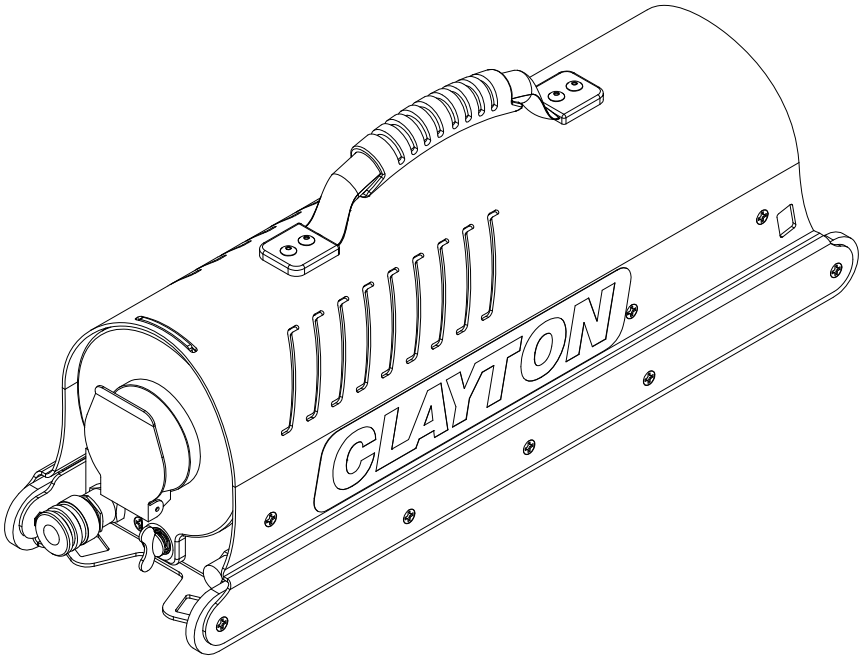


TECHNICAL MANUAL OPERATION AND MAINTENANCE INSTRUCTIONS

FOR THE HORNET ACE-SERIES VACUUM SANDING SYSTEMS

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This manual is intended as a complete operator's manual for owners and users of the Clayton ACE-300, ACE-400, ACE-500, ACE-1000, and other systems which incorporate the Clayton Hornet ULPA Vacuum. Although this manual details maintenance and operation of Clayton pneumatic tools in conjunction with the vacuum, these tools may be sold separately or as part of a kit. Purchasers of the ACE vacuum systems or other vacuum systems may choose to purchase pneumatic tools, hoses, or accessories from Clayton Associates, Inc.

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HAZARDOUS MATERIALS WARNINGS

There are no inherently hazardous materials in the Clayton ACE Vacuum Sanding Systems. However, use of the system can generate hazardous materials, depending on the media being sanded. When removing coatings such as lead paint, or other hazardous paints and primers, the resultant dust is hazardous and can cause serious health problems. Check with environmental or safety officers to determine the level of protection required when performing surface coatings removal.



Proper breathing protection should be worn whenever sanding surfaces with potentially harmful surface coatings. Paints and primers may contain lead, chromium, or other hazardous substances which can cause respiratory damage when inhaled as an airborne particle. Sanding fiberglass and other composite materials can generate a fine dust which has the ability to cause harm to the lungs. When in doubt, always take proper precautions.



Proper eye protection should always be worn when using the Clayton ACE-500/1000 Vacuum Sanding System or any other pneumatic tool. The mechanical interaction between the tool and the work surface can generate flying particles which can cause severe damage to the eyes.



Vacuum equipment should always be grounded. The friction caused by dust and air moving through the vacuum system causes a remarkable amount of static electricity. If the vacuum is not grounded at all times, the static charge will build rapidly, and may arc to the nearest ground. In environments where flammable fumes are present, this sudden spark can cause an explosion.

FOD Awareness:

All external fasteners have been installed using a calibrated torque wrench and thread locking compound to reduce the risk of Foreign Object Debris. If a fastener must be removed or replaced for any reason, thread locking compound must be applied.

