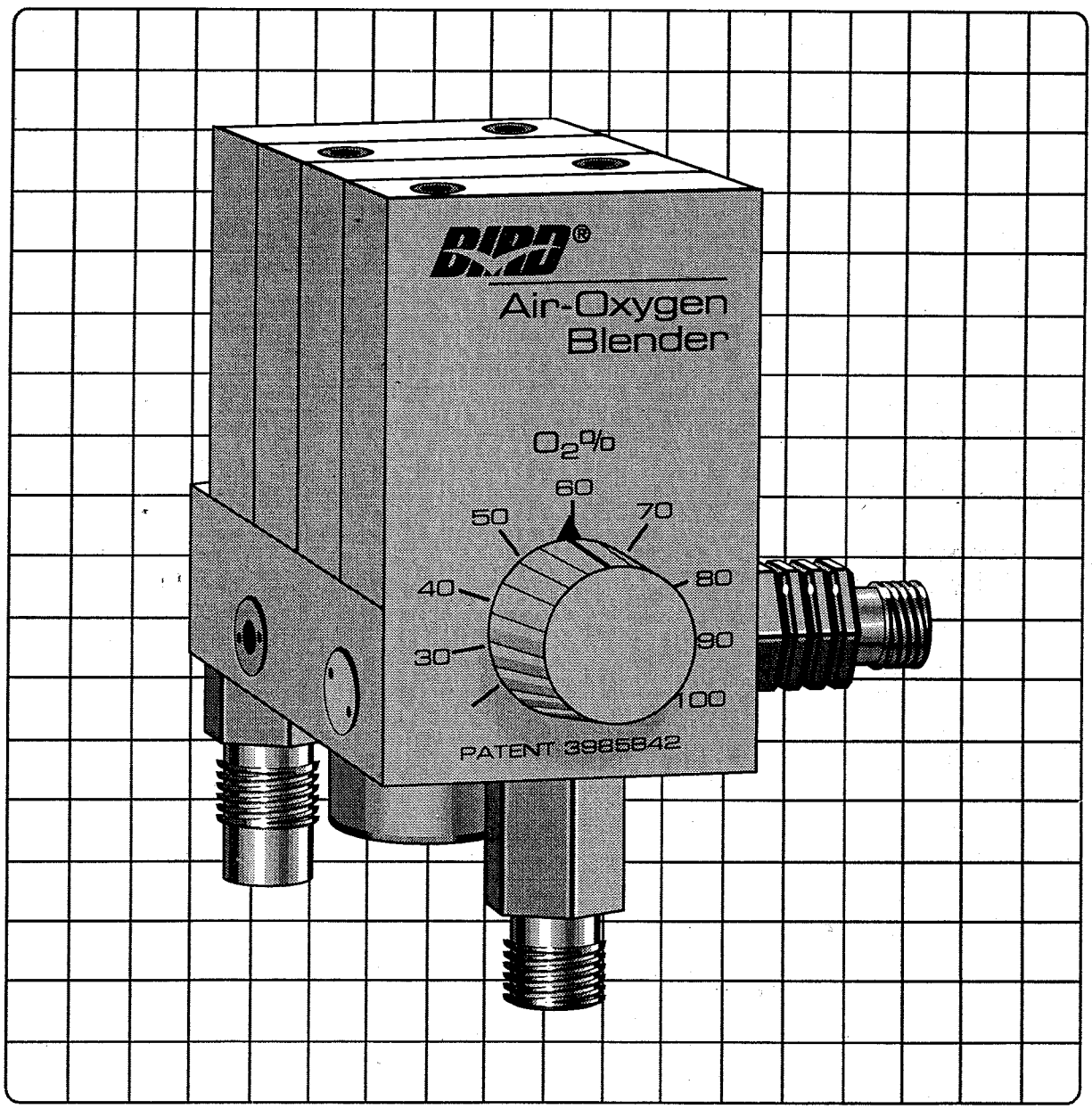
3800™ MicroBlender



L1009R1 4/95

Service Manual

ORDERING INFORMATION

Contact your Bird Products Corporation Dealer or Bird Products Corporation **Customer Service Department** directly:

1100 Bird Center Drive
Palm Springs, CA 92262
(760) 778-7200 or
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TLX: 9103805605
Fax: (760) 778-7274

TECHNICAL INFORMATION

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Palm Springs, CA 92262
(760) 778-7200 or
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[(800) 934-2473]

Bird Products Corporation
1100 Bird Center Drive, Palm Springs, CA 92262
(760) 778-7200 ■ TLX: 9103805605
(800) 328-4139 ■ FAX: (760) 778-7274

TABLE OF CONTENTS

NOTE: This manual is intended as a guide for the service/repair calibration of the 3800 MicroBlender by a qualified technician.

SECTION 1:
OVERVIEW OF THE 3800 MICROBLENDER OPERATION

August, 1991

The 3800 MicroBlender mixes medical grade compressed air and oxygen to provide a pressurized gas source ranging from 21% to 100% oxygen.

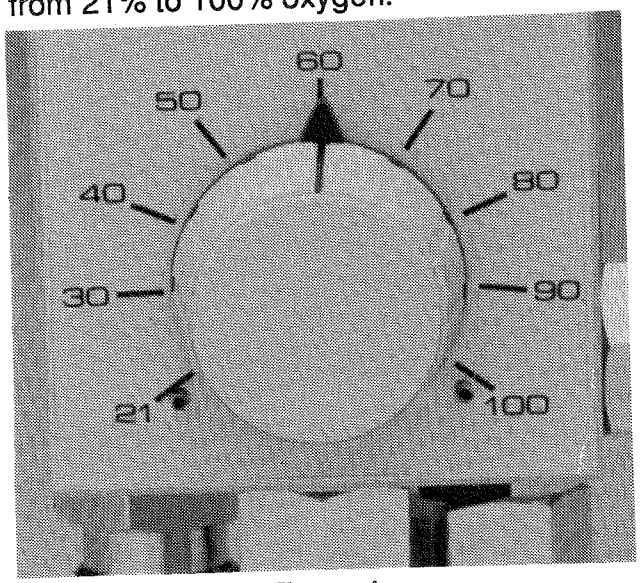


Figure 1

The two 50 ± 5 PSIG (3.52 ± 0.35 kg/cm^2) gas sources enter through the diameter indexed (DISS) air and oxygen inlet connectors located on the bottom, rear of the blender (Fig. 2). Each inlet connector incorporates a 30 micron particulate filter. After being filtered, the gases travel through duckbill check valves which prevent possible reverse gas flow to either the air or oxygen supply systems.

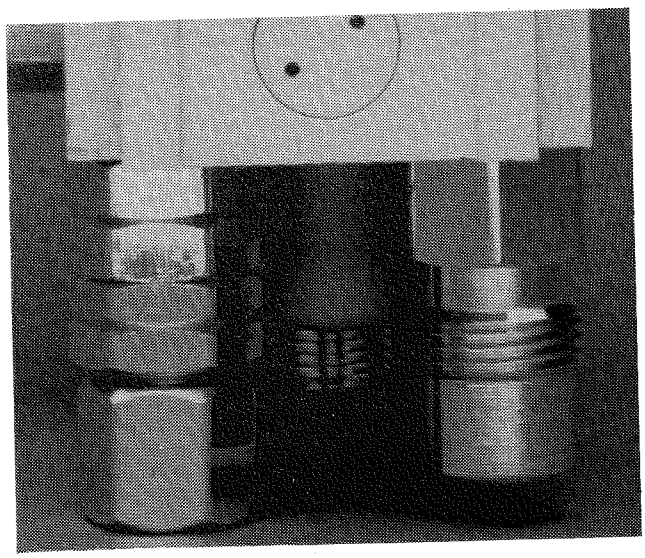


Figure 2

■ BALANCE MODULE (FIGURE 3)

The two gases then enter the two-stage Balance Module. The purpose of this module is to equalize the operating pressure of the air and oxygen gas sources before entering the Proportioning Module. The diaphragm responds to the difference in pressure and directs the movement (stroke) of each ball valve assembly contained within the air and oxygen chambers. The movement of each ball valve adjusts the amount of gas flowing through the Balance Module, equalizing the air and oxygen pressures to the lower of the two pressures.

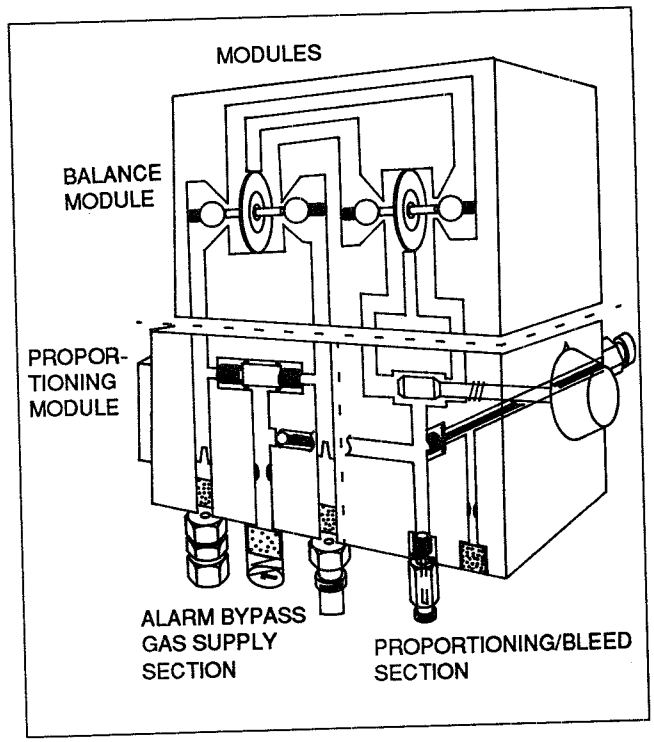


Figure 3, Bird Air-Oxygen Blender Diagram

■ PROPORTIONING MODULE (FIGURE 4)

From the Balance Module the gases flow into the Proportioning Module and are mixed according to the oxygen percentage selected on the external control knob. This Module consists of a double ended valve positioned between two valve seats.

One valve seat controls the passage of air and the other valve seat controls the passage of oxygen into the MicroBlender outlet. At this point, the two gases have been blended according to the oxygen percentage selected on the MicroBlender control knob.

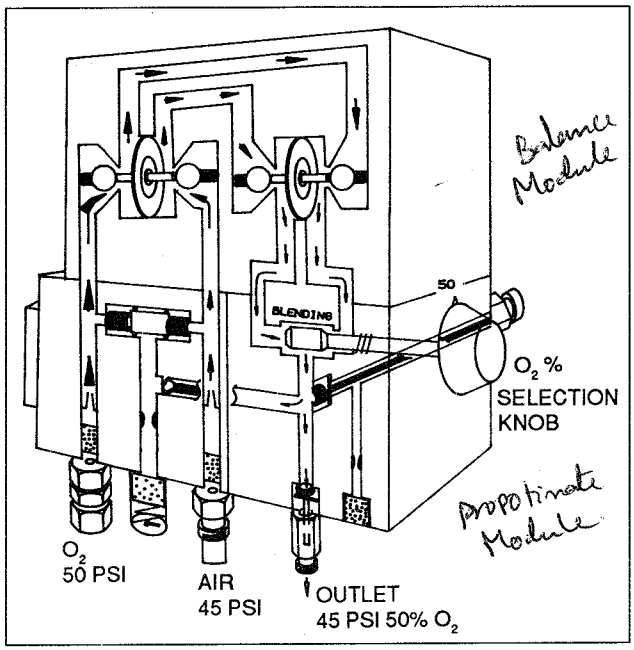


Figure 4

With the control knob at the full counter-clockwise position (21%), the double ended valve will completely close off the flow of oxygen, allowing only the air to flow. By adjusting the control knob in the full clockwise (100%) position the flow of air is blocked, permitting only the flow of oxygen through the blender outlet.

■ ALARM/BYPASS (FIGURE 5)

The alarm feature provides for an audible alarm if source pressures differ by 20 PSI (1.41 kg/cm^2) or more. The primary purpose of the alarm is to audibly warn the operator of an excessive pressure drop or depletion of either source gas. The alarm will also activate in the event of elevation of either source gas when a difference of 20 PSI (1.41 kg/cm^2) or more is detected.

Should both gas pressures (oxygen or medical air) increase or decrease simultaneously, and a 20 PSI (1.41 kg/cm^2) differential is not seen, there will not be an audible alarm. If either source gas pressure drops, the output pressure of the blender will drop similarly, since the source gases are always balanced to that of the lower pressure.

The bypass function operates in unison with the alarm. The alarm bypass poppet communicates directly with the air supply on one end and the oxygen supply on the other.

