) range. A color code is used to identify the amplification of the column as follows:

GREEN	=	1000 to 1	RED	=	10,000 to 1
AMBER	=	2000 to 1	BLUE	=	20,000 to 1
BLACK	=	5000 to 1	BLUE BLACK	=	40,000 to 1

Smaller special jets may provide fractional amplifications when used for gaging special features, such as lands, shallow holes, small diameters, etc.

TABLE 1. MAXIMUM TOLERANCE/SPREAD PER AMPLIFICATION (9")

AMPLIFICATION	MAXIMUM RECOMMENDED* TOLERANCE Mm	in.	SPREAD mm	in.	EACH GRADUATION mm	in.
1000 to 1	0.1250	.0050	125.0	5	0.005	.0002
2000 to 1	0.0760	.0030	152.0	6	0.002	.0001
5000 to 1	0.0300	.0012	150.0	6	0.001	.00005
10,000 to 1	0.0150	.0006	150.0	6	0.0005	.000020
20,000 to 1	0.0076	.0003	152.0	6	0.0002	.000010
40,000 to 1	0.0038	.00015	152.0	6	0.0001	.000005

* This table shows the maximum recommended tolerance and spread. However, if the tolerance spread is set from 50.8 to 101.6 mm (2 to 4 in.), most out-of-balance indications will be accurately reflected.

TABLE 2. MAXIMUM TOLERANCE/SPREAD PER AMPLIFICATION (15")

AMPLIFICATION	MAXIMUM RECOMMENDED* TOLERANCE mm	in.	SPREAD mm	in.	EACH GRADUATION mm	in.
5000 to 1	0.0600	.0024	300.0	12	0.001	.00005
10,000 to 1	0.030	.0012	300.0	12	0.0005	.000020

* This table shows the maximum recommended tolerance and spread. However, if the tolerance spread is set from 101.6 to 203.2 mm (4 to 8 in.), most out-of-balance indications will be accurately reflected.

AMPLIFICATION CONVERSION

Standard Amplification Conversion Kits are available to provide the modular columns with different amplifications when required by special types of tooling. Consult with your Precision Gage and Tool Co. representative or contact our plant at 375 Gargrave Road, Dayton, Ohio, 45449, Phone (937) 866-9666 or Fax (937)866-9661.

SECTION 3. CLEANING AND MAINTENANCE

CLEANING THE COLUMN

Over a period of time, impurities in the filtered air supply tend to coat the inner surface of the glass column. Periodic cleaning of the column prevents excessive accumulations and usually corrects improper float action. Use the following procedure for cleaning the column (see Figure 6):

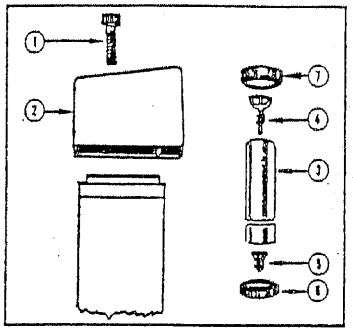

Figure 6. Removing the Column for Cleaning

1. Remove the cap screw (1).

2. Remove the cap (2), glass tube (3), and the float bumper (4).

WARNING

When using flammable solvents for cleaning, make sure that the area is ventilated and that there are no sparks or flames present that could ignite the solvent vapors.

3. Clean the glass tube of the column with a column cleaning brush that has been saturated with alcohol.

4. Flush the glass column with ANSTAC Type 2M Antistatic Cleaning solution (or equivalent) and allow the column to air dry.

5. Wash the float and bumper with alcohol.

6. Reassemble the column by placing the small end of the glass column in the lower seal (6), drop the float into the column, and place the bumper (4) point down in the top of the column.

7. Hold the glass column directly under the cap (2) and push down on the cap. The bushing and upper seal will drop onto the glass column.

8. Make certain that the glass tube is centered in the upper and lower column seals (6 and 7) and the bumper (4) is seated squarely in the top of the tube, then tighten the cap screw (1) for an air-tight seal.

FILTER MAINTENANCE

The water and oil accumulation in the filter should be drained by opening the drain petcock at least once daily. If there is more than one ounce of fluid in the filter, it should be drained more frequently.

The filter element should be replaced every six months or when the pressure drop across the filter reaches 10 psi.

Replacing the Filter Element

CAUTION

Before attempting to replace the filter element, shut off the air supply line to the filter and relieve all pressure in the line by opening the drain petcock.