Pre-Operational Checklist:

1. Visually inspect vacuum to ensure that no parts are missing or damaged.
2. Ensure that vacuum is properly grounded using the grounding jack to the left of the compressed air coupling.
3. Ensure compressed air supply hose is at least ½", and that it is connected to an equal or larger supply line.
4. Check to see if a filter bag and ULPA filter are installed in the vacuum.

Post-Operational Checklist:

1. Visually inspect vacuum to ensure that no parts are missing or damaged.
2. Ensure that all accessories are accounted for and returned to their proper locations.
3. Check condition of filter bag, and replace if necessary.

1. Introduction

- 1.1. Fabrication and surface preparation of sheet metal, composites, fiberglass, wood, and other materials frequently requires a technician to use pneumatic tools. These tools, whether sanders, drills, needle scalers, or trimmers, all generate dust and debris, which can be hazardous to the technician and to the environment. Use of an ULPA filtered vacuum along with vacuum capable tools can practically eliminate all exposure to airborne dust. The procedures herein provide a method for performing surface preparation operations while minimizing the particulate contamination of hazardous dust into the air, ground, and water.

2. Purpose

- 2.1. This technical manual presented in work package (WP) format, describes the Clayton Hornet Vacuum System, and how it shall be used to perform surface preparation operations.

3. Description

- 3.1. The Hornet vacuum system integrates a high efficiency filter vacuum cleaner with vacuum-capable sanders and tools for eliminating airborne toxins during sanding/grinding operations from metallic and nonmetallic aircraft structures, marine vessels, ground support equipment, and other surfaces requiring maintenance, repair, or fabrication.
- 3.2. The Clayton Hornet ULPA Filter Vacuum consists of a conductive plated aluminum enclosure powered by a pneumatic motor. When supplied with compressed air, the vacuum generates a minimum 70 c.f.m. of airflow, adequate to collect dust and debris from 1-2 vacuum tools. Depending on the work being performed, the vacuum may be used to provide dust collection from 2 tools. The vacuum can be hand carried. It can also be transported and used as a backpack vacuum using the included strap assembly.
- 3.3. The vacuum utilizes a two-stage replaceable filter system, and provides exceptional filtration of 99.999% of airborne particles 0.12 micron in size or larger. The first stage is a disposable filter bag, which captures the larger particles. After the filter bag, air passes through an ULPA filter, which captures any remaining particles. The bag filter can be changed using the patented Safe-Filter-Change. Using this method, filters are changed while the vacuum is running, minimizing the risk of contaminating the operator or the environment.

4. Warnings and Cautions

- 4.1. When operating air-powered appliances, or while working nearby one, safety precautions should be exercised to avoid personal injury and property damage. The following safety precautions should be followed by and communicated to all personnel working with or around Clayton DustMaster™ Vacuums and pneumatic tools:

- 4.2. Always follow static electricity safety procedures specified in NFPA 77. It is the responsibility of the user to take appropriate precautions in dress and behavior to avoid static buildup on his or her person. Always use proper bonding and grounding procedures when operating equipment in potentially explosive environments.
- 4.3. Before using this cleaning equipment, please check to see that a disposable filter bag is positioned properly in the vacuum, and that a Clayton ULPA Filter is threaded into place. All machines should have these filters in place when shipped. Follow Safe-Filter-Change™ procedures to open filter compartment after initial use (see Paragraph 12).
- 4.4. Never open cover to filter compartment without first supplying compressed air to the vacuum, and partially opening the operating valve. The constant suction will prevent recontamination of the work area and personal exposure to hazardous dust.
- 4.5. Never use vacuum to collect smoldering ash, burning embers, or other high temperature debris.
- 4.6. Never use vacuum to collect fuel, oil, or other flammable liquids.
- 4.7. This vacuum collection system is intended to collect dry or damp, not wet matter. Free flowing liquids may damage the ULPA filter, and use of this vacuum for wet pickup will void the warranty.
- 4.8. Always store equipment in dry area.
- 4.9. Always supply this vacuum with clean and dry compressed air. Motor damage from debris in the compressed air supply is not covered under warranty.
- 4.10. Use caution when connecting and disconnecting compressed air lines. When static air pressure is released suddenly, the airline can whip.
- 4.11. When operating Clayton pneumatic tools, always comply with: General Industry Safety & Health Regulations 29 CFR, part 1910 available from: Superintendent of Documents, Government Printing Office, Washington, DC 20402 and with the Safety Code For Portable Air Tools - ANSI B186.1, B7.1 and Z87.1 available from : American National Standards Institute, Inc.1430 Broadway, New York, NY 10018
- 4.12. Following information applies to kits which include Clayton pneumatic tools: Backup pads supplied with the sanders are specifically designed for these tools. Before using backup pads from another manufacturer, the operator must be sure that they have a speed rating which is higher than the free speed rating of the sander. Free speed ratings are based on 90 P.S.I.G. (6 bar, G) at the air inlet of the tool with the tool operating at free speed.
- 4.13. Safe and efficient operation of sanders can be best attained by observing proper operating, inspection and maintenance procedures. The operator must be carefully instructed in the safe operation and use of the tool. Ear, eye, face and body protection should be worn at all times when operating sanders. Use of a respirator is recommended until air monitoring confirms that a respirator is no longer needed.
- 4.14. Always disconnect the compressed air supply line before installing or removing abrasive discs, backup pads or otherwise performing service or maintenance to the sanders.

