

INSTRUCTION MANUAL

OPERATION & SERVICE

SUCTION AND PRESSURE APPARATUS, SURGICAL

MODEL 317M

NSN 6515-01-174-1477

CONTRACT NO. SPO200-94-C-8511

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IMPACT INSTRUMENTATION, INC., 27 Fairfield Place, West Caldwell, NJ 07006

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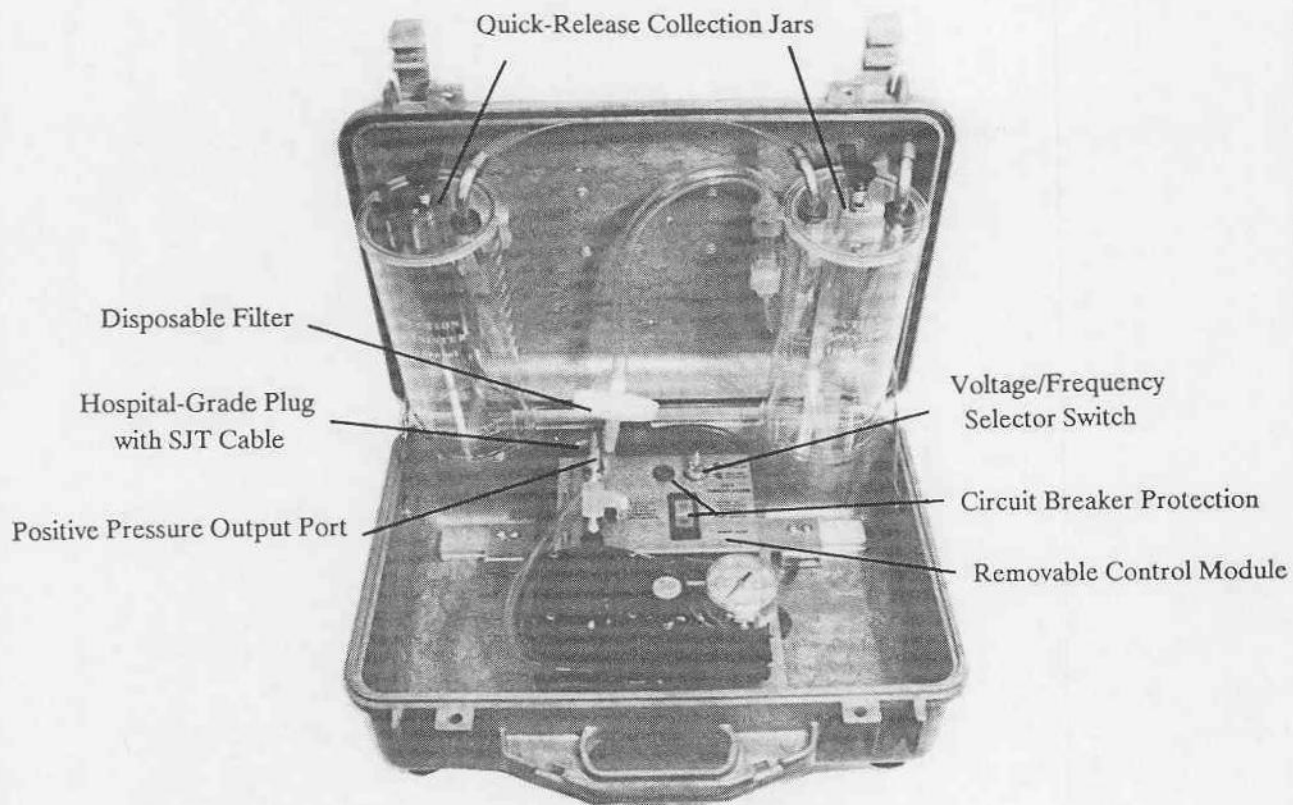


Figure 1. Model 317M Main Features

SHIPPING CONTENTS

Each Model 317M is shipped with the following contents:

- 1 ea. Apparatus Outer Container
- 1 ea. Control Module
- 2 ea. Reusable Collection Canister System
- 1 ea. Assembly, Overflow Shutoff Valve
- 1 ea. Hose, Clear, PVC, 6" Long
- 1 ea. Hose, Clear, PVC, 12" Long
- 2 ea. Suction Hose, Sterile, Clear
- 2 ea. Instruction Manual, Operation & Service
- 1 ea. Filter, Disposable, Hydrophobic/Bacterial

ACCESSORIES LIST

The Accessories List contains common items, required from time to time. Each item is preceded by its part number. Accessories may be ordered direct from Impact. When ordering, please include the part number, description and quantity required.

Send written purchase orders to: Impact Instrumentation, Inc.
P.O. Box 508
27 Fairfield Place
West Caldwell, New Jersey 07006

Telephonic orders: 201/882-1212

Part Number	Description
465-0005-00	Filter, Disposable, Hydrophobic
540-0067-00	Hose, Clear, PVC, 6" Long
540-0068-00	Hose, Clear, PVC, 12" Long
703-0317-02	Assembly, Collection Canister
704-0317-02	Assembly, Overflow Shutoff Valve
820-0018-00	Tubing, Suction, Sterile, 9/32" I.D. X 6'
906-0317-01	Instruction Manual, Operation & Service

LIMITED COPYRIGHT RELEASE

Permission is hereby granted to the Department of Defense to reproduce all material furnished under this contract for use in a military service training program and other technical training programs.

CALIBRATION NOTICE

This device should be incorporated into a regular preventative maintenance program to insure compliance with operating specifications. Calibration measurements should be made on a biannual basis unless significant usage warrants a shorter period between preventative maintenance inspections. A calibration check should be made following each cumulative period of 300 hours of operation. Recommended maintenance checks can be found in the **SERVICE** section of this Manual.

UNPACKING

Check the contents of the shipping case(s) against the enclosed packing list. Examine the instrument for any obvious signs of shipping damage. If there is no apparent sign of mechanical damage, read the instructions contained within this manual before attempting to operate the instrument.

LOCATION OF USE

The Model 317M is a transportable device, therefore, its physical area of use will vary. When operated in a wet environment, user's should take precautions and protect this device by covering it with a protective barrier (small tarp, plastic sheet, etc.).

WARNINGS REGARDING USE

This equipment is intended for use by qualified medical personnel only.

Danger - Possible explosion hazard if used in the presence of flammable anesthetics.

Caution - Electric shock hazard, do not remove instrument covers. Refer servicing to qualified service personnel only.

Do not operate this instrument prior to reading the instructions contained within this manual.

Always use overflow shutoff valve to protect pump mechanism.

Do not clean collection canisters with abrasive cleansers (See **ROUTINE CARE AND MAINTENANCE** section **Cleaning**).

ASSEMBLY, INTERCONNECTIONS AND INITIAL ADJUSTMENTS

ASSEMBLY: No assembly is required before placing this device into operation.

INTERCONNECTIONS: The following interconnections are required to connect the Model 317M to its Overflow Shutoff Valve, Hydrophobic Filter and Collection Jar System. When using a collection system other than Impact's, utilize the connection instructions provided by the respective collection jar manufacturer.

ASSEMBLY, INTERCONNECTIONS AND INITIAL ADJUSTMENTS (cont'd)

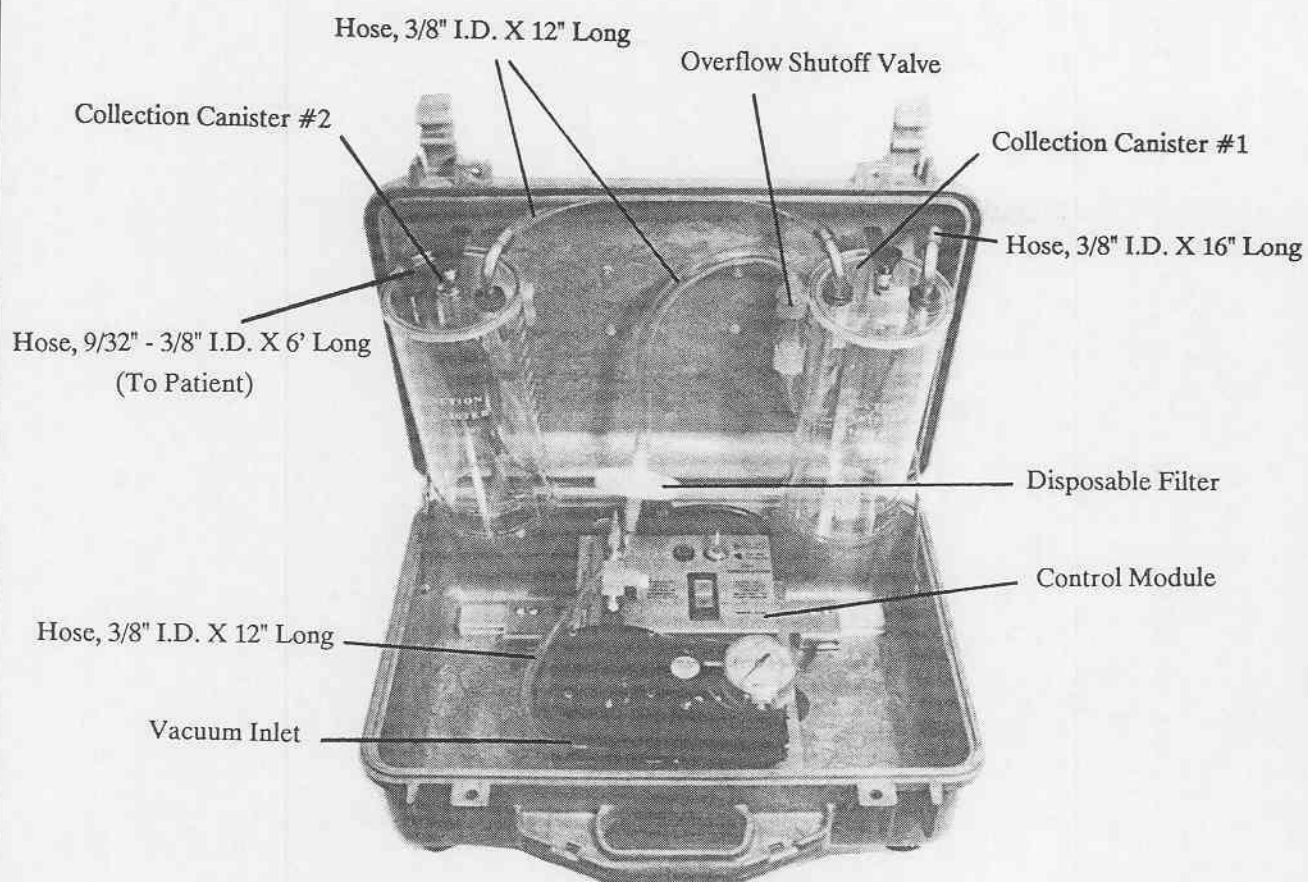


Figure 2.

Interconnection Diagram - Suction Module/Overflow Shutoff Valve/Hydrophobic Filter/Collection Jar System

INITIAL ADJUSTMENTS: Before placing this device into operation read the section entitled **OPERATION, DESCRIPTION OF CONTROLS AND INDICATORS**. Make control settings and verify device performance prior to interfacing with patient.

Additional Collection Canister and Connecting
Hose is not furnished as a component of this assembly.

Refer to Figure 2 for additional interconnection reference.