1. Remove the filter cap, O-ring, and the filter element.

2. Use an air hose to blow any particles out of the filter unit. Wipe the filter unit with a clean lint-free cloth.

3. Inspect the plastic bowl for cracks or crazing and replace it, if necessary.

4. Reassemble the filter by inserting the replacement element and O-ring. Make certain that the O-ring is properly seated.

5. Replace and tighten the filter cap, close the drain petcock, and open the air supply line to resume operation.

NOTE

Since more than one type of filter may be used with the Precisionaire® Column Instrument, check the filter placard for the correct replacement filter element and O-ring. Observe the placard restrictions. If more information is needed, contact your Precision Gage and Tool Co. Representative or contact our plant at (937) 866-9666, Fax (937) 866-9661.

MAINTAINING THE REGULATOR

The Modular Precisionaire® Column Instruments are equipped with a Constantaire Regulator for each column. The care and maintenance of the regulator are treated in the paragraphs which follow.

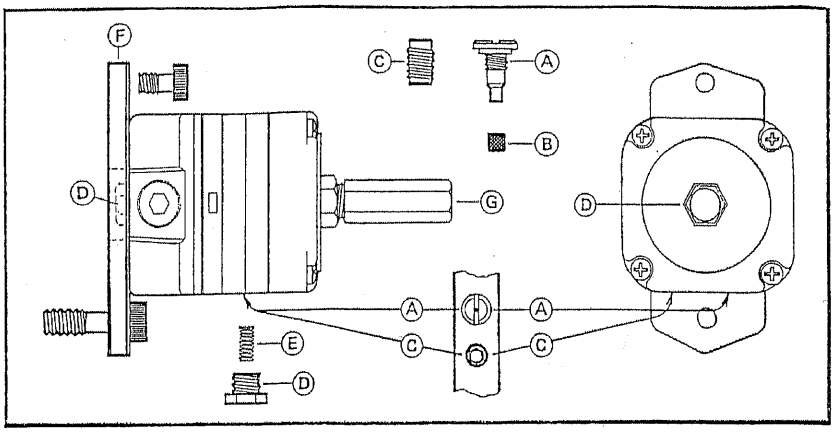

Figure 7. Constantaire Regulator

Constantaire Regulator

The Constantaire regulator requires little maintenance. If the regulator appears to operate improperly, fails maintain pressure, etc., cleaning the regulator will usually correct the problem. (See Figure 7.)

Cleaning

1. Remove the bleed orifice screw (A) with filter screen (B) and the cleanout plug (C) from the bottom of the regulator. Clean them with chlorethene or white gas and blow them dry.

WARNING

Chlorethene and white gas are volatile, flammable liquids. They should be used only in a ventilated area and not near open flames or sparks that could ignite the vapors.

NOTE

Inspect the orifice in the bleeder screw to make sure that it is open and clean but do not attempt to clean the orifice with a wire.

2. Use a compressed air gun to blow into the cleanout port and force out any particles through the bleeder screw hole.

3. Reassemble and test the regulator for proper operation. Use a minimum of 5 inch/pounds of torque on both the bleeder screw and cleanout screw to prevent air leakage.

4. If the regulator continues to operate improperly, remove the regulator and the regulator mounting plate (F) from the manifold.

5. Use a 3/8 inch socket wrench to remove the plug (D) and spring (E) from the bottom of the regulator, and clean them with chlorethene or white gas and blow them dry.

6. Use a compressed air gun to blow into the plug hole to dislodge and clean out any particles that may be in the chamber.

7. Reassemble the regulator, mount it onto the manifold and test for proper operation.

Setting the Pressure

The Constantaire Regulator has a pressure setting of 10 psi when it leaves the factory. This setting can be verified by using the procedures for CHECKING THE PRESSURE REGULATOR SETTING in Section 2.

Use the following procedures to change the pressure setting to 20 psi (see Figure 8):

1. With the air pressure indicator attached to the column instrument, remove the tamperproof nut (G) (the long hexagonal shaft on the back of the regulator).

2. Use a screw driver in the slotted end of the pressure setting shaft, to turn the shaft clockwise, until the air pressure indicator reflects a pressure of 20 psi.

3. Replace the tamperproof nut and then remove the air pressure indicator. The column instrument is ready for operation at 20 psi.

Changing the Regulator Position

Regulators on multicolumn instruments are located in alternate upper and lower positions on the rear of the manifold to permit the stacking of column modules. This is necessary because the width of the Constantaire regulator exceeds the width of the Precisionaire® Column Instrument.