- 4.15. If the tool produces an unusual sound or vibrates more than is customary, discontinue its use and repair it immediately.
- 4.16. Tool speed check: If possible, tools should be checked at least once every twenty hours of use, or once weekly, whichever is more frequent. Do not use the tool if the speed exceeds the rating of the tool. Speed checks are best performed with a reed tachometer.

5. Specifications

- 5.1. Weight of complete system: ... Approx. 60lbs (depending on accessories)
- 5.2. Weight of vacuum only: 10lbs
- 5.3. Vacuum Dimensions: 6.25 x 6 x 20 inches
- 5.4. ULPA filter efficiency: 99.999% @ 0.12 micron
- 5.5. Filter bag efficiency: 95% @ 0.5 micron
- 5.6. Air Consumption (vacuum): 30-50 S.C.F.M. @ 90 P.S.I.
- 5.7. Air Consumption (sander): 17 S.C.F.M. @ 90 P.S.I.
- 5.8. Recommended Supply: 90 P.S.I (150 PSI Maximum)
- 5.9. Air intake: ½"
- 5.10. Hose Length: 10' combination Air/Vacuum Hose
- 5.11. Vacuum Performance 70 C.F.M., 140" WC (adjustable)

6. Principles of Operation

- 6.1. With air supply connected, compressed air is supplied to both the vacuum system and the pneumatic tool system.
- 6.2. Pressurized air enters the vacuum system and provides power to the air motor.
- 6.3. The suction created by the motor draws dust and debris from the pneumatic tools, along an air/vacuum hose, and into the DustMaster™ Filter Bag. Particles small enough to pass through the bag's filter media are captured by either the prefilter or the ULPA filter.
- 6.4. As pressurized air enters the pneumatic tool system, it is directed to the air coupler, where the pneumatic tool hose may be connected.
- 6.5. Connected to the vacuum through the main vacuum port is the air/vacuum hose, which delivers pressurized air to the pneumatic tools, and allows the flow of dust and debris back to the vacuum.

7. Preparation for Use

- 7.1. System is shipped complete. Remove packaging material from around system.
- 7.2. Open the case, and inspect the vacuum and tools. Any tools shipped with the system will be shadowboxed into the foam or packaged separately. The vacuum hose will be in the storage bag affixed to the lid.

- 7.3. Some equipment packages are shipped with a 30' supply airline, but depending on the system purchased, an airline may not be included. The vacuum is designed to operate on a 3/8" or larger airline. If one airline is used to power the vacuum and a pneumatic tool, then a 1/2" airline is required. Failure to use an adequate air supply can cause a decrease in performance of the pneumatic tools. Smaller air lines will not supply an adequate air supply to run the vacuum and tools. If you are unable to obtain an adequate airline, you may need to operate the tools and vacuum from separate airlines. If your shop air pressure is not high enough, you may need to operate the tools from separate airlines.
- 7.4. All vacuum filters are in place and ready for use when the vacuum ships.

8. Preparation for Storage

- 8.1. The Clayton DustMaster™ systems require no special preparation for short term storage.
- 8.2. When long term storage is required, Clayton recommends that the operator perform a Safe-Filter-Change to remove any dust or residue from the system.
- 8.3. Pneumatic tools should be oiled and operated briefly prior to long-term storage.

