

INSTRUCTION MANUAL

OPERATION & SERVICE

325M SERIES

SUCTION APPARATUS OROPHARYNGEAL, TRACHEAL PORTABLE, BATTERY OPERATED

NSN 6515-01-435-5350 (DEPMEDS AAC "J")

NSN 6515-01-435-4257 (DEPMEDS AAC "L")

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IMPACT INSTRUMENTATION, INC.

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

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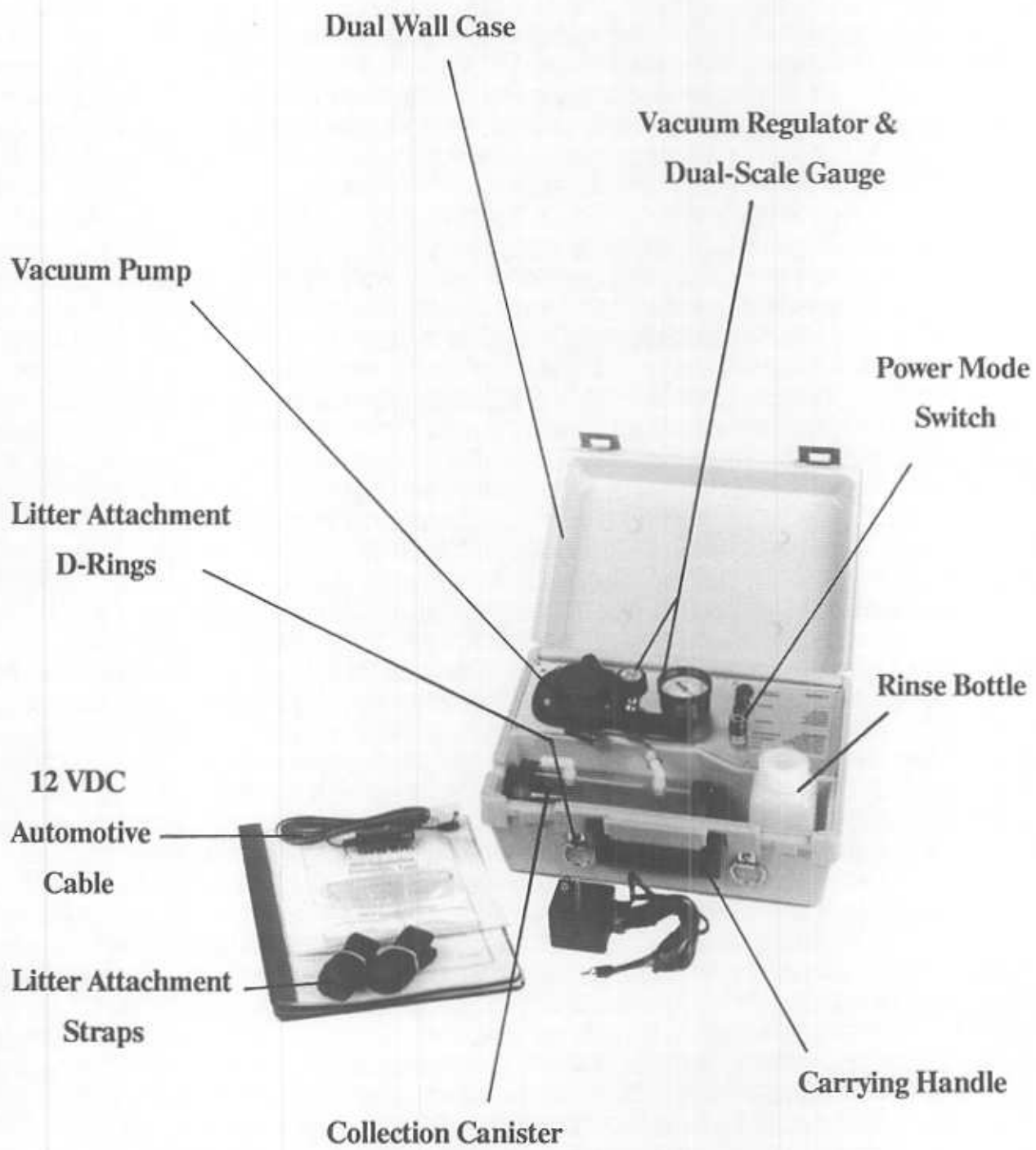


Figure 1. Model 325M Main Features

SHIPPING CONTENTS

Each Model 325M is shipped with the following contents:

- | | |
|-----------------------------------------------------------------------------------------------------|-------------------------------------------------|
| 1 ea. Apparatus, Suction, Portable | 2 ea. Strap, Velcro TM /Webbed Nylon |
| 1 ea. Assembly, Auto Power Cable | 1 ea. Hose, Clear, PVC, 9' Long (approx) |
| 1 ea. Suction Hose, Sterile, Clear, 6' Long | 1 ea. Rinse Bottle |
| 1 ea. AC/DC Charger Adapter (115 VAC,
50/60/400 HZ input; nominal
12 VDC output), 3-Cond, CSA | 2 ea. Instruction Manual, Operation & Service |

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

Telephone orders: 201/882-1212
FAX orders: 201/882-4993

<u>PART NUMBER</u>	<u>DESCRIPTION</u>
540-0022-00	Hose, Clear, PVC, 9' Long
703-0305-11	Assembly, Collection Jar
810-0001-00	AC-DC Charger Adapter, 3-Cond, CSA
820-0018-00	Tubing, Suction, Sterile, 9/32" I.D. X 6'
906-0325-02	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 325M 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 or person(s) under the guidance and instruction of certified medical therapists.

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

Caution - Electric shock hazard, do not remove inside cover. Refer servicing to qualified biomedical equipment technicians only. See section entitled **SERVICE**.

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

Do not operate device with lid closed unless optional bacterial/overflow filter is used. (See **ROUTINE CARE AND MAINTENANCE** section **CLEANING**).

Do not clean collection canister with abrasive cleansers or alcohol (See **ROUTINE CARE AND MAINTENANCE** section **CLEANING**).

ASSEMBLY, INTERCONNECTIONS AND INITIAL ADJUSTMENTS

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

INTERCONNECTIONS: No interconnections are required before placing this device into operation. Figure 2 depicts the interconnections required to connect the Model 325M to the optional bacterial/overflow filter.

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

**ASSEMBLY, INTERCONNECTIONS AND INITIAL
ADJUSTMENTS (cont'd)**

Optional
Bacterial
Overflow
Filter

Collection
Canister



Figure 2. Interconnection Diagram

Suction Apparatus shown with optional bacterial/overflow filter.

SECTION I. OPERATION

INTRODUCTION

The Impact Model 325M is a self-contained, general-purpose, suction apparatus designed for removing secretions from the upper airway during oropharyngeal and/or tracheal suctioning procedures. The apparatus includes EMI/RFI suppression circuitry and is suitable for use in desert, tropic, arctic or aeromedical environments. Battery recharge is permitted from nominal 115 VAC or 12 VDC using the provided AC/DC Charger Adapter or Auto Power Cable accessories. An optional AC/DC Charger Adapter is available for battery recharge from nominal 220-240 VAC, 50/60 HZ. The Model 325M may be operated from external 12 VDC using the included Auto Power Cable accessory.

The Model 325M lower case assembly contains the vacuum pump, control and 12 VDC power supply circuits; a dual-scale vacuum gauge with adjustable vacuum limiter; circuit breaker, collection canister, rinse bottle, accessories and attachment tubing. The complete device is housed within a high-density polyethylene case which includes latch-locks and carrying handle.

This device is intended for use in non-explosive atmospheres. Read the instructions contained within this manual before attempting to operate this instrument.

OPERATION

DESCRIPTION OF CONTROLS, CIRCUIT BREAKER, CONNECTORS 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) Power Lamp
- (3) Charge Lamp
- (4) Operating Mode Selector Switch
- (5) Vacuum Gauge
- (6) Vacuum Limiter Control
- (7) External 12 VDC Jack (interface to Auto Power Cable)
- (8) External AC/DC Charger Adapter interface Jack

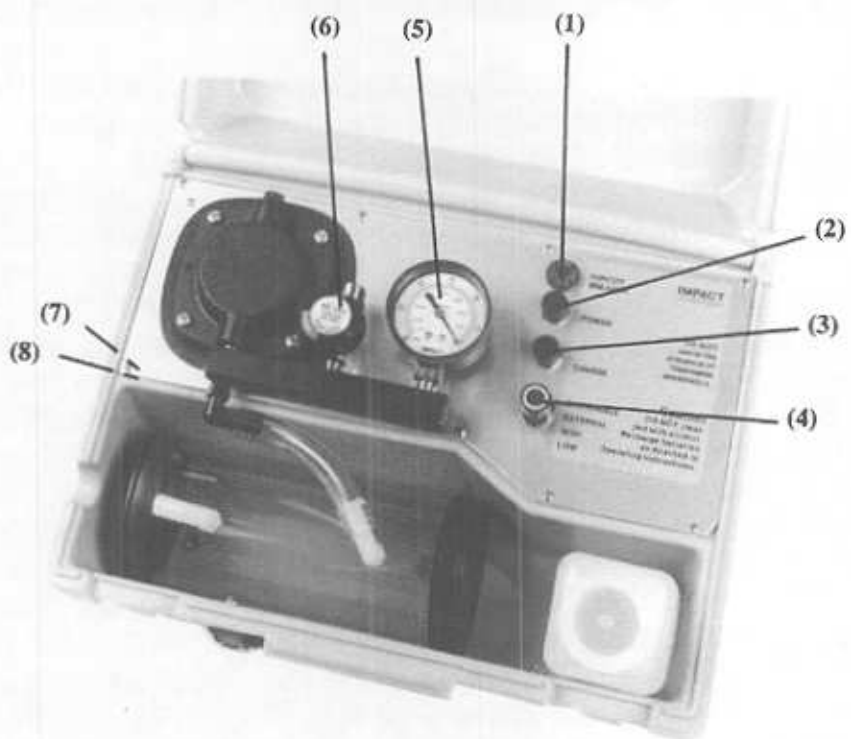


Figure 3. Panel Controls, Circuit Breaker, Connectors and Indicators

OPERATION (cont'd)

DESCRIPTION OF CONTROLS, CIRCUIT BREAKER, CONNECTORS AND INDICATORS (cont'd)

- (1) Circuit Breaker - Protects pump motor from drawing excessive current.
- (2) Power Lamp - Illuminates during operation from internal batteries and external 12 VDC.
- (3) Charge Lamp - Illuminates when batteries are placed on charge and connection is made to a live power source.
- (4) Mode Selector Switch

OFF/CHARGE: Turns operating power "OFF" and allows batteries to recharge from AC/DC Charger Adapter or external 12 VDC power source.

EXTERNAL: Allows operation from an external 12 VDC power source.

HIGH: Internal battery operation. Provides maximum vacuum and airflow delivery capability.

LOW: Internal battery operation. Reduces airflow delivery to prolong battery operating time.

- (5) Vacuum Gauge - Displays vacuum developed within the patient circuit.
- (6) Vacuum Regulator (Limiter) Control - Limits the maximum deliverable vacuum level.
- (7) External 12 VDC Jack - Permits operation or battery recharge from external 12 VDC power source through supplied Auto Power Cable.
- (8) AC/DC Charger Adapter Jack - Permits battery recharge from 115 VAC through supplied accessory.

OPERATING POWER SELECTION & STOPPING

The Model 325M is designed to operate from external 12 VDC or internal rechargeable batteries. The operating voltage (external 12 VDC or internal rechargeable battery) is determined by the Mode Selector Switch (4) setting: EXTERNAL, HIGH, LOW. The Mode Selector Switch (4) also acts as a master power switch to start and stop operation.