When it becomes necessary to change the position of a regulator, use the following procedure (see Figure 8):

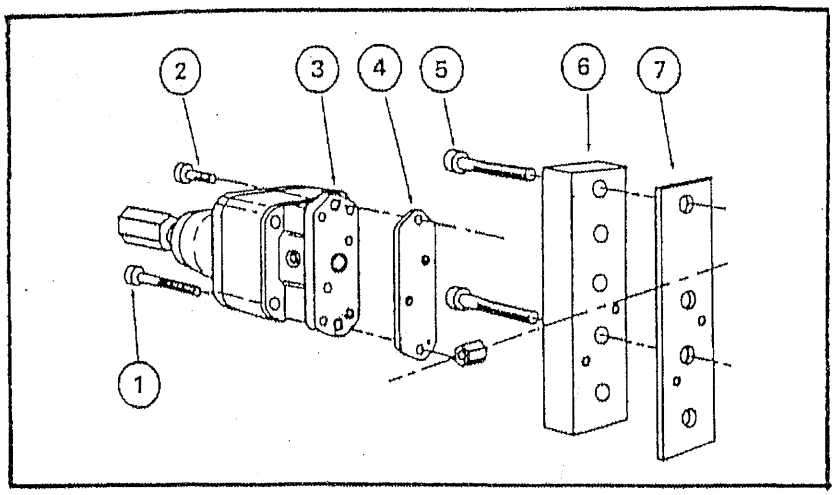

Figure 8. Changing the Regulator Position

1. Remove the regulator and mounting plate (3) and the regulator gasket (4) by removing two socket-head screws (1 and 2). Note that the top of the regulator is marked "UP".

2. Remove the two socket-head screws (5) to remove the manifold (6) and the manifold gasket (7).

3. Rotate the manifold (6) and gasket (7) end-for-end and remount on the column.

NOTE

The two socket-head screws (5) must pass through the same two holes in the manifold and gasket from which they were taken.

4. Reinstall the regulator gasket and regulator in the new position with the two socket-head screws originally used to fasten the regulator, and the repositioning is complete.

NOTE

The orientation of the regulator does not change. The marking "UP" is still on the top of the regulator in the new position.

ADDING AND REMOVING COLUMNS

The Modular Precisionaire® Column Instrument can be easily modified by the addition or removal of columns to accommodate new or changed inspection requirements. Each Precisionaire® instrument consists of a left-hand panel (with an air shut-off connection), one or more modular columns, and a right-hand panel (see Figure 9).

When you order a modular column to add to a column instrument, it is shipped completely assembled with a regulator, float, float bumper, scale, pointers, and cap. In addition, a module mounting kit assembly, consisting of two assembly connectors, two lock washers, and on "O" ring, is shipped with the modular column.