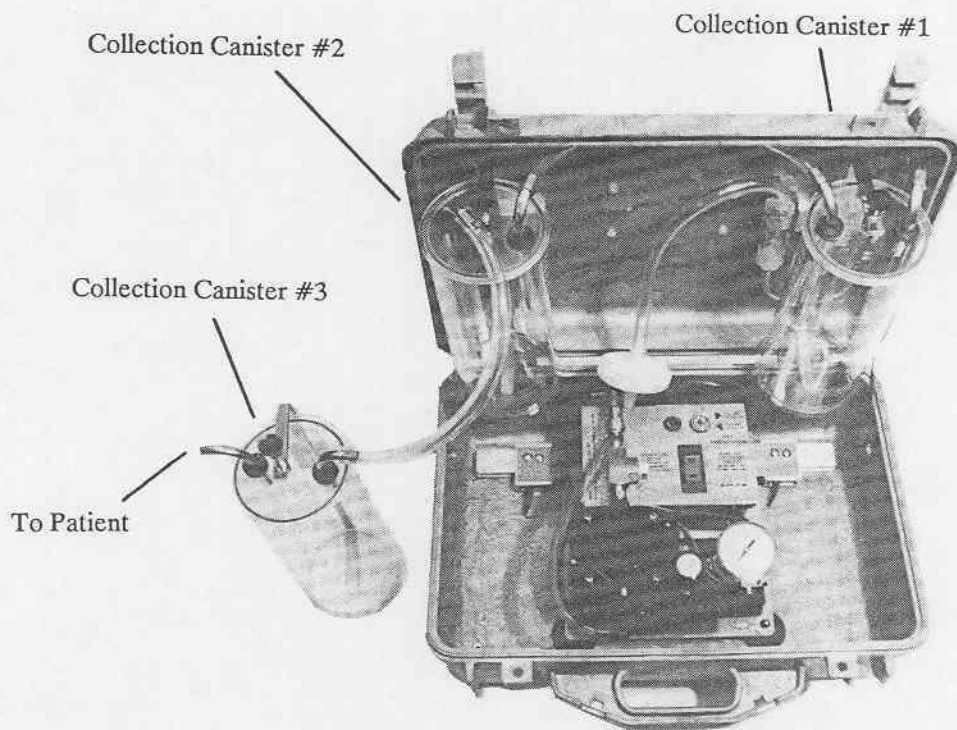


Figure 3. Interconnection Diagram - Three Suction Bottle Configuration

Additional Collection Canisters and Connecting Hoses are not furnished as components of this assembly.

Refer to Figure 2 for additional interconnection reference.

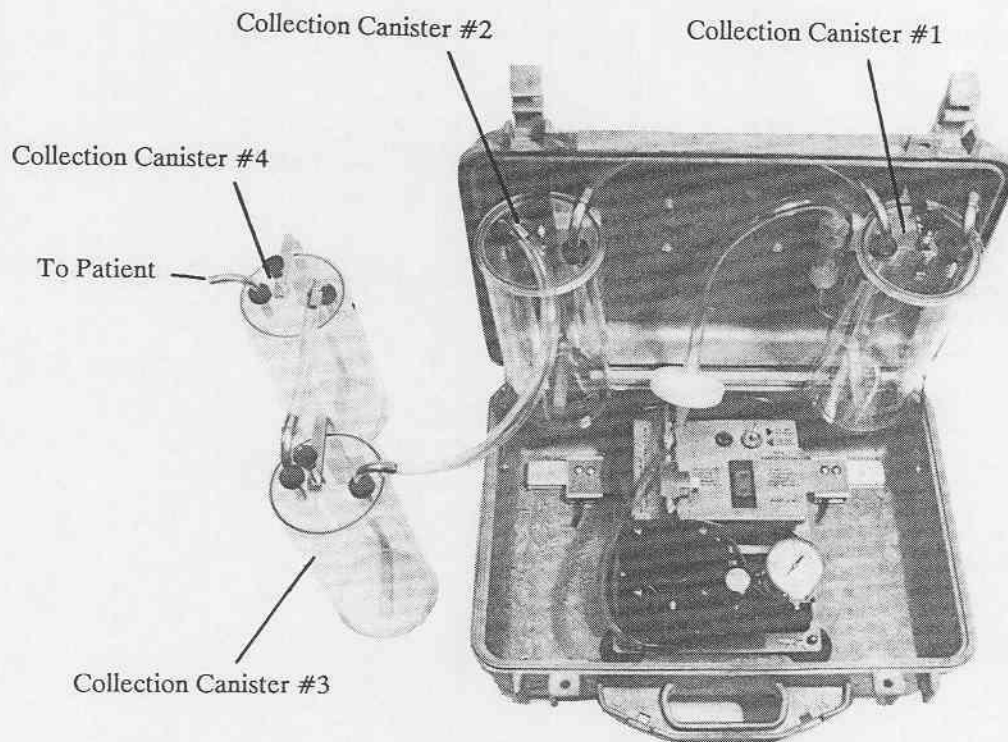


Figure 4. Interconnection Diagram - Four Suction Bottle Configuration

SECTION I. OPERATION

INTRODUCTION

The Impact Model 317M is a self-contained, general-purpose, Suction/Pressure apparatus designed for field use. Operating voltages and frequencies for 115/230 VAC, 50/60 HZ are "key switch" selectable for world-wide usage.

The Model 317M consists of a control module containing: vacuum/pressure pump, control and power supply circuits, a dual-scale vacuum gauge with adjustable regulator, and pressure port with overload protection; a dual collection canister system; overflow shutoff valve; hydrophobic/bacterial filter and attachment tubing. The complete device is housed within a structural ABS enclosure featuring latch-locks and integral carrying handle. The control module and collection canisters are rail mounted with quick release guides to facilitate removal and deployment.

This device is intended for use in non-explosive atmospheres: for surgical procedures; oral, nasal and tracheal suctioning. Read the instructions contained within this manual before attempting to operate this instrument.

OPERATION

DESCRIPTION OF CONTROLS AND INDICATORS

Refer to the reference pictorial below. Numbers contained within this text (in parenthesis) correspond to the numbers indicated in the pictorial.

- (1) Circuit Breaker
- (2) Key Switch
- (3) Rocker Switch/Circuit Breaker
- (4) Vacuum Regulator Valve
- (5) Vacuum Gauge
- (6) Vacuum Inlet Fitting
- (7) Pressure Relief Valve
- (8) Pressure Port

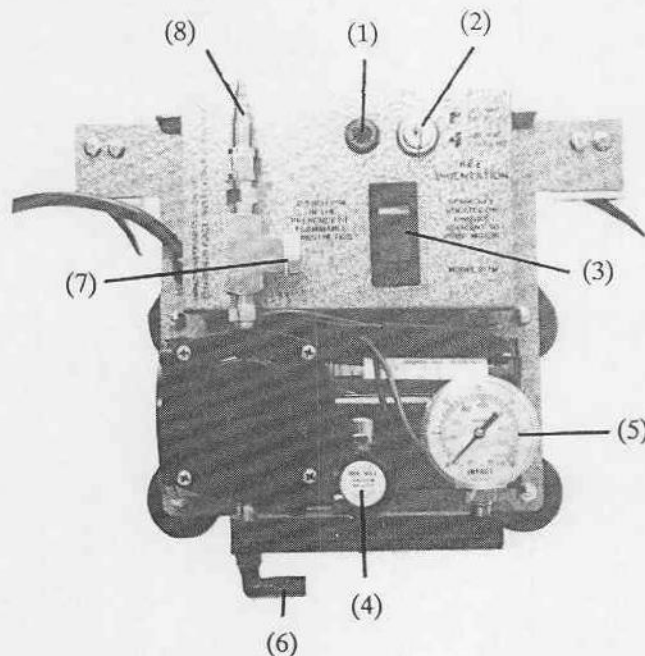


Figure 5. Panel Controls, Circuit Breakers and Indicators

OPERATION (cont'd)

OPERATING POWER SELECTION & STOPPING

The Model 317M is designed to operate on 115 VAC, 50/60 HZ or 230 VAC, 50/60 HZ. The operating voltage is selected by setting Key Switch (2) to the applicable 115 VAC or 230 VAC setting. Note: 230 VAC settings apply to operation within the 220-240 VAC. The Rocker Switch/Circuit Breaker (3) acts as a master power switch to start and stop operation.

SUCTIONING

1. Verify that Key Switch (2) is set to correct operating voltage.
2. Insure that all suction tubing is properly secured to respective fittings. Verify that collection canister lids are properly secured, fittings in place as shown (Figure 2), and no kinks in connecting tubing.
3. Depress Rocker Switch/Circuit Breaker (3) to "ON" position.
4. Adjust Vacuum Regulator Valve (4) to the maximum desired vacuum level by "pinching" and holding the vacuum tubing going to the first stage collection canister. Deliverable vacuum levels will not exceed the preset maximum level. Adjusted and delivered vacuum levels are continuously displayed on the dual-scale Vacuum Gauge (5).
5. For applications which require fast pump down times, utilize first stage collection canister only. For applications which warrant suctioning of greater quantities of aspirate, utilize dual canisters, connected in series, as shown. Always connect overflow mechanism between vacuum pump and collection canister. When using multiple canisters, connect overflow mechanism between vacuum pump and collection canister furthest from the patient (Figure 2).
6. A disposable filter which is both hydrophobic and bacterial is provided. This filter connects between the overflow mechanism and collection canister. When multiple canisters are used, connect the filter between the overflow mechanism and collection canister furthest from the patient (Figure 2). This filter should be replaced when discoloration of its membrane occurs, the membrane contacts aspirate, or following 150 cumulative hours of use. This filter is designed to retain bacteria which would otherwise be exhausted into the immediate vicinity. **DO NOT** bypass this filter.
7. **DO NOT** block or occlude the Pressure Port (8) during suctioning.

PRESSURE

1. Verify that Key Switch (2) is set to correct operating voltage.
2. Secure tubing (not supplied) to Pressure Port (8).
3. Depress Rocker Switch/Circuit Breaker (3) to "ON" position.

OPERATION (cont'd)

PRESSURE (cont'd)

4. **DO NOT** block or occlude Vacuum Inlet Fitting (6), or suction lines. It is recommended that the user disconnect the overflow mechanism, filter, suction hose(s) and collection canister(s) when utilizing this device for pressure related applications.

5. A Pressure Relief Valve (7) limits maximum deliverable pressure to 11 pounds per square inch (PSI). **DO NOT** block or occlude this valve.

VACUUM REGULATOR

The Vacuum Regulator Valve (4) works in conjunction with the Vacuum Gauge (5). Vacuum levels may be selected by rotating the Vacuum Regulator Valve (4): clockwise to increase vacuum; counterclockwise to decrease vacuum. Vacuum regulator adjustments should be made to the maximum desired vacuum level by "pinching" and holding the vacuum tubing going to the first stage collection canister (canister closest to "patient"). Deliverable vacuum levels will not exceed this preset maximum. Adjusted and delivered vacuum levels will continuously display during operation on the dual-scale Vacuum Gauge (5).

COLLECTION JAR SYSTEM

ALWAYS use the overflow shutoff valve provided with this unit to protect the suction mechanism from overflows which may permanently damage the vacuum pump. Vacuum tubing is provided for interconnection of collection canisters, hydrophobic filter, overflow shutoff valve and control module Vacuum Inlet Fitting (6).

Collection canisters may be repeatedly sterilized using ethylene dioxide gas. **DO NOT** use abrasive cleansing agents or chlorinated hydrocarbons. To determine compatibility with commercially available cleanser/disinfectants please note the following material content:

Collection Canister and Covers:	Polycarbonate
Hose Fittings:	Stainless Steel
Bushings:	Neoprene Rubber

OPERATOR PERFORMANCE CHECKS

Before placing this device into operation, the operator can perform various operational checks to insure proper performance.

1. Verify operating power selections at 115 or 230 VAC.
2. Verify continuous operation.

OPERATION (cont'd)

OPERATOR PERFORMANCE CHECKS (cont'd)

3. Test the vacuum regulator for correct operation at various vacuum settings.
4. Insure that all hoses and fittings are properly connected.

ROUTINE CARE AND MAINTENANCE

CLEANING

NOTE: Routine decontaminations which do not involve the removal of aspirate can be effected using a spray disinfectant. With the device operating, simply spray a small amount of disinfectant directly into the collection canister and shortly thereafter into the vacuum inlet of the pump head. This should be performed after each use to avoid risk of bacterial growth. In the event of an aspirate overflow, remove the pump head assembly (**SECTION II. SERVICE, DISASSEMBLY/ASSEMBLY**). All pump head components may be sterilized using a liquid disinfectant, a mild spray disinfectant or ethylene oxide gas.

● Component Removal

The control module and collection canisters may be removed from their respective rails for cleaning or deployment. The control module is secured with two (2) cam-locking guides, each collection canister is secured with one (1) cam-locking guide. Each guide contains a locking lever. To release tension (unlock the guide), slide the lever fully to the right. To lock, slide the lever to the left. When the guide lever is in its unlocked position, the control module or canisters can slide along their rails for repositioning or removal.

A rail edge view discloses a concave and rectangular track. A guide edge view discloses a convex track. The rail-to-guide interface is made when (1) the convex track is "tipped" into the convex track, and (2) the guide lever is locked into the rail's rectangular track.

● Exterior Case

Periodically or when applicable, clean the exterior case using a mild, non- abrasive cleanser. Remove the control module, collection canisters, overflow shutoff valve, hydrophobic/bacterial filter and any stored accessories to facilitate cleaning.