9. Preparation for Shipping

- 9.1. Place the vacuum into the storage case. Place all accessories into their proper locations in the case.
- 9.2. The ACE-500/1000 cases are sturdy enough for shipping. Use a plastic cable tie or wire to secure the lid shut using the padlock eyes in the lid.

10. Operational Procedures

- 10.1. Ensure that the vacuum is grounded. The vacuum has a grounding jack alongside the air inlet. Connect a standard aircraft grounding plug (Milspec M83413/4-1) to the vacuum using this jack. **WARNING: FAILURE TO USE SUITABLE BONDING/GROUNDING METHOD MAY RESULT IN STATIC ELECTRICITY BUILDUP AND MAY CAUSE AN EXPLOSION IF FLAMMABLE DUST OR FUMES ARE PRESENT.**
- 10.2. Connect one end of a 1/2" supply line to shop air supply.
- 10.3. Remove the vacuum/air hose from the storage bag in the case lid.
- 10.4. One end of the hose has a metal sleeve – insert this end into the vacuum inlet. Connect the end of the airline to the air coupler located beside the vacuum port. This connection can be made by pushing the airline plug directly into the coupler.
- 10.5. Select a pneumatic tool. Pick a tool whose shape and size best meets the needs of the job. Connect the vacuum exhaust cuff of the tool to the end of the adapter hose by threading the cuff onto the hose. Note that this is a reverse-thread. Turning the cuff counter-clockwise will tighten the fitting. Connect the air fitting on the tool to the airline coupler of the adapter hose.

10.6. Choose the proper size of abrasive for the pneumatic tool. Choose a grit that meets the requirements of the work surface. If you are unsure of the proper grit abrasive, check with a supervisor. **CAUTION:** *Always follow approved technical orders when selecting abrasive grits.* Press the throttle lever of the tool to ensure that the tool is not pressurized. **WARNING:** *Never replace abrasives or perform maintenance on any pneumatic tool while it is connected to an air supply.* Lay the abrasive onto the backup pad, with the abrasive side facing away from the tool. Ensure that the abrasive sheet covers the backup pad completely, and that the abrasive is oriented properly. Press the tool against a flat surface to affix the abrasive to the backup pad.

11. Operating as a Backpack Vacuum

11.1. Remove Backpack Strap Assembly from case

11.2. Attach the assembly to the vacuum, keeping the padded supports at the same end of the vacuum as the filter cover. Clips on the strap assembly attach to the loops under the filter cover, and to the loops in the rear side of the cover. In use, the vacuum hose should point upwards, and the compressed air supply line should hang straight down.

11.3. Loosen the straps by lifting the tab on the buckle portion of the straps.

11.4. Pull down on strap ends to snug the vacuum against the back.

11.5. Clip sternum strap to secure assembly across chest.

12. Using the Cooling Wand

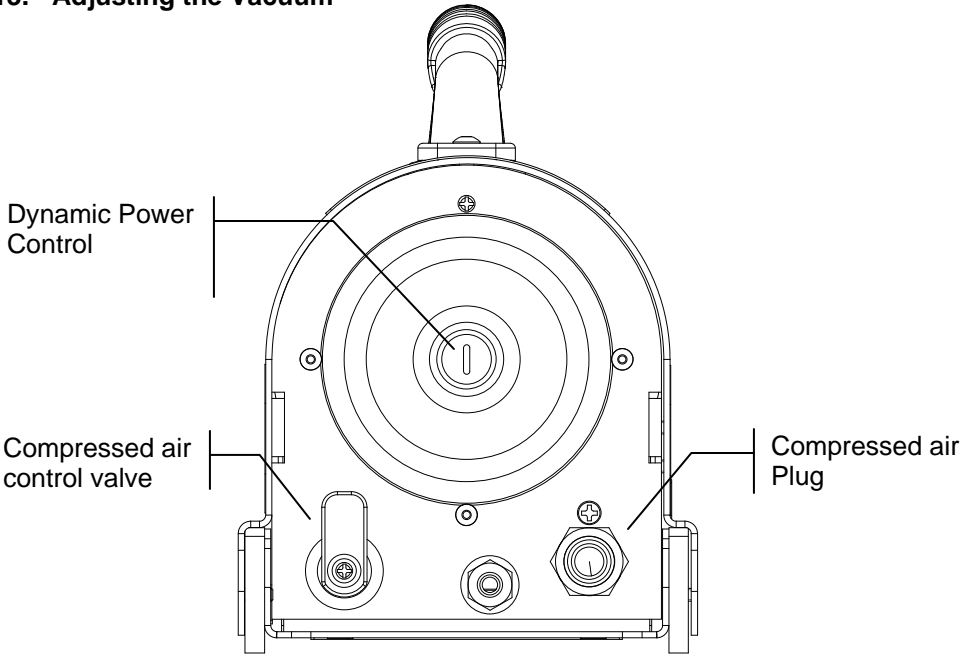
12.1. Some of the equipment packages include a blue and orange cooling wand with an integrated valve. This wand is typically located in the lower storage compartment of the case.