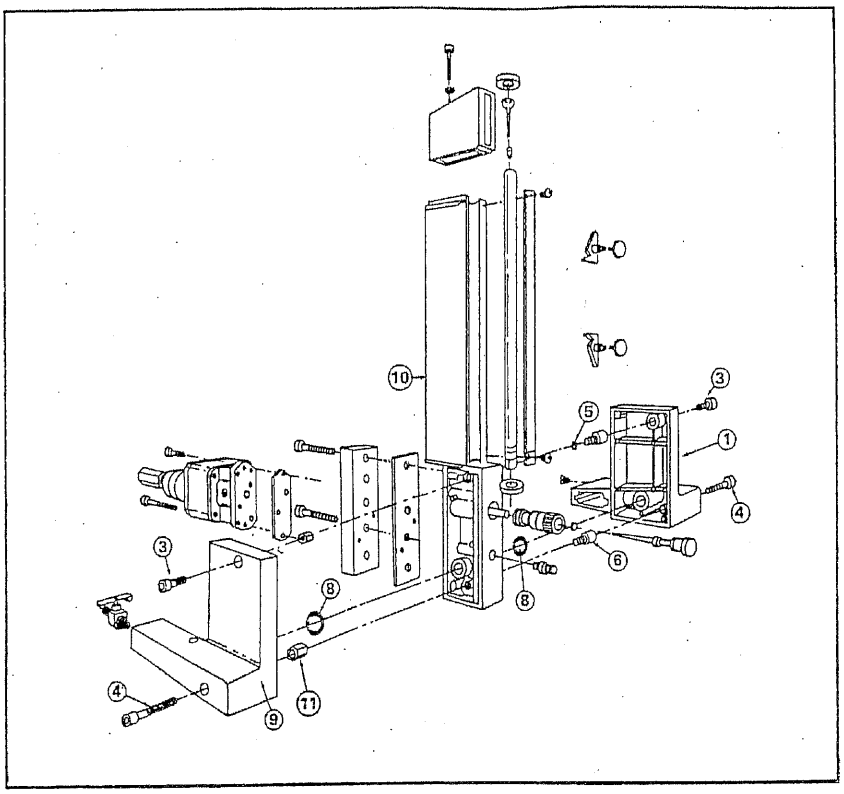

Figure 14. Modifying the Column Instrument

Adding Columns

Use the following procedures when adding columns to an instrument:

1. Unfasten the right-hand end panel (1) by removing the two socket-head screws (3,4), then pulling the panel away from the right-hand column.

NOTE

The "O" ring that seals the column and the right-hand panel should remain cemented in its seat on the column. If the "O" ring is damaged as a result of disassembly, it must be replaced.

2. Place the column to be added into position to the right of the existing column.

3. Place the two lock washers (5) onto the threaded portion of the assembly connectors (6), then insert the connectors through the column being added and tighten the connectors with a box-end or socket wrench.

4. If an "O" ring (8) is not in its seat on the right side of the column just added, cement one into position before proceeding.

5. If additional columns are to be added, repeat steps 2 through 4 for each column.

6. After the last column has been added, fasten the right-hand panel in place with the two socket-head screws (3,4) previously removed.

Removing Columns

The following procedures should be used when removing columns from an instrument:

1. Unfasten the right-hand end panel (1) by removing the two socket-head screws (3,4), then pull the panel away from the right-hand column.

NOTE

The "O" ring that seals the column and the right-hand panel should remain cemented in its set on the column If the "O" ring is damaged as a result of disassembly, it must be replaced before the column can be reused.

2. Remove the two assembly connectors (6) from the right-hand column and separate the column from the rest of the instrument.

3. Check the condition of the "O" ring on the column just exposed. If the "O" ring is damaged, it must be replaced.

4. Save the assembly connectors (6) and associated lock washers (5) with the removed column for future use.

5. If additional columns are to be removed, repeat steps 2 through 4.

6. When no additional columns are to be removed, fasten the right-hand panel (1) in place with the two socket-head screws (3,4).

Building a New Column Instrument

Occasionally you may wish to build up a new column instrument from a modular column or columns which were removed from other instruments. This may require ordering the right-hand (1) and left-had (9) panels if none are on-hand.

When building a complete instrument, use the following procedures:

1. Select a modular column that is to become a part of the new instrument and place it so that the glass column and pointers face toward you.

2. Mount the lock washers (5) on the threaded end of the two assembly connectors (6) and insert the assembly connectors into the right side of the column (10).

3. Screw the assembly connectors into the two assembly nuts (11) that come with the left-hand end panel (9) and tighten securely with box-end or socket wrenches on both sides of the column.

4. Cement an "O" ring into the seat on the inner side of the left-hand panel (9), if one is not already there.

5. If additional columns are to be added, proceed as in steps 1 and 2 and fasten the added column to the column on the left by tightening the assembly connector with a box-end or socket wrench.

6. Repeat the preceding step for each additional column.

NOTE

Make sure that a useable "O" ring (8) is seated in the right side of each column before adding another column or the right-hand end plate to the instrument.

7. Fasten the right-hand end plate (1) to the right-most column using the two socket-head screws (3,4) that come with the right-hand end plate.

8. Fasten the left-hand end plate (9) to the left-most column using the two socket-head screws (3,4) that come with the left-hand end plate.