● Control Module

UNPLUG POWER CORD before cleaning control module. **DO NOT** allow liquids to enter control module. A damp cloth will suffice in most cases. Disinfectant spraying is recommended at regular intervals.

● Collection Canisters

Collection canister systems should be cleaned or disposed of in accordance with their respective instructions.

Impact's reusable collection canisters may be repeatedly sterilized using ethylene oxide gas. **DO NOT** use abrasive cleansing agents or chlorinated hydrocarbons. To determine compatibility with commercially available cleanser/disinfectants, please note the following material content:

Collection Canister and Covers: Polycarbonate

Hose Fittings: Stainless Steel

Bushings: Neoprene Rubber

ROUTINE CARE AND MAINTENANCE, CLEANING (cont'd)

● Collection Canisters (cont'd)

1. Thoroughly clean collection canister(s), and fittings after each use.

Collection canisters are held in place by a spring loaded plunger. To quickly remove either canister, pull the plunger knob up with one hand and pull the canister forward with the other.

2. Tubing is considered disposable and should be discarded following each use.
3. Insure that all covers and parts are securely fastened after cleaning.
4. Orient collection canisters as shown in Figure 2 following cleaning. Route connecting tubing and filter as shown in Figure 2.

● Overflow Shutoff Valve

The overflow shutoff valve may be disassembled and cleaned using warm soapy water or a mild disinfectant solution. Disinfectant solutions should be diluted according to their respective instructions. Dry thoroughly before reassembling.

● Hydrophobic/Bacterial Filter

DO NOT attempt to clean the disposable hydrophobic/bacterial filter. This item is disposable and should be replaced whenever it becomes discolored or contacts aspirate, airflow is impeded, or following 150 cumulative hours of use, whichever comes first.

DO NOT bypass this filter. Its intended use is to retain bacteria which would be exhausted through the pressure port or allowed to accumulate in the pump head.

As filters become occluded with particulate matter during repeated usages, a reduction in device airflow will become evident. Filter replacement will restore device performance to its original airflow levels.

MAINTENANCE

Routine maintenance should be performed on this apparatus at regular intervals and prior to being placed into service. Routine maintenance should consist of the following:

1. Cleaning checks - as described above.
2. Filter checks - replace when discolored, contact with aspirate occurs, airflow performance diminishes considerably or following 150 hours of cumulative use.
3. Overflow shutoff valve - clean in warm, soapy water or with a mild disinfectant solution when contacted with aspirate or following 150 hours of cumulative use. Dry thoroughly before reassembling.
4. Operational checks - as described in **OPERATOR PERFORMANCE CHECKS**.
5. Tubing checks - replace crimped, cracked or worn tubing as required.

IN CASE OF DIFFICULTY

Authorization to service this instrument by other than factory-trained and certified personnel will not be given, nor does Impact Instrumentation, Inc. assume any responsibility and/or liability resulting from such unauthorized servicing.

Impact will, upon request, provide competent biomedical engineering departments with service data and schematics. Such departments are encouraged to contact the factory for assistance when needed and it is recommended that staff members attend a factory training course. Details may be obtained by contacting the Impact Customer Service Department.

OPERATOR CORRECTIBLE PROBLEMS

Common problems may be quickly rectified by users. Should the Model 317M fail to operate properly, verify the integrity of all tube connections, tubing, fittings, and control settings. One can quickly isolate problems to an accessory item or the Suction Module by testing for vacuum at various locations.

To isolate a problem, check for vacuum at the inlet of each item, tracing backwards through the system, i.e.: vacuum from jar #2 to jar #1, vacuum from jar #1 to the filter, vacuum from the filter to the overflow shutoff valve, vacuum from the overflow shutoff valve to the Vacuum Inlet Fitting (6).

OPERATOR PROBLEMS REQUIRING SERVICE

If the tests described above do not resolve an operating problem, service is required. Should servicing be necessary, contact your nearest Impact representative or the Impact Customer Service Department (201) 882-1212. Please have the Model and Serial Numbers ready and any other pertinent data you wish to include in your service request. The Model 317M Serial Number is located on the outer case identification label.

STORAGE INFORMATION

For prolonged storage periods, the Model 317M should be stored indoors. The environment should be clean, and out of direct sunlight. Storage temperatures should range between 5°F and 104°F (-15°C to 40°C), humidity should be low.

The Model 317M may be stored for lengthy periods of time, without requiring periodic maintenance inspections or parts replacements.

Following periods of extended storage in non-controlled environments, allow the Model 317M sufficient time to stabilize to a temperature within its specified operating range (see **SPECIFICATIONS**, below).

LIMITED WARRANTY

Impact Instrumentation, Inc. warrants this instrument to be free from all defects in materials and workmanship for a period of one (1) year. Accessories, which by their nature are consumable, will be warranted only for defects of manufacturing origin. This warranty is neither assignable nor transferable, nor does it apply if this instrument is tampered with, misused or serviced by unauthorized personnel.

SPECIFICATIONS

Vacuum:	550 mm/Hg (22 inches/mercury)
Airflow:	31 Liters Per Minute (LPM)
Temperature Operating Range:	-29°C to 60°C (-20°F to 140°F)
Controls:	Power Switch - OFF/ON Vacuum Adjust
Collection Capacity:	1600cc x 2
Power:	Nominal 115/230 VAC, 50/60 HZ
Case:	Structural ABS with integral carrying handle
Size:	47cm W x 18cm H x 39cm D (18.5" W x 7" H x 15.5" D)
Cube:	1.2 cu. ft.
Weight:	9.8 kg (25 lbs.)
Warranty:	One (1) year, limited

SPECIFICATIONS CONTAINED HEREIN REPRESENT TYPICAL DEVICE PERFORMANCE

SECTION II. SERVICE

INTRODUCTION

The information contained herein is intended only for use by factory-trained, and certified personnel or military personnel trained in the care and servicing of this product. The manufacturer does not authorize or assume any obligations resulting from unauthorized servicing nor will it be held liable for any injuries or damages incurred therefrom.

Impact Instrumentation will provide service training at the manufacturing site at no schooling charge to users; however, travel and meal costs resulting therefrom shall be borne by the user. Training at the user's site will result in travel, meal and time costs charged to the user at prevailing rates.

The Impact service facility encourages dialogue from user service personnel towards rectifying any service related matter. All service requests may be addressed to the Service Manager, Impact Instrumentation, Inc., 27 Fairfield Place, West Caldwell, New Jersey 07006, 201/882-1212.

Should factory servicing become necessary, or technical assistance is required, please have the Model 317M Serial Number ready and any other pertinent data you wish to include in your service request. The Model 317M Serial Number is located on the outer case identification label.

CAUTIONARY NOTE

Prior to servicing this device, insure that Key Switch (2) is set for the appropriate operating voltage.

HELPFUL HINTS

Before attempting to repair/calibrate this instrument, please take a few moments to insure that the problem is not accessory related.

Check the integrity of all tubing and fittings. Verify that tubing is not crimped or cracked due to fatigue.

Insure that all collection canisters seal properly and that overflow mechanisms do not stick. Verify that the hydrophobic/bacterial filter is not dirty or clogged.

Refer to the schematic and assembly pictorials when trouble shooting. Isolate the problem to a functional segment of the circuitry. Always insure the integrity of circuit ground and the correct AC mains voltage.

Always safeguard your personal well being when troubleshooting electronic circuitry. Keep jewelry and liquids from the vicinity of active circuitry.

DISASSEMBLY/REASSEMBLY

REQUIRED TOOLS

Screwdriver, slotted, medium size
Screwdriver, phillips head, medium size
3/8" socket with drive handle
3/8" open end wrench
Pliers, needle nosed
Open end wrench, adjustable, 10"
Bench vise with smooth jaws

PUMP HEAD

Four (4) 10-32 X 1/2 slotted cap head screws secure the pump head to the pump housing. Remove these four screws in order to access the pump head for cleaning or servicing (see Figure 9).

Once the pump head is removed, the pump diaphragm is accessible for cleaning or replacement. A metal disk, secured with four (4) 8-32 X 3/8 phillips flat head screws "clamps" the diaphragm in place.

Flapper valves are located inside the pump head and can be seen once the head is removed and turned upside down. The flapper valves are each held in place by a small rectangular flat washer and 6-32 X 3/16 slotted bind head screw which is secured to a metal disk. Four (4) 8-32 X 7/16 phillips flat head screws fasten this disk to the pump head. Removing these screws should release the disk, however, a gasket located between the disk and pump head is sometimes compressed and prevents the disk assembly from coming free. Should this occur, remove the slotted screw which secures the facing flapper valve. Set the flapper and its rectangular washer aside for the moment. Reinsert and tighten the slotted screw which will quickly "back out" the disk assembly.

The underside of the disk assembly exposes a fiber gasket and second flapper valve. This valve can be disassembled by removing its respective 6-32 X 3/16 slotted bind head screw and rectangular washer.

To reassemble, align the fiber gasket within the pump head. Secure a flapper valve to each side of the disk making sure that the valves lay flush on the disk surface. Each valve is held to the disk with a rectangular washer and slotted screw. Orient each washer with the stamped word "UP" visible. Set the assembled disk within the pump head. **NOTE:** Refer to Figure 9 for proper orientation of the assembled disk to avoid reversing the vacuum and pressure ports. Tightly secure the disk with its four (4) 8-32 X 3/8 phillips flat head screws. Mount the assembled pump head in place using the four (4) 10-32 X 1/2 slotted cap head screws.

CAUTION: Test for vacuum at the vacuum port after reassembly prior to returning this device for patient use. Pump head components must be assembled and oriented as shown in Figure 9. Deviation will result in reversal of vacuum and pressure port functions and will negate intended device operation.

DISASSEMBLY/REASSEMBLY (cont'd)

VACUUM GAUGE/REGULATOR AND PRESSURE MANIFOLDS

Disassembly of the vacuum gauge/regulator and pressure manifolds are periodically required. Most components of these two assemblies contain tapered pipe threads. Caution must be exercised to prevent breakage of fittings which are secured under high torque pressures to achieve an airtight seal.

To disassemble, remove the pump head as described earlier. A vise, with protective (smooth) jaws is required. This will prevent damage to chromed and/or smooth surfaces.

Place the pump head in the vise and secure with minimal holding force. Using an adjustable open end wrench, disconnect each manifold at the point where it enters the pump head. Each manifold component may be individually disassembled using the adjustable wrench and vise (see Figure 11).

To reassemble, insure that all fittings are correctly aligned and tightened on each manifold. Secure the pump head in the vise, using minimal holding force. Refer to Figure 11 and insure that each manifold is secured to its respective port. Do not reverse port connections.

CONTROL MODULE (INNER CASE)

The Control Module Assembly consists of a Chassis Assembly, Side Frame Assembly, Inner Cover Assembly and Pump Assembly. To access any of these assemblies, the Control Module must be removed from the Outer Case.

The control module is secured with two (2) cam-locking guides. Each guide contains a locking lever. To release tension (unlock the guide), slide the lever fully to the right. To lock, slide the lever to the left. When the guide lever is in its unlocked position, the control module can slide along its rail for repositioning or removal.

A rail edge view discloses a concave and rectangular track. A guide edge view discloses a convex track. The rail-to-guide interface is made when (1) the convex track is "tipped" into the convex track, and (2) the guide lever is locked into the rail's rectangular track.

PUMP ASSEMBLY

Remove the Control Module Assembly (Inner Case) as directed in the preceding section.

The Pump Assembly (see Figure 9) is mechanically mounted to the Chassis Assembly with three (3) 8-32 X 3/8 slotted bind head screws, and electrically connected via an insulated two-conductor automotive-grade connector. To remove the entire Pump Assembly; position the Inner Case on one of its sides. While grasping the Pump Assembly with one hand, remove each of the three mounting screws which go through the Chassis underside into the pump. Set the Pump Assembly down, then separate the automotive connector halves.

DISASSEMBLY/REASSEMBLY (cont'd)

PUMP ASSEMBLY (cont'd)

NOTE: It is acceptable to separate the automotive connector halves prior to removing the three mounting screws. Service personnel should determine which method is more convenient.

To reassemble, reverse the above procedure. Insure that the automotive connector wires are not "pinched" between metal surfaces and are neatly "dressed" out of the way.

INNER COVER ASSEMBLY

To remove the Inner Cover Assembly (Figure 8), it is necessary to remove the Control Module (Inner Case) and Pump Assemblies as described earlier within this section.