12.2. Plug this wand directly into the air coupling beneath the filter compartment lid, between the work hose and the vacuum.

12.3. Cool air will begin flowing from this tube when the system is pressurized. Adjust the valve to control the amount of air.

12.4. **WARNING:** *Cooling air comes directly from compressed air supply and is not respirable air. Do not direct this air into breathing zone or into hoods or masks. This air should be directed only towards areas of the body that are protected by clothing and are not near the nose, eyes, or mouth.*

13. Adjusting the Vacuum



13.1 Turn the Dynamic Power Control to adjust performance characteristics using a large flathead screwdriver.

Turning the control counter-clockwise \curvearrowright increases vacuum performance. Increasing vacuum performance increases air consumption.

Turning the control clockwise \curvearrowleft decreases vacuum performance. Reducing vacuum performance reduces air consumption.

14. Replacing Abrasives

14.1. Disconnect pneumatic tool from air supply.

14.2. Grasp abrasive by the edge and peel it away from backup pad. **WARNING: DISPOSE OF ABRASIVES PROPERLY. USED ABRASIVES MAY CONTAIN RESIDUAL HAZARDOUS MATERIALS.** If you are unsure of the preferred method of disposal, check with your supervisor or safety officer.

14.3. Check the wear on the hooks of the backup pad and pad protector. If significant wear is evident, replace protector and/or pad. Worn protection pads and backup pads will not adhere to the abrasive properly, and may allow the abrasives to spin off of the pad.

- 14.4. Choose the proper size of abrasive for the pneumatic tool. Choose a grit that meets the requirements of the work surface. If you are unsure of the proper grit abrasive, check with a supervisor. Press the throttle lever of the tool to ensure that the tool is not pressurized. *WARNING: Never replace abrasives or perform maintenance on a pneumatic tool while it is connected to a compressed air supply.*
- 14.5. Lay the abrasive onto the backup pad, with the abrasive side facing away from the tool. Ensure that the abrasive sheet covers the backup pad completely, and that the abrasive is oriented properly.
- 14.6. Press the tool against a flat surface with the abrasive down, to affix the abrasive to the backup pad.

15. Safe-Filter-Change™ Procedure

- 15.1. **WARNING:** It is imperative that the operator perform the following Safe-Filter-Change procedure in order to ensure that neither the operator nor the environment is exposed to potentially hazardous dust.
- 15.2. Connect the vacuum to the shop air supply.
- 15.3. Grasp the winged knob beneath the filter cover, and turn counter-clockwise one quarter turn to disengage the filter cover from the vacuum.
- 15.4. Open the vacuum's operating valve slightly to start airflow.
- 15.5. Gently pull the filter cover away from the vacuum housing. The filter bag will remain attached to the filter cover, and will pull free from the vacuum.
- 15.6. Turn a disposal bag (300-043-12) inside out, and place it over your hand like a mitten. Orient the filter cover so that the filter bag hangs straight down, and give it a light shake, allowing dust to settle to the bottom of the bag. Grasp the filter bag and pull it off of the filter cover, using the disposal bag to keep your hand from contacting the filter. Use a slight twisting motion to facilitate removal. Keep the mouth of the filter bag near the opening of the vacuum, so that any dust or debris dislodged from the filter will be drawn into the vacuum and will be captured by the ULPA filter.
- 15.7. Turn the disposal bag inside out around the DustMaster™ filter bag, and tape or tie the end of the disposal bag shut. Gently shake the sealed end of the disposal bag over the mouth of the Hornet to ensure that residual dust is not clinging to the exterior of the disposal bag. Dispose of the used bag in accordance with all regulations. Use ONLY Clayton DustMaster™ Filter Bags. Reorder part number 500-313-5
- 15.8. Place a new filter into the vacuum, so that the cardboard flange rests against the edge of the filter compartment. Slip the filter cover tab into the slot above the filter area. Tip the filter cover down, pressing the fill tube through the opening in the filter flange. Grasp the winged fastener, and press and turn it counterclockwise one-quarter turn to secure the filter. Turn off vacuum.