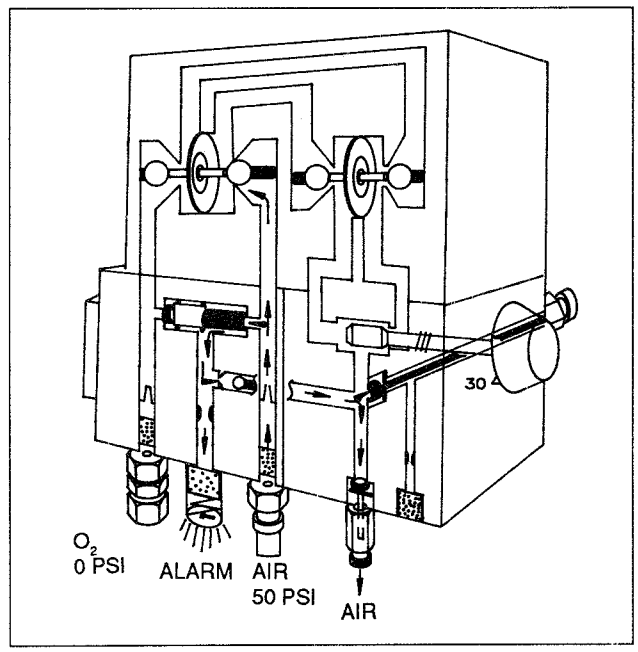


Figure 5

When the two source gases are near equal in pressure, the alarm bypass poppet is positioned over the bypass channel, blocking the flow of both gases. The poppet will remain seated for unequal pressures up to 20 PSI (1.41 kg/cm^2). Once a 20 PSI (1.41 kg/cm^2) difference is sensed by the poppet, the higher gas pressure will overcome the spring force and pressure at its opposite end, thus creating a path for gas (air or oxygen) to flow into the alarm channel.

The gas with the higher pressure will also flow directly to the blender outlet port bypassing the Balance and Proportioning Modules. The gas is also directed to the bottom of the unit to the reed alarm, thus creating an audible warning. The oxygen concentration will be that of the gas at the higher pressure. The blender in the alarm/bypass mode will deliver the oxygen (100%) or air (21%) until the bypass mechanism resets when source gas pressure is restored to a differential of approximately 6 PSI (0.42 kg/cm^2).

Some characteristics of the alarm/bypass system on the MicroBlender differ somewhat from those of model 3300 and other model blenders.

If the MicroBlender is set at 21% and the OXYGEN source pressure is reduced sufficiently to produce a 20 PSI (1.41 kg/cm^2) or greater differential, the unit will not alarm because it will continue to deliver 21% concentration according to the setting. If the control is moved slightly from the 21% setting, the alarm will sound.

Similarly, if the MicroBlender is set to deliver 100% concentration and AIR source pressure is reduced or lost, the unit will not alarm because it will continue to deliver the selected 100% concentration.

The MicroBlender should be disconnected when not being used. If left connected to source gases while not being used (i.e. no output flow or bleed flow), the unit will not alarm if a 20 PSI (1.41 kg/cm^2) or greater pressure differential develops. It is felt that if the blender is not in use, an alarm under these conditions may be an unnecessary distraction or nuisance.

■ GAS OUTLETS (FIGURE 6)

The primary gas outlet is utilized for unmetered high flow applications in the range of 15-120 LPM. The flow of gas is automatically initiated by an attachment of a pneumatic device to the outlet port. A check valve is unseated upon connection allowing the mixed gases to flow through the primary outlet.

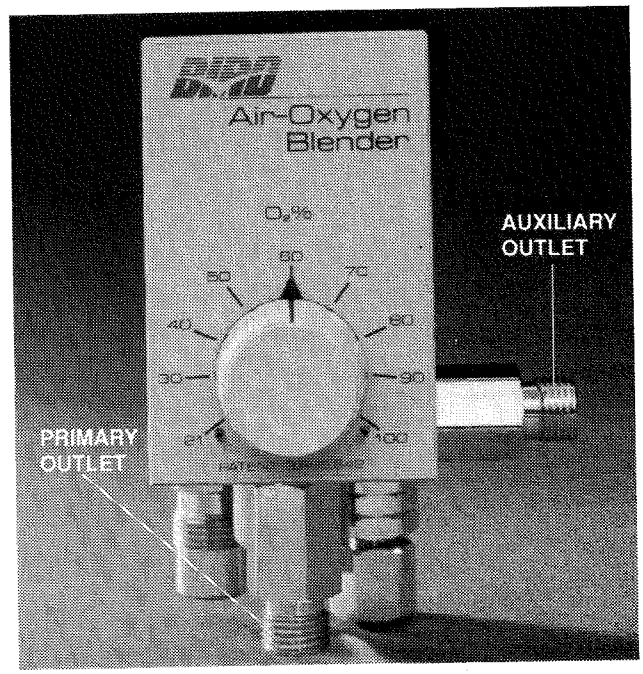


Figure 6

The auxiliary outlet is located on the right side of the MicroBlender and is designed to deliver metered gas through a flowmeter. Mixed gas may be delivered within specified accuracy tolerance from this outlet at 2 LPM and above. When a connection is made to the auxiliary outlet a 10-12 LPM bleed of mixed gas to the atmosphere is activated. This bleed is essential to ensure accuracy of concentration for applications utilizing low flows down to 2 LPM.

SECTION 2:
WARNINGS, CAUTIONS AND NOTES

August, 1991

The 3800 MicroBlender should be operated by trained, qualified medical personnel under the direct supervision of a licensed physician. Before clinical application, the WARNINGS, CAUTIONS and NOTES should be read and understood.

WARNING:

CONDITIONS MAY EXIST THAT COULD ADVERSELY AFFECT THE OPERATOR OR PATIENT.

CAUTION: Conditions may exist that could damage the 3800 MicroBlender or other pieces of equipment.

NOTE: A specific point is made to assist the operator in its understanding.

WARNINGS:

■ RESPIRABLE (MEDICAL) AIR SHOULD MEET THE REQUIREMENTS OF ANSI Z86.1-1973 COMMODITY SPECIFICATION FOR AIR, TYPE 1 GRADE D OR BETTER. IT SHOULD ALSO HAVE A DEW POINT OF 5° F (2.75°C) OR MORE BELOW THE LOWEST TEMPERATURES TO WHICH THE AIR DISTRIBUTION (PIPING) SYSTEM IS EXPOSED. PARTICULATE (CONDENSED) WATER IS THE AIR SUPPLY IS HARMFUL TO MANY MEDICAL DEVICES UTILIZING OR CONTROLLING COMPRESSED AIR. FILTERS FREQUENTLY BECOME RESTRICTED BY DEPOSITS OF DISSOLVED SALTS AND OTHER AIRBORNE MATTER. WHILE COMPRESSED AIR IS TYPICALLY THE MAJOR SOURCE OF DEPOSITS, OTHER MEDICAL GASES AND DISTRIBUTION SYSTEMS ARE CAPABLE OF DELIVERING FILTER RESTRICTING MATTER. THIS RESTRICTION OF FILTERS CAUSES INSIDIOUS REDUCTION IN FLOW CAPABILITY OF THE BLENDER, POSSIBLY STARVING A DOWNSTREAM DEVICE SUCH AS A VENTILATOR, CAUSING MALFUNCTION. THEREFORE, IT IS VERY IMPORTANT TO PERFORM PREVENTATIVE MAINTENANCE, MINIMALLY AT RECOMMENDED INTERVALS ON DEVICES WITH FILTERS, ESPECIALLY IF THE GAS SUPPLY IS NOT KNOWN TO BE CLEAN AND/OR FREE OF CONDENSED WATER.

■ THE 3800 MICROBLENDER SHOULD BE SERVICED AND/OR CALIBRATED BY A BIRD PRODUCTS CORPORATION TRAINED HOSPITAL/DEALER SERVICE TECHNICIAN OR BIRD PRODUCTS CORPORATION.

■ THE MICROBLENDER IS DESIGNED TO OPERATE FROM A 50 PSIG (3.52 kg/cm^2) AIR SOURCE AND A 50 PSIG (3.52 kg/cm^2) OXYGEN SOURCE.

■ **DO NOT** OCCLUDE OR OBSTRUCT THE BLEED PORT OR MUFFLER ON THE BOTTOM OF THE MICROBLENDER.

■ ADJUSTMENT OF OXYGEN CONCENTRATIONS SHOULD BE VERIFIED BY AN OXYGEN ANALYZER.

WARNINGS (CON'T)

■ WHEN REASSEMBLING THE BLENDER, DO NOT PRESSURIZE THE SYSTEM UNLESS THE VALVE SEAT HAS 3 FULL TURNS OF THREAD ENGAGED. THE SEAT CAN BE FORCEFULLY EJECTED BY GAS PRESSURE IF NOT SUFFICIENTLY ENGAGED. DO NOT EXCEED 3 FULL TURNS OR THE REAR SEAT MAY BE DAMAGED.

■ WHEN THE MICROBLENDER IS NOT IN USE AND THE AUXILIARY OUTLET IS CONNECTED, CLOSE OFF GAS SUPPLY SOURCES AS THE CONTINUOUS GAS BLEED MAY DRAIN COMPRESSED GAS TANKS EMPTY.

CAUTIONS:

■ An air inlet filter/water trap (P/N 07426) is recommended for use with the MicroBlender to minimize the possibility of contaminants such as particulate debris or condensed water entering the blender or patient gas delivery system.

■ **DO NOT** steam autoclave or otherwise subject the MicroBlender to temperatures above 145° F (62°C).

■ **DO NOT** immerse assembled blender in liquid decontamination agents.

■ Use recommended lubricants sparingly as lubricant may migrate to other areas and cause the MicroBlender to malfunction.

■ When pressurizing the blender inlets, avoid excessive pressure surges, (as could be caused by "Quick Dump" valves). Always use needle valves and pressurize inlets slowly.

NOTES:

■ Users are advised to use pressure regulators that display regulated pressure.

■ Allow equilibration time for FIO_2 changes before analyzing gas.

PROBLEM	POTENTIAL CAUSE	CORRECTIVE ACTION
Oxygen concentration discrepancy between blender setting and analyzer (greater than 3%).	1. Flow requirements are outside the specified LPM range.	1. Correct flow. Auxiliary outlet (2 LPM or more). Primary outlet (15 LPM or more).
	2. Analyzer out of calibration.	2. Calibrate analyzer.
	3. Blender out of calibration.	3. Recalibrate or service further as necessary (See Section 4).
	4. Low flow bleed muffler obstructed causing restriction of fixed bleed.	4. Remove obstruction and verify bleed flow is within tolerance.
	5. Gas supply contaminated.	5. Check source gases with calibrated O_2 analyzer to confirm O_2 is 100% and AIR is 21%.
	6. Air entrained into circuit by ventilator or accessory device.	6. Correct.
Alarm sounding.	1. Inlet pressure differences of 20 PSI (1.41 kg/cm^2) or more.	1. Correct pressure difference.
	2. Alarm module not calibrated properly.	2. Recalibrate or service further as necessary (See Section 4).
	3. Inlet gas contamination, alarm module malfunction.	3. Disassemble, clean, reassemble, calibrate, install inlet filter/water trap on air line, and correct cause of gas contamination.

PROBLEM	POTENTIAL CAUSE	CORRECTIVE ACTION
MicroBlender in bypass. No Alarm.	1. Reed plate (P/N 01866) improperly installed or damaged.	1. Remove and replace.
	2. Alarm gas orifice obstructed.	2. Remove obstruction from orifice.
MicroBlender accurate only when inlet gas pressures are equal.	1. Balance module not functioning properly.	1. Disassemble balance module, clean, replace diaphragm(s), reassemble and test.

1.7 Insert second diaphragm alignment tool (P/N 03850) into Block "B", making sure the poppet pin on diaphragm seats into alignment tool.

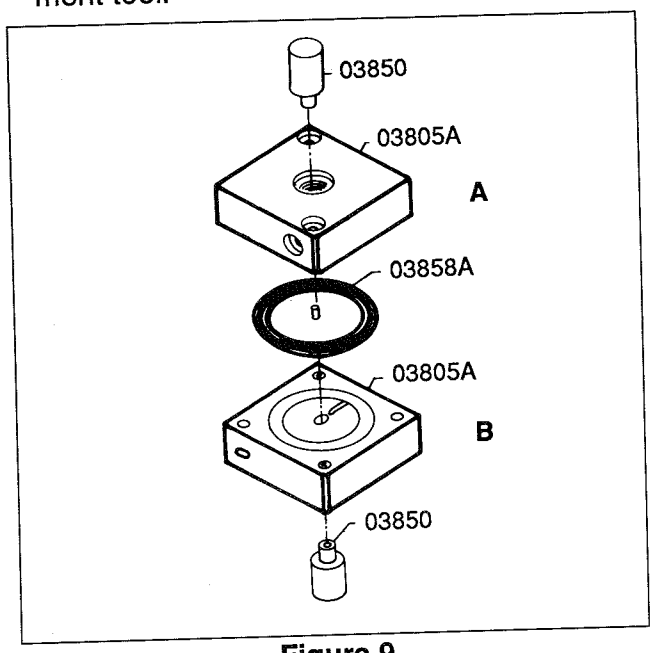


Figure 9

1.8 Fasten block "A" and "B" together loosely with two (2) screws (P/N 03825).

1.9 Holding the two (2) diaphragm alignment tools in place, lay the entire assembly with one of it's surfaces on a flat surface. This will align blocks properly for mating with valve block.

1.10 Using a 5/32" Allen wrench, tighten the previously installed two (2) screws holding blocks "A" and "B" together. Torque to 60 in/lbs.

1.11 Install and tighten, using a 5/32" Allen wrench, remaining two (2) screws (P/N 03825) to opposite side of "A" and "B" block assembly. Torque to 60 in/lbs.

1.12 Remove both diaphragm alignment tools and place "A" and "B" block assembly on its side.

1.13 Lightly lubricate O-ring (P/N 05186) with lubricant (P/N 00631) and install on Balance Block Cap.

1.14 Place a very small amount of lubricant grease (P/N 03851) on one end of spring (P/N 03859), then install lubricated end into balance block cap.