SUCTIONING

- 1. 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.
- 2. Connect Auto Power Cable between 12 VDC source and Model 325M (Charge Lamp (3) will not illuminate during operation) if external operating power is required.
- 3. Turn Mode Selector Switch (4) to the appropriate position: EXTERNAL, HIGH or LOW. Pump should begin operation and Power Lamp (2) illuminates.
- 4. Adjust Vacuum Regulator (Limiter) (6) to the maximum desired vacuum level by "pinching" and holding the vacuum tubing going to the 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).

OPERATION, (cont'd)

SUCTIONING, (cont'd)

5. An optional filter which is both hydrophobic and bacterial can be utilized. This filter connects between the vacuum pump and collection canister (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.

6. DO NOT block or occlude the pump head's exhaust port.

VACUUM REGULATOR (LIMITER)

The Vacuum Regulator (Limiter) (6) works in conjunction with the Vacuum Gauge (5). Vacuum levels may be selected by rotating the Vacuum Regulator (Limiter) (6): 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 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 CANISTER

Protect the suction mechanism from overflows which may permanently damage the vacuum pump if not properly and promptly cleaned. Vacuum tubing is provided for interconnection of collection canister to the vacuum pump inlet fitting.

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 Tube: Butyrate

Hose Fittings: Nylon

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 from external 12 VDC or internal rechargeable batteries.
2. Verify continuous operation.
3. Test the Vacuum Limiter (6) for correct operation at various vacuum settings.
4. Insure that all hoses and fittings are properly connected.

OPERATION, (cont'd)

USAGE TIPS

1. A rinse bottle is included with the Model 325M. Its purpose is to hold a water/saline solution to flush the suction tubing and catheter which may become clogged with aspirate. Keep the rinse bottle cap tightly closed when not in use.
2. For crash cart use, consider mounting a standard hospital style collection canister to the crash carts side. Run a length of suction tubing from the Model 325M to the larger collection canister. Usage in this manner will afford greater collection capacity, increase usage versatility, provide an indication of aspirated volume and provide compatibility with the hospital piped-in system.

BATTERY CARE

The Model 325M utilizes sealed GEL cell batteries which offer excellent charge retention characteristics, particularly during long periods of storage. This ensures an ample amount of power during emergencies and transitory procedures. The battery pack in this device is not intended for use as the primary power source, therefore, it should be used with discretion and its design understood. To provide long life and maximum performance capabilities, the Model 325M requires 16-hours to fully recharge its fully discharged batteries. Of course, the batteries are rarely discharged this much so the subsequent recharge time is usually less. GEL Cell batteries require little user care to provide optimum performance and life expectancy. Because their self-discharge rate is extremely low (approximately 1 1/2% per month), lengthy periods of disuse without replenishment charging is possible. If long-term disuse is common, it would be advisable to recharge the unit once every two months. This will insure that battery charge is maintained at 80% capacity or better. Continuous battery recharging from the AC mains is permissible but not required. Recharging from 115 VAC is accomplished using the AC/DC Charger Adapter accessory supplied with the Model 325M. Batteries can be recharged from an external 12VDC power source too. For external 12VDC operation or recharge, a connecting cable with automotive plug is furnished. The external 12VDC Power Jack is located to the left of the vacuum pump on the outside of the case. The AC/DC Charger Adapter Jack is located adjacent to the 12 VDC Power Jack.

The life of these batteries depends, to a great extent, upon the care they receive. Following these simple guidelines will prevent premature charge depletion and reduction of battery life.

1. **DO NOT** operate this instrument where the temperature range exceeds -60°C to 60°C (-76°F to 140°F).
2. **DO NOT** charge this instrument where the temperature range exceeds -20°C to 50°C (-4°F to 122°F).
3. **DO NOT** store this instrument with the batteries discharged. Always store in a charged condition.
4. For long-term storage, the optimum storage temperature range is 10°C to 30°C (50°F to 80°F).

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/REASSEMBLY). All pump head components may be sterilized using a liquid disinfectant, a mild spray disinfectant or ethylene oxide gas. **DISCONNECT AC/DC CHARGER ADAPTER OR AUTO POWER CABLE FROM MODEL 325M PRIOR TO CLEANING.**

● Component Removal

The collection canister and accessories should be removed from the case to facilitate cleaning. The four (4) screws securing the vacuum pump head to the pump body can be removed when more extensive cleaning is required.

● Exterior Case

Periodically or when applicable, clean the exterior case using a mild, non- abrasive cleanser. Remove the collection canister and all accessories. **DO NOT** immerse or allow liquids to enter the case. A damp cloth will suffice in most instances. Disinfectant spraying is recommended at regular intervals.

● Collection Canister

Impact's reusable collection canisters may be repeatedly sterilized using ethylene oxide gas. **Do not** autoclave or attempt to clean with abrasive cleansing agents, alcohol or chlorinated hydrocarbons. To determine compatibility with commercially available cleanser/disinfectants please note the following material content:

Collection Canister Tube: Butyrate

Hose Fittings: Nylon

1. Thoroughly clean collection canister(s), and fittings after each use. Before emptying collection canister, cap both hose fittings. A short length of tubing is supplied with the Model 325M accessories to prevent accidental spillage of aspirate.
2. Tubing is considered disposable and should be discarded following each use.
3. Insure that all parts are securely fastened and properly connected after cleaning.
4. Orient collection canister and route tubing as shown in Figure 2 following cleaning.
5. To prevent risk of cross contamination and the spread of airborne particulate matter, the use of bacterial filters is recommended. If filters are not used, this device should be disinfected and cleaned, following each use, as described earlier within this section.

Disposable filters connect between the collection canister and vacuum pump inlet. The filter screws into the pump head and contains a hose barb at one end to facilitate quick collection canister connection.

6. Disposable filters may be obtained from Impact. When ordering, specify Impact part number 465-0006-00. Filters may be used repeatedly until discolored or contact with aspirate and/or fluids occurs. As filters become occluded with particulate matter during repeated usages, a reduction in device airflow will become evident. Filter replacement will restore the device to its original airflow levels.

ROUTINE CARE AND MAINTENANCE (cont'd)

● Bacterial/Overflow Filter

Do not attempt to clean disposable bacterial/overflow filters. 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 expelled through the exhaust 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 normal airflow levels.

MAINTENANCE

Routine maintenance should be performed on this apparatus at regular intervals and prior to its 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. Operational checks - as described in **OPERATOR PERFORMANCE CHECKS**.
4. Tubing checks - replace crimped, cracked or worn tubing as required.

IN CASE OF DIFFICULTY

Authorization to service this instrument by other than factory-trained or 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 325M 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 apparatus 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 the collection canister to the Vacuum Inlet Fitting; or if a filter is used: vacuum from the collection canister to the filter, then vacuum from the filter to the Vacuum Inlet Fitting.

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 325M Serial Number is located on the outer case identification label.

STORAGE INFORMATION

For prolonged storage periods, the Model 325M 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.

When batteries are in extended storage, it is recommended that they receive a refresh charge at recommended intervals:

<u>STORAGE AMBIENT</u>	<u>RECHARGE INTERVAL</u>
Below 68°F (20°C)	18 months
68° to 86°F (20° to 30°C)	12 months
86° to 104°F (30° to 40°C)	6 months

Following periods of extended storage in non-controlled environments, allow the Model 325M sufficient time to stabilize to a temperature within its specified operating range (see BATTERY CARE).

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. Batteries, which by their nature are consumable and subjected to environmental extremes, will be warranted only for defects of manufacturing origin for a period of ninety (90) days. Disposable accessories, consumable in usage, will be warranted only for defects of manufacturing origin prior to their initial use. This warranty is neither assignable nor transferable, nor does it apply if this instrument is tampered with, misused or serviced by unauthorized personnel. All warranty repairs shall be subject to return postage billing.

SPECIFICATIONS

Vacuum:	Minimum 0-550 mm/Hg (0-22 inches/mercury), regulator adjustable.
Airflow:	
High Power:	Minimum 30 Liters Per Minute (LPM)
Low Power:	Minimum 13.5 Liters Per Minute (LPM)
Temperature Operating Range:	-60°C to 60°C (-76°F to 140°F)
Inputs:	External 12 VDC (through Auto Power Cable) External 115 VAC, 50/60/400 Hz (through AC/DC Charger Adapter)
Controls:	Mode Selector Switch (Power Switch) - OFF/EXTERNAL/HIGH/LOW Vacuum Regulator - Adjustable Valve
Displays:	Charge Indicator Lamp Power OFF/ON Indicator Lamp Vacuum Gauge, Dual-Scale (Metric/English), 2 1/2" diameter.
Collection Capacity:	680cc (.68 Liter)
Power:	
Internal:	
Operating Time:	
High Power:	35 Minutes (typical) @free airflow (30 LPM minimum)
Low Power:	60 Minutes (typical) @free airflow (13.5 LPM minimum)
Recharge Time:	24 Hours (maximum)
External:	
117 VAC:	Recharge only with supplied AC/DC Charger Adapter
12 VDC:	Continuous operation or recharge
Accessories (included):	External DC Power Cable AC-DC Charger Adapter, 3-Cond, CSA Hose, Clear, PVC, 9' Long 6 ft. Clear Suction Tubing Rinse Bottle Operator's Manual (2 ea.) Universal mounting attachment consisting of four (4) D-rings attached to case front and rear, and furnished with two (2) 24" long Velcro™/Nylon webbing attachment straps.
Case Material:	Polyethylene, double-wall, shatterproof, scuffproof, flame retardant.
Size:	34cm W x 25cm H x 15cm D (13.5" W x 10" H x 6 1/8" D)
Weight:	5.9 kg (13 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. For additional information, contact Impact Customer Service and request the brochure: **IMPACT INSTRUMENTATION, INC., TECHNICAL SERVICES DEPARTMENT.**

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 325M Serial Number ready and any other pertinent data you wish to include in your service request. The Model 325M Serial Number is located on the outer case identification label.

CAUTIONARY NOTE

Prior to servicing this device, be aware of the presence of potentially dangerous operating voltages.

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 the collection canister seals properly and, if used, that the bacterial/overflow filter is not dirty or clogged.

Refer to the schematic and assembly pictorials when troubleshooting. Isolate the problem to a functional segment of the circuitry. Always insure the integrity of circuit ground and the correct mains voltages.

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 and extension (4" to 6" long)
3/8" open end wrench
Pliers, needle nosed
Open end wrench, adjustable, 10"
Open end wrench set, 1/4" to 5/8"
Bench vise with smooth jaws
Allen wrench, 1/16"

PUMP HEAD

Four (4) 10-24 X 1/2 phillips cap head screws secure pump head to pump housing. Remove these screws in order to access pump head for cleaning or servicing (see Figure 6).

Once pump head is removed, 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 pump diaphragm in place.

Flapper valves are located inside pump head and can be seen when pump head is removed and turned upside down. 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 slotted screw which secures facing flapper valve. Set flapper and its rectangular washer aside for the moment. Reinsert and tighten slotted screw which will quickly "back out" 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.

Examine fiber gasket prior to reassembly. If gasket appears cracked, torn or damaged in any way, replace it. To reassemble, align fiber gasket within pump head. Secure a flapper valve to each side of disk making sure that valves lay flush on disk surface. Each valve is held to the disk with a rectangular washer and slotted screw. Orient each washer with stamped word "UP" visible. Set assembled disk within pump head. **NOTE: Refer to Figure 6 for proper orientation of assembled disk to avoid reversing vacuum and pressure ports.** Tightly secure disk with its four (4) 8-32 X 3/8 phillips flat head screws. Mount assembled pump head in place using four (4) 10-24 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 6. Deviation will result in reversal of vacuum and pressure port functions and will negate intended device operation.

DISASSEMBLY/REASSEMBLY (cont'd)

VACUUM GAUGE/REGULATOR (VACUUM LIMITER) ASSEMBLY

Disassembly of the Vacuum Gauge/Regulator manifold is periodically required. Most components comprising this assembly have 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 chrome plated and/or smooth surfaces.