SECTION 4. REPLACEMENT PARTS LIST

KEY NO.	PART NAME	ORDER NO.
1	Module Body 9" Column Assembly	62000014
	Module Body 15" Column Assembly	62000015
2	Column Cap	62000121
3	Cap Screw	20101094
4	Cap Screw Washer	20269013
5	Tube Nipple 9" Column	60108792
	Tube Nipple 15" Column	60107258
6	Transflex Tube	60103404
7	Tube Clamp	60102057
8	"O" Ring	20316012
9	Calibration Adjustment	60106215
10	Float Positioning Adjustment	60107286
11	"O" Ring	60107075
12	"O" Ring	60107076
13	Tooling Connection	60103671
14	Pressure Setting Indicator	60060456
18	Filter	60106428
19	Fitting 1/4 to 1/8 Reducing	60103706
20	Hose Assembly	60060332
21	Assembly Nut	60106947
22	Assembly Connector	60106946
23	L.H. Side Panel Assembly includes Key No. 23, 8, 21, 24, 25, 26, 27, and 28	62000138
24	Valve	60106918
25	Lock Washer	60107059
26	Upper Panel Screw	20101101
27	Lower Panel Screw	20101108
28	Rubber Pad	70103783
29	R.H. Side Panel Assembly includes Key No. 29, 26, 27, and 30	62000139
30	Pipe Plug	20702102
31	Upper Pointer Assembly includes Key No. 31, 35	60106481
32	Lower Pointer Assembly includes Key No. 32, 35	60106482
33	Scale Screw	20002049
34	Sliding Indicator (Optional)	
	1 Column	60107032
	2 Column	60107033
	3 Column	60107034
	4 Column	60107035
	5 Column	60107036
35	Indicator Shield Screw	60054975

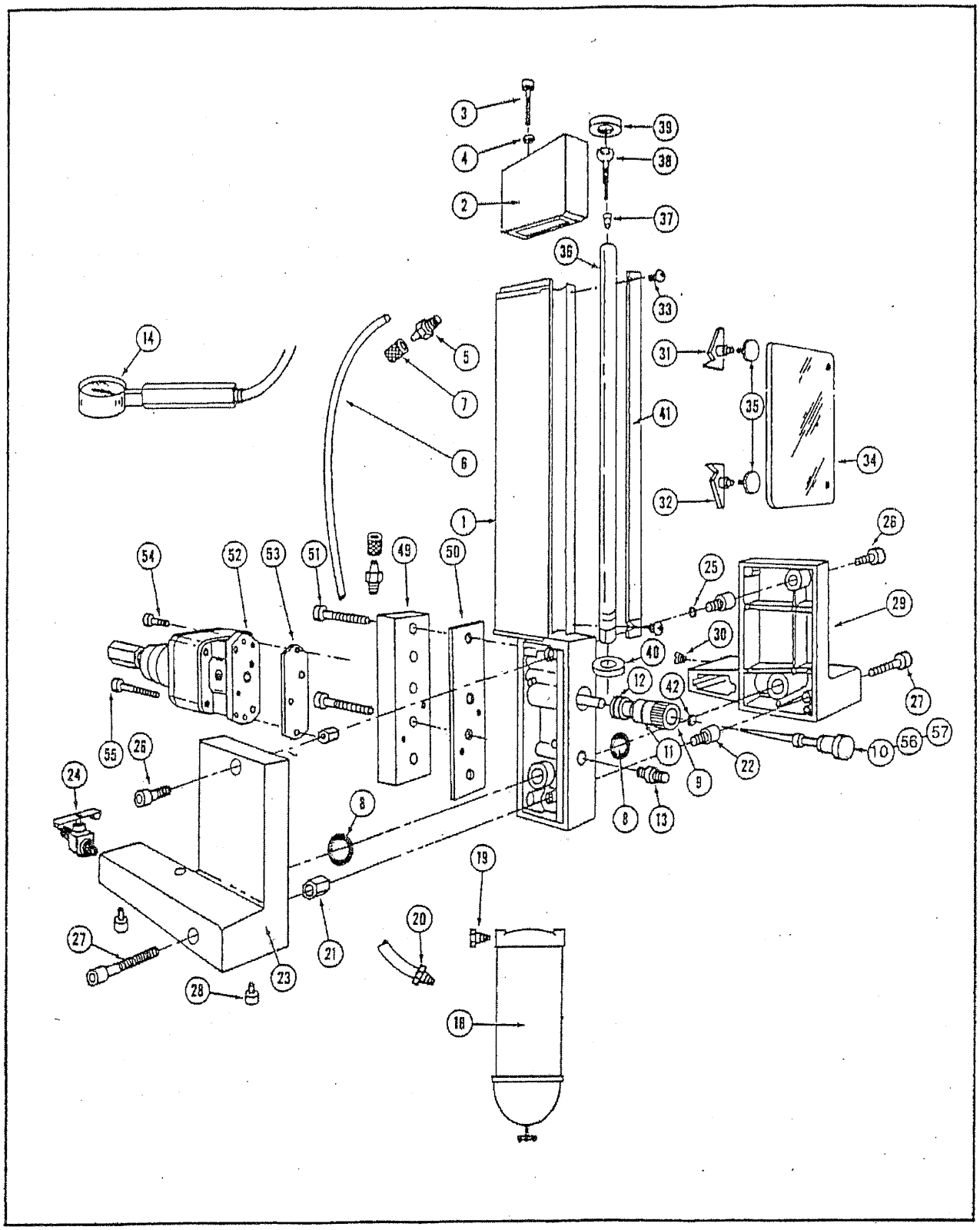

Figure 10. Parts Illustration

REPLACEMENT PARTS LIST (cont.)