The Inner Cover Assembly is secured to the Chassis and Side Frame Assemblies with four (4) 4-40 X 5/16 phillips pan head screws. Remove these screws to disengage the Inner Cover. The Inner Cover Assembly remains electrically connected to the rest of the circuitry.

The Inner Cover Assembly can be electrically disconnected by removing the "faston" connected black, white and brown wires from CB1; and the "faston" connected black and white wires from T1 (refer to **Electrical Schematic**).

To reassemble; connect each wire to its respective location, carefully close the Inner Cover to avoid pinching wires and secure with the four (4) phillips pan head screws.

SIDE FRAME ASSEMBLY

To remove the Side Frame Assembly, it is necessary to remove the Control Module (Inner Case), Pump and Inner Cover Assemblies as described earlier within this section.

The Side Frame Assembly (Figure 7) is secured to the Chassis Assembly by four (4) 4-40 X 5/16 phillips pan head screws. Remove these screws to disengage the Side Frame Assembly. Four (4) in-line "faston" connections must be separated to electrically disconnect this assembly. Disconnect the red and black wires from the pump connector and the red and blue wires from the fan (refer to **Electrical Schematic**).

Removal of this Assembly provides service access to transformer T1, the bridge rectifier D1-4 and capacitor C1.

To reassemble; connect each wire to its respective in-line connection, carefully attach the Side Frame Assembly to the Chassis Assembly and secure with the four (4) phillips pan head screws.

CALIBRATION PROCEDURE

EQUIPMENT REQUIRED

1. Vacuum Gauge, 0 - 30" Hg (0 - 760 mmHg), $\pm 3\%$ accuracy or better. (A liquid filled gauge is preferable to dampen needle oscillations).
2. Pressure Gauge, 0 - 30 PSI, $\pm 3\%$ accuracy or better. (A liquid filled gauge is preferable to dampen needle oscillations).
3. Flow Meter (Rotameter), 0 - 40 LPM, $\pm 3\%$ accuracy or better, minimum inlet fitting bore 1/4".

PROCEDURES

NOTE: All calibration tests may be performed with device mounted within its outer case.

1. Vacuum Tests: All vacuum tests must be performed in the absence of air flow. Insure that no vacuum port is exposed, even slightly, to atmosphere. The pressure port, however, must remain unblocked.

- a) Connect device to a live A.C. power source.
- b) Insure that all tubing, fittings and collection canisters are properly connected and tightly secured.
- c) Insure that all tubing is free from kinks and fatigue cracks. Replace all tubing exhibiting these characteristics before proceeding further with calibration verifications.
- d) Close vacuum regulator valve by turning its knob fully clockwise.
- e) Turn power on.
- f) Connect vacuum gauge to patient inlet fitting of the leftmost collection canister.
- g) The device will now commence "pumping down" and drawing a vacuum as evidenced by the vacuum gauge reading. Allow for stabilization of gauge reading and verify that reading is in fact equal to or greater than 500 mmHg. Allow for vacuum gauge tolerances in final reading. If device reading is below standards see section entitled **CALIBRATION PROBLEMS**.
- h) Verify similar readings between the device vacuum gauge and the test vacuum gauge. Repeat this procedure at preset maximum vacuum levels of 100, and 300 mmHg to verify gauge linearity. Allow for tolerance differences between vacuum gauges which can be additive.

IMPORTANT NOTICE: The vacuum gauge must be connected after power is applied to the device. An occluded vacuum inlet at the time of the power on sequence can result in a startup motor torque requirement that is far in excess of pump motor capability. The motor will "stall", temporarily draw excessive current, and the protective circuit breaker will trip to prevent any electrical damage from occurring.

CALIBRATION PROCEDURES (cont'd)

VACUUM TESTS (cont'd)

2. Pressure Test: All pressure tests must be made in the absence of air flow. Insure that no pressure port is exposed, even slightly, to atmosphere. Do not block or occlude the pressure relief valve or any ports on the vacuum side of the circuit.

- a) Connect device to a live A.C. power source.
- b) Insure that all fittings are tightly secured.
- c) Connect pressure gauge to pressure port.
- d) Insure that pressure gauge connecting tubing is free from fatigue or signs of cracking. Replace defective tubing. Insure that tubing is rated for use under pressure.
- e) Turn power on.
- f) Verify a minimum pressure reading of 10 PSI. Allow for pressure gauge tolerance when taking final reading. If pressure measurement is below 10 PSI see section entitled **CALIBRATION PROBLEMS**.

3. Air flow test: Air flow measurements must be taken with the vacuum and pressure circuits exposed to atmosphere. **DO NOT** occlude any ports on the pressure circuit or air flow measuring instrument.

- a) Connect device to a live A.C. power source.
- b) Remove disposable filter from circuit. Insure that all tubing, fittings and collection canisters are tightly secured.
- c) Insure that all tubing is free from kinks or fatigue cracking. Replace any tubing exhibiting these characteristics.
- d) Connect flow meter to the patient port on the leftmost collection canister.
- e) Turn power on.
- f) Verify a minimum free air flow of 30 LPM. Allow for flow meter tolerance when taking final reading. If reading is below 30 LPM see section entitled **CALIBRATION PROBLEMS**.

IMPORTANT NOTE: All connecting tubing and fittings used with the measuring flow meter must have an inner diameter of at least 1/4" so as not to unnecessarily restrict flow. Connecting tubing lengths should be kept to a minimum. Bends in tubing, and the use of connection elbows to the flow meter should also be avoided as each has a restricting effect upon flow.

CALIBRATION PROCEDURES (cont'd)

CALIBRATION PROBLEMS

1. Vacuum tests: If insufficient vacuum readings are made, insure the proper connection of all tubing, fittings and collection canister components. Replace all defective tubing which is crimped or cracked. Insure that the vacuum regulating valve is closed (turned fully clockwise). Verify that the pump head is securely mounted.

If these steps do not result in desired vacuum readings, remove the pump head as described in the **DISASSEMBLY/REASSEMBLY** instructions. Verify that all flapper valves are properly sealing and tightly secured. Insure that the diaphragm is not cracked or worn. Replace the pump head gasket if torn or cracked.

2. Pressure test: If an insufficient pressure reading is made, insure the proper connection of all tubing and fittings. Replace defective tubing which is crimped or cracked. Verify that the pump head is securely mounted.

If these steps do not result in desired pressure readings, partially occlude the pressure relief valve during the measurement test. If the pressure reading exceeds 10 PSI, this valve requires replacement.

If the above steps fail to result in proper pressure readings, remove the pump head as described in the **DISASSEMBLY/REASSEMBLY** instructions. Verify that all flapper valves are properly sealing and tightly secured. Insure that the diaphragm is not crimped or worn. Replace the pump head gasket if torn or cracked.

3. Air flow test: If an insufficient air flow reading is made, insure the proper connection of all tubing, fittings and collection canisters. Replace defective tubing which is crimped or cracked. Verify that the pump head is securely mounted. Insure that the vacuum regulating valve is closed (turned fully clockwise).

If these steps do not result in the desired air flow reading, remove the pump head as described in the **DISASSEMBLY/REASSEMBLY** instructions. Verify that all flapper valves are properly sealing and tightly secured. Insure that the diaphragm is not crimped or worn. Replace the pump head gasket if torn or cracked.

CIRCUIT DESCRIPTIONS (Refer to the attached schematic drawing).

P1, CB1, S1 and T1 represent a voltage selection circuit. S1 is a Key Switch which allows selection of nominal 115 or 230 VAC. T1 is a dual-primary, power transformer rated for 50/60 Hz operation with a nominal 12 VAC output. CB1 is a two-pole, multi-voltage circuit breaker/switch which protects the "hot" and "neutral" sides of the incoming AC line.

D1-4 and C1 represent a full-wave bridge rectifier and filter capacitor for converting the 12 VAC to a filtered DC signal suitable for powering the pump and fan motors. M1 represents the miniature cooling fan's motor. Its purpose is to maintain a continuous air flow, during operation, within the electronics enclosure. M2 represents the vacuum/pressure pump motor. Circuit breaker CB2 protects the rectifier and motor circuits against current overloads.

*** NOTE ***

Waveforms and voltage measurements have been noted at various locations on the schematic drawing. In most cases, considerable leeway has been given as to what constitutes an acceptable voltage value in order to maintain device performance over a broad range of conditions.

PREVENTATIVE MAINTENANCE INSPECTIONS

Preventative maintenance inspections should be incorporated on a routine basis to insure proper device performance. These inspections should consist of both visual and performance checks, and cleaning when warranted.

Preventative maintenance inspections (PMI) should be made as follows:

If monthly usage is less than 50 hours - PMI bimonthly.

If monthly usage is greater than 100 hours - PMI monthly.

VISUAL CHECKS: Visual checks should include, but not be limited to:

1. Inspection of tubing, fittings and collection canisters for cracks, crimps, leakage and general wear. They should be replaced as necessary.
2. Check the vacuum gauge for a "zero area" reading when the device is turned off.
3. Check the disposable Hydrophobic Filter for discoloration. Replace if discolored.
4. Check collection canisters for chips or cracks in bottle, for worn or loose fitting lids. Replace as required.

PERFORMANCE CHECKS: Performance checks should include, but not be limited to:

1. Check tactile feel and operation of switches and controls.
2. Check various operating modes (refer to the OPERATOR PERFORMANCE CHECKS section in the OPERATION portion of this manual).
3. Check the Overflow Shutoff Valve. Insure that the ball float does not stick and is debris free.
4. Check cam-locking guides for attachment and detachment operation.

CLEANING: Refer to the ROUTINE CARE AND MAINTENANCE "CLEANING" section in the OPERATION portion of this manual.

TROUBLESHOOTING GUIDE

SYMPTOM: No power.

Check for active (live) mains line. Reset CB1 and/or CB2. Check for proper voltages at T1, D1-4, M1 and M2. Disconnect M2 at its automotive connector then recheck voltages to see if pump is overloading circuit.

SYMPTOM: Inadequate power.

Verify proper Key Switch positioning to the correct line voltage. Disconnect M2 at its automotive connector, test voltages at T1, D1-4, and CB2 to determine if pump motor is overloading circuit. Insure that pump head is properly secured.

SYMPTOM: No vacuum or weak vacuum.

Check tubing connections for crimps and cracks. Insure fittings are properly secured. Check collection canisters for correct seal. Insure that pump head is properly secured. Check to see if vacuum regulating valve is turned fully clockwise.

SYMPTOM: Circuit breaker CB2 trips.

Check for overload at M1 and M2, by disconnecting each motor individually to isolate problem.

SYMPTOM: Circuit breaker CB1 trips.

Check for defective transformer T1, bridge rectifier D1-4 or capacitor C1.

TECHNICAL DOCUMENTATION

NOTE: Refer to applicable Bill Of Material for Part Number description.