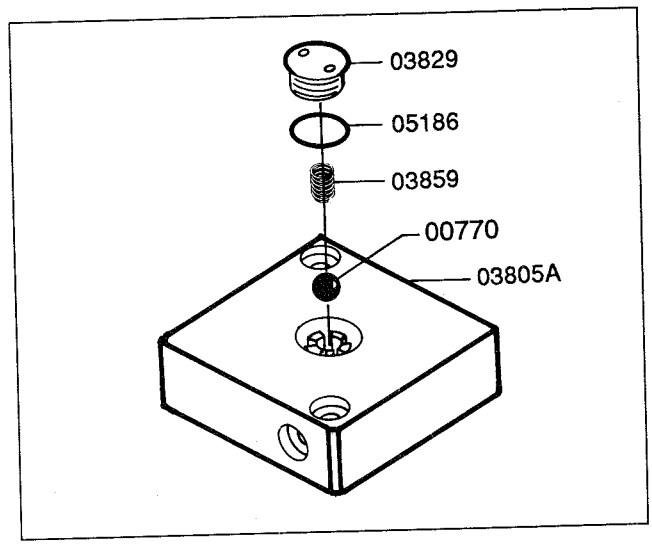


Figure 10

NOTE: Lubricant on spring end ensures adherence of spring to cap during placement into block assembly.

1.15 Install cap and spring into block assembly and tighten in place using spanner wrench (P/N 03849).

1.16 Place block assembly "AB" on opposite side and repeat steps 1.13 to 1.16.

1.17 Reassemble block "CD" using same procedure as "AB" beginning with Step 1.4.

1.18 Lightly lubricate O-rings (P/N 00138) with lubricant (P/N 00631).

1.19 Place block assemblies and O-rings (P/N 00138) aside for final assembly.

■ VALVE BLOCK

2.0 OXYGEN INLET DISASSEMBLY/ REASSEMBLY - BOTTOM REAR OF MICROBLENDER (FIGURE 11)

NOTE: This assembly threads into the block with a left-handed thread. A single groove on nut indicates left hand thread.

2.1 With a 3/4" open end wrench, remove the oxygen inlet assembly from the valve block.

2.2 Using a second 3/4" open end wrench, separate the O_2 connector from the filter retainer.

2.3 Use a 3/4" open end wrench to stabilize the filter retainer, then remove the O_2 tail piece using a 1/8" Allen wrench.

2.4 Remove the filter, duckbill check valve, O-rings and washer and discard.

NOTE: The filter may have to be grasped with pliers to remove.

Clean all parts with an ultrasonic cleaner. Ensure all passages are blown completely dry before beginning reassembly.

• OXYGEN INLET REASSEMBLY

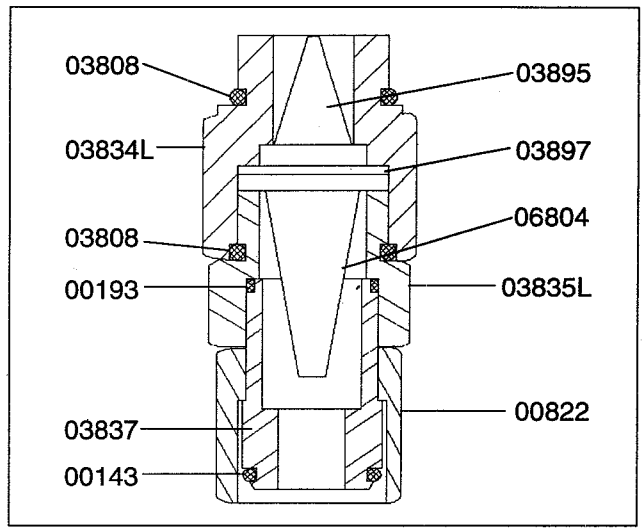


Figure 11

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
00143	1	O-ring
00193	1	O-ring
03808	2	O-ring
03895	1	Duckbill Check Valve
03897	1	Washer
06804	1	Inlet Cone Filter

NOTE: Prior to installation, place a small amount of Vibra-Tite (P/N 03884) on threads of O_2 Tailpiece (P/N 03837) and let Vibra-Tite dry for at least 10 minutes.

2.5 Lightly lubricate O-ring (P/N 03808) with lubricant (P/N 00631) and assemble to O_2 connector (P/N 03834).

2.6 Insert duckbill check valve (P/N 03895), washer (P/N 03897) and cone filter (P/N 06804) into O_2 connector.

NOTE: Step on washer fits into duckbill check valve.

2.7 Lightly lubricate O-rings (P/N 03808, 00193) with lubricant (P/N 00631) and assemble to O_2 filter retainer (P/N 03835L).

2.8 Using two (2) 3/4" open end wrenches, tighten the O_2 connector to the filter retainer. Torque to 10 ft./lbs.

2.9 Take unlubricated O-ring (P/N 00143) and assemble to O_2 tail piece (P/N 03837).

2.10 Insert O_2 tail piece into nut (P/N 00822) and using a 1/8" Allen wrench, tighten to O_2 connector. Torque to 10 ft./lbs.

2.11 Set O_2 inlet aside for final assembly to valve block.

3.0 AIR INLET DISASSEMBLY/ REASSEMBLY - BOTTOM REAR OF MICROBLENDER (FIGURE 12)

3.1 With a 3/4" open end wrench, remove the air inlet assembly with O-ring. Remove and discard O-ring.

3.2 Remove the inlet cone filter located in valve block and discard.

NOTE: The filter may have to be grasped with pliers to remove.

3.3 Next, remove the washer and duckbill check valve from the valve block assembly. Discard check valve and washer.

Clean all parts with ultrasonic cleaner. Ensure all passages are blown completely dry before beginning reassembly.

- AIR INLET REASSEMBLY

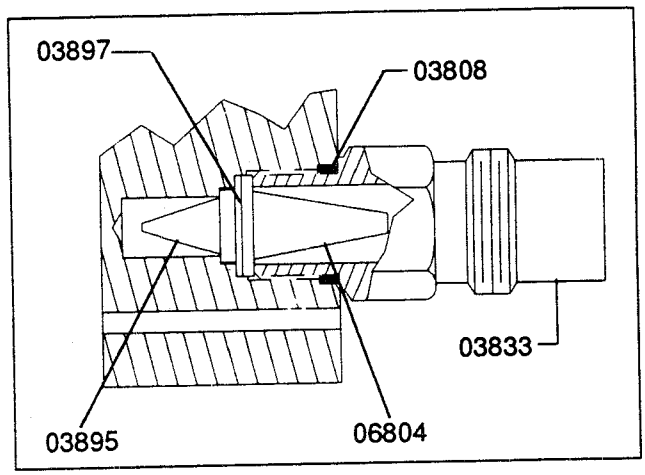


Figure 12

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
03808	1	O-ring
03895	1	Duckbill Check Valve
03897	1	Washer
06804	1	Inlet Cone Filter

3.4 Install lightly lubricated O-ring (P/N 03808) with lubricant (P/N 00631) on air inlet connection (P/N 03895).

3.5 Place inlet cone filter (P/N 06804) inside air inlet.

3.6 Set air inlet aside with duckbill check valve (P/N 03895) and washer (P/N 03897) for final assembly to valve block.

4.0 PRIMARY OUTLET DISASSEMBLY/ REASSEMBLY - BOTTOM, FRONT OF MICROBLENDER

4.1 With an 11/16" open end wrench, remove the primary outlet from the valve block assembly.

NOTE: Small spring is loose and may fall out of cavity.

4.2 Remove poppet from primary outlet, then remove O-ring from poppet and discard.

4.3 Remove O-ring from primary outlet and discard.

Clean all parts with an ultrasonic cleaner and rinse with clean, warm water. Ensure all passages are blown completely dry and that poppet seat areas are perfectly clean before beginning reassembly.

- PRIMARY OUTLET REASSEMBLY

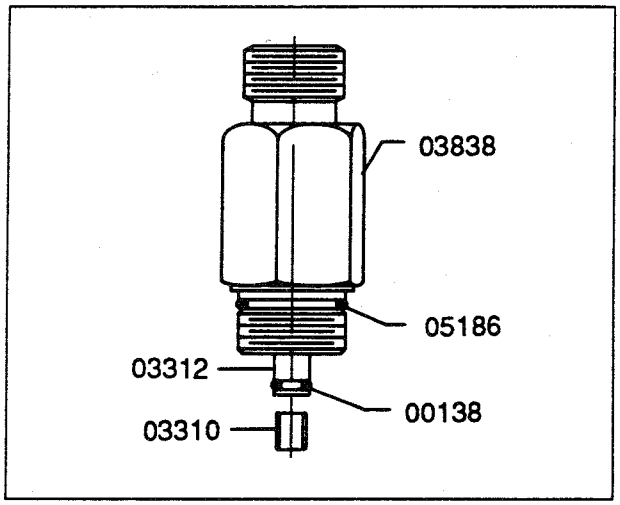


Figure 13

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
00138	1	O-ring
05186	1	O-ring

4.4 Lightly lubricate O-ring (P/N 05186) with lubricant (P/N 00631) and install on primary outlet housing (P/N 03838) and lubricated O-ring (P/N 00138) on poppet (P/N 03312).

4.5 Insert poppet into the outlet housing.

4.6 Set assembly with spring (P/N 03310) aside for final assembly.

5.0 AUXILIARY OUTLET DISASSEMBLY/ REASSEMBLY -
RIGHT SIDE, FRONT OF MICROBLENDER (FIGURE 14)

5.1 Using an $^{11}/_{16}$" open end wrench, remove the auxiliary outlet from the valve block assembly.

NOTE: Small spring is loose and may fall out of cavity.

5.2 Remove poppet from auxiliary outlet then remove O-ring from poppet and discard.

5.3 Remove O-rings from auxiliary outlet housing and discard.

Clean all parts with an ultrasonic cleaner. Ensure all passages are blown completely dry and poppet seats are perfectly clean before beginning reassembly. Ensure orifice on Auxiliary outlet (P/N 03809) is not occluded.

- AUXILIARY OUTLET REASSEMBLY

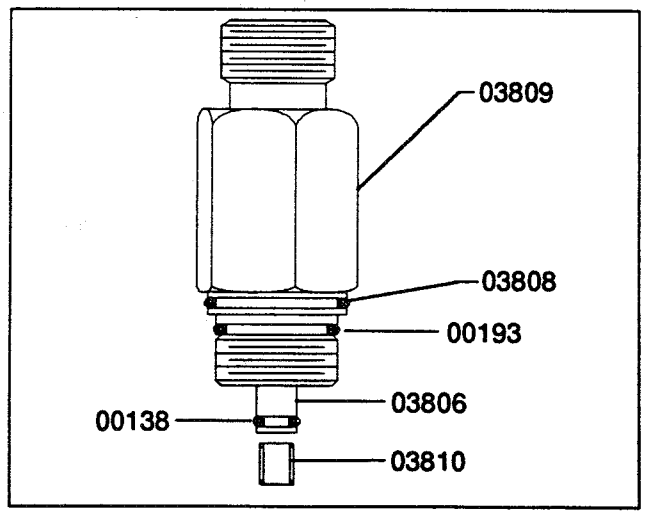


Figure 14

WARNING:

THE 3800 MICROBLENDER SHOULD BE SERVICED AND/OR CALIBRATED BY A BIRD TRAINED HOSPITAL/ DEALER SERVICE TECHNICIAN OR BIRD PRODUCTS CORPORATION.

CAUTION: Before attempting to service/ repair the 3800 MicroBlender, the service person should first be familiar with its design and operation as explained in Section 1 of this manual.

A. SERVICE/CALIBRATION TOOLS

Special Bird tools will be required for the service disassembly and assembly of the 3800 MicroBlender. These products may be obtained from Bird Products Corporation under the following individual part numbers or as the MicroBlender Tool Kit (P/N 03852). See Figure 8.

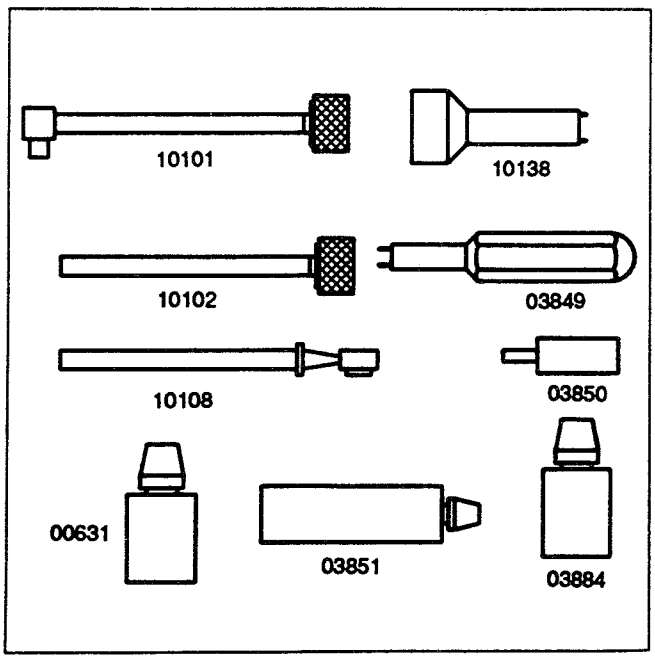


Figure 8

PART NO.	DESCRIPTION
00631	Lubricant
03850	Alignment Assembly Tool (2)
03849	Spanner Wrench
03851	Lubricant Grease
03884	Vibra-Tite Thread-locking Compound
10101	Tube Assembly, Leak Test
10102	Tube Assembly, Pressure Test
10108	Fitting, Bleed Test
10138	Blender Alarm Tool

Additional tools and supplies recommended for service/repair (not available from Bird Products Corporation):

- 5/32" Allen wrench
- 1/8" Allen wrench
- 9/32" hex nut driver
- 5/32" Allen driver
- 1/8" Allen driver
- 3/4" Deep socket
- 11/16" Deep socket
- 3/4" open end or adjustable wrenches (2)
- 11/16" open end or adjustable wrench
- 7/32" Allen wrench
- Small needle nose pliers
- Isopropyl Alcohol
- Torque wrench (to 120 in/lbs)
- 0–10 LPM Flowmeter (1/2 LPM Increments)

A MicroBlender Maintenance Kit may be ordered by specifying P/N 10003. This kit includes all parts necessary for periodic preventive maintenance.