Place the pump head in the vise and secure with minimal holding force. Using an adjustable open end wrench, disconnect the Vacuum Gauge/Regulator 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. Secure the pump head in the vise, using minimal holding force. Refer to Figure 11 and insure that the manifold is secured to its respective port. Do not reverse port connections.

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 6. Deviation will result in reversal of vacuum and pressure port functions and will negate intended device operation.

BATTERY PACK

The Inner Cover Assembly must be removed to access its controls and indicator wiring and to access the Chassis Assembly, Lower Case Assembly, Vacuum Pump and Battery Pack. Remove the eight (8) 4-40 X 7/16 phillips head screws securing the Inner Cover Assembly to the Lower Case Assembly. The Inner Cover can now be lifted from the Lower Case and rested against the case cover.

Stand the battery pack upright, then remove the red, black, orange and gray wire "fast-on" terminal connectors from the battery terminals. Remove the battery pack from its case to avoid accidental shorting between the battery terminals.

To reassemble the Battery Pack, reconnect the "fast-on" battery terminal connectors to their respective battery terminals.

CHASSIS, LOWER CASE ASSEMBLY & VACUUM PUMP

Remove the Pump Head (containing the Vacuum Gauge/Regulator Assembly). Raise the Inner Cover Assembly and remove the Battery Pack as directed in the preceding sections.

The Vacuum Pump (see Figure 11) is mechanically mounted to its own chassis which is then attached to the main Chassis Assembly with five (5) 10-32 keps nuts and four (4) #10 flat washers. Remove the keps nuts and washers using the 3/8" socket with drive handle and extension. Note: two (2) keps nuts are "stacked"; one secures the pump chassis to the main Chassis, the other keps nut secures the circuit ground wire to chassis ground. Remove the black wire jumper grounding the Inner Cover to the Chassis Assembly. It is secured with a 4-40 X 3/8 phillips head screw and 4-40 keps nut at the Inner Cover.

DISASSEMBLY/REASSEMBLY (cont'd)

CHASSIS, LOWER CASE ASSEMBLY & VACUUM PUMP (cont'd)

CAUTION

Carefully unsolder red wire connected to Circuit Breaker and cut cable tie to release this wire. Carefully lift and remove Vacuum Pump from main Chassis Assembly. The Vacuum Pump is connected to its chassis by three (3) 8-32 X 1/2 slotted, flat head, undercut screws.

1. Carefully remove the AC-DC Charger Adapter Jack and DC Power Jack from the side of the Lower Case Assembly.
2. The Chassis Assembly is secured to the Lower Case Assembly with three (3) 4-40 X 1/2 bumper foot/screws and 4-40 lock nuts. Remove these screws, nuts and bumper feet to separate the Chassis Assembly from the Lower Case Assembly.

The Lower Case Assembly consists of four (4) D-ring latches and two (2) bumper feet (front of case). Front latches are secured with two (2) 10-32 X 7/16 phillips head screws and two (2) 10-32 keps nuts. The rear latches are secured with two (2) 10-32 X 3/8 phillips head screws and two (2) 10-32 keps nuts. Bumper feet are secured with two (2) 4-40 keps nuts.

To reassemble the Chassis and Lower Case Assemblies: reattach the D-ring latches and front bumper feet; reattach the Chassis to the Lower Case; connect the AC-DC Charger Adapter Jack and DC Power Jack to the side of the Lower Case; connect the Vacuum Pump/pump chassis to the main chassis - as noted above in the disassembly instructions. Carefully solder the red wire to the circuit breaker.

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. Flow Meter (Rotameter), 0 - 40 LPM, $\pm 3\%$ accuracy or better, minimum inlet fitting bore 1/4".
3. Digital Voltmeter.

PROCEDURES

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 exhaust port, however, must remain unblocked.

- a) Connect device to an External 12 VDC power source.
- b) Insure that tubing, fittings and collection canister 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 by setting Mode Selector Switch to the HIGH position.
- f) Connect vacuum gauge to "patient side" of 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.
- i) Repeat steps b) thru h) with Mode Selector Switch set to EXTERNAL.

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 PROCEDURE (cont'd)

PROCEDURES (cont'd)

2. **Air Flow Tests:** Air flow measurements must be taken with the vacuum and exhaust ports exposed to atmosphere. **DO NOT** occlude ports on air flow measuring instrument either.

- a) Connect device to a live A.C. power source.
- b) Insure that tubing, fittings and collection canister 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 side" of the 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**.
- g) Repeat steps b) thru h) with external 12 VDC applied. Repeat again while operating from internal battery power.

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 DIFFICULTIES

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. **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 DESCRIPTION

(Refer to attached schematic drawing, Page 13-27)

J1, J2, D1-3, R1, R2 and L1 represent the external power input and battery recharge circuits. D1 and D2 act as blocking diodes for the various power inputs. D3 is a blocking diode which prevents lamp L1 from falsely illuminating during internal battery or external 12 VDC operation. R1 and R2 are current limiting resistors which limit battery recharge currents to about 400 milliamperes. L1 is the charging indicator lamp.

J1 is the external 12 VDC input jack. J2 is the input jack for battery recharging current supplied by the AC/DC Charger Adapter accessory.

B1, B2, S1, CB1, L2 and the filter module function in the operational modes. CB1 protects the vacuum pump motor against excessive current draws, L2 is the power indicator lamp. Depending upon the position of S1, 12 VDC or 6 VDC (in parallel) is selected for: battery recharge current (OFF-position), external 12VDC (EXT-position) or internal batteries (HIGH or LOW-position). B1 and B2 are disconnected from the circuit when S1 is in the External position. The filter module is a low pass filter assembly. Its purpose is to suppress EMI/RFI at the pump motor.

*** NOTE ***

Waveforms and voltage measurements have been noted at various locations on each 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 canister 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. If using the optional disposable Bacterial/Overflow Filter, check for discoloration. Replace filter if discolored.
4. Check collection canister 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 for tactile feel and operation of switches and controls.
2. Check the various operating modes (refer to the **OPERATOR PERFORMANCE CHECKS** section in the **OPERATION** portion of this manual).

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

TROUBLESHOOTING GUIDE

SYMPTOM: No internal DC power.

Check for battery voltage, CB1 and S1 wiring connections.

SYMPTOM: Internal DC power weak.

Check B1/B2 battery voltages, D1-3, R1 and R2. Verify charging current.

SYMPTOM: Circuit breaker CB1 trips.

Check pump and pump motor for stalling which will draw excessive currents.

SYMPTOM: No vacuum or weak vacuum.

Same as above. Also, check tubing connections for crimps and cracks. Insure fittings are properly secured. Check collection canister for correct seal. Insure that pump head is properly secured. Check to see if vacuum regulating valve is turned fully clockwise.

* **Accidental Overflow:** To service, completely disassemble the pump head (see instructions **DISASSEMBLY/REASSEMBLY, PUMP HEAD**). Clean all parts thoroughly giving particular care to the gasket. Dry all parts immediately and reassemble, (See Figure 6). Test apparatus before returning to operation. Insure that vacuum and exhaust port functions have not been reversed.

TECHNICAL DOCUMENTATION

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

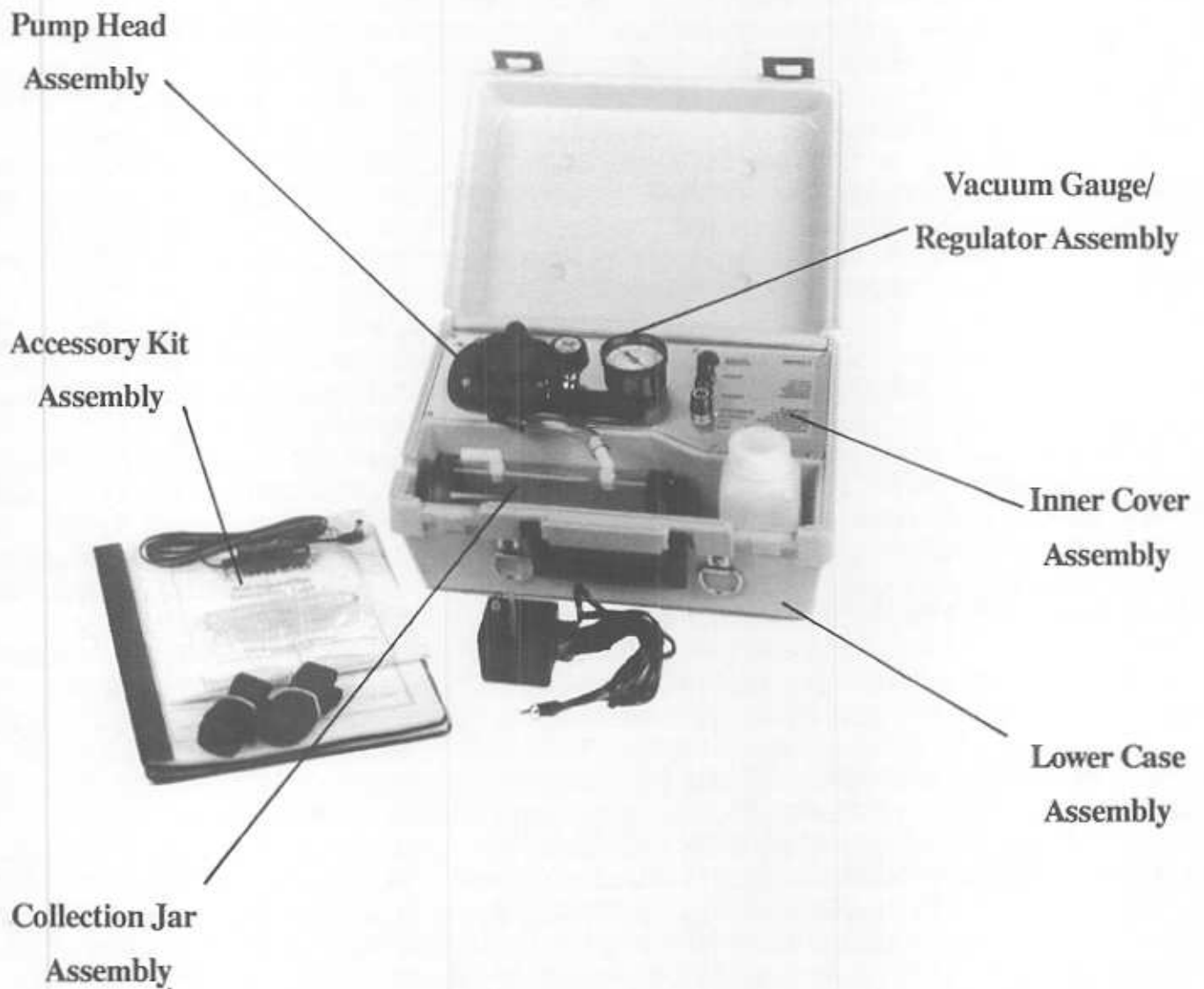
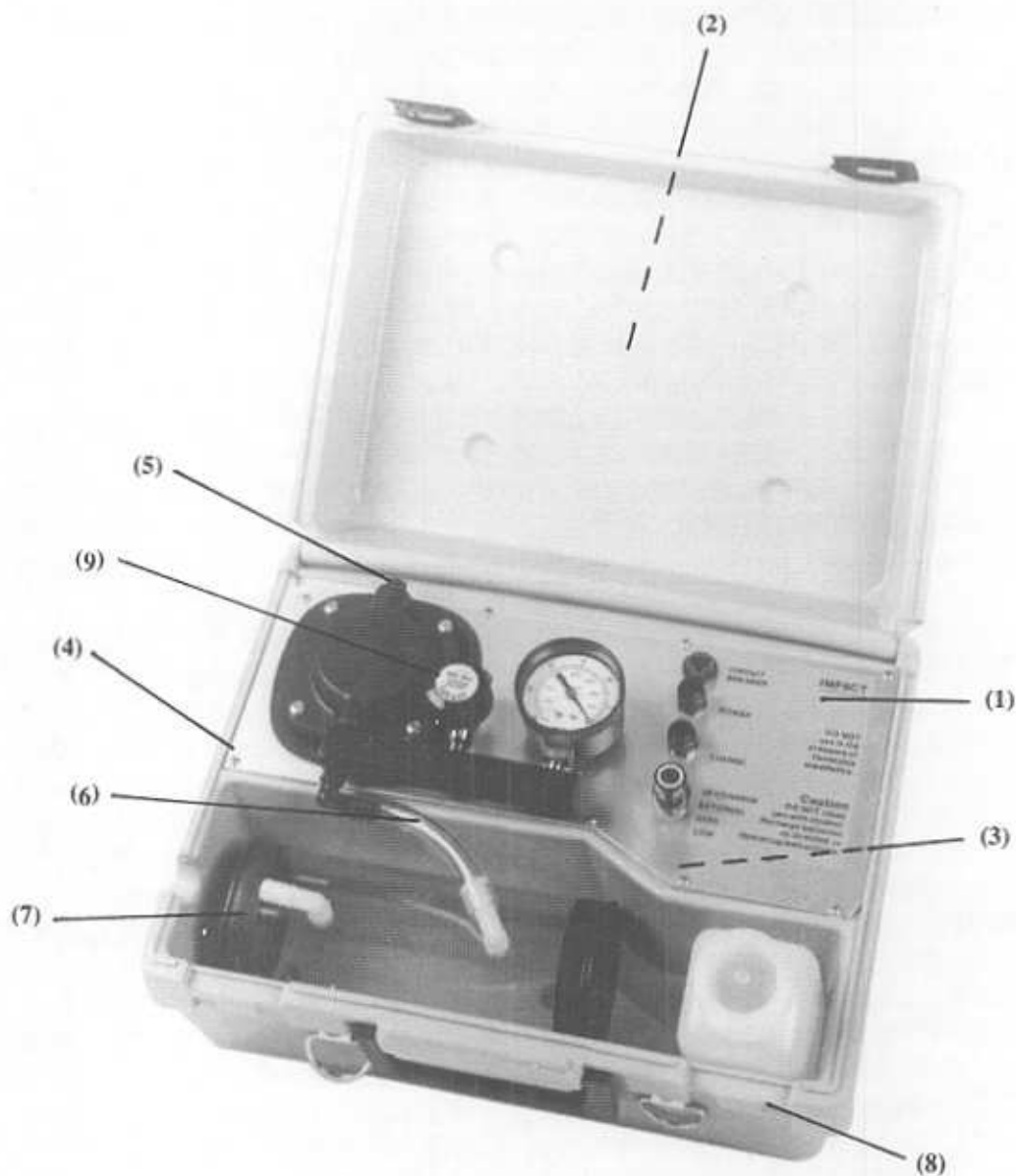