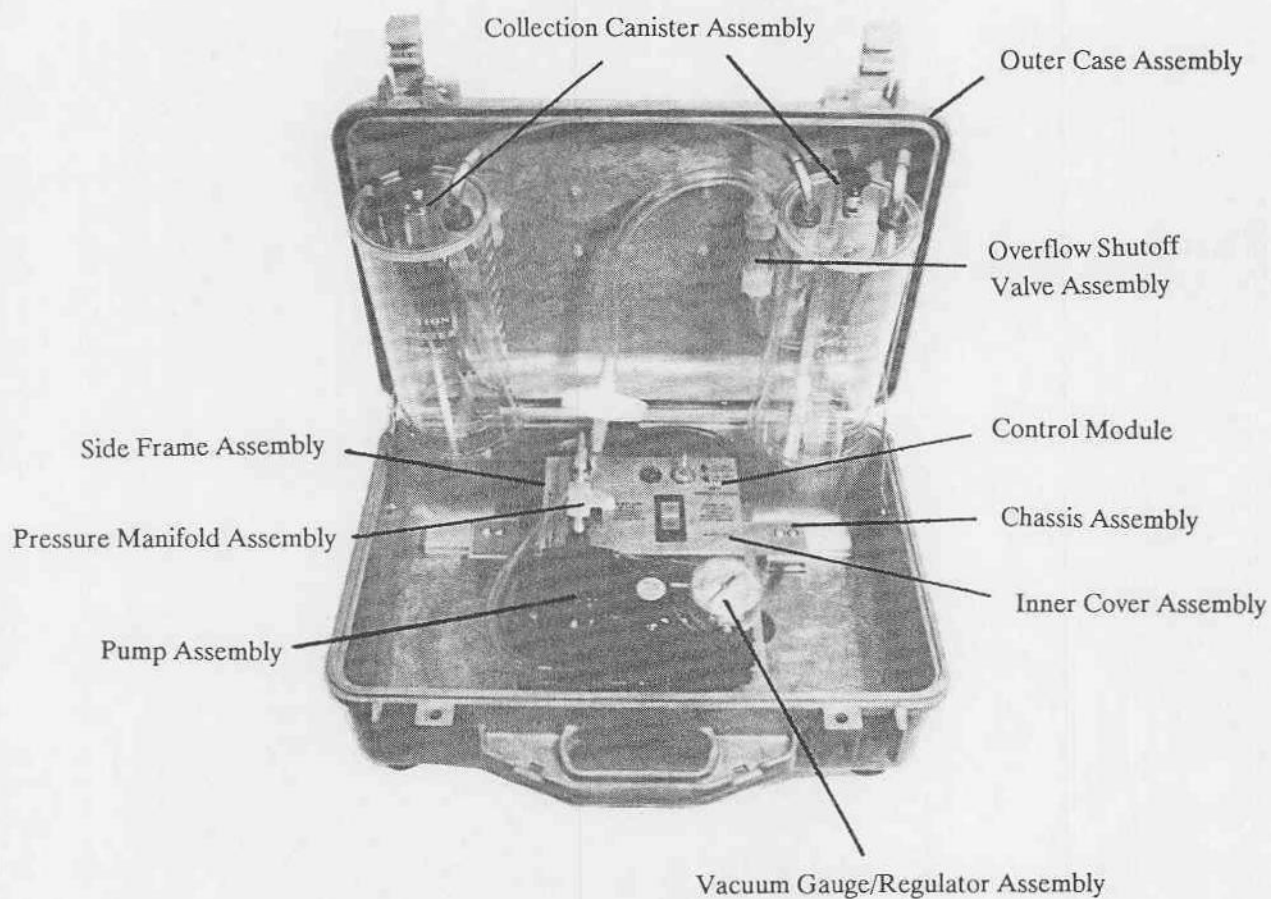
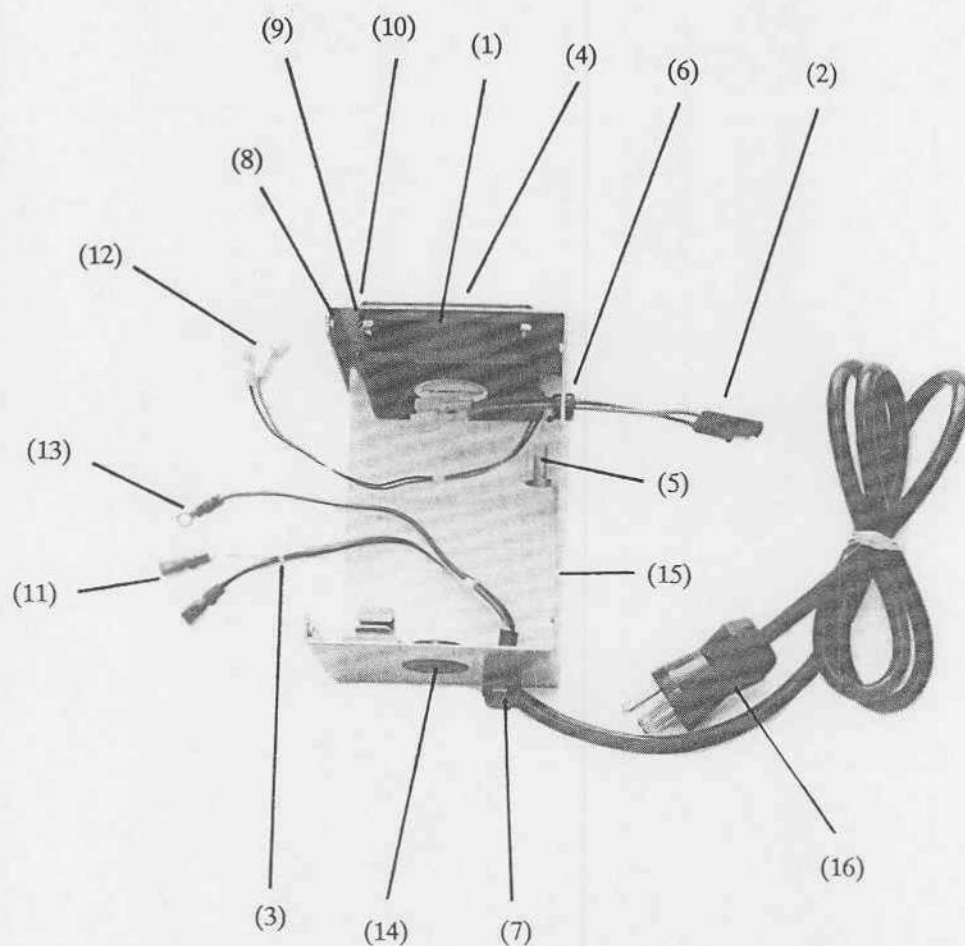


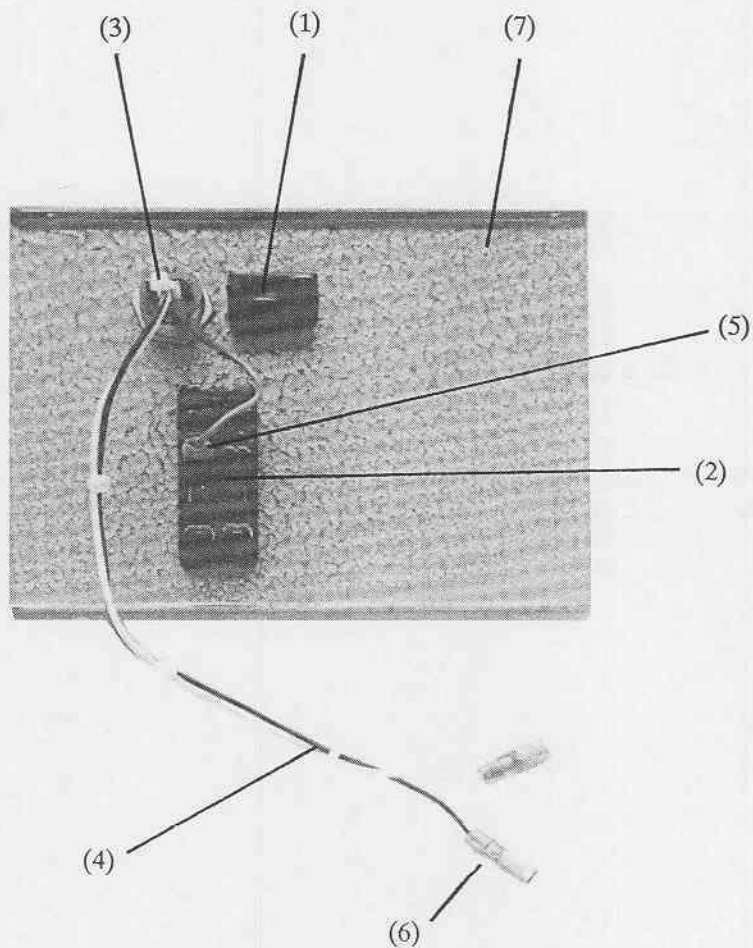
Figure 6. Composite Illustration Depicting Major Sub-Assemblies



#	Part Number	#	Part Number	#	Part Number
1	043-0001-00	7	340-0014-00	13	374-0016-00
2	099-0009-02	8	346-0440-03	14	416-0002-00
3	305-0001-00	9	346-0632-01	15	422-0316-11
4	322-0001-00	10	352-0632-10	16	708-0002-00
5	334-0012-00	11	374-0002-00		
6	340-0002-00	12	374-0009-00		

See Bill of Material 704-0316-02 for complete Part Number Description.

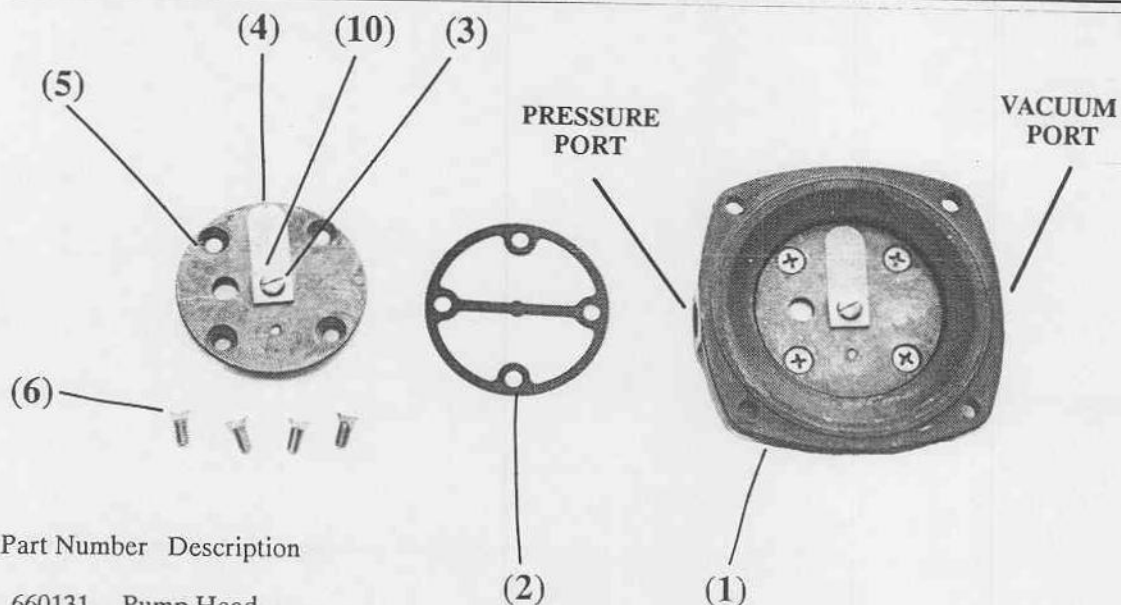
Figure 7. Side Frame Assembly



#	Part Number	#	Part Number
1	081-0006-00	5	374-0001-00
2	081-0007-00	6	374-0003-00
3	131-0007-00	7	416-0316-11
4	305-0001-00		

See Bill of Material 704-0316-03 for complete Part Number Description.

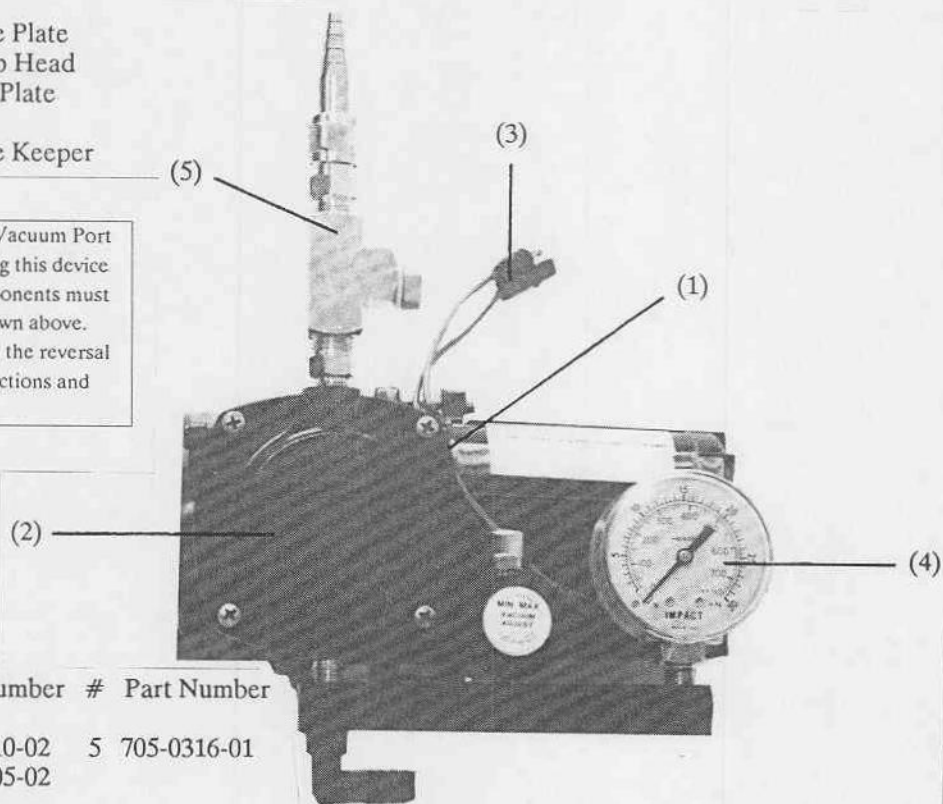
Figure 8. Inner Cover Assembly



Part Number Description

1	660131	Pump Head
2	633439	Gasket
3	617045	Valve Keeper
4	621102	Flapper Valve
5	654129	Valve Plate
6	625141	Screw, Valve Plate
7	625109	Screw, Pump Head
8	654649	Hold Down Plate
9	608148	Diaphragm
10	625160	Screw, Valve Keeper

CAUTION: Test for vacuum at Vacuum Port after reassembly prior to returning this device for patient use. Pump head components must be assembled and oriented as shown above. Incorrect reassembly will result in the reversal of Vacuum and Pressure Port functions and cause device malfunction.