Bird Products Corporation recommends using an ultrasonic cleaner for cleaning all components. However, cleaning with an all-purpose liquid cleaner and rinsing with clear, warm water may be substituted. Both methods require thoroughly blow drying all passages before final assembly. When using an ultrasonic cleaner, follow the manufacturers instructions.

B. DISASSEMBLY/REASSEMBLY PROCEDURE (FIGURE 9 and 10)

■ BALANCING REGULATORS

1.0 BALANCE BLOCK DISASSEMBLY/ REASSEMBLY - TOP OF MICROBLENDER

1.1 With a 5/32" Allen wrench, remove the top four screws securing the two balance block assemblies to the valve block.

NOTE: The balance block assemblies are identical and interchangeable. For ease of assembly, the blocks may be labeled (A, B, C and D).

1.2 Using spanner wrench, remove the caps (2 each per balance block assembly). Remove O-rings and discard.

NOTE: Poppet spring and ball will be loose following removal of balance block cap. Remove components and set aside.

1.3 With a 5/32" Allen wrench, remove each of four (4) screws securing each pair of blocks. Remove the diaphragms and O-rings and discard.

Clean all parts with an ultrasonic cleaner. Ensure all passages are blown completely dry before beginning reassembly. Be sure that the poppet seat areas are perfectly clean.

Balance block assembly replacement parts:

PART NO.	QTY.	DESCRIPTION
00138	8	O-Ring
03858A	2	Diaphragm
05186	4	O-ring

- BALANCE BLOCK REASSEMBLY

1.4 Holding diaphragm alignment tool (P/N 03850) in hand, place the "A" Block onto the alignment tool with the diaphragm cavity facing up.

1.5 Place diaphragm (P/N 03858A) into cavity.

NOTE: Make sure poppet pin on diaphragm seats into diaphragm alignment tool (P/N 03850).

1.6 Place "B" block on top of assembly with diaphragm cavity facing down.

NOTE: Align block assemblies for proper gas flow. Three holes on each block (bottom) must be aligned.

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
00138	1	O-ring
00193	1	O-ring
03808	1	O-ring

5.4 Lightly lubricate O-rings with lubricant (P/N 00631). Install lubricated O-rings (P/N's 03808 and 00193) on auxiliary outlet housing (P/N 03839) and O-ring (P/N 00138) on poppet (P/N 03806).

5.5 Insert poppet into auxiliary housing.

5.6 Set assembly with spring (P/N 03810) aside for final assembly.

■ PROPORTIONING MODULE

6.0 CONTROL KNOB/FRONT AND REAR SEAT VALVE DISASSEMBLY/ REASSEMBLY - FRONT OF MICROBLENDER (FIGURE 15)

6.1 With thin blade screwdriver or knife, remove gray cover plate from knob assembly.

6.2 Using a 9/32" nut driver, loosen nut just enough to remove knob assembly from front seat valve stem.

6.3 Remove and discard O-ring from front seat locknut. Using an 11/16" open end wrench, remove front seat lock nut . Remove front plate by gently separating from block assembly.

6.4 Using spanner wrench (P/N 03849), remove the front seat (incorporating valve stem).

6.5 Rotate valve stem counterclockwise to remove from rear of front seat. Remove and discard O-rings.

6.6 Carefully remove poppet valve and spring from rear seat.

6.7 Using a 1/8" Allen wrench, remove the rear seat and O-ring from valve body. Remove O-ring from rear seat and discard.

Clean all parts with an ultrasonic cleaner. Ensure all passages are blown completely dry before beginning reassembly.

CAUTION: Valves and seats should be handled carefully to avoid any damage.

- CONTROL KNOB/FRONT AND REAR SEAT REASSEMBLY

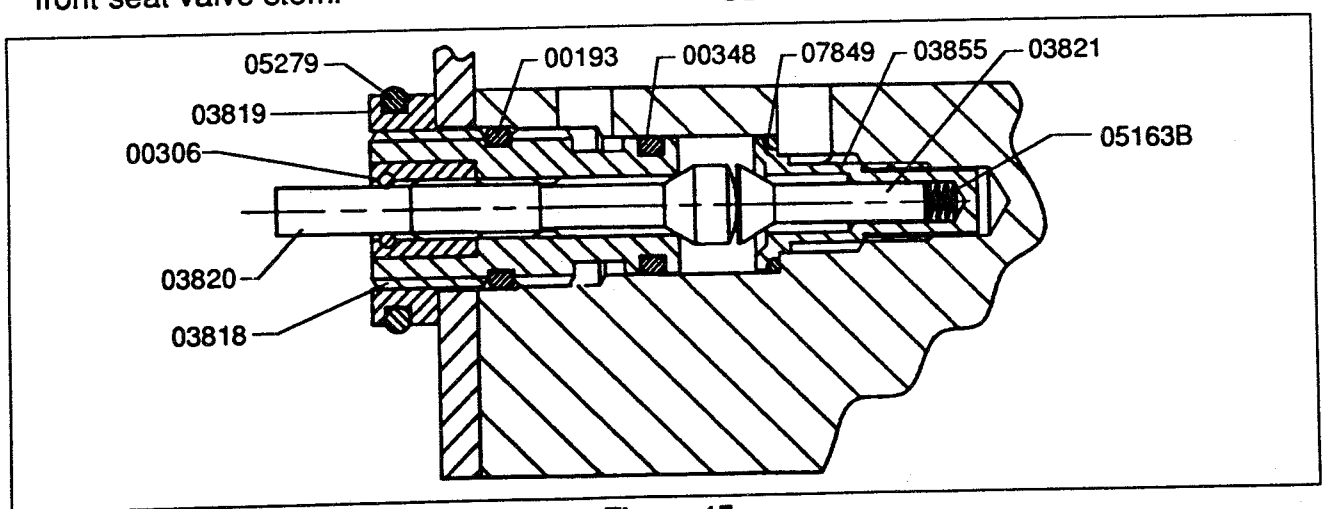


Figure 15

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
00193	1	O-ring
00306	1	O-ring
00348	1	O-ring
05279	1	O-ring
07849	1	O-ring

6.8 Inspect valve seat faces carefully. They should have a sharp edge void of chamfer, nicks or wear. Replace if necessary.

6.9 Lightly lubricate O-rings (P/N's 00193, 00348 and 00306) with lubricant (P/N 00631) and install on front seat (P/N 03818).

6.9 Lightly lubricate O-ring (P/N 07849) with lubricant (P/N 00631) and install on rear seat (P/N 03855).

6.10 Lubricate threads on valve stem (P/N 03820) with lubricant grease (P/N 03851) and carefully install valve stem into front seat (P/N 03818). Rotate stem clockwise until light contact is made with front seat.

CAUTION: Do not over tighten as valve seat damage could occur.

6.11 Set control knob and cap (P/N 03854), front plate (P/N 03840), lock nut (P/N 03819), front seat assembly, rear seat assembly, rear valve spring (P/N 05163B) and O-ring (P/N 05279) aside for final assembly.

7.0 BYPASS DISASSEMBLY/REASSEMBLY-BOTH SIDES, REAR OF MICROBLENDER (FIGURE 16)

7.1 Using a slender, pointed probe, remove sealant plug from both side caps.

7.2 Using a 1/8" Allen wrench, unscrew adjuster from left and right hand side bypass seats.

7.3 Remove and discard O-ring from each adjuster.

NOTE: A small spring is contained in each assembly and might remain in poppet bypass valve housing after adjuster has been removed.

7.4 Using a spanner wrench (P/N 03849), unscrew bypass sleeve from left rear side of valve block. Remove and discard O-rings.

7.5 From right rear side of block, unscrew bypass seat. Remove and discard O-ring.

NOTE: If spring(s) are still in cavity, carefully remove them.

7.6 Carefully push bypass poppet valve through bypass sleeve.

NOTE: Use a blunt slender probe to push poppet valve out of enclosure. Use care to avoid scratching surface of cylinder in which poppet valve operates.

7.7 Remove and discard O-rings from poppet valve.

Clean all parts with an ultrasonic cleaner. Ensure all passages are blown completely dry before beginning reassembly.

CAUTION: Carefully inspect internal surface of sleeve for any signs of wear and damage to the special impregnated Teflon coating.

- ALARM BYPASS REASSEMBLY

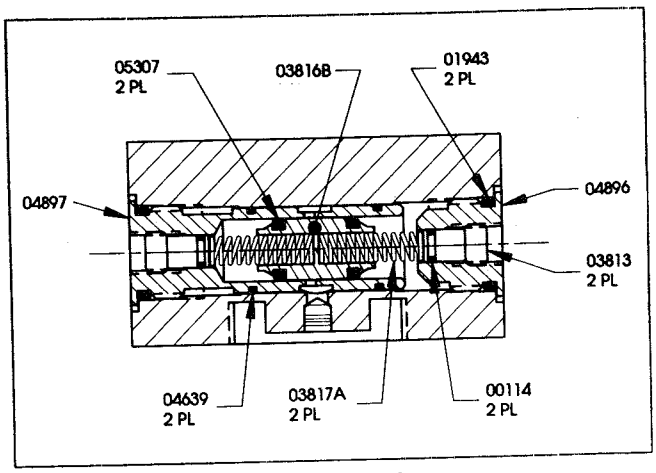


Figure 16

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
00114	2	O-ring
01943	2	O-ring
04639	2	O-ring
05307	2	O-ring

7.8 Using lubricant (P/N 00631), lubricate (2) O-rings (P/N 01943). Install one (1) O-ring on bypass seat cap (P/N 04896) and one (1) O-ring on sleeve (P/N 04897).

7.9 Using lubricant (P/N 00631), lubricate two (2) O-rings (P/N 04639) and install on sleeve (P/N 04897).

7.10 Using lubricant (P/N 00631), lightly lubricate two (2) O-rings (P/N 00114) and install one (1) on each bypass adjuster (P/N 03813).

7.11 Thoroughly lubricate two (2) O-rings (P/N 05307) with lubricant grease (P/N 03851) and install one (1) in each groove at end of bypass poppet (P/N 03816B).

7.12 Set bypass seat assembly, sleeve assembly, bypass poppet assembly, adjuster springs (P/N 03817A) and adjuster assemblies aside for final assembly.

8.0 OUTLET CAP DISASSEMBLY/ REASSEMBLY - LEFT SIDE, FRONT OF MICROBLENDER

8.1 Using spanner wrench (P/N 03849), remove outlet cap and O-ring from valve block. Remove and discard O-ring.

- OUTLET CAP REASSEMBLY

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
05186	1	O-ring

8.2 Lightly lubricate and install O-ring (P/N 05186) on cap (P/N 03829). Set aside for final assembly.

9.0 MUFFLER DISASSEMBLY - BOTTOM MIDDLE OF MICROBLENDER

9.1 With a small screwdriver, carefully lift star retainer from bottom of valve block. Discard star retainer.

9.2 Remove muffler carefully with a pointed probe and discard.

- MUFFLER ASSEMBLY

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
03314	1	Star Retainer
03319	1	Muffler

9.3 Set muffler (P/N 03319) and retainer (P/N 03314) aside for final assembly.

10.0 ALARM DISASSEMBLY/ REASSEMBLY - BOTTOM, MIDDLE OF MICROBLENDER (FIGURE 17)

10.1 Using blender alarm wrench (P/N 10138), unscrew alarm cap.

10.2 Remove diffuser foam and discard.

10.3 Remove spring.

- ALARM CAP REASSEMBLY

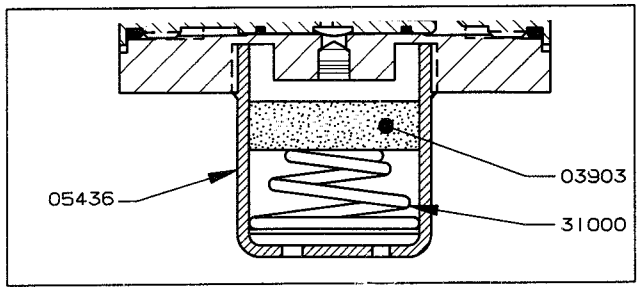


Figure 17

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
03903	1	Diffuser
05436	1	Alarm Cap

10.4 Install spring (P/N 31000) with it's wide base on top of reed inside alarm cap (P/N 05436).

10.5 Place diffuser (P/N 03903) into alarm cap above spring.

10.6 Check alarm assembly for proper audible function.

10.7 Set alarm assembly aside for final assembly.

11.0 ALARM CHECK VALVE DISASSEMBLY/REASSEMBLY - REAR OF MICROBLENDER (FIGURE 18)

11.1 With spanner wrench (P/N 03849) remove cap from rear of valve block.

11.2 Remove and discard O-ring from cap.

11.3 Using a 5/32" Allen wrench, remove checkball retainer, rubber checkball and spring.

11.4 Remove and discard O-ring and rubber checkball.

- ALARM CHECK VALVE REASSEMBLY

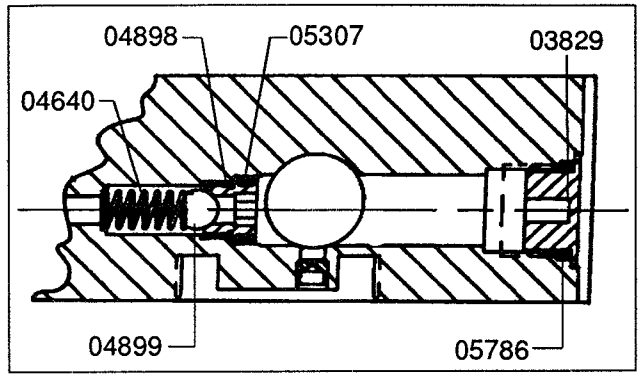


Figure 18

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
04898	1	Rubber Checkball
05186	1	O-ring
05307	1	O-ring

11.5 Using lubricant (P/N 00631), lubricate O-ring (P/N 05186) and install on cap (P/N 03829).

11.6 Using lubricant (P/N 00631), lubricate O-ring (P/N 05307) and install in groove on checkball retainer (P/N 04898).

11.7 Inspect new rubber checkball (P/N 04899) to ensure that it is spotless, clean and not damaged by scratches, nicks or flat spots. Lubricate lightly with lubricant (P/N 00631).