KEY NO.	PART NAME	ORDER NO.
36	Glass Column - 9" Models	
	1,000-1	60060479
	2,000-1	60100758
	5,000-1	60100759
	10,000-1	60100760
	20,000-1	60101730
	40,000-1	60060484
	Glass Column - 15" Models	
	5,000-1	60101937
	10,000-1	60101852

KEY NO.	PART NAME	9" MODEL ORDER NO.	15" MODEL ORDER NO.
37	Float - 1,000-1	60060550	
	2,000-1	60060521	
	5,000-1	60060488	60060521
	10,000-1	60060488	60060488
	20,000-1	60060488	
	40,000-1	60060488	
38	Float Bumper -		
	1,000-1	60060541	
	2,000-1	60060344	
	5,000-1	60060341	60060344
	10,000-1	60060341	60060341
	20,000-1	60060341	
	40,000-1	60060341	
39	Upper Column Seal -		
	1,000-1	60060545	
	2,000-1	60060108	
	5,000-1	60060101	60060108
	10,000-1	60060101	60060101
	20,000-1	60060101	
	40,000-1	60060101	
40	Lower Column Seal -		
	1,000-1	60060120	
	2,000-1	60060113	
	5,000-1	60060107	60060113
	10,000-1	60060107	60060107
	20,000-1	60060107	
	40,000-1	60060107	

KEY NO.			9" MODEL ORDER NO.	15" MODEL ORDER NO.
41	Scales Amp	Style	INCH SERIES	
	62.5	'0' High & Low	60108586	
		'0' Center	60108576	
	125	'0' High & Low	60108587	60108837
		'0' Center	60108576	60108827
	250 &	'0' High & Low	60108588	60108838
	2500	'0' Center	60108577	60108828
	375 &	'0' High & Low	60108589	60108839
	3750	'0' Center	60108577	60108828
	500 &	'0' High & Low	60108590	60108840
	5000	'0' Center	60108578	60108829
	750 &	'0' High & Low	60108591	60108841
	7500	'0' Center	60108579	60108830
	1000 &	'0' High & Low	60108592	60108842
	10,000	'0' Center	60108578	60108829
	1500 &	'0' High & Low	60108593	60108843
	15,000	'0' Center	60108579	60108830
	2000 &	'0' High & Low	60108594	60108844
	20,000	'0' Center	60108580	60108831
	4000 &	'0' High & Low	60108595	60108845
	40,000	'0' Center	60108580	60108831
	Scales Amp	Style	METRIC SERIES	
	50	'0' High & Low	60112602	
		'0' Center	60112600	
	100, 1000	'0' High & Low	60112604	60112830
	& 10,000	'0' Center	60112600	60112825
	200, 2000	'0' High & Low	60112603	60112831
	& 20,000	'0' Center	60112601	60112826
	250	'0' High & Low	60112869	60112832
	& 2500	'0' Center	60112867	60112827
	375	'0' High & Low	60112870	60112833
	& 3750	'0' Center	60112867	60112827
	400, 4000	'0' High & Low	60112871	60112834
	& 40,000	'0' Center	60112601	60112826
	500	'0' High & Low	60112602	60112921
	& 5000	'0' Center	60112600	60112825
	750	'0' High & Low	60112872	60112835
	& 7500	'0' Center	60112868	60112828
	1500	'0' High & Low	60112873	60112836
	& 15,000	'0' Center	60112868	60112828
42	Felt Washer (2 required)		60106691	

REPLACEMENT PARTS LIST (cont.)

KEY NO.	PART NAME	9" MODEL ORDER NO.	15" MODEL ORDER NO.
49	Manifold	62000019	62000117
50	Manifold Gasket	60106469	
51	Manifold Screws	20101103	
52	Regulator Constantaire	60106485	
53	Regulator Gasket	60106489	
54	Regulator Screw	20101101	
55	Regulator Screw	20101106	
56	Nylon Nut	60070173	
57	Brass Retainer	60070169	

NOTES

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