16. ULPA Filter Change

- 16.1. First, perform the Safe Filter Change detailed above. Changing the ULPA Filter can expose the worker and the environment to hazardous dust. Be sure to wear appropriate PPE. The Hornet should not be operating during the ULPA Filter Change – disconnect all air lines before changing the filter.
- 16.2. With the main filter bag removed from the Hornet, reach into the filter compartment and grasp the ULPA filter.
- 16.3. Turn the filter counter clockwise to unscrew it from its mount. Grasp the knob on top of the filter, and slowly pull the filter out of the Hornet.
- 16.4. Place ULPA filter into a disposal bag (pn 300-043-12), and seal the bag.
- 16.5. Replace this filter ONLY with a Clayton ULPA Filter (pn 627-516H). Place the new ULPA Filter into the Hornet, and screw it down onto the mount.
- 16.6. Replace primary filter bag (pn 690-A0031)
- 16.7. Secure filter cover on vacuum to complete filter change.

17. Vacuum Maintenance

- 17.1. Check the primary filter bag at regular intervals. The frequency with which this filter will need to be changed will depend upon the amount of sanding you perform, and the type of material collected.
- 17.2. Keep the unit away from moisture or harsh environments whenever possible. Store unit in a dry location.
- 17.3. Never use the Clayton Vacuum for wet vacuuming. The Clayton System is designed to extract dry dust, and is not equipped for fluid extraction. Vacuuming wet material can ruin the filter system, and void the warranty.
- 17.4. No field adjustment or calibration is required on vacuum system air pressure gages.

18. Tool Maintenance

- 18.1. Always check the condition of a pneumatic tool before use. Ensure that the backup pad is in good condition. Replace the backup pad at the first sign of wear. An old or damaged backup pad can break apart at high speeds, causing personal injury or property damage.
- 18.2. Oil the tools regularly. Before each use, place a drop of pneumatic tool oil directly into the air intake of each tool.
- 18.3. Always disconnect the pneumatic tool from the air supply when the tool is not in use. Change abrasives whenever a decrease in sanding performance is noticed. Failure to change abrasives regularly can cause more rapid degradation of backup pads.
- 18.4. Use only Clayton DustMaster™ Supreme backup pads, and only use the proper size for the sander. Each tool is calibrated for a specific size pad. Using an under- or over-sized pad will most likely result in heavy vibration, and a shortened lifespan for the tool and the backup pad. Excess vibration can cause personal injury.

19. Hose Maintenance

- 19.1. Never use the Clayton Air/Vacuum hose for suctioning liquids.
- 19.2. Always visually examine the air lines and disconnect plugs before using the Clayton Air/Vacuum Hoses. If a leak is detected, discontinue use immediately and repair or replace the hose.
- 19.3. Always store hoses in the case. Before turning off the vacuum, shake the hose to dislodge debris inside, and allow the vacuum to clear the hose.

20. Trouble Shooting

Symptom	Probable Cause / Remedy
Vacuum will not start	Air connection has not been made Ensure that main air supply is connected
Vacuum performance is low	Shop air pressure is set too low, Filter bag is full, ULPA filter requires replacement, or hose is clogged Ensure that shop air pressure is at least 90-120 PSI, and that the supply lines are at least ½". Replace filter bag using the Safe-Filter-Change procedure. Replace ULPA filter following instructions in Section 15. Check each hose for obstruction, and remove any debris
Air tools operating too fast	Tool throttle is set too high, Shop air pressure is too high Reduce tool throttle with adjustment knob on tool Ensure that shop air pressure does not exceed 120 PSI
Air tools operating too slowly	Tool throttle is set too low, Shop air pressure is set too low Increase tool throttle with adjustment knob on tool Ensure that shop air pressure is at least 90-120 PSI
Air pressure will not allow vacuum to achieve operating levels.	Supply air line is not delivering enough air Be sure to use a 1/2" or larger air line. Use a gauge to check the pressure of the main supply line. If the pressure on the main line is not adequate, you may need to increase shop capacity
Static electricity is causing sparks or shocking.	System is not properly grounded Ensure that shop air lines are grounded. Check to be sure that a ground wire has been connected to the vacuum grounding jack.
Excessive dust is visible at work surface.	Filter bag is full, Fine dust has coated surface of filter bag ULPA filter needs to be replaced Replace filter bag using the Safe-Filter-Change procedure. Replace ULPA filter following the instructions in section 15

21. Warranty

Clayton Associates, Inc. guarantees its products against defects in materials or workmanship and will either repair or replace all parts that prove defective under normal use for a period of one (1) year with the exception of Clayton Associates, Inc. vacuums, for which the period is two (2) years. The warranty period shall commence from the date of invoice.

This warranty does not cover repairs due to normal wear, accident, neglect, misuse, or use other than as indicated in the instruction booklet.

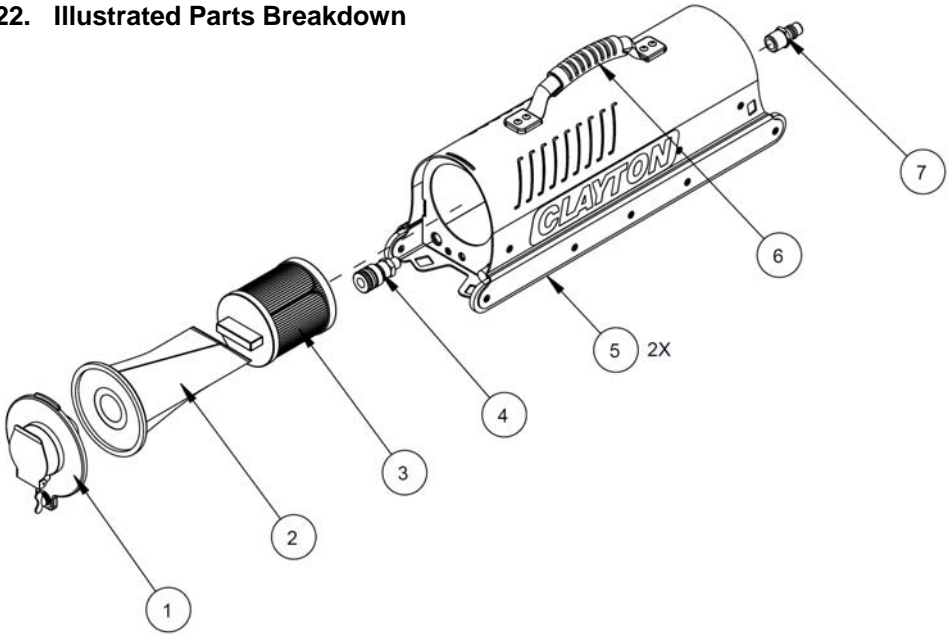
Within the continental U.S.: During the first 90 days of the warranty period, Clayton will at no charge to the customer, provide parts and labor at the customer's site. From day 91 onward, Clayton will provide parts to the customer's site at no charge and will perform labor at no charge for products returned to its factory at the customer's expense.

Outside the continental U.S.: Clayton will provide parts to the customer's site at no charge or for products returned to its factory at the customer's expense, Clayton will provide parts and perform labor at no charge.

Clayton shall not in any event be liable for any damages, loss of production time or profits, whether based on contract, warranty, negligence, strict liability or otherwise, including without limitation any consequential, incidental or special damages, arising with respect to the equipment or its failure to operate.

Clayton Associates, Inc. makes