11.8 Set rubber checkball, checkball retainer assembly, spring (P/N 04640) and cap assembly aside for final assembly.

12.0 VALVE BLOCK

12.1 Clean valve block with an ultrasonic cleaner. Ensure all passages are blown completely dry before assembly.

Inspect for any sign of excessive wear, damage, or any condition that may affect proper function.

■ SEQUENCE/INDEX OF FINAL ASSEMBLY:

13.	ALARM CHECK VALVE ASSEMBLY
14.	FRONT/REAR SEAT ASSEMBLY
15.	AUXILIARY OUTLET ASSEMBLY
16.	PRIMARY OUTLET ASSEMBLY
17.	OUTLET CAP
18.	MUFFLER
19.	BALANCE BLOCK
20.	ALARM BYPASS ASSEMBLY
21.	AIR INLET ASSEMBLY
22.	OXYGEN INLET ASSEMBLY
23.	ALARM CAP ASSEMBLY

■ 3800 MICROBLENDER FINAL ASSEMBLY

CAUTION: Using lubricant (P/N 00631) lightly lubricate all threaded components with the exception of Rear Seat (P/N 03855).

13.0 ALARM CHECK VALVE ASSEMBLY - REAR OF VALVE BLOCK (FIGURE 19)

13.1 Position blender resting on front surface, with rear of valve block (P/N 03914A) facing upwards.

13.2 Install spring (P/N 04640), place lubricated rubber checkball (P/N 04899) on spring.

13.3 Using a 5/32" Allen driver, install check valve retainer (P/N 04898). Verify that O-ring (P/N 05307) is lightly lubricated prior to installing retainer. Torque to 30 in/lbs.

13.4 Using spanner wrench (P/N 03849), install cap (P/N 03829), verify O-ring (P/N 05186) is lightly lubricated. Torque to 30 in/lbs.

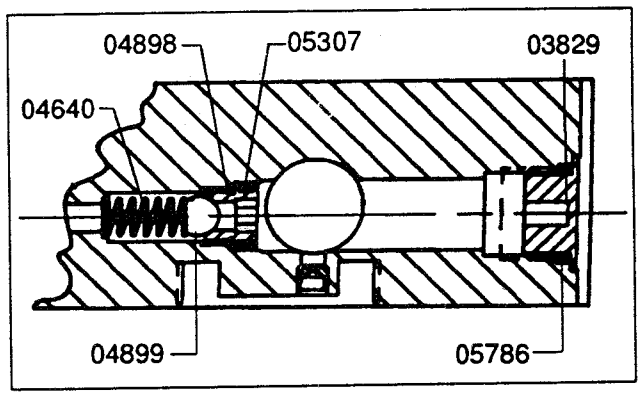


Figure 19

14.0 FRONT AND REAR VALVE SEAT ASSEMBLY - FRONT OF VALVE BLOCK (FIGURE 20)

14.1 Position blender with front surface facing upwards.

14.2 Install rear valve seat (P/N 03855) with lubricated O-ring (P/N 07849) through front port.

14.3 Using a 1/8" Allen driver torque wrench, secure rear seat in place. Torque to 30 in/lbs.

14.4 Lightly lubricate one end of spring (P/N 05163B) with lubricant grease (P/N 03851) and insert lubricated end into rear valve stem (P/N 03821).

14.5 Using a small, slim needle nose plier, carefully place rear valve stem with spring into rear valve seat (P/N 03855).

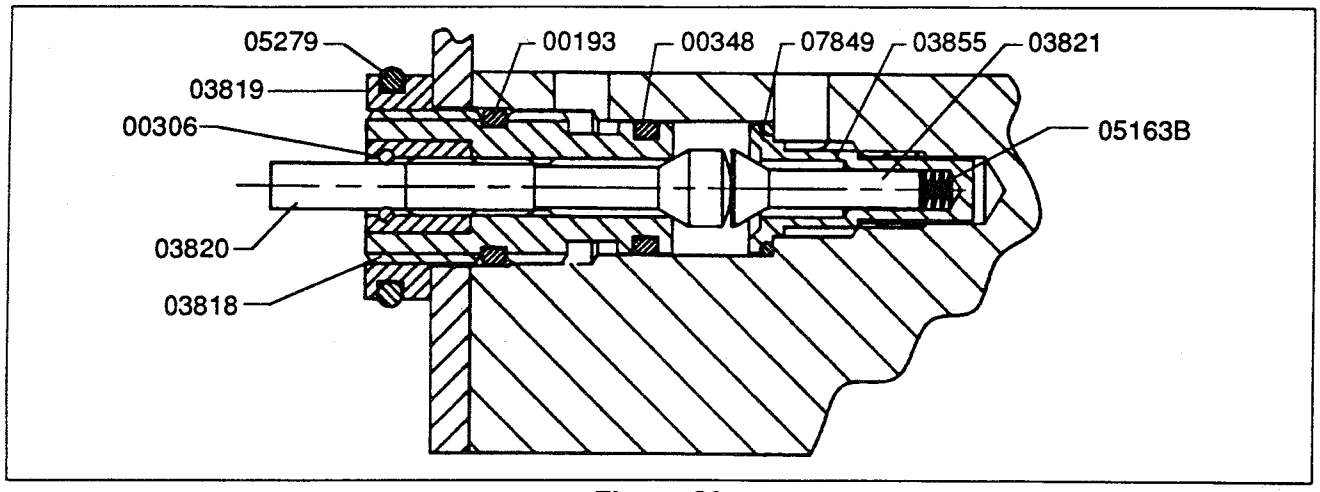


Figure 20

14.6 Verify that front valve stem is hand tightened until light contact is made with front seat. Place front valve seat assembly (P/N 03818A) in threaded hole. With spanner wrench (P/N 03849), exert slight pressure and rotate COUNTERCLOCKWISE until initial thread engagement is found.

This initial thread engagement is easily recognizable by the assembly dropping slightly and making a distinguishable "click". Then rotate assembly CLOCKWISE three full turns.

WARNING:

DO NOT PRESSURIZE SYSTEM UNLESS THE VALVE/SEAT HAS 3 FULL TURNS OF THE THREADS ENGAGED. SEAT CAN BE FORCEFULLY EJECTED BY GAS PRESSURE IF NOT SUFFICIENTLY ENGAGED. DO NOT EXCEED 3 FULL TURNS OR REAR SEAT MAY BE DAMAGED.

14.7 Align and gently push the two pins in front plate assembly (P/N 03840) into the two dowel pin holes in valve block frontal surface.

14.8 Install nut (P/N 03819) with wide shoulder against front plate, and secure nut using an $^{11}/_{16}$" open end wrench.

NOTE: DO NOT INSTALL O-RING (P/N 05279) IN GROOVE AT THIS TIME.

15.0 RIGHT SIDE AUXILIARY OUTLET - RIGHT SIDE, FRONT OF VALVE BLOCK (FIGURE 21)

15.1 Position blender assembly on its side (auxiliary outlet port facing up) then install spring (P/N 03810) into bottom of recess in auxiliary outlet valve block port.

NOTE: Auxiliary outlet spring is longer than primary outlet spring.

15.2 After verifying O-rings are lubricated, install auxiliary outlet housing and poppet into auxiliary outlet port on valve block and hand tighten in place.

15.3 Using an $^{11}/_{16}$" wrench, tighten assembly to valve block. Torque to 10 ft/lbs.

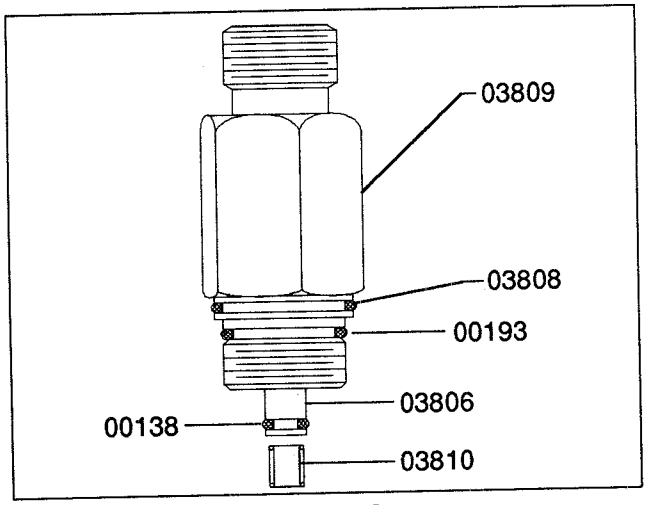


Figure 21

16.0 PRIMARY OUTLET ASSEMBLY - BOTTOM, CENTER OF VALVE BLOCK (FIGURE 22)

16.1 Position blender assembly with valve block bottom facing upwards. Install primary spring (P/N 03310) in center of primary outlet cavity bottom.

NOTE: Primary outlet spring is shorter than auxiliary outlet spring.

16.2 After verifying O-rings are lubricated, install primary outlet housing and poppet into primary outlet port on valve block and hand tighten in place.

16.3 Using an $^{11}/_{16}$" deep socket wrench, tighten assembly to valve block. Torque to 10 ft/lbs.

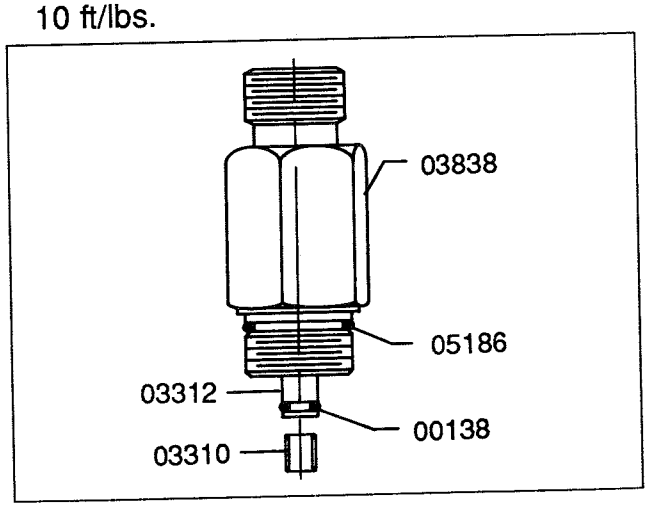


Figure 22

17.0 OUTLET CAP - LEFT SIDE FRONT OF VALVE BLOCK (FIGURE 23)

17.1 Using spanner wrench (P/N 03849), secure outlet cap (P/N 03829) with lightly lubricated O-ring (P/N 05186) into valve block. Torque to 30 in/lbs.

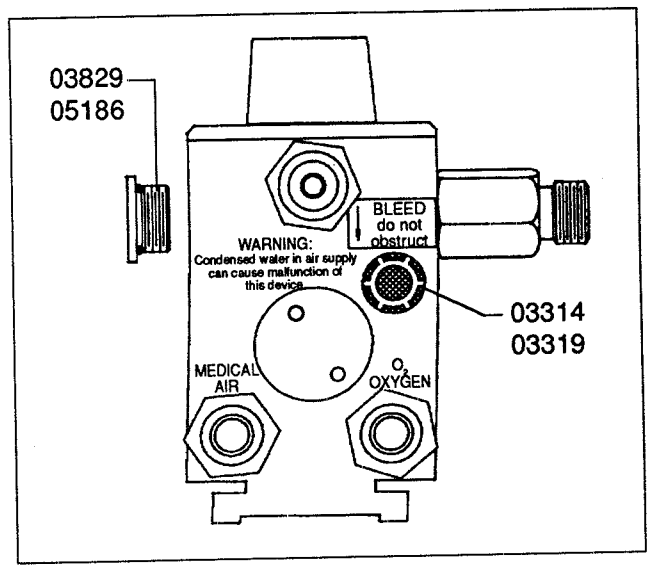


Figure 23

18.0 MUFFLER ASSEMBLY - BOTTOM OF VALVE BLOCK (FIGURE 23)

18.1 Install one (1) muffler (P/N 03319) into valve block bleed port.

18.2 With a small screwdriver, secure the star retainer (P/N 03314) over the muffler.

19.0 BALANCE BLOCK ASSEMBLY - TOP OF VALVE BLOCK

19.1 Assemble four (4) lubricated O-rings (P/N 00138) each, to two (2) balance block assemblies (P/N 03892).

19.2 Using a 5/32" Allen wrench and a torque wrench, secure the two (2) balance block assemblies to the valve block with four (4) screws (P/N 03826). Torque to 60 in/lbs.

NOTE: Align balance block assemblies squarely with valve block prior to tightening in place.

20.0 ALARM BYPASS ASSEMBLY - LEFT/RIGHT SIDE, REAR OF VALVE BLOCK (FIGURE 24)

20.1 Position blender on its top side. After verifying all O-rings are lubricated, insert assembled bypass sleeve (P/N 04897) into valve block.

Using Spanner wrench (P/N 03849) secure sleeve into valve block. Torque to 30 in/lbs.

CAUTION: Be extremely careful not to damage O-rings (P/N 04639) during bypass sleeve (P/N 04896) installation.

NOTE: Ensure that bypass poppet valve (P/N 03816B) with two (2) lubricated O-rings (P/N 05307) is inside sleeve.

20.2 Install one (1) spring (P/N 03817A) through bypass sleeve into hole in bypass poppet.

NOTE: Ensure that spring (P/N 03817A) is positioned into bypass poppet (P/N 03816B).

20.3 Using an 1/8" Allen wrench, screw bypass adjuster (P/N 03813) with lightly lubricated O-ring (P/N 00114) into bypass sleeve until adjuster is slightly recessed into sleeve.

20.4 Position blender on bypass sleeve side and install bypass seat (P/N 04986) with lubricated O-ring (P/N 01943), using spanner wrench (P/N 03849), secure seat to valve block. Torque to 30 in/lbs.

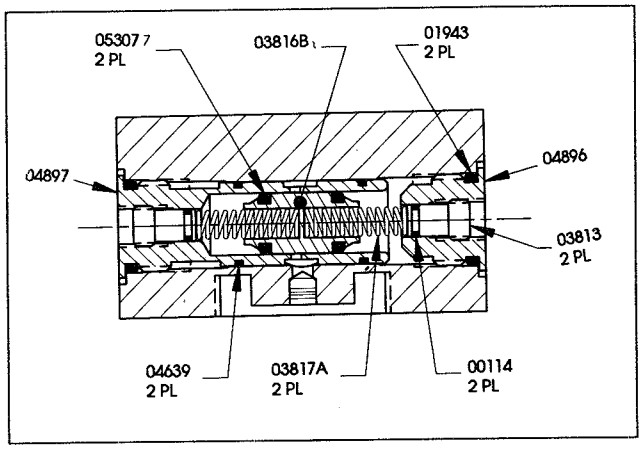


Figure 24

20.5 Carefully insert 1/8" Allen wrench through bypass seat (P/N 04986) and into bypass poppet valve. Push bypass poppet against spring (P/N 03817A) and check for smooth movement and recoil action.

20.6 Install spring (P/N 03817A) through bypass seat (P/N 04986) into hole in bypass poppet (P/N 03816B).

20.7 Using an 1/8" Allen wrench, screw bypass adjuster screw (P/N 03813) with lubricated O-ring (P/N 00114) into bypass seat until adjuster is slightly recessed into valve seat.

21.0 AIR INLET ASSEMBLY - BOTTOM REAR, LEFT OF VALVE BLOCK (FIGURE 25)

21.1 Install duckbill check valve (P/N 03895) in air inlet port with bill facing inside cavity.

21.2 Place washer (P/N 03897) on top of duckbill check valve. Step on washer fits into duckbill.

NOTE: Lightly lubricate both sides of washer to prevent binding or twisting between duckbill check valve and nylon cone inlet filter.

21.3 Place large diameter end of nylon cone inlet filter (P/N 06804) into air inlet port on valve block.

NOTE: Install air inlet fitting (P/N 03833) with lubricated O-ring (P/N 03808) into air inlet port on valve block and hand tighten in place.

21.4 Using a 3/4" deep socket wrench, secure air inlet into valve block. Torque to 10 ft/lbs.

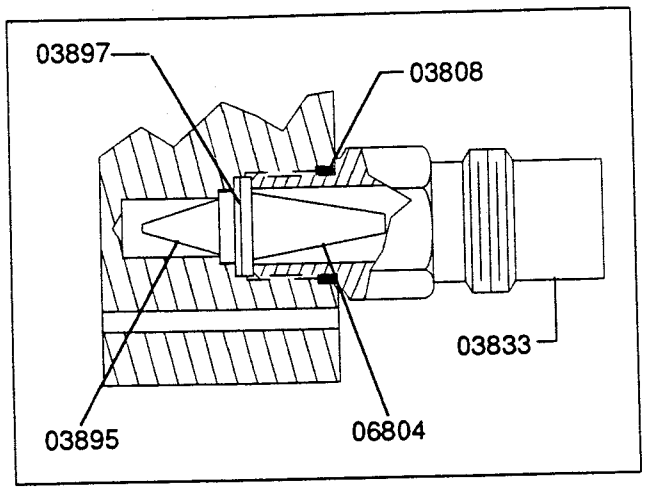


Figure 25

22.0 OXYGEN INLET ASSEMBLY - BOTTOM REAR, RIGHT OF VALVE BLOCK (FIGURE 26)

22.1 Hand tighten oxygen inlet assembly in valve block port.

NOTE: This assembly threads into the block with a left hand thread. Turn COUNTERCLOCKWISE to tighten. Single groove on nut indicates left hand thread.

22.2 With a 3/4" wrench, secure assembly to valve block. Torque to 10 ft/lbs.

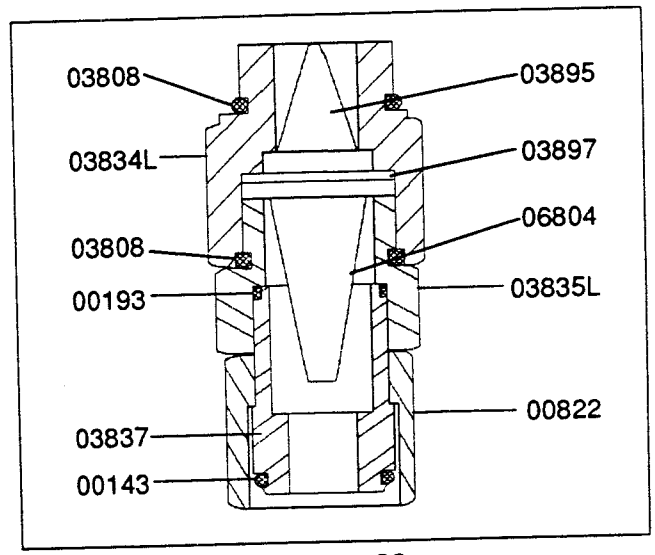


Figure 26

23.0 ALARM RETAINER CAP ASSEMBLY- BOTTOM OF VALVE BLOCK (FIGURE 26)

23.1 From below valve block, carefully install alarm cap assembly into valve block and tighten with spanner wrench (P/N 03849).

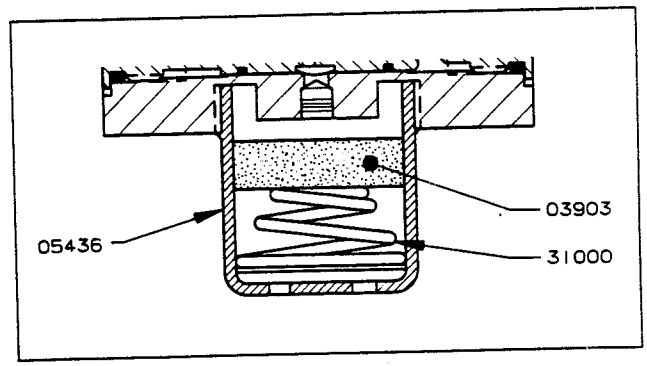


Figure 27

C. SET UP PROCEDURE FOR TESTING

The MicroBlender should be tested in a system which closely duplicates the conditions of use for which the blender was designed. Illustrated below is a schematic diagram of the system that should be used to test the MicroBlender.

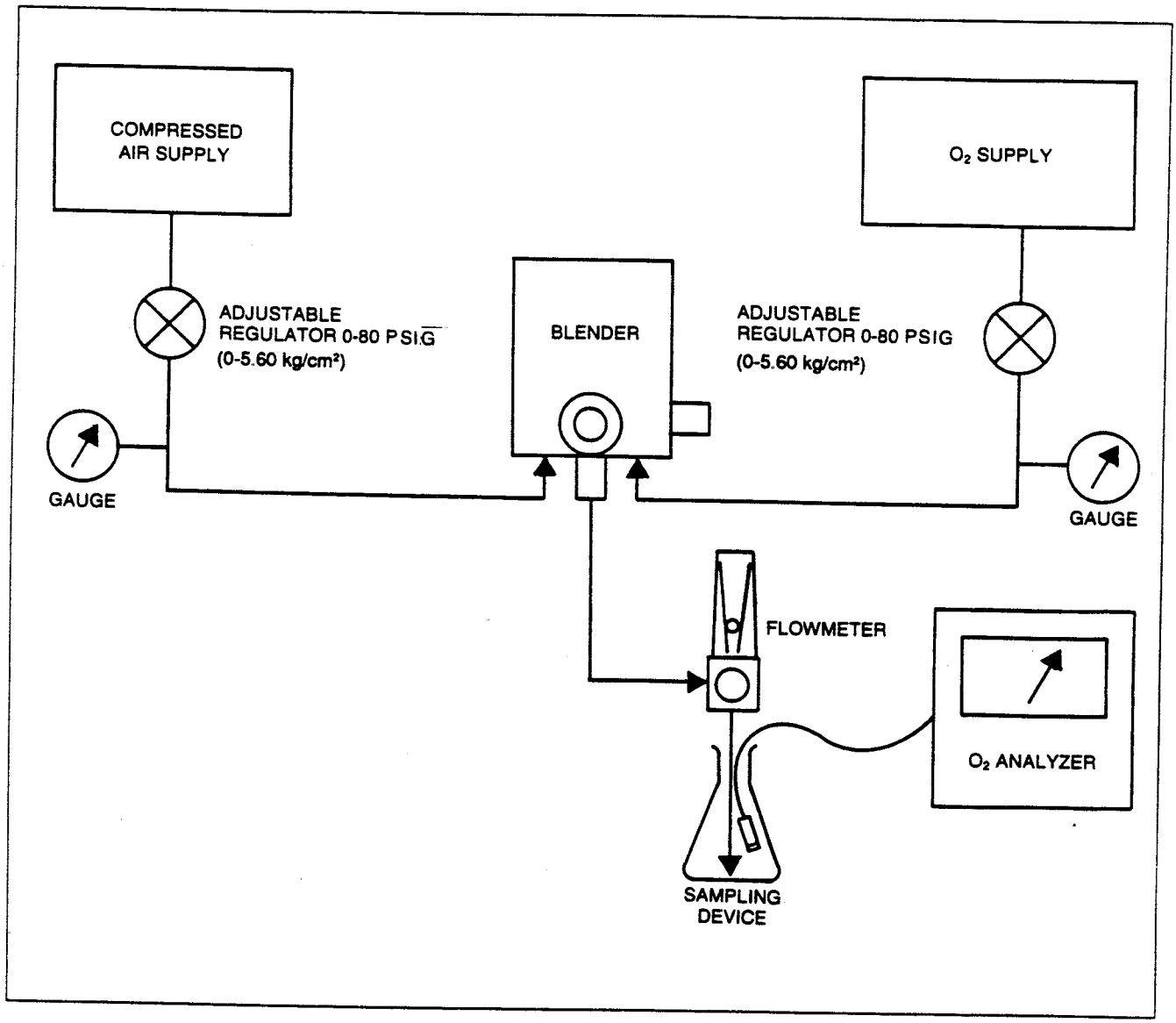


Figure 28

1. CALIBRATION TOOLS/EQUIPMENT

- Thin Bladed Screwdriver or Knife
- 1/8" Allen Wrench
- 9/32" Nut Driver
- Bird Spanner Wrench (P/N 03849)
- 11/16" Open End Wrench
- Oxygen Regulator (2 Stage, Adjustable 0-80 PSIG [0-5.60 kg/cm^2])
- Air Regulator (2 Stage, Adjustable 0-80 PSIG [0-5.60 kg/cm^2])
- Oxygen Flowmeter (0 - 20 LPM
- 1" Crooked Neck Pole or equivalent
- Oxygen Analyzer (analyzer should read in tenths to ensure accuracy of calibration)
- Female Post Bracket (P/N 04322)
- Oxygen Sampling Hose (P/N 07572)
- Hex Nut (P/N 00822)
- Tapered Nipple (P/N 00680)
- Flowmeter Adapter (P/N 00673)
- 1-1/8" open end wrench
- 7/8" open end wrench

2. AIR/OXYGEN SETUP

- The gas supplies must be clean and dry and have the ability to generate 80 PSIG (0-5.60 kg/cm^2) for both air and oxygen inlet pressures.
- When high pressure tanks are utilized, blow potential debris from the valve; quickly open and close each valve to prevent debris from entering the test equipment.
- Connect recommended adjustable air and oxygen regulators to each gas supply, securing with a wrench.
- Turn the oxygen and air regulator control knobs to full counterclockwise closed position.
- Secure the air and oxygen high pressure hoses to each regulator using applicable wrenches.

3. OXYGEN ANALYZER SETUP/ CALIBRATION

- The accuracy of the calibration of the 3800 MicroBlender will depend heavily upon the accuracy of the oxygen analyzer.
- The oxygen analyzer should have a response time of 10 seconds or less. The analyzer should read in tenths and ideally be of the digital type.
- Calibrate the oxygen analyzer according to the manufacturer's procedure.