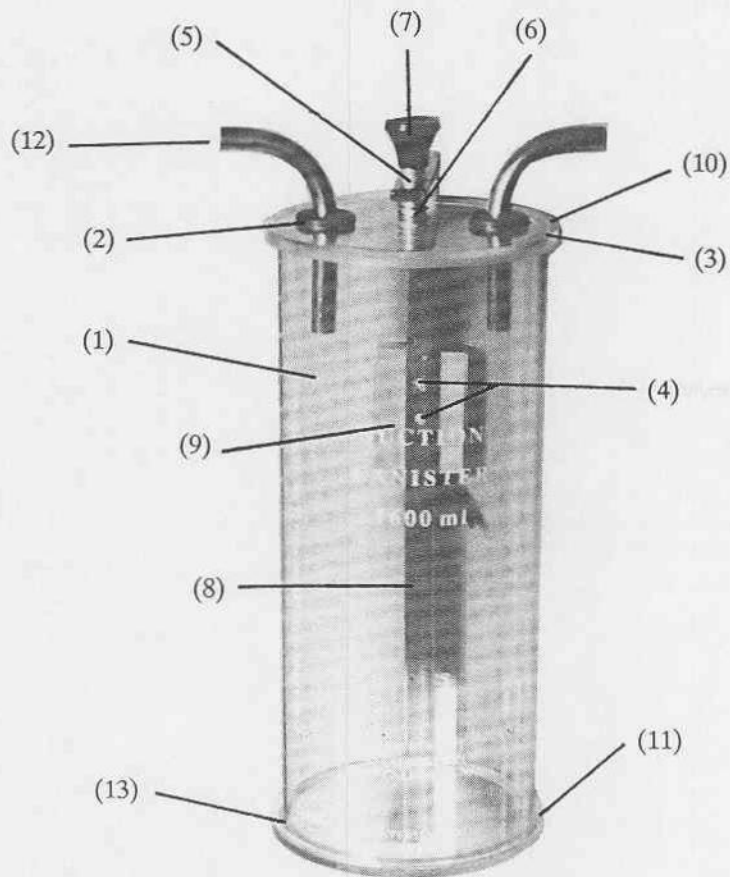


Part Number # Part Number # Part Number

1	016-0004-00	3	099-0010-02	5	705-0316-01
2	041-0002-00	4	704-0305-02		

See Bill of Material 704-0316-04 for complete Part Number Description.

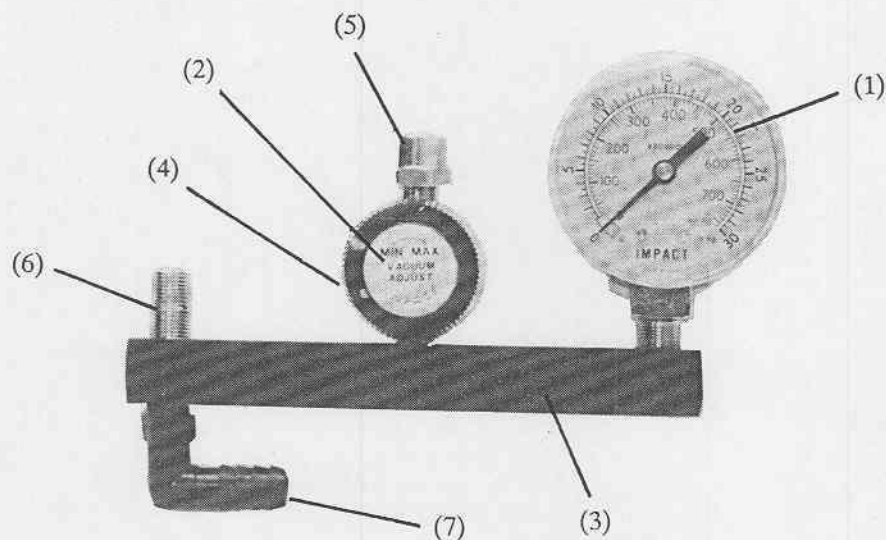
Figure 9. Pump Assembly & Pump Head



#	Part Number	#	Part Number	#	Part Number
1	016-0317-11	6	370-0002-00	11	416-0317-21
2	340-0025-00	7	392-0014-00	12	540-0066-00
3	340-0027-00	8	404-0316-21	13	602-0001-00
4	357-1032-05	9	404-0900-11		
5	365-0003-00	10	416-0317-11		

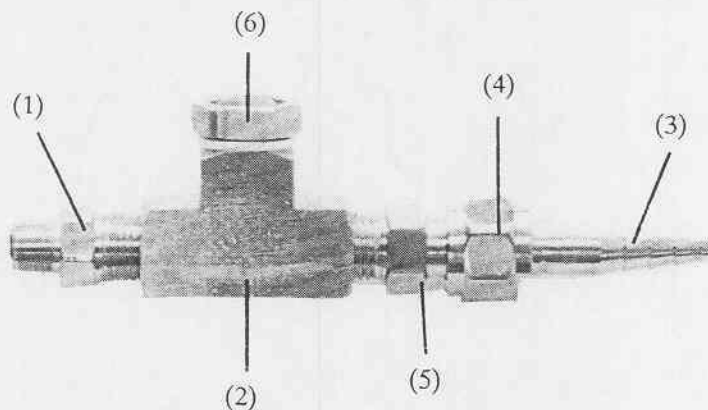
See Bill of Material 704-0305-02 for complete Part Number Description.

Figure 10. Collection Canister Assembly



# Part Number	# Part Number	# Part Number
1 315-0003-00	4 480-0038-00	7 480-0065-00
2 325-0305-05	5 480-0048-00	
3 470-0001-00	6 480-0058-00	

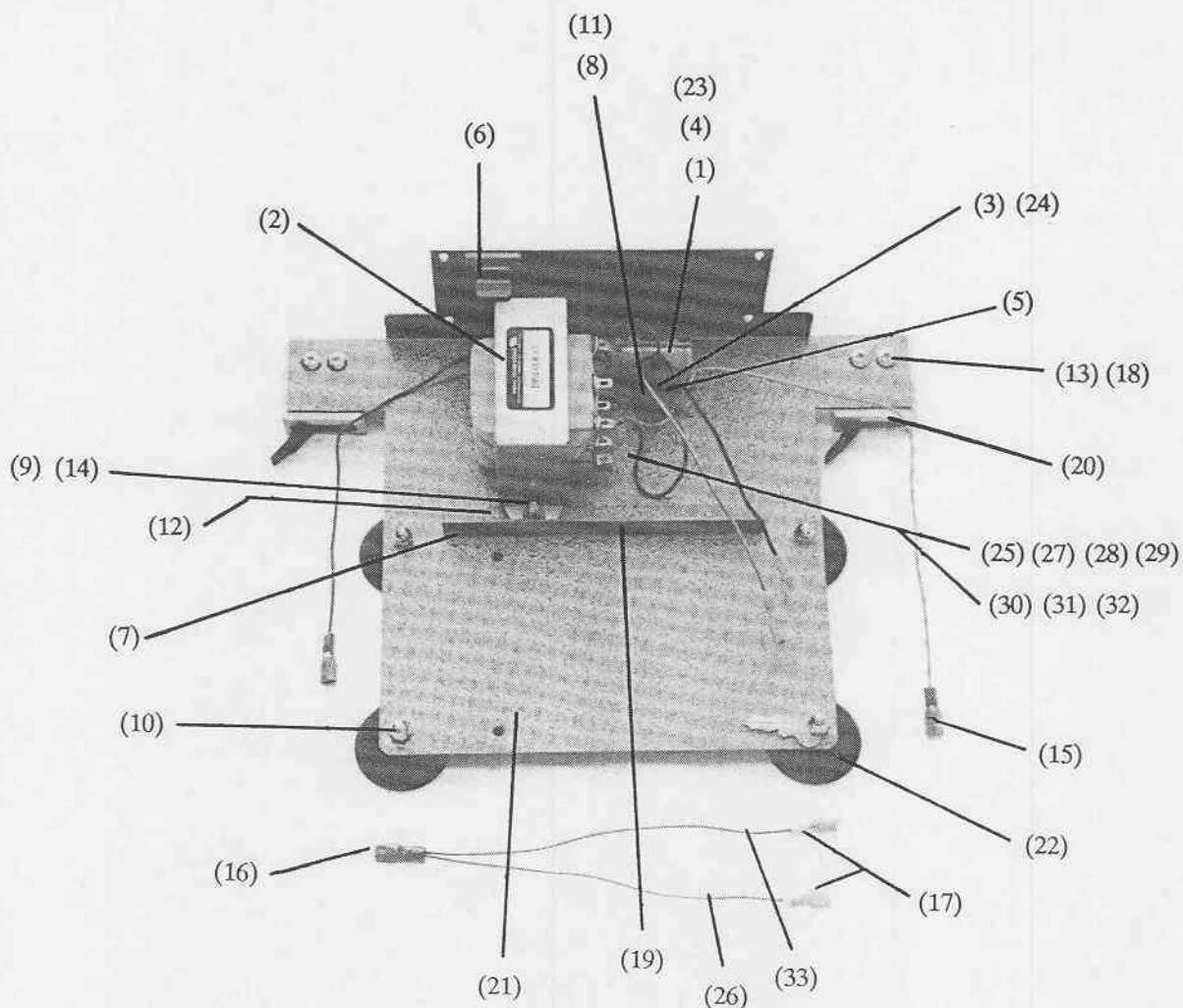
See Bill of Material 704-0305-02 for complete Part Number Description.



# Part Number	# Part Number	# Part Number
1 480-0057-00	3 480-0103-00	5 480-0105-00
2 480-0100-00	4 480-0104-00	6 490-0003-00

See Bill of Material 705-0316-01 for complete Part Number Description.

Figure 11. Vacuum Gauge/Regulator & Pressure Manifold Assemblies

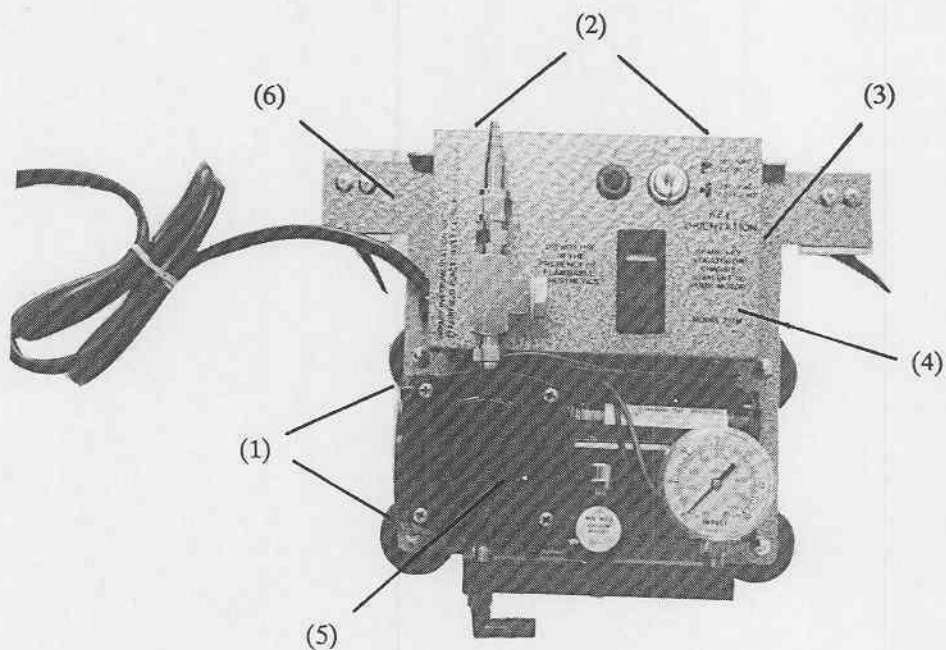


Part Number # Part Number # Part Number

1 016-0020-00	12 358-0440-05	23 602-0001-00
2 023-0007-00	13 358-1032-03	24 606-0001-00
3 047-0005-00	14 358-1032-10	25 700-0316-01
4 252-4786-31	15 374-0001-00	26 700-0316-02
5 305-0001-00	16 374-0002-00	27 700-0316-04
6 334-0012-00	17 374-0014-00	28 700-0316-05
7 346-0440-03	18 376-0020-00	29 700-0316-06
8 346-0632-01	19 404-0316-11	30 700-0316-07
9 346-1032-01	20 404-0900-151	31 700-0316-08
10 346-1032-05	21 414-0317-11	32 700-0316-09
11 352-0632-10	22 450-0006-00	33 700-0316-10

See Bill of Material 704-0317-01 for complete Part Number Description.