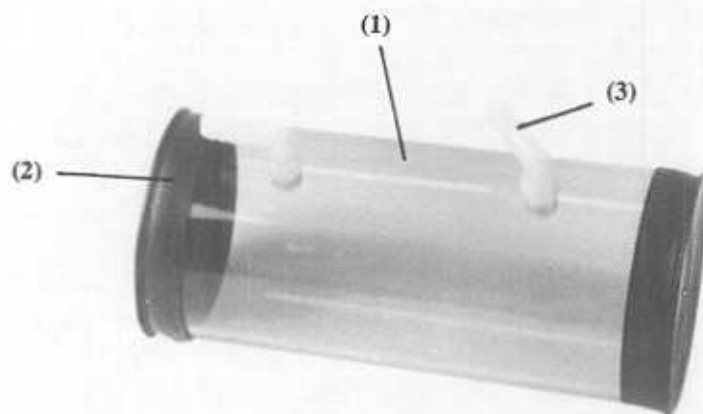
Figure 4. Composite Illustration Depicting Major Sub-Assemblies



#	Part Number	#	Part Number	#	Part Number
1	325-0325-02	4	358-0440-08	7	703-0305-11
2	325-0325-03	5	480-0156-00	8	703-0325-02
3	342-0002-00	6	540-0037-00	9	704-0325-01

See Bill of Material 701-0325-02 for complete Part Number Description (Page 13-12).

Figure 5. Final Mechanical Assembly



#	Part Number	#	Part Number	#	Part Number
1	016-0305-31	2	416-0003-00	3	480-0034-00

See Bill of Material 703-0305-11 for complete Part Number Description (Page 13-15).



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 (shown in Figure 7)
8	654649	Hold Down Plate (shown in Figure 7)
9	608148	Diaphragm (shown in Figure 7)
10	625160	Screw, Valve Keeper

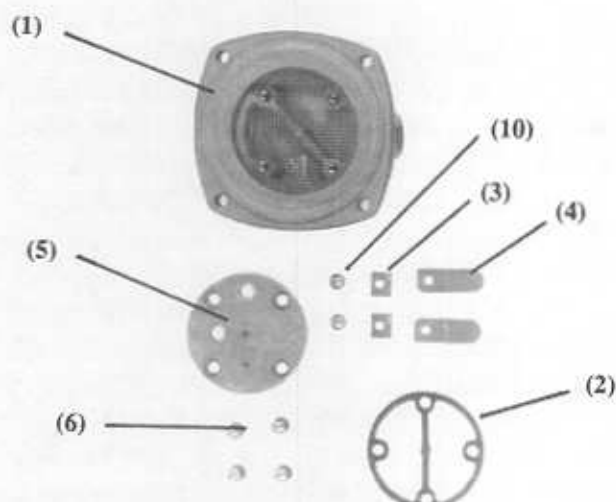
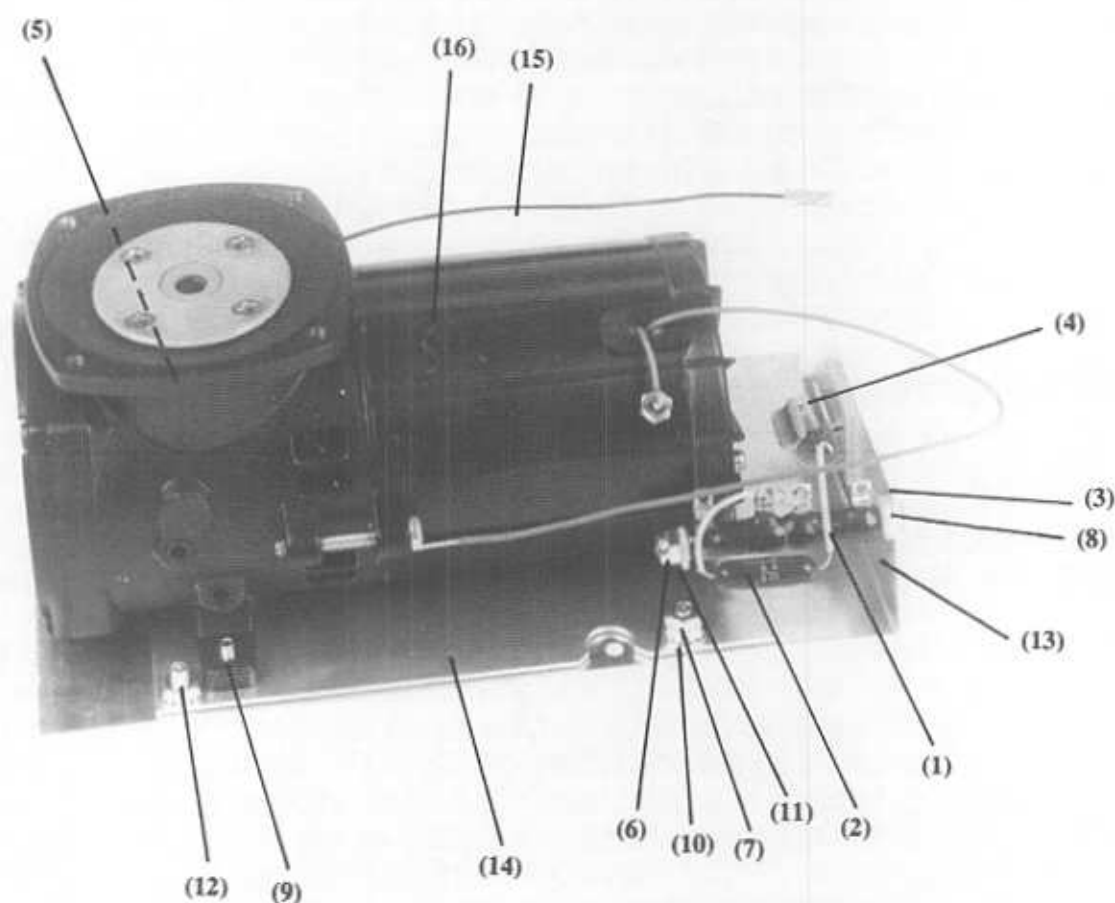


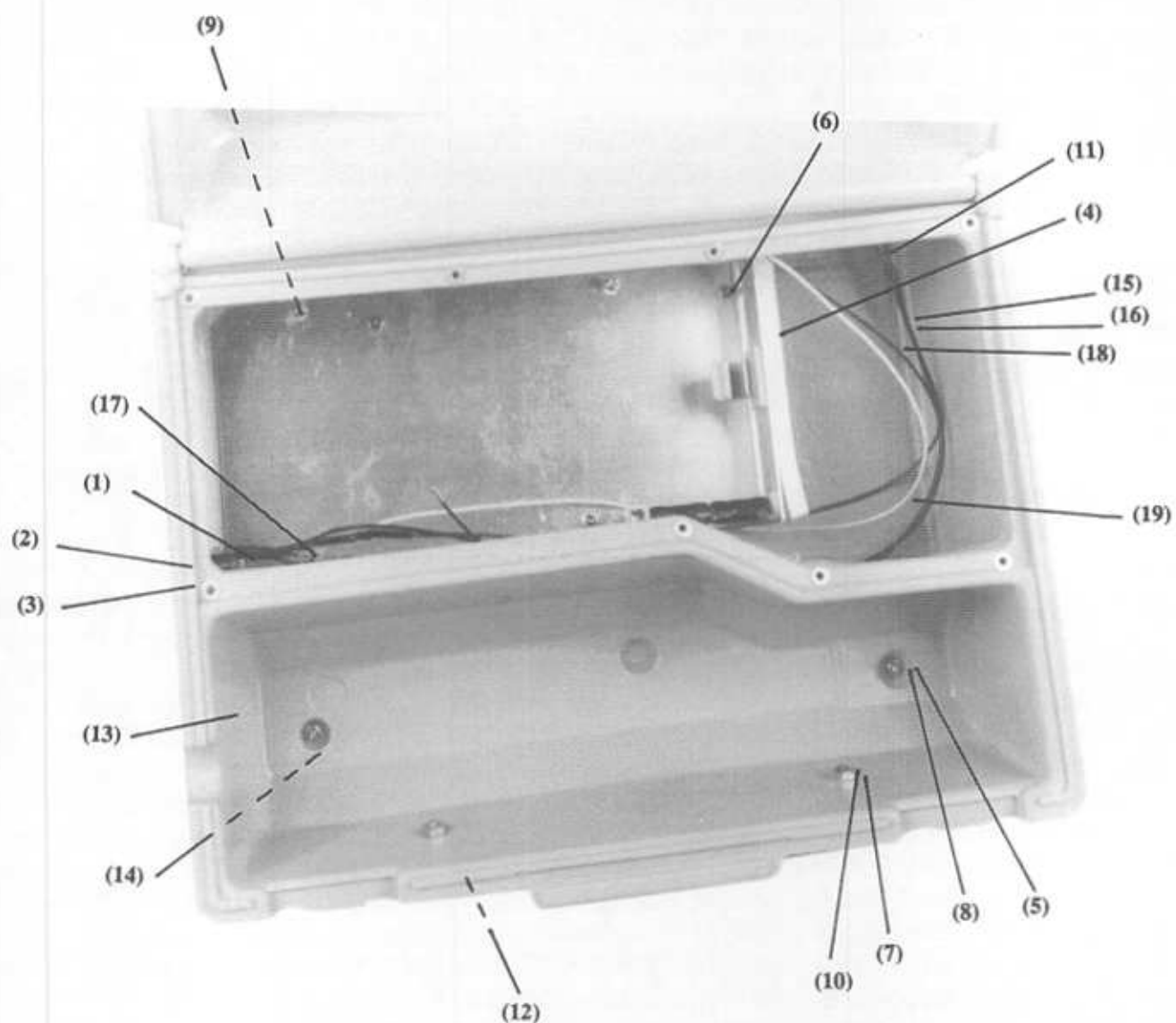
Figure 6. Collection Jar Assembly & Pump Head



#	Part Number	#	Part Number	#	Part Number
1	210-0020-00	7	346-1032-01	13	414-0305-41
2	210-075X-01	8	352-0832-38	14	414-0305-51
3	312-0018-00	9	359-0832-08	15	700-0325-20
4	334-0012-00	10	376-0003-00	16	704-0325-02
5	346-0832-01	11	376-0016-00		
6	346-0832-02	12	378-1032-08		

See Bill of Material 703-0325-03 for complete Part Number Description (Page 13-17).