4. TEST EQUIPMENT SETUP

- Secure a female post (P/N 04322) bracket to a 1-inch diameter pole.
- Install the built-in male post bracket on the MicroBlender into the female post bracket on the pole.
- Using 7/8" and 11/16" open end wrenches, secure the air and oxygen high pressure hoses to the MicroBlender inlets.
- Attach flowmeter adapter (P/N 00673) to primary outlet on blender. Line up adapter side outlet to the right.

NOTE: Plug opposite end of flowmeter adapter with cap provided.

- Attach and secure flowmeter, in upright position, to side outlet on adapter.

NOTE: Insure flowmeter is turned OFF.

Secure tapered nipple (P/N 00680) and hex nut (P/N 00822) to flowmeter outlet.

Attach one end of sampling hose (P/N 07572) to flowmeter and other end to bifurcation (P/N 01003). Ensure one-way valve (P/N 06665) is secured into remaining large opening of bifurcation. Attach remaining outlet of bifurcation to oxygen analyzer probe.

The system is now ready for calibration.

D. CALIBRATION PROCEDURE - 3800 MICROBLENDER

1.0 PROPORTIONING VALVE CALIBRATION

1.1 Remove control knob cap. With a 9/32" nut driver, loosen collet nut sufficiently until the knob may be removed.

1.2 Remove control knob and carefully rotate valve stem with fingers counter-clockwise so valve just seats.

1.3 Place knob on valve stem shaft with black pointer at 21% stop, and secure with 9/32" nut driver.

NOTE: Procedures 1.1, 1.2 and 1.3 are not applicable if MicroBlender reassembly procedures are being followed.

1.4 Turn air and oxygen sources ON. Adjust both regulators to a static 50 PSIG (3.52 kg/cm^2) and adjust flowmeter to 15 LPM.

1.5 Rotate control knob clockwise slowly until oxygen concentration on analyzer stabilizes between 21.1% and 21.5%. (**DO NOT** exceed 21.5%)

1.6 Hold knob securely with fingers and loosen collet nut, rotate black pointer counterclockwise to 21% stop without turning valve stem.

1.7 Check oxygen concentration for correct reading and tighten collet nut securely to valve stem with 9/32" nut driver.

1.8 Recheck oxygen concentration after tightening lock nuts and repeat steps 1.5 - 1.7 if necessary.

1.9 Carefully rotate control knob fully clockwise to 100% stop position. **DO NOT** force.

NOTE: If knob will not rotate to 100% stop, the front seat was probably turned in more than three turns. Rotate the front seat counterclockwise slightly and return to step 1.1.

1.10 Hold knob securely with fingers and loosen collet nut with 9/32" nut driver, then remove knob.

1.11 With the spanner wrench (P/N 03849), carefully rotate the front seat in a clockwise direction until the rear stem lightly touches its seat.

NOTE: This can be detected by a sudden increase in resistance to further rotation.

CAUTION: Rotating front seat past this point may damage rear seat and/or rear stem.

1.12 Observe the oxygen percentage and allow the analyzer to stabilize before continuing on.

1.13 The oxygen concentration should exceed 99.5%, ideally reaching 100%. If it doesn't, verify the rear stem is seated by slightly rotating front seat further clockwise. **DO NOT** force.

1.14 Tighten the front plate locknut to secure the front plate to valve block assembly with an $^{11}/_{16}$" torque wrench.

1.15 Install control knob with black pointer at 100% stop.

1.16 Using a $^{9}/_{32}$" nut driver, tighten the collet nut on control knob to the valve stem.

NOTE: The end points are now calibrated.

1.17 Rotate control knob counterclockwise to 21% stop, allow analyzer to stabilize to confirm that this setting has not changed.

Perform the following checks:

Knob Setting	Pressure Oxygen/Air	% Concentration
21	*50 PSIG/50 PSIG	21.0% - 22.0%
30	*50 PSIG/50 PSIG	27.0% - 33.0%
60	*50 PSIG/50 PSIG	57.0% - 63.0%
90	*50 PSIG/50 PSIG	87.0% - 93.0%
100	*50 PSIG/50 PSIG	99.0% - 100%

* = 3.52 kg/cm² / 3.52 kg/cm²

If concentrations are out of specification, repeat Steps 1.1 - 1.16 in Calibration Procedure.

Knob Setting	Pressure Oxygen/Air	Oxygen Concentration
30	*50 PSIG/40 PSIG	27.0% - 33.0%
60	*50 PSIG/40 PSIG	57.0% - 63.0%
90	*50 PSIG/40 PSIG	87.0% - 93.0%

* = 3.52 kg/cm² / 2.81 kg/cm²

30	*50 PSIG/60 PSIG	27.0% - 33.0%
60	*50 PSIG/60 PSIG	57.0% - 63.0%
90	*50 PSIG/60 PSIG	87.0% - 93.0%

* = 3.52 kg/cm² / 4.22 kg/cm²

If concentrations meet specifications, continue on. If concentrations do not meet specifications, repeat Step 1.1 - 1.16 in Calibration Procedure.

1.18 Adjust control knob at 60% oxygen and set air/oxygen pressures each at 50 PSIG (3.52 kg/cm²).

1.19 Remove flowmeter adapter (P/N 00673) and flowmeter from primary outlet.

1.20 Disconnect flowmeter from adapter then connect flowmeter to auxiliary outlet on MicroBlender.

1.21 Adjust flowmeter to 2 LPM and check oxygen analyzer. Reading should be between 57.0% - 63.0%.

NOTE: Should blender not meet this specification, inspect bleed orifice in auxiliary outlet for occlusion.

1.22 Insert bleed test tube (P/N 10108) assembly into bleedport at bottom of valve block. Flow tube should read 10 – 12 LPM.

NOTE: Should blender not meet this specification, inspect bleed orifice in auxiliary outlet for occlusion.

1.23 Increase air pressure from 50 PSIG to 60 PSIG. Oxygen percent on oxygen analyzer should read 57% – 63%.

1.24 Lower air pressure from 60 PSIG to 40 PSIG. Oxygen percent on oxygen analyzer should read 57% – 63%.

Repeat steps 1.23 and 1.24 by increasing or decreasing oxygen supply pressure.

1.25 Remove bleed test tube assembly from bleedport.

2.0 ALARM CALIBRATION

The alarm system is designed to sound an audible tone if the inlet pressures are different by 20 PSI (1.41 kg/cm²) or more, such as if either source gas failed.

When the MicroBlender is in the alarm phase, the remaining or higher pressure gas is routed to the blender outlet. Some gas will also flow through the alarm reed valve creating an audible tone.

2.1 Ensure air and oxygen regulators are adjusted to a static 50 PSIG (3.52 kg/cm²), align control knob indicator with 60%, and ensure flowmeter is set to 15 LPM.

2.2 Reduce air pressure until the audible alarm sounds. The air pressure should read 30 ± 2 PSIG (2.11 ± 0.14 kg/cm²).

If alarm sounds above this pressure, rotate adjuster clockwise, left side of blender, with a 1/8" Allen wrench until alarm sounds at 30 ± 2 PSIG (2.11 ± 0.14 kg/cm²).

If alarm sounds below this pressure, rotate adjuster counterclockwise, left side of blender, with a 1/8" Allen wrench until alarm sounds at 30 ± 2 PSIG (2.11 ± 0.14 kg/cm²).

2.3 Raise air pressure slowly. Alarm/bypass should reset to normal function when pressure reaches 44 PSIG (3.10 kg/cm²) or above.

2.4 Restore air pressure to 50 PSIG (3.52 kg/cm²) and reduce oxygen pressure until the audible alarm sounds. The oxygen pressure must be 30 ± 2 PSIG (2.11 ± 0.14 kg/cm²).

- If alarm sounds above this pressure, rotate adjuster clockwise, right side of blender, with a 1/8" Allen wrench until alarm sounds at 30 ± 2 PSIG (2.11 ± 0.14 kg/cm²).

- If alarm sounds below this pressure, rotate adjuster counterclockwise, right side of blender, with a 1/8" Allen wrench until alarm sounds at 30 ± 2 PSIG (2.11 ± 0.14 kg/cm²).

2.5 Raise oxygen pressure slowly. Alarm/bypass should reset to normal function when pressure reaches 44 PSIG (3.10 kg/cm²) or above.

3.0 INLET CHECK VALVE LEAK TEST

3.1 Disconnect oxygen hose assembly from gas source. Remove all connections from blender outlets to ensure that there is no outlet flow from blender.

3.2 Place free end of oxygen supply hose under water to check for leakage past oxygen inlet check valve. Gradually increase air supply pressure from 0 to 80 PSIG (0 to 5.62 kg/cm²).

3.3 Reverse above procedure to check for leakage past air inlet check valve.

3.4 Replace duckbill check valves (P/N 03895) in inlets if bubbles indicate any leakage.

3.5 Reconnect, inlet hose assemblies and adjust both to 50 PSIG (3.52 kg/cm^2). Check exterior of blender for leaks using a commercial leak detector.

4.0 INSTALLATION OF CONTROL KNOB FRICTION O-RING

4.1 Rotate control knob fully to 100% position. Check O_2 concentration.

4.2 Using a 9/32" nut driver, loosen collet nut and remove control knob.

4.3 Install O-ring (P/N 05279) on front seat lock nut (P/N 03819).

4.4 Push control knob onto front valve stem, seating it fully on the lock nut O-ring with the black pointer at the 100% position. Be careful not to rotate valve stem.

4.5 Tighten the collet nut securely, using a 9/32" socket. Torque to 4 in/lbs.

4.6 Recheck 100% - 21% O_2 concentration.

4.7 Snap control knob cap into control knob.

SECTION 5:
PERFORMANCE CHECK

August 1991

Prior to placing the 3800 MicroBlender into clinical use, perform the following test:

After satisfactory completion of the Performance Check, refer to Section 7, Operating Instructions.

WARNING:

IF THE 3800 MICROBLENDER DOES NOT FUNCTION AS DESCRIBED BELOW, CONTACT YOUR BIRD DISTRIBUTOR OR BIRD PRODUCTS CORPORATION, 3101 EAST ALEJO ROAD, PALM SPRINGS, CALIFORNIA 92262, (619) 778-7200, OR (800) 328-4139 . DO NOT USE THE BLENDER UNTIL CORRECT PERFORMANCE IS VERIFIED. USE SETUP PROCEDURE AS DESCRIBED IN SECTION 5.

BLENDER ALARM BYPASS CHECK

BLENDER ADJUSTMENT	BLENDER RESPONSE
1. Connect 50 ± 5 PSIG (3.52 ± 0.35 kg/cm²) air / oxygen source gases. Adjust control knob to 60%. Connect flowmeter to auxiliary outlet, set flow to 2 LPM minimum.	**1.** Alarm/Bypass should **not** activate.
2. Connect an oxygen flowmeter to auxiliary outlet to activate auxiliary bleed and disconnect 50 PSIG (3.52 kg/cm²) air source from blender.	**2.** Audible alarm.
NOTE: The blender must be flowing gas for the alarm to activate.	
3. Reconnect 50 PSIG (3.52 kg/cm²) air source to blender.	**3.** Audible alarm stops. Verify oxygen concentration (57% to 63%) with an oxygen analyzer.
4. Disconnect 50 PSIG (3.52 kg/cm²) oxygen source from blender.	**4.** Audible alarm.
5. Reconnect 50 PSIG (3.52 kg/cm²) oxygen source from blender.	**5.** Audible alarm stops. Verify oxygen concentration (57% to 63%) with an oxygen analyzer.
6. Verify oxygen flowmeter is set at 2 LPM.	**6.** Oxygen analyzer should read 57% to 63% when measured from the flowmeter outlet.

SECTION 6:
CLEANING AND STERILIZATION

Blenders manufactured by Bird Products Corporation are compatible with ethylene oxide gas sterilization.

CAUTION: Do not steam autoclave or otherwise subject MicroBlenders to temperatures over 145°F (62°C).

CAUTION: Do not immerse assembled MicroBlender into liquid decontamination agents.

CAUTION: Do not use any strong solvent or abrasive cleaners on labels.

Use an all purpose liquid cleaner on exterior.

SECTION 7:
MAINTENANCE AND SERVICE POLICY

CAUTION: The 3800 MicroBlender should be serviced or calibrated by a Bird Products Corporation trained hospital/dealer service technician.

The MicroBlender should be subject to a regular maintenance and service program, including periodic accuracy checks between normal overhauls. Although the frequency of these tests will vary depending on degree and severity of service, it is recommended that they be performed at least once every six (6) months under the best of conditions.

Elastomer components such as diaphragms and O-rings are designed to function satisfactorily for a minimum of two (2) years. The need for cleaning and replacement will depend on gas line conditions and will be indicated by the blender not meeting its specification performance. Bird Products Corporation recommends that complete maintenance be performed at least every two (2) years. Elastomer components will not function indefinitely, and the probability of their causing malfunctions increases progressively after two (2) years of service.

SECTION 8:
REPLACEMENT PARTS

Part Number	Description	Quantity Required
* 00114D	O-ring (.117 x .040)	2
* 00138D	O-ring (.176 x .070)	10
* 00143D	O-ring (.239 x .070)	1
* 00193D	O-ring (.364 x .070)	3
* 00306D	O-ring (.114 x .070)	1
* 00348D	O-ring (.301 x .070)	1
00770D	Ball, 3/16" Diam.	4
00822	Nut, 9/16" - 18 Hex	1
01866	Reed, Alarm Plate	1
* 01943	O-ring (.437 x .070)	2
03310	Spring, .21 x .16 x .25LG	1
03312	Poppet Check Valve	1
* 03314D	Ring, Rtng, Int., .39	1
* 03319	Muffler Bleed	1
03805A	Blender, Balance Block Micro	4
03806	PPT, Check Valve, MicroBlender	1
03914A	Block, Vlv MicroBlender, W Plugs	1
* 03808D	O-ring, (.4681D x. 078)	4
03809	Conn. Aux. Outlet O_2, 1/4 BPT	1
03810	Spring, .210 x .156 x .437	1
03813	Bypass Adjuster	2
03816B	Bypass, PPT	1
03817A	Spring, (.148OD x .500)	2
03818	Front Valve Seat	1
03819D	Nut, Front Seat	1
03820	Stem, Valve Front, MicroBlender	1
03821	Valve Stem, Rear	1
03825D	Screw, 10-32 x .75 Hex Soc Hd	8
03826D	Screw, 10-32 x 2.25 Hex Soc Hd	4
03829	Cap, Balance Block	5
03833	Air Inlet Connector	1
03834L	Conn, 9/16 - 18 LH x 9/16 - 18 LH, O_2	1
03835L	Conn, 7/17 - 27 x 9/16 - 18 LH, O_2	1
03837	Nipple, O_2 Conn	1
03838	Hsng, Check Vlv, MicroBlender	1
03840	Plate, Front Asy. MicroBlender	1
03854	Knob, Asy, MicroBlender Ctrl	1
03855	Rear Valve Seat	1
* 03858A	Diaphragm, Assembly	2
03859D	Spring (.118OD x .450LG)	1

* Indicates parts are contained in Maintenance Kit, P/N 10003.

REPLACEMENT PARTS

Part Number	Description	Quantity Required
03864L	Inlet, 02 Diss	1
03869	Outlet, Auxiliary	1
03870	Outlet, Primary	1
* 03897D	Washer, Step (.500D x .171D)	2
* 03895D	Duckbill Check Valve	3
* 03903D	Plug, Foam Alarm	1
* 04639D	O-ring, (.426 x .040)	1
04640	Spring, 210 x .20 x .55	1
04896	Cap, Bypass Seat	1
04897	Cap, Sleeve	1
04898	Retainer, Check	1
* 04899	Ball, Rubber Check	1
* 05163B	Spring (.093 x .053 x .300)	1
* 05186D	O-ring (.414 x .070)	7
* 05279D	O-ring (.614 x .070)	1
* 05307D	O-ring (.239 x .070)	3
05436	Alarm Blender Bypass	1
* 06804D	Nylon Cone Filter	2
* 07849D	O-ring (.313 x .051)	1
31000	Spring	1
* 33621	Ball, Rubber, 3/16" DIA	4

Refer to page 9 for component illustration.

The "D" suffix is used when ordering certain parts. These parts come in packages of 10. However, the "Quantity Required" column indicates the number of parts actually required for one MicroBlender.

* Indicates parts are contained in Maintenance Kit (P/N 10003).

Maintenance Kit (P/N 10003) is packaged with the actual quantity required.

MICROBLENDER MAINTENANCE KIT P/N 10003

Part Number	Description	Quantity
00114	O-Ring .117 x .040	2
00138	O-Ring .176 x .070	10
00143	O-Ring .239 x .070	1
00193	O-Ring .364 x .070	3
00306	O-Ring .114 x .070	1
00348	O-Ring .301 x .070	1
01943	O-Ring .437 x .070	2
03314	Starwasher	1
03319	Muffler	1
03808	O-Ring .468 1D x .078	4
03858A	Diaphragm Assembly	2
03895	Duckbill Check Valve	2
03897	Washer, Step	2
03903	Foam Diffuser	1
04639	O-Ring .426 x .040	2
04899	Ball, Rubber, Check Valve	1
05163B	Spring .093 x .053 x .300	1
05186	O-Ring .414 x .072	7
05279	O-Ring .614 x .070	1
05307	O-Ring .239 x .070	3
06804	Nylon Filter	2
07849	O-Ring .313 x .051	1
33621	Ball, Rubber, $^{3}/_{16}$" DIA	4

SECTION 9:
PRODUCT SPECIFICATIONS

3800 MICROBLENDER

Size (not including inlet and outlet fittings)	H - 3 1/2" (9cm) x W - 2 1/4"(5.6cm) x D - 4 1/2"(11.5cm)
Weight	2 3/4 lbs (1.4 kg).
Gas Supply Pressure (Air & O_2)	30 - 75 PSIG (2.11 kg/cm^2 - 5.27 kg/cm^2). The blender will maintain stated accuracy at supply pressures provided the differential between supply pressures does not exceed 10 PSIG (0.70 kg/cm^2). Output flow rate will be diminished if either supply pressure is below 50 PSIG (3.52 kg/cm^2) and will be increased if both supply pressures are above 50 PSIG (3.52 kg/cm^2).
Knob Adjustment Range	21 to 100%
Primary Outlet	Bottom Port
Primary Outlet Flow Range	15 to 120 LPM (no bleed)
Maximum Flow @ 60% knob setting, 50 PSIG (3.52 kg/cm^2) inlet pressure	>120 LPM
Flow @ 21% or 100% knob setting, 50 PSIG (3.52 kg/cm^2) inlet pressure	>90 LPM
Bypass flow (loss of air or O_2) 50 PSIG (3.52 kg/cm^2) inlet pressure of remaining gas	>90 LPM
Auxiliary Outlet	Right Side Port (Facing unit)
Auxiliary Outlet Flow Range	2 to 100 LPM (Bleed 10-12 LPM)
Accuracy - with inlet gases within 10 PSIG (0.70 kg/cm^2) and each gas pressure greater than 30 PSIG (2.11 kg/cm^2), but less than 75 PSIG (5.27 kg/cm^2)	±3% of full scale over the stated flow ranges (i.e., 3 percentage points at any reading)

Alarm/Bypass Activation	20 ± 2 PSIG (1.41 ± 0.14 kg/cm²) When inlet gas pressures differ by a nominal 20 PSIG (1.41 kg/cm²) or more provided maximum pressure of either supply gas does not exceed 75 PSIG (5.27 kg/cm²) and minimum pressure of one supply gas remains at 40 PSIG (2.81 kg/cm²) or above. In other words, one supply gas must remain at 40 PSIG (2.81 kg/cm²) or above to provide enough gas pressure to operate the alarm in the event the other supply pressure falls to 20 PSIG (1.41 kg/cm²) or below. There will be no alarm or bypass if the control knob is set to 21% and source oxygen pressure is reduced or turned off. Similarly, if control is set to 100% there will be no alarm if air pressure is reduced or turned off. In either case, the unit will continue to deliver the selected concentration of 21% or 100%. There will be no alarm under condition of 20 PSIG (1.41 kg/cm²) or greater source pressure differential if unit is not in use (i.e. no output flow or bleed flow).
Alarm Sound Generator	Vibrating Reed
Alarm/Bypass Reset	When inlet pressure differential is 6 PSI (0.42 kg/cm²) or less.
Pressure Drop	Less than 6 PSIG (0.42 kg/cm²) at 50 PSIG (3.52 kg/cm²) inlet pressures and 40 LPM flow

THE PRODUCTS OF BIRD PRODUCTS CORPORATION (BIRD HEREIN) ARE WARRANTED TO BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP AND TO MEET THE PUBLISHED SPECIFICATIONS.

The liability of Bird under this warranty is limited to replacing, repairing or issuing credit, at the discretion of Bird, for the parts that become defective or fail to meet published specifications during the warranty period; Bird will not be liable under this warranty unless (A) Bird is promptly notified in writing by Buyer upon discovery of defects or failure to meet specifications; (B) the defective unit or part is returned to Bird, transportation charges prepaid by Buyer; (C) the defective unit or part is received by Bird for adjustment no later than four weeks following the last day of the warranty period; and (D) Bird's examination of such unit or part shall disclose, to its satisfaction, that such defects or failures have not been caused by misuse, neglect, improper installation, unauthorized repair, alteration or accident.

Any authorization of Bird for repair or alteration by the Buyer must be in writing to prevent voiding warranty.

Bird warranties as hereinabove set forth shall not be enlarged, diminished or affected by, and no obligation or liability shall arise or grow out of the rendering of technical advice or service by Bird or its agents in connection with Buyer's order of the products furnished hereunder.

■ LIMITATIONS OF LIABILITIES

In no event shall Bird be liable to Buyer for loss of profits, loss of use, consequential damage or damages of any kind based upon a claim for breach of warranty, other than the purchase price of any defective product covered hereunder.

This warranty does not cover normal maintenance such as cleaning, adjustment or lubrication and updating of equipment or parts. This warranty shall be void and shall not apply if the equipment is used with accessories or parts not manufactured by Bird or authorized for use in writing by Bird, or if the equipment is not maintained in accordance with a prescribed schedule of maintenance.

The warranty stated above shall extend for a period of one year from date of delivery, with the following exceptions:

1. Electrical components for remote monitoring of physical variables such as temperature, pressure, oxygen saturation or flow are warranted for ninety (90) days from date of receipt.

2. Elastomeric components and other parts or components subject to deterioration over which Bird has not control are warranted for sixty (60) days from date of receipt.

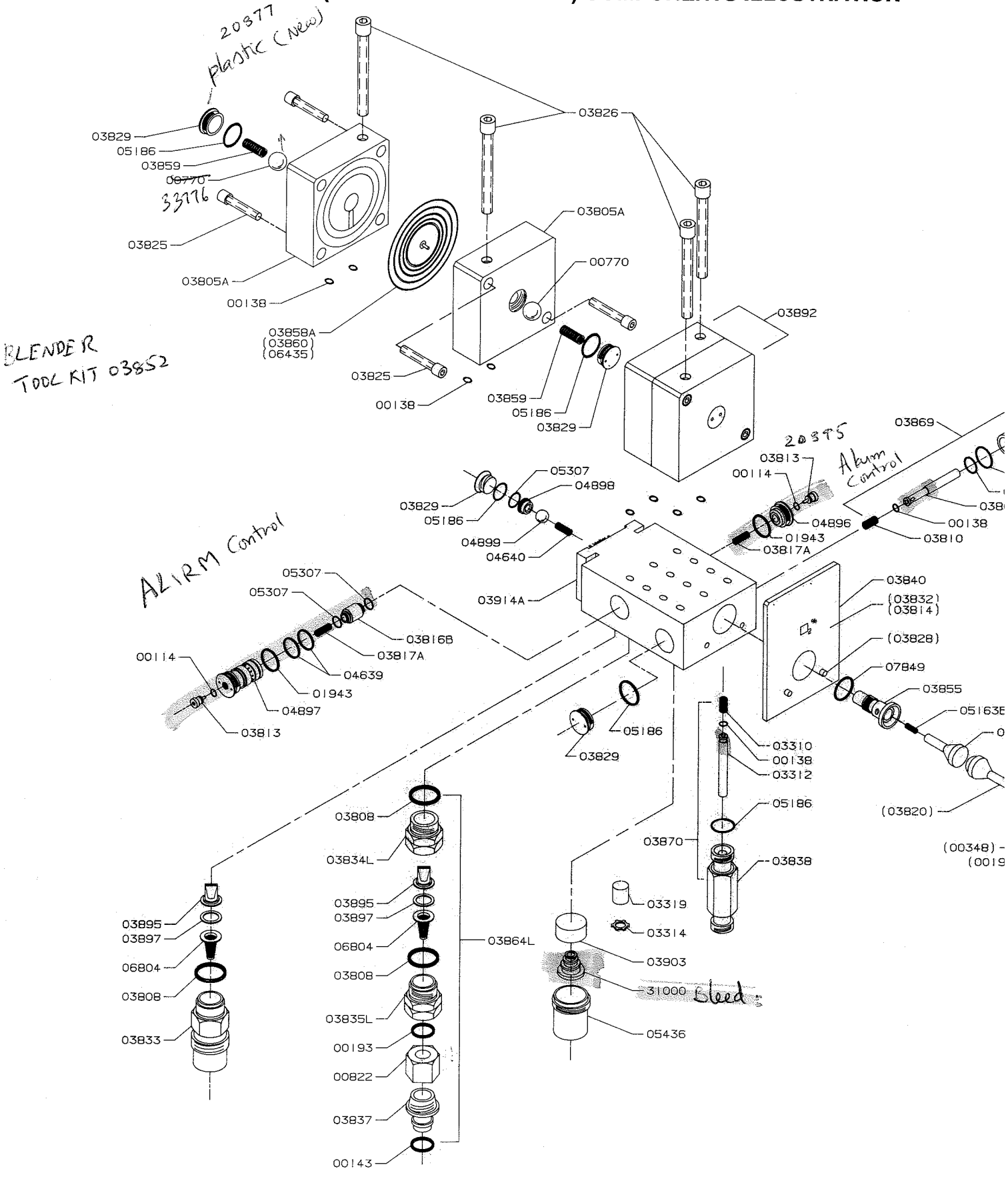
The foregoing is in lieu of any other warranty, expressed or implied, including, without limitation, any warranty of merchantability, except as to title, and can be amended only in writing by a duly authorized representative of Bird.

PM KIT 10003

SECTION 4:
SERVICE, REPAIR AND CALIBRATION

August 1991

3800 MICROBLENDER (AIR/OXYGEN BLENDER) COMPONENTS ILLUSTRATION



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