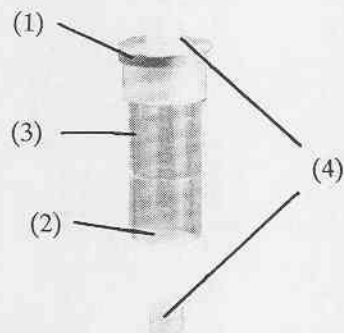
Figure 12. Chassis Assembly



Part Number # Part Number # Part Number

1 352-0832-06	3 704-0316-02	5 704-0316-04
2 358-0440-05	4 704-0316-03	6 704-0317-01

See Bill of Material 703-0316-02 for complete Part Number Description.

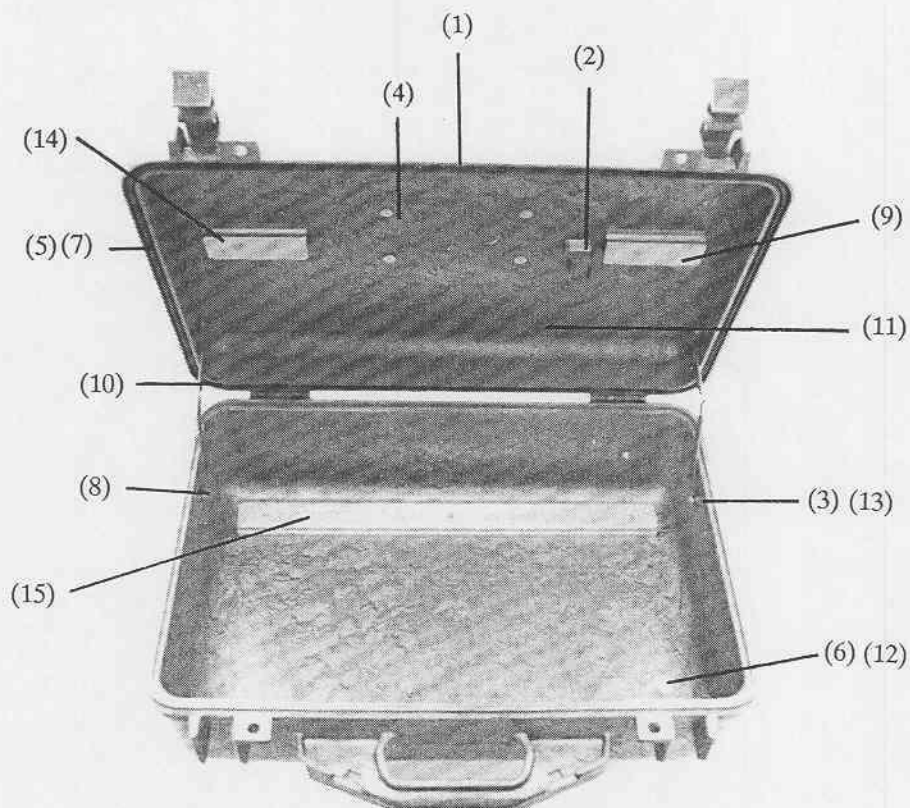


Part Number # Part Number

1 340-0019-00	3 820-0016-00
2 475-0002-00	4 820-0034-00

See Bill of Material 704-0317-02 for complete Part Number Description.

Figure 13. Control Module & Overflow Shutoff Valve Assemblies



Part Number # Part Number # Part Number

1 325-0317-01	6 346-1032-01	11 402-0316-11
2 334-0029-00	7 358-1032-07	12 450-0006-00
3 338-0005-00	8 376-0031-00	13 602-0001-00
4 338-0006-00	9 378-1032-08	14 900-0002-00
5 340-0011-00	10 394-0004-00	15 900-0003-00

See Bill of Material 703-0317-01 for complete Part Number Description.

Figure 14. Outer Case Assembly

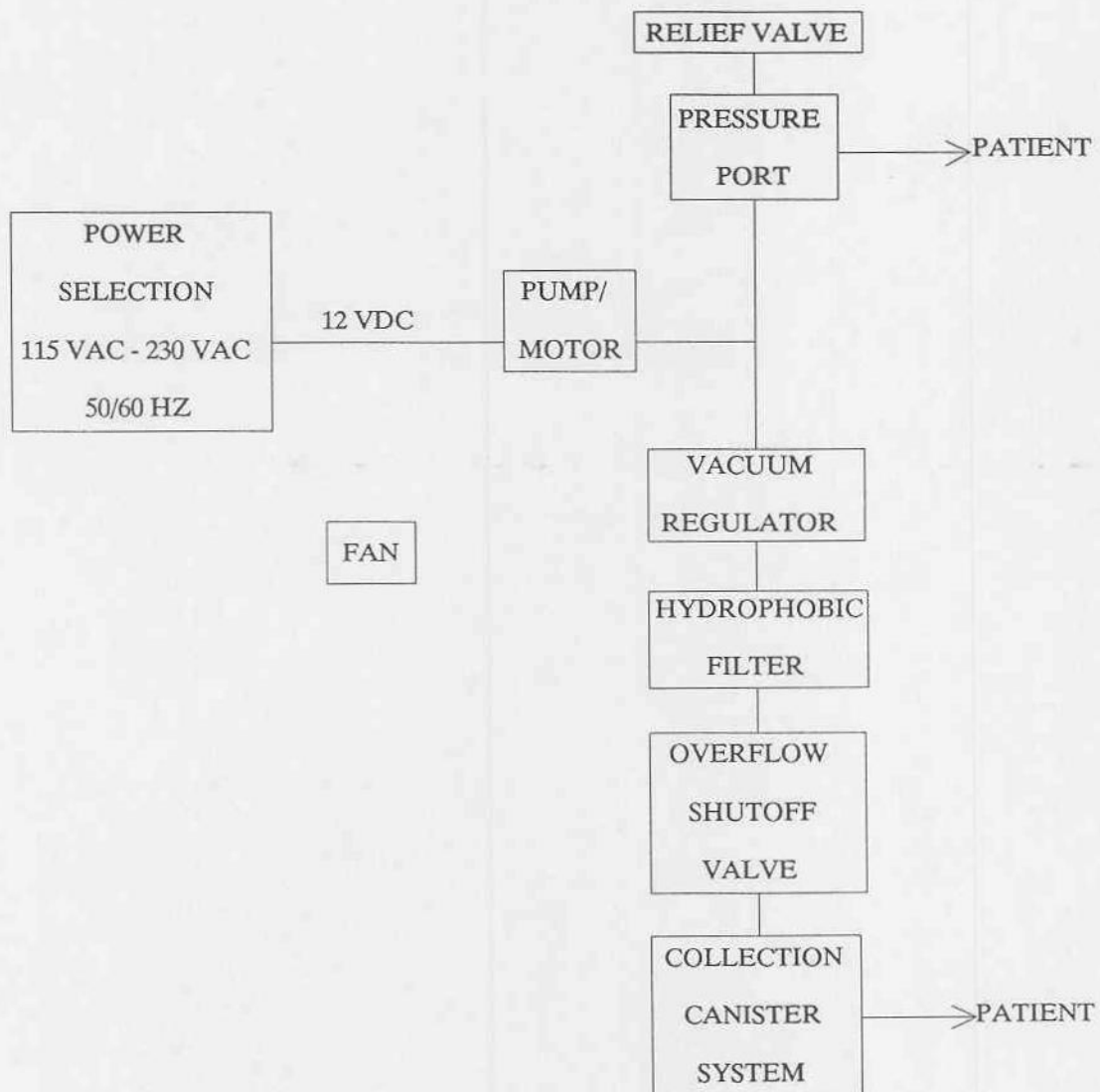


Figure 15. Functional Block Diagram

QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP. DES.
1	701-0317-01	Assembly, Final Mechanical	PL701-0317-01	
1	WL702-0316-01	Wire List	WL702-0316-01	
1	703-0316-02	Assembly, Case, Inner	PL703-0316-02	
1	703-0317-01	Assembly, Case, Outer	PL703-0317-01	
2	703-0317-02	Assembly, Collection Canister	PL703-0317-02	
1	704-0305-02	Assembly, Vacuum Gauge/Regulator	PL704-0305-02	
1	704-0316-02	Assembly, Side Frame	PL704-0316-02	
1	704-0316-03	Assembly, Cover, Inner	PL704-0316-03	
1	704-0316-04	Assembly, Pump	PL704-0316-04	
1	704-0317-01	Assembly, Chassis	PL704-0317-01	
1	704-0317-02	Assembly, Assembly, Overflow Shutoff Valve	PL704-0317-02	
1	705-0316-01	Assembly, Manifold, Pressure	PL705-0316-01	
1	802-0317-01	Assembly, Accessory Kit	PL802-0317-01	

800-0317-00 MASTER BILL OF MATERIALS

MODEL 317 0 LHS 1 1

QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP. DES.
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1	465-0005-00	Filter, Disposable, Hydrophobic/Bacterial		
1	540-0067-00	Hose, 6" Long, Clear, PVC		
3	540-0068-00	Hose, 12" Long, Clear, PVC		
1	703-0316-02	Assembly, Case, Inner	PL703-0316-02	
1	703-0317-01	Assembly, Case, Outer	PL703-0317-01	
2	703-0317-02	Assembly, Collection Canister	PL703-0317-02	

701-0317-01	ASSEMBLY, FINAL MECHANICAL	MODEL 317	0	LHS	1	1
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RUN	COLOR	SLD-(AWG)-STR	LENGTH (")	STRIP (")	TIN	ORIGIN	STRIP (")	TIN	DESTINATION
1	Blk	18	1 1/2	3/8	Y	T1-Primary CT	3/8	Y	T1-Primary CT
2	Blk	18	6 3/4	3/8	(1)	D1-4 (-)	3/8	(3)	M2
3									
4	Brn	18	11 1/2	3/8	(5)	CB1	3/8	Y	T1-Primary
5	Red	18	7 1/2	3/8	(2)	CB2	3/8	(3)	M1
6	Red	18	7 1/2	3/8	(2)	CB2	3/8	(3)	M2
7	Org	18	10 1/2	3/8	(5)	D1-4 (+)	3/8	(5)	CB2
8	Grn	18	3	3/8	Y	T1 Secondary	3/8	(5)	D1-4 (AC)
9	Grn	18	7	3/8	Y	T1 Secondary	3/8	(5)	D1-4 (AC)
10	Blu	18	6 3/4	3/8	(1)	D1-4 (-)	3/8	(3)	M1
11									

ASSEMBLY NOTES:

(1) = Blue, .250, Fully Insulated Female (Both wires crimped to same terminal).

(2) = Blue, .250, Fully Insulated Female (Both wires crimped to same terminal).

(3) = Red, .250, Fully Insulated Female, Nylon.

(4) = Red, .187, Fully Insulated Female.

(5) = Red, .250, Fully Insulated Female.

Unspecified terminal material may be vinyl or nylon.

WL702-0316-01 WIRELIST

MODEL 316/317 0 LHS 1 1

QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP. DES.
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3	352-0832-06	Screw, Blind Head, Slotted, 8-32 X 3/8		
8	358-0440-05	Screw, Pan Head, Phillips, 4-40 X 5/16		

1	704-0316-02	Assembly, Side Frame	PL704-0316-02	
1	704-0316-03	Assembly, Cover, Inner	PL704-0316-03	
1	704-0316-04	Assembly, Pump	PL704-0316-04	
1	704-0317-01	Assembly, Chassis	PL704-0317-01	

703-0316-02	ASSEMBLY, CASE, INNER	MODEL 316	0	LHS	1	1
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QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP. DES.
1	325-0316-02	Label, P/S, Instructions	C325-0316-02	
1	325-0317-01	Label, Metal, I.D.	B325-0317-01	
1	334-0029-00	Clip, Retaining		
2	338-0003-00	Rivet, Pop, #4		
4	338-0004-00	Rivet, Pop, #4		
4	338-0005-00	Rivet, Pop, #4		
5	340-0011-00	Bushing, Rolled Collar, #10		
2	346-1032-01	Nut, Keps, 10-32		
5	358-1032-07	Screw, Phillips, Pan Head, 10-32 X 7/16		
12	376-0031-00	Washer, Flat, Aluminum, 1/8" I.D.		
7	378-1032-09	Standoff, Self-Clinching, Female, 10-32 X 9/16		
2	394-0003-00	Hinged Lid Support		
1	402-0316-11	Case, ABS		
4	450-0006-00	Suction Cup, Foot, w/10-32 X 3/8" Stud		
As Req	602-0001-00	Sealant, Silicone, Rubber, RTV		
2	900-0002-00	Rail, 3" Long		
1	900-0003-00	Rail, 15 1/2" Long		

703-0317-01 ASSEMBLY, CASE, OUTER

MODEL 317 A LHS 1 1

QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP. DES.
1	016-0317-11	Tubing, Clear, Lexan, 9 1/4" Long	B016-0317-11	
2	340-0025-00	Grommet		
1	340-0027-00	Gasket, P/S		
2	357-1032-05	Screw, Phillips, Flat Head, 10-32 X 5/16		
1	365-0003-00	Screw, Shoulder, Aluminum	B365-0003-00	
1	370-0002-00	Spring, Compression		
1	392-0014-00	Knob, Pull, w/10-32 Female Insert		
1	404-0316-21	Bracket, Mounting, Collection Canister	C404-0316-21	
1	404-0900-11	Bracket, Guide	B404-0900-11	
1	416-0317-11	Cover, Top	B416-0317-11	
1	416-0317-21	Cover, Bottom	B416-0317-21	
2	540-0066-00	Elbow, S/S		
As Req	602-0001-00	Sealant, Silicone Rubber, RTV		

703-0317-02 ASSEMBLY, COLLECTION CANISTER MODEL 317 A LHS 1 1

QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP. DES.
1	315-0003-00	Vacuum Gauge, 2 1/4" O.D., Bottom Mounting, 1/8" NPTM		
1	325-0305-05	Label, Valve		
1	470-0001-00	Manifold, Gauge/Regulator		
1	480-0038-00	Valve, Chrome, Ball Seat, 1/8" NPTM		
1	480-0048-00	Nut, Chrome, 1/8" NPTF, Modified		
1	480-0058-00	Nipple, Close, Chrome, 1/8" NPTM, Modified		
1	480-0065-00	Elbow, Polyethylene, Black, 1/8" NPTM to 3/8" I.D. Tube		

704-0305-02 ASSEMBLY, VACUUM GAUGE/REGULATOR MODEL 305 E LHS 1 1

QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP. DES.
-----	-------------	-------------	-------------	------------

1	043-0001-00	Fan, 12VDC		M1
1	099-0009-02	Plug, CMM/F, 2 Cond, (Red Wire Insulated)		
4	305-0001-00	Cable Tie, Miniature		
1	322-0001-00	Grill, Fan		
2	334-0012-00	Clip, P/S, for 3/8" Wire Bundle		
1	340-0002-00	Bushing, Strain Relief, for SPT-1 Wire		
1	340-0003-00	Bushing, Strain Relief, for SPT Wire		
6	346-0440-03	Nut, Self-Clinching, 4-40		
4	346-0632-01	Nut, Keps, 6-32		
4	352-0632-10	Screw, Bind Head, Slotted, 6-32 X 5/8		
2	374-0001-00	Terminal, Fully Insulated Female, Red, .250W		
4	374-0009-00	Terminal, Fully Insulated Male, Red, .250W, Nylon		
1	374-0016-00	Terminal, Insulated, Red, #10 Ring		
1	416-0002-00	Cap, Vented, Black		
1	422-0316-11	Panel, Side Frame	C422-0316-11	
1	708-0002-00	Cable, Molded, 16/3 SPT w/Molded Hospital-Grade Plug		P1

704-0316-02 ASSEMBLY, SIDE FRAME

MODEL 316 A LHS 1 1

QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP. DES.
2	016-0004-00	Tubing, Shrink, 3/16" I.D. X 1" Long		
1	081-0006-00	Circuit Breaker, 7A, SPST		CB2
1	081-0007-00	Circuit Breaker, 4A, DPST		CB1
1	131-0007-00	Switch, Key, SPDT		
6	305-0001-00	Cable Tie, Miniature		
1	374-0001-00	Terminal, Fully Insulated Female, Red, .250W		
2	374-0003-00	Terminal, Fully Insulated Female, Red, .187W		
1	416-0316-11	Cover, Top, Inner	B416-0316-11	
1	700-0316-03	Jumper, Black, 15 1/2" Long	WL702-0316-01	
1	700-0316-11	Jumper, White, 15 1/2" Long	WL702-0316-01	

704-0316-03 ASSEMBLY, COVER, INNER

MODEL 316 0 LHS 1 1

QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP. DES.
2	016-0004-00	Tubing, Shrink, 3/16" I.D. X 1" Long		
1	041-0002-00	Pump, Vacuum		M2
1	099-0010-02	Plug, CMM/F, 2 Cond, (Black Wire Insulated)		
1	704-0305-02	Assembly, Vacuum Gauge/Regulator	PL704-0305-02	
1	705-0316-01	Assembly, Manifold, Pressure	PL705-0316-01	

704-0316-04 ASSEMBLY, PUMP

MODEL 316 0 LHS 1 1

QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP. DES.
2	016-0020-00	Tubing, Teflon Sleeving, #18 AWG		
1	023-0007-00	Transformer, Power, Dual Primary		T1
1	047-0005-00	Diode, Bridge Rectifier, 12A, 50 PIV		D1-4
1	252-4786-31	Capacitor, Aluminum, Electrolytic, 4700 ufd, 25V		C1
4	305-0001-00	Cable Tie, Miniature		
1	334-0012-00	Clip, P/S, For 3/8" Wire Bundle		
4	346-0440-03	Nut, Self-Clinching, 4-40		
1	346-0632-01	Nut, Keps, 6-32		
3	346-1032-01	Nut, Keps, 10-32		
4	346-1032-05	Nut, Cap, 10-32		
1	352-0632-10	Screw, Bind Head, Slotted, 6-32 X 5/8		
2	358-0440-05	Screw, Pan Head, Phillips, 4-40 X 5/16		
4	358-1032-03	Screw, Pan Head, Phillips, 10-32 X 3/16		
2	358-1032-10	Screw, Pan Head, Phillips, 10-32 X 5/8		
5	374-0001-00	Terminal, Fully Insulated Female, Red, .250W		
2	374-0002-00	Terminal, Fully Insulated Female, Blue, .250W		
4	374-0014-00	Terminal, Fully Insulated Female, Red, .250W, Nylon		
8	376-0020-00	Washer, Lock, Internal Tooth, #10		

704-0317-01 ASSEMBLY, CHASSIS

MODEL 317 A LHS 1 2

QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP. DES.
1	404-0316-11	Bracket, Side Frame	B404-0316-11	
2	404-0900-151	Bracket, Guide, 2-Hole	B404-0900-151	
1	414-0317-11	Chassis	C414-0317-11	
4	450-0006-00	Suction Cup, Foot, w/10-32 Stud		
As Req	602-0001-00	Sealant, Silicone Rubber, RTV		
As Req	606-0001-00	Silicone Grease		
1	700-0316-01	Jumper, Black, 1 1/2" Long	WL702-0316-01	
1	700-0316-02	Jumper, Black, 6 3/4" Long	WL702-0316-01	
1	700-0316-04	Jumper, Brown, 11 1/2" Long	WL702-0316-01	
1	700-0316-05	Jumper, Red, 7 1/2" Long	WL702-0316-01	
1	700-0316-06	Jumper, Red, 7 1/2" Long	WL702-0316-01	
1	700-0316-07	Jumper, Orange, 10 1/2" Long	WL702-0316-01	
1	700-0316-08	Jumper, Green, 3" Long	WL702-0316-01	
1	700-0316-09	Jumper, Green, 7" Long	WL702-0316-01	
1	700-0316-10	Jumper, Blue, 6 3/4" Long	WL702-0316-01	

704-0317-01 ASSEMBLY, CHASSIS

MODEL 317 A LHS 2 2

QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP.	DES.
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1	340-0019-00	Bushing, Shoulder			
1	475-0002-00	Ball, Float			
1	820-0016-00	Tube			
2	820-0034-00	Cap, Tube			

704-0317-02	ASSEMBLY, OVERFLOW SHUTOFF VALVE	MODEL 317	0	LHS	1	1
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QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP.	DES.
1	480-0057-00	Nipple Adapter, Hex, Chrome, 1/8" NPTM to 1/4" NPTM			
1	480-0100-00	Tee, Modified, Chrome			
1	480-0103-00	Hose Barb, Chrome, Tapered to #1240			
1	480-0104-00	Nut, Hex, Chrome, #1240			
1	480-0105-00	Adaptor, Body, Chrome, 1/4" NPTM to Male #1240			
1	490-0003-00	Valve, Relief, Pressure, 11 PSI			

705-0316-01	ASSEMBLY, MANIFOLD, PRESSURE	MODEL 316	0	LHS	1	1
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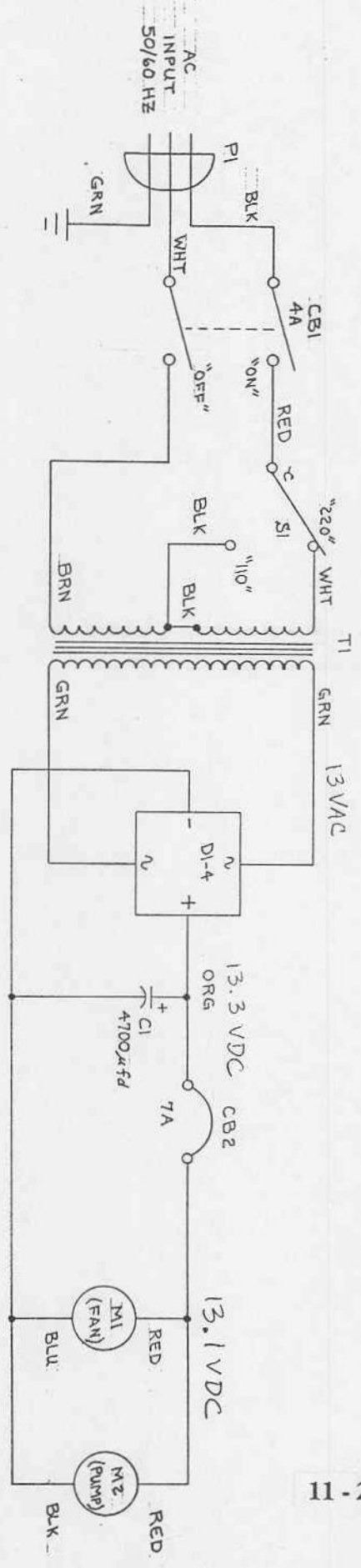
QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP. DES.
2	820-0018-00	Tubing, Suction, Sterile, 9/32" I.D. X 6' Long		
2	906-0317-01	Manual, Operation/Service		

802-0317-01 ASSEMBLY, ACCESSORY KIT

MODEL 317 0 LHS 1 1

LTR		REVISIONS		DATE	APPROVED
Ø	NEW DWG	DESCRIPTION		12-9-83	LHS

11 - 26



CB1 = DPST CIRCUIT
BREAKER/SWITCH
CB2 = SPST CIRCUIT
BREAKER
S1 = SPDT KEY SWITCH

TOLERANCES UNLESS OTHERWISE SPECIFIED				FRACTIONS DEC ANGLES			
±	±	±	±	±	±	±	±
APPROVALS	DATE	SCHEMATIC, ASPIRATOR/PRESSURE APPARATUS					
DRAWN LHS	12-8-83	MODEL 316/317					
CHECKED	12-8-83	SCALE	SIZE	DRAWING NO.			
		NONE	B	240-0316-01-4			
DO NOT SCALE DRAWING				SHEET	1 OF 1		