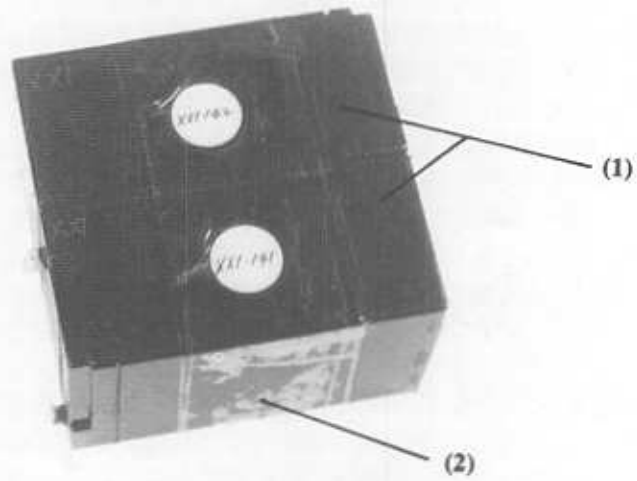
Figure 7. Chassis Assembly



#	Part Number	#	Part Number	#	Part Number	#	Part Number
1	047-4004-00	7	346-1032-01	13	402-0305-31	19	700-0325-08
2	089-0007-00	8	352-0440-08	14	450-0002-00		
3	089-0017-00	9	358-1032-06	15	700-0325-01		
4	312-0026-00	10	358-1032-07	16	700-0325-03		
5	346-0440-01	11	374-0004-00	17	700-0325-04		
6	346-0440-02	12	394-0005-00	18	700-0325-05		

See Bill of Material 703-0325-02 for complete Part Number Description (Page 13-16).

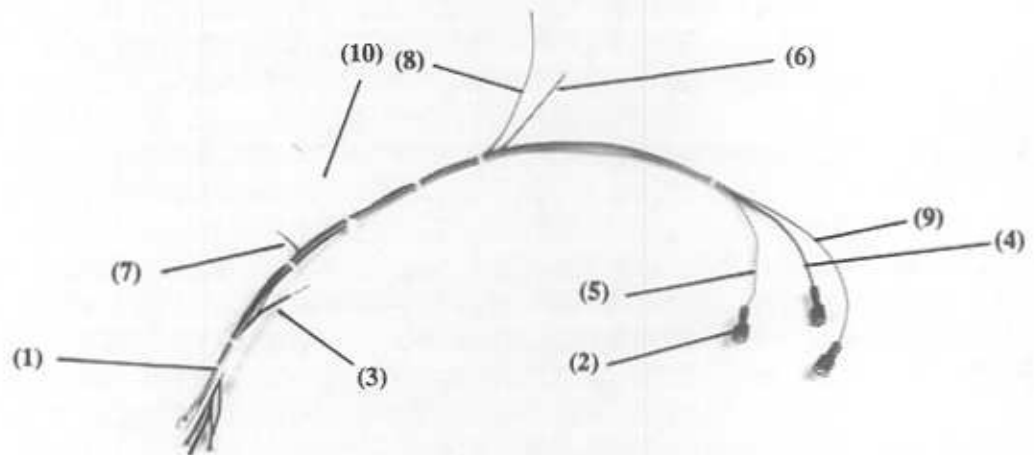
Figure 8. Lower Case Assembly



Part Number

- 1 021-0019-00 or 021-0006-00
- 2 312-0020-00

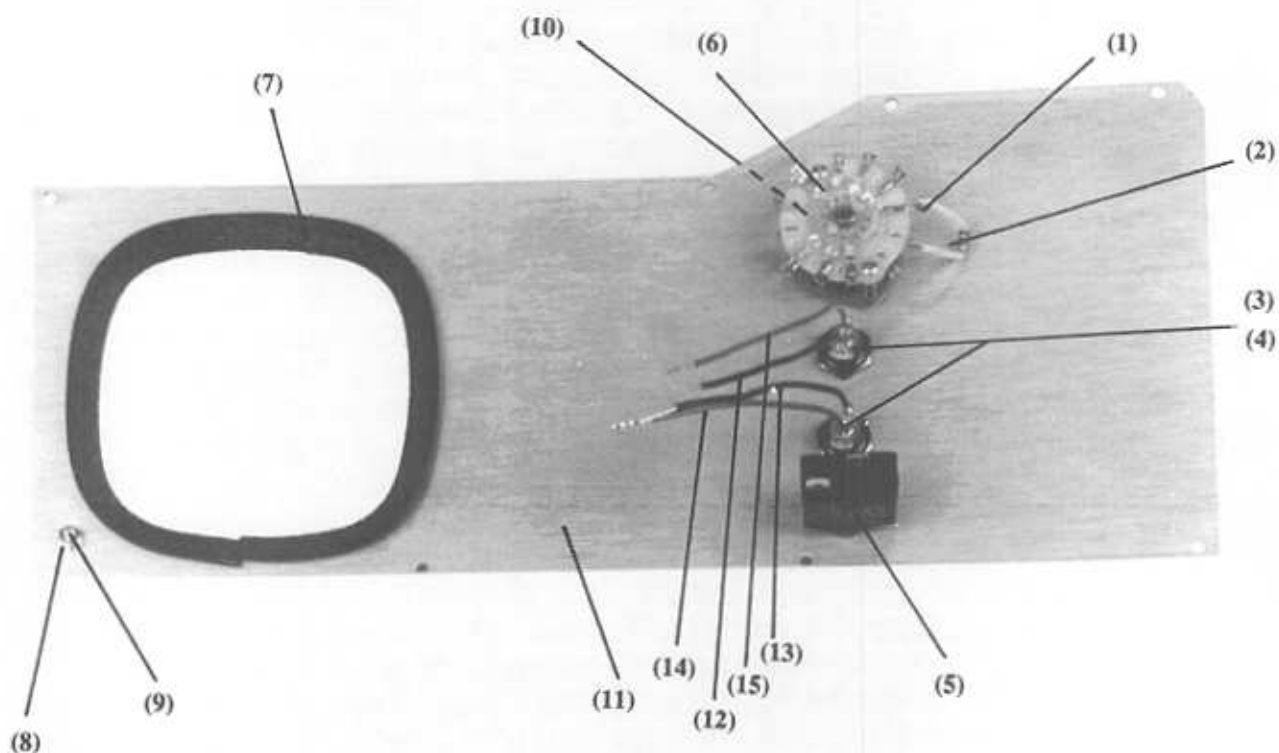
See Bill of Material 703-0325-04 or 703-0325-05 for complete Part Number Description (Pages 13-18, 13-19).



# Part Number	# Part Number	# Part Number
1 305-0001-00	5 700-0325-07	8 700-0325-11
2 374-0003-00	6 700-0325-09	9 700-0325-12
3 700-0325-02	7 700-0325-10	10 700-0325-13
4 700-0325-06		

See Bill of Material 703-0325-06 or 703-0325-07 for complete Part Number Description (Pages 13-20, 13-21).

Figure 9. Battery Pack & Wire Harness Assemblies

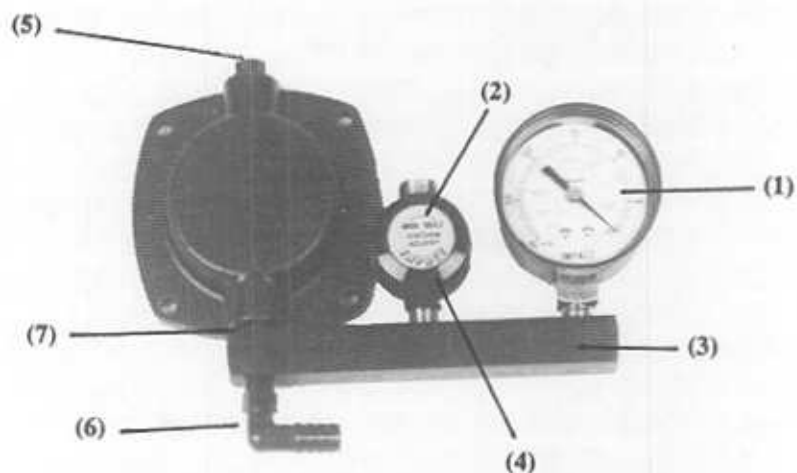


#	Part Number	#	Part Number	#	Part Number
1	016-0016-00	*6	117-0009-00	11	416-0305-21
2	047-4004-00	7	340-0016-00	12	700-0325-14
3	068-0004-00	8	346-0440-01	13	700-0325-15
4	068-0005-00	9	358-0440-08	14	700-0325-16
5	081-0006-00	10	392-0001-00	15	700-0325-17

*For Centralab use 117-0006-00

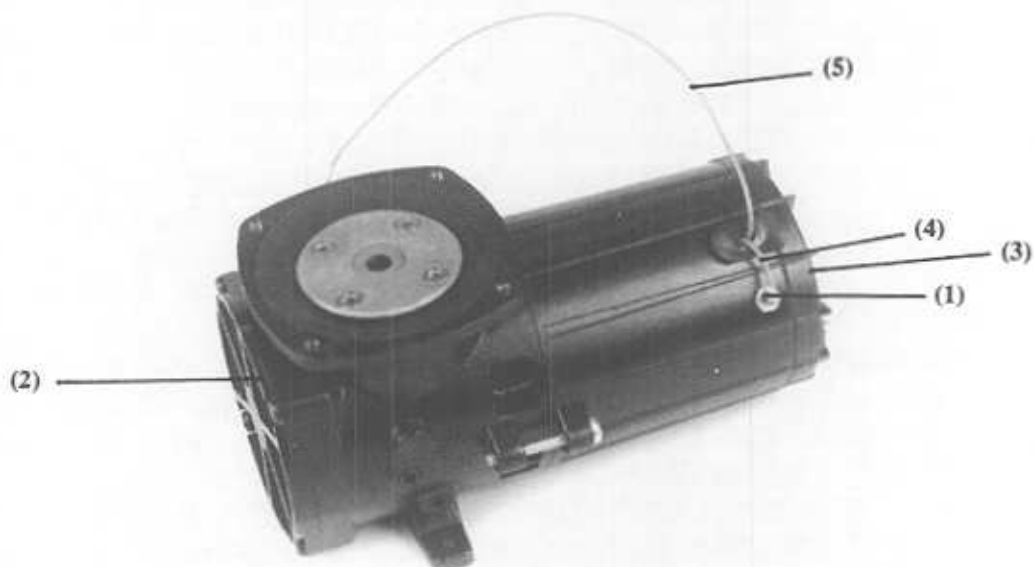
See Bill of Material 703-0325-08 or 703-0325-09 for complete Part Number Description (Pages 13-22, 13-23).

Figure 10. Inner Cover Assembly



#	Part Number	#	Part Number	#	Part Number
1	315-0003-00	3	470-0001-00	5	480-0048-00
2	325-0305-05	4	480-0038-00	6	480-0065-00
				7	480-0132-00

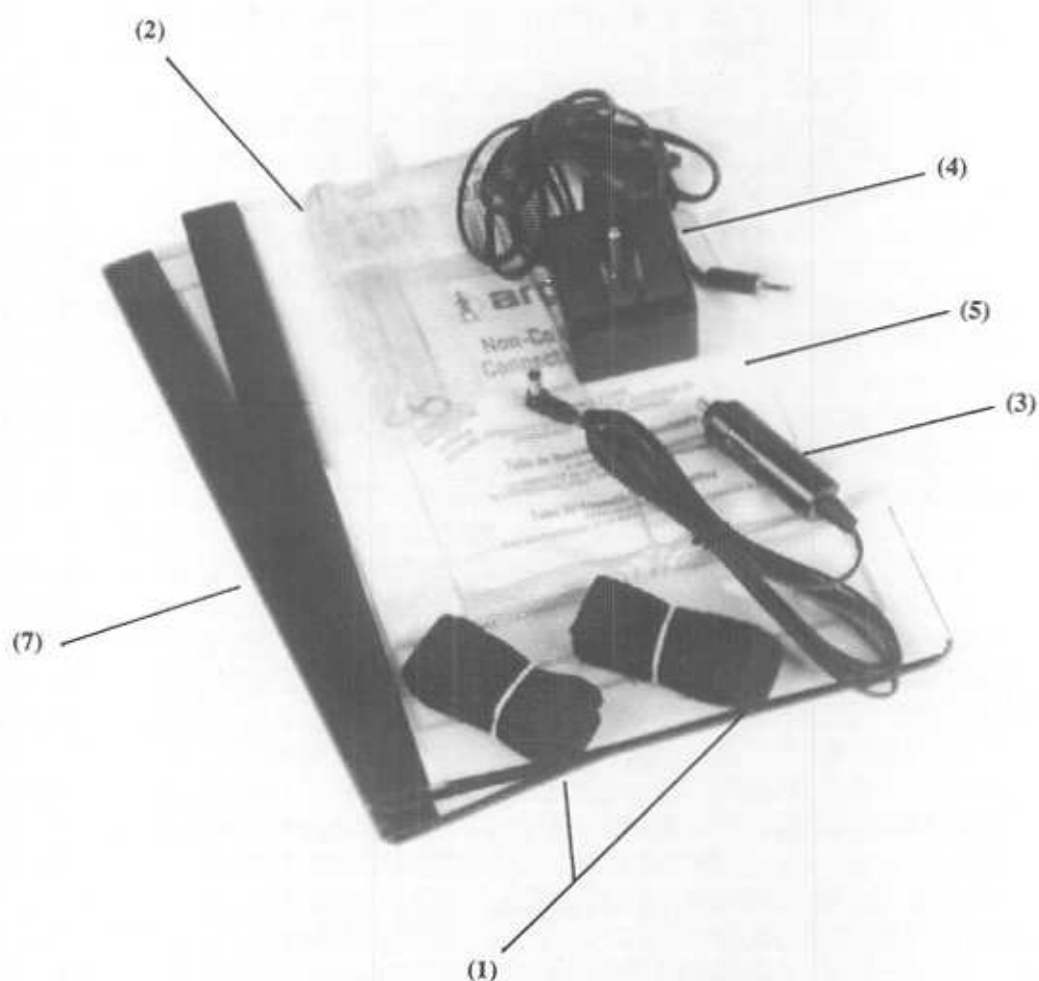
See Bill of Material 704-0325-01 for complete Part Number Description (Page 13-24).



#	Part Number	#	Part Number	#	Part Number
1	031-0001-00	3	374-0006-00	5	700-0325-19
2	041-0002-00	4	700-0325-18		

See Bill of Material 704-0325-02 for complete Part Number Description (Page 13-25).

Figure 11. Vacuum Gauge/Regulator & Vacuum Pump Assemblies



#	Part Number	#	Part Number	#	Part Number
1	334-0020-00	4	810-0001-00	7	906-0325-02
2	540-0022-00	5	820-0018-00		
3	708-0001-00	6	820-0024-00 (shown in Figure 1)		

See Bill of Material 802-0325-02 for complete Part Number Description (Page 13-26).

Figure 12. Accessory Kit Assembly

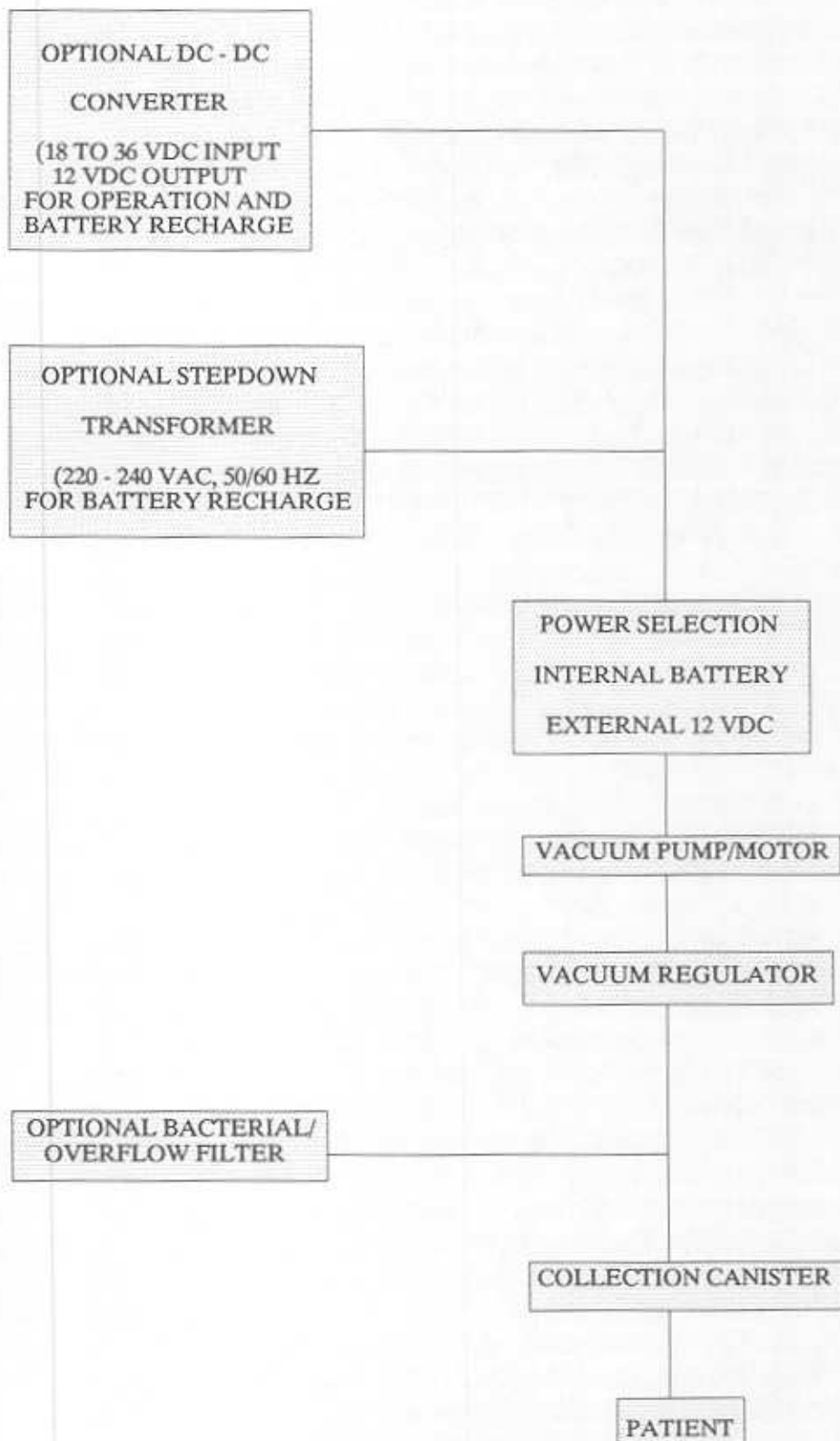


Figure 13. Functional Block Diagram

REF QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP.
1	701-0325-01	Assembly, Final Mechanical, Model 325	PL701-0325-01	
1	701-0325-02	Assembly, Final Mechanical, Model 325M	PL701-0325-02	
1	WL702-0325-01	Wire List, Model 325() (Standard-Grigsby)	WL702-0325-01	
1	WL702-0325-02	Wire List, Model 325() (Centralab)	WL702-0325-02	
1	703-0305-11	Assembly, Collection Canister	PL703-0305-11	
1	703-0325-01	Assembly, Lower Case, Model 325	PL703-0325-01	
1	703-0325-02	Assembly, Lower Case, Model 325M	PL703-0325-02	
1	703-0325-03	Assembly, Chassis	PL703-0325-03	
1	703-0325-04	Assembly, Battery Pack, 5AH	PL703-0325-04	
1	703-0325-05	Assembly, Battery Pack, 4.5AH	PL703-0325-05	
1	703-0325-06	Assembly, Wire Harness (Standard-Grigsby)	PL703-0325-06	
1	703-0325-07	Assembly, Wire Harness (Centralab)	PL703-0325-07	
1	703-0325-08	Assembly, Inner Cover (Standard-Grigsby)	PL703-0325-08	
1	703-0325-09	Assembly, Inner Cover (Centralab)	PL703-0325-09	
1	704-0325-01	Assembly, Vacuum Gauge/Regulator	PL704-0325-01	
1	704-0325-02	Assembly, Vacuum Pump	PL704-0325-02	
1	802-0325-01	Assembly, Accessory Kit (Commercial)	PL802-0325-01	
1	802-0325-02	Assembly, Accessory Kit ("M" Military)	PL802-0325-02	

REF	QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP.
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- X	1	325-0325-01	Label, Name/Model	B325-0325-01	
1	1	325-0325-02	Label, Condensed Operating Instr & Warning	B325-0325-02	
2	\$ 1	325-0325-03	Label, Name/Model/Serial Number, Military	B325-0325-03	
3	8	342-0002-00	Insert, Steel, 4-40		
4	8	358-0440-08	Screw, Phillips, Pan Head, 4-40 X 1/2		
5	1	480-0156-00	Plug, Pipe, Plastic (Modified from 480-0157-00)		
6	1	540-0037-00	Hose, 3/8" I.D. X 9/16" O.D., 3 1/2" Lg.		
7	1	703-0305-11	Assembly, Collection Canister	PL703-0305-11	
8	1	703-0325-02	Assembly, Lower Case	PL703-0325-02	
9	1	704-0325-01	Assembly, Vacuum Gauge/Regulator	PL704-0325-01	

X Use on Non-DPSC Orders
\$ Use on DPSC Orders

13 - 12

701-0325-02	ASSEMBLY, FINAL MECHANICAL, MODEL 325M	0	LHS	1	1
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RUN	COLOR	SLD-(AWG)-STR	LENGTH (")	STRIP (")	TIN	ORIGIN	STRIP (")	TIN	DESTINATION
1	Blk	18	3	3/8	Y	J1-Sleeve	3/8	Y	J2-Sleeve
2	Blk	18	4	3/8	Y	S1C-Pos 4	3/8	Y	L2/Pump (-)
3	Blk	18	15	3/8	Y	L1/L2/Pump (-)	3/8		B2 (-)
4	Blk	18	17	3/8	Y	J1-Sleeve	3/8		B2 (-)
5	Brn	18	18	3/8	Y	S1F-Pos 1	3/8	Y	D1 Cathode
6	Red	18	18 1/2	3/8	Y	S1A-Pos 4	3/8		B1 (+)
7	Org	18	16 1/2	3/8	Y	S1B-Pos 1	3/8		B2 (+)
8	Yel	18	19	3/8	Y	J1-Tip	3/8	Y	S1A-Pos 2
9	Grn	18	13 1/2	3/8	Y	R1	3/8	Y	S1D-Pos 1
10	Blu	18	6 1/2	3/8	Y	S1A-Wiper	3/8	Y	CB1
11	Vlo	18	13	3/8	Y	R1	3/8	Y	S1E-Pos 1
12	Gry	18	16 1/2	3/8	Y	S1C-Wiper	3/8		B1 (-)
13	Wht	18	9	3/8	Y	S1F-Pos 1	3/8	Y	D3 Anode
14	Blk	18	3	3/8	Y	L2 (-)	3/8	Y	L1/L2/Pump(-)
15	Blk	18	3	3/8	Y	L1 (-)	3/8	Y	L1/L2/Pump(-)
16	Gry	18	3	3/8	Y	CB1	3/8	Y	L2 (+)
17	Gry	18	3	3/8	Y	S1F-Wiper	3/8	Y	L1 (+)
18	Red	18	1 1/4	3/8	Y	Pump (+)	3/8	Y	Filter In
19	Red	18	11	3/8	Y	Filter Out	3/8	Y	CB1
20	Blk	18	8	3/8	Y	L2/Pump (-)	3/8	Y	Inner Cover

13 - 13

RUN	COLOR	SLD-(AWG)-STR	LENGTH (")	STRIP (")	TIN	ORIGIN	STRIP (")	TIN	DESTINATION
1	Blk	18	3	3/8	Y	J1-Sleeve	3/8	Y	J2-Sleeve
2	Blk	18	4	3/8	Y	S1C-Pos 4	3/8	Y	L2/Pump (-)
3	Blk	18	15	3/8	Y	L1/L2/Pump (-)	3/8		B2 (-)
4	Blk	18	17	3/8	Y	J1-Sleeve	3/8		B2 (-)
5	Brn	18	19 1/2	3/8	Y	S1F-Pos 1	3/8	Y	D1 Cathode
6	Red	18	19 1/2	3/8	Y	S1A-Pos 4	3/8		B1 (+)
7	Org	18	16	3/8	Y	S1B-Pos 1	3/8		B2 (+)
8	Yel	18	20	3/8	Y	J1-Tip	3/8	Y	S1A-Pos 2
9	Grn	18	13	3/8	Y	R1	3/8	Y	S1D-Pos 1
10	Blu	18	6	3/8	Y	S1A-Wiper	3/8	Y	CB1
11	Vio	18	12	3/8	Y	R1	3/8	Y	S1E-Pos 1
12	Gry	18	16	3/8	Y	S1C-Wiper	3/8		B1 (-)
13	Wht	18	10	3/8	Y	S1F-Pos 1	3/8	Y	D3 Anode
14	Blk	18	3	3/8	Y	L2 (-)	3/8	Y	L1/L2/Pump(-)
15	Blk	18	3	3/8	Y	L1 (-)	3/8	Y	L1/L2/Pump(-)
16	Gry	18	3	3/8	Y	CB1	3/8	Y	L2 (+)
17	Gry	18	3	3/8	Y	S1F-Wiper	3/8	Y	L1 (+)
18	Red	18	1 1/4	3/8	Y	Pump (+)	3/8	Y	Filter In
19	Red	18	11	3/8	Y	Filter Out	3/8	Y	CB1
20	Blk	18	8	3/8	y	L2/Pump (-)	3/8	Y	Inner Cover

13 - 14

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

1	1	016-0305-31	Cylinder, Jar	B016-0305-31	
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2	2	416-0003-00	Cap, End, for 3" O.D. Tube		
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3	2	480-0034-00	Elbow, Nylon, 1/8" NPTM to 3/8" I.D. Tube		
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13 - 15

703-0305-11	ASSEMBLY, COLLECTION CANISTER	MODEL 305()	0	LHS	1	1
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REF	QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP.
1	2	047-4004-00	Diode, 1N4004		
2	1	089-0007-00	Jack, Power, 2-Cond, 2.5 mm Post		
3	1	089-0017-00	Jack, Tini, 2-Cond, 3.5 mm I.D.		
4	1	312-0026-00	Tape, Foam, P/S, 1" Wide X 4" Long X 3/8" THK		
5	2	346-0440-01	Nut, Keps, 4-40		
6	3	346-0440-02	Nut, Lock, 4-40		
7	4	346-1032-01	Nut, Keps, 10-32		
8	5	352-0440-08	Screw, Slotted, Blind Head, 4-40 X 1/2		
9	2	358-1032-06	Screw, Phillips, Pan Head, 10-32 X 3/8		
10	2	358-1032-07	Screw, Phillips, Pan Head, 10-32 X 7/16		
11	1	374-0004-00	Terminal, Fully Insulated, Female, .187 Blue		
12	4	394-0005-00	Latch, "D"-Ring, W/#10 Mounting Clips		
13	1	402-0305-31	Case, Modified	B402-0305-31	
14	5	450-0002-00	Bumper, Black, Rubber Feet, w/Brass Insert		
15	1	700-0325-01	Jumper, Black	WL702-0325-01,02	
16	1	700-0325-03	Jumper, Black	WL702-0325-01,02	
17	1	700-0325-04	Jumper, Black	WL702-0325-01,02	
18	1	700-0325-05	Jumper, Brown	WL702-0325-01,02	
19	1	700-0325-08	Jumper, Yellow	WL702-0325-01,02	
-	1	703-0325-03	Assembly, Chassis	PL703-0325-03	
-	1	703-0325-04	Assembly, Battery Pack, 5.0AH	PL703-0325-04	
- *	1	703-0325-05	Assembly, Battery Pack, 4.5AH	PL703-0325-05	
-	1	703-0325-08	Assembly, Inner Cover (Standard-Grigsby)	PL703-0325-08	
- #	1	703-0325-09	Assembly, Inner Cover (Centralab)	PL703-0325-09	

* May be used in place of 703-0325-04

May be used in place of 703-0325-08

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703-0325-02 ASSEMBLY, LOWER CASE

MODEL 325M A

LHS 1 1

REF	QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP.
1	1	210-0020-00	Resistor, Power, Wire Wound, 2 Ohms, 5W		
2	2	210-075X-01	Resistor, Power, Wire Wound, 7.5 Ohms, 5W		
3	1	312-0018-00	Tape, Foam, P/S, 1" Wide X 4" Long X 1/8" THK		
4	1	334-0012-00	Clip, Nylon, P/S, Cable, 1/2" I.D.		
5	1	346-0832-01	Nut, Keps, 8-32		
6	1	346-0832-02	Nut, Lock, 8-32		
7	5	346-1032-01	Nut, Keps, 10-32		
8	1	352-0832-38	Screw, Phillips, Blind Head, 8-32 X 2 1/2		
9	3	359-0832-08	Screw, Slotted, FH, Undercut, 8-32 X 1/2		
10	4	376-0003-00	Washer, Flat, #10		
11	2	376-0016-00	Washer, Nylon, #10		
12	4	378-1032-08	Standoff, Self-Clinching, Stud, 10-32 X 1/2		
13	1	414-0305-41	Chassis, Sub	B414-0305-41	
14	1	414-0305-51	Chassis, Pump	B414-0305-51	
15	1	700-0325-20	Jumper, Black	WL702-0325-01,02	
16	1	704-0325-02	Assembly, Vacuum Pump	PL704-0325-02	

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703-0325-03 ASSEMBLY, CHASSIS

MODEL 325() 0

LHS 1 1

REF	QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP.
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1	2	021-0019-00	Battery, 6VDC, 5.0 AH		
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2	AS RQ	312-0020-00	Tape, Mylar, Packing, 2" Wide		
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13 - 18

703-0325-04	ASSEMBLY, BATTERY PACK, 5.0AH	MODEL 325()	0	LHS	1	1
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REF	QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP.
-----	-----	-------------	-------------	-------------	-------

1	2	021-0006-00	Battery, 6VDC, 4.5 AH		
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2	AS RQ	312-0020-00	Tape, Mylar, Packing, 2" Wide		
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13 - 19

703-0325-05	ASSEMBLY, BATTERY PACK, 4.5AH	MODEL 325()	0	LHS	1	1
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REF	QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP.
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1	7	305-0001-00	Cable Tie, Nylon, Miniature		
2	3	374-0003-00	Terminal, Fully Insulated, Female, .187W, Red		
3	1	700-0325-02	Jumper, Black	WL702-0325-01	
4	1	700-0325-06	Jumper, Red	WL702-0325-01	
5	1	700-0325-07	Jumper, Orange	WL702-0325-01	
6	1	700-0325-09	Jumper, Green	WL702-0325-01	
7	1	700-0325-10	Jumper, Blue	WL702-0325-01	
8	1	700-0325-11	Jumper, Violet	WL702-0325-01	
9	1	700-0325-12	Jumper, Gray	WL702-0325-01	
10	1	700-0325-13	Jumper, White	WL702-0325-01	

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703-0325-06 ASSEMBLY, WIRE HARNESS (STD-GRIGSBY) MODEL 325() A LHS 1 1

REF	QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP.
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1	7	305-0001-00	Cable Tie, Nylon, Miniature		
2	3	374-0003-00	Terminal, Fully Insulated, Female, .187W, Red		
3	1	700-0325-02	Jumper, Black	WL702-0325-02	
4	1	700-0325-06	Jumper, Red	WL702-0325-02	
5	1	700-0325-07	Jumper, Orange	WL702-0325-02	
6	1	700-0325-09	Jumper, Green	WL702-0325-02	
7	1	700-0325-10	Jumper, Blue	WL702-0325-02	
8	1	700-0325-11	Jumper, Violet	WL702-0325-02	
9	1	700-0325-12	Jumper, Gray	WL702-0325-02	
10	1	700-0325-13	Jumper, White	WL702-0325-02	

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703-0325-07 ASSEMBLY, WIRE HARNESS (CENTRALAB) MODEL 325() 0 LHS 1 1

REF QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP.
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1	1	016-0016-00	Tubing, Shrink, 3/8" I.D. X 1 1/2" Lg.	
2	1	047-4004-00	Diode, 1N4004	D2
3	2	068-0004-00	Lamp, Incandescent	L1,2
4	2	068-0005-00	Lamp Holder, Green Lens	
5	1	081-0006-00	Circuit Breaker, 7A	CB1
6	1	117-0009-00	Switch, Rotary, 6-Pole, 4-Position	S1
7	1	340-0016-00	Grommeting, 12 5/8" Long, Black	
8	1	346-0440-01	Nut, Keps, 4-40	
9	1	358-0440-08	Screw, Phillips, Pan Head, 4-40 X 1/2	
10	1	392-0001-00	Knob, w/Indicator	
11	1	416-0305-21	Cover, Inner	B416-0305-21
12	1	700-0325-14	Jumper, Black	WL702-0325-02
13	1	700-0325-15	Jumper, Black	WL702-0325-02
14	1	700-0325-16	Jumper, Gray	WL702-0325-02
15	1	700-0325-17	Jumper, Gray	WL702-0325-02
-	1	703-0325-06	Assembly, Wire Harness	PL703-0325-06

Notes: Prewire Standard-Grigsby S1 with D2 as follows:

D2-Anode to S1A-Pin 2
D2-Cathode to S1F-Pin 1

REF	QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP.
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1	1	016-0016-00	Tubing, Shrink, 3/8" I.D. X 1 1/2" Lg.		
2	1	047-4004-00	Diode, 1N4004		D2
3	2	068-0004-00	Lamp, Incandescent		L1,2
4	2	068-0005-00	Lamp Holder, Green Lens		
5	1	081-0006-00	Circuit Breaker, 7A		CB1
6	1	117-0006-00	Switch, Rotary, 6-Pole, 4-Position		S1
7	1	340-0016-00	Grommeting, 12 5/8" Long, Black		
8	1	346-0440-01	Nut, Keps, 4-40		
9	1	358-0440-08	Screw, Phillips, Pan Head, 4-40 X 1/2		
10	1	392-0001-00	Knob, w/Indicator		
11	1	416-0305-21	Cover, Inner	B416-0305-21	
12	1	700-0325-14	Jumper, Black	WL702-0325-02	
13	1	700-0325-15	Jumper, Black	WL702-0325-02	
14	1	700-0325-16	Jumper, Gray	WL702-0325-02	
15	1	700-0325-17	Jumper, Gray	WL702-0325-02	
-	1	703-0325-07	Assembly, Wire Harness	PL703-0325-07	

Notes: Prewire Centralab S1 as follows with #18 AWG busswire:

S1D-Wiper to S1B-Wiper
 S1B-Pin 1 to S1B-Pin 4 to S1C-Pin 3
 S1E-Pin W to S1A-Pin 3 to S1A-Pin 4
 S1C-Pin 1 to S1C-Pin 4

Prewire Centralab S1 with D2 as follows:

D2-Anode to S1A-Pin 2
 D2-Cathode to S1F-Pin 1

REF	QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP.
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1	1	315-0003-00	Vacuum Gauge, Bottom Mtg, w/1/8" NPTM		
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2	1	325-0305-05	Label, P/S, Valve	B325-0305-05	
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3	1	470-0001-00	Manifold Block, Black		
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4	1	480-0038-00	Valve, Ball Seat, 1/8" NPTM		
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5	1	480-0048-00	Cap, 1/8" NPT, Modified		
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6	1	480-0065-00	Elbow, Black, PE, 1/8" NPTM to 3/8" I.D. Hose		
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7	1	480-0132-00	Nipple, Chrome, 1/8" NPTM to 1/8" NPTM		
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704-0325-01	ASSEMBLY, VACUUM GAUGE/REGULATOR	MODEL 325()	0	LHS	1	1
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REF	QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP.
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1	1	031-0001-00	Filter		
2	1	041-0002-00	Pump/Motor, Vacuum, 12 VDC, Diaphragm		
3	1	374-0006-00	Terminal, Insulated, Ring		
4	1	700-0325-18	Jumper, Red	WL702-0325-01,02	
5	1	700-0325-19	Jumper, Red	WL702-0325-01,02	

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704-0325-02	ASSEMBLY, VACUUM PUMP	MODEL 325()	0	LHS	1	1
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REF	QTY	PART NUMBER	DESCRIPTION	DWG. NUMBER	COMP.
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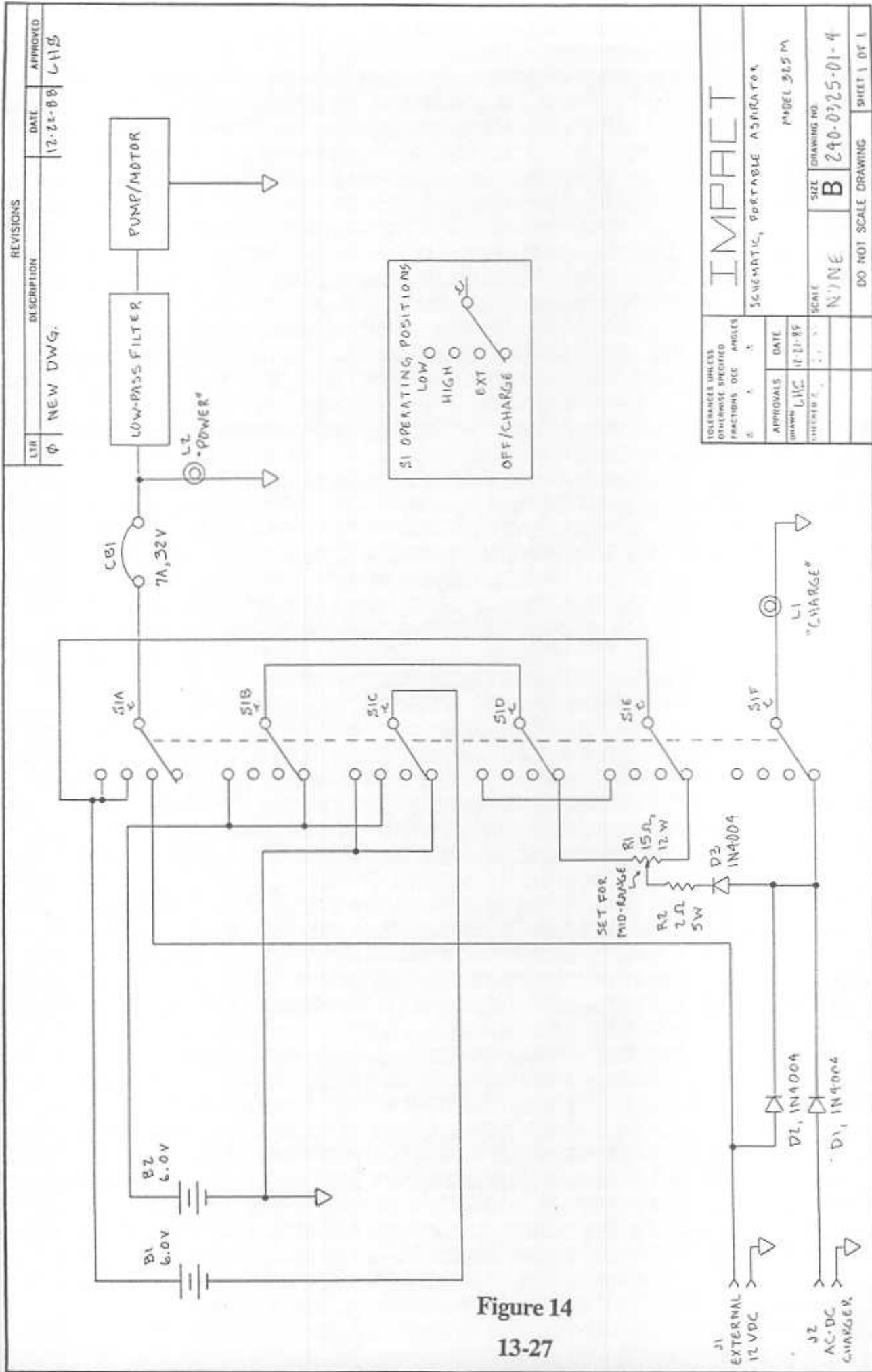
1	2	334-0020-00	Strap, Velcro/Webbing		
2	1	540-0022-00	Hose, 9" Lg.		
3	1	708-0001-00	Assembly, Auto Charger Cable		
4	1	810-0001-00	AC-DC Charger Adapter, 3-Cond, CSA		
5	1	820-0018-00	Hose, Sterile, Suction, 6' Lg.		
6	1	820-0024-00	Rinse Bottle		
7	2	906-0325-02	Manual, Operation/Service		

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802-0325-02 ASSEMBLY, ACCESSORY KIT

MODEL 325M A

LHS 1 1



TOLERANCES UNLESS OTHERWISE SPECIFIED		FRACTIONS DEC ANGLES	
INCHES	INCHES	DECIMALS	DEGREES
APPROVALS	DATE		
DRAWN LJC	11-11-88		
CHECKED LJC	11-11-88		
IMPACT		SCHEMATIC, PORTABLE ASPIRATOR	
		MODEL 325 M	
		SCALE	DRAWING NO.
		NONE	B
		SIZE	240-0325-01-4
		DO NOT SCALE DRAWING	SHEET 1 OF 1

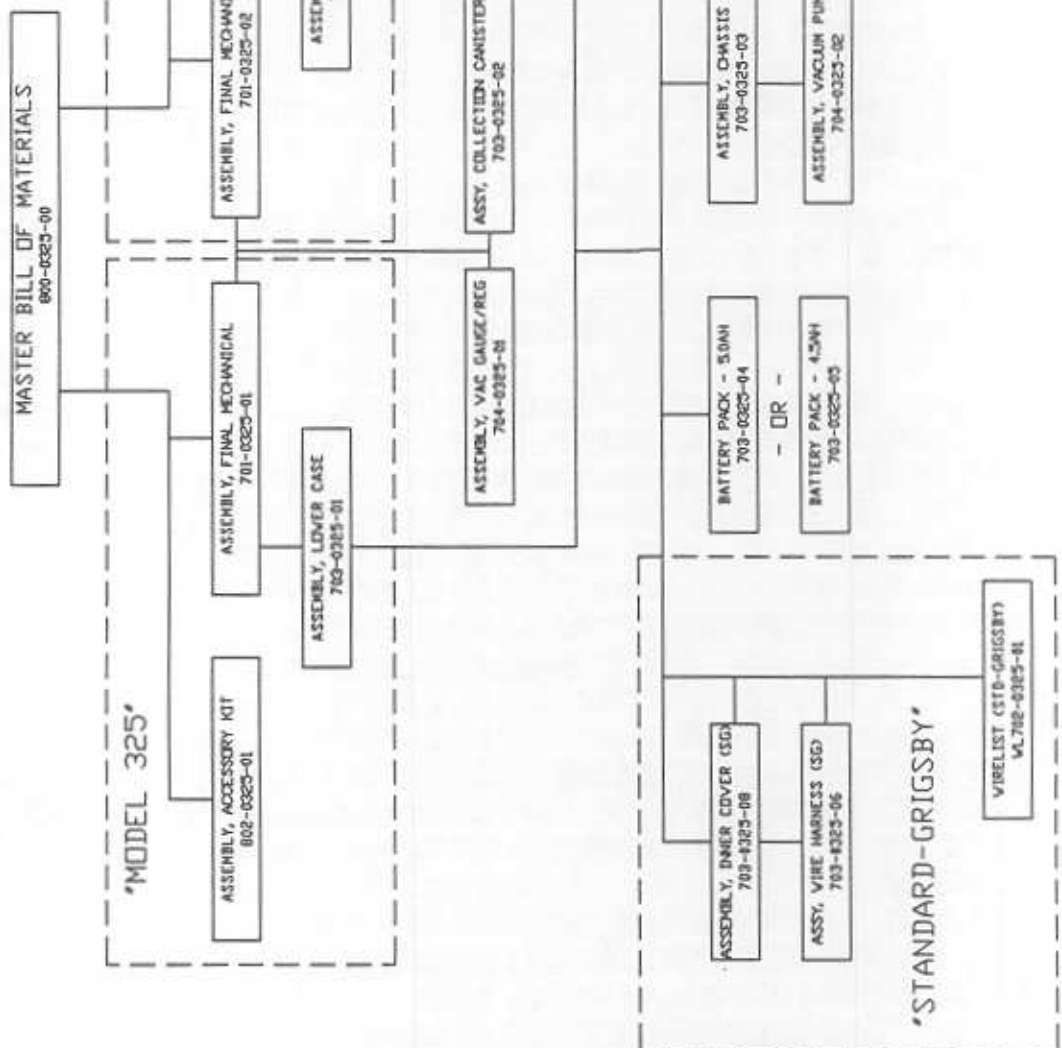


Figure 15
13 - 28

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DECIMALS +/- +/- +/-		IMPACT	
APPROVALS	DATE	BLOCK DIAGRAM	
DRWING LHS	02/093	MODEL 325/325M	
ORCING AG	02/093	SCALE	SIZE
		NONE	C
		DRAWING NO. 914-0325-00	
		SHEET 1 OF 1	

df: 91403250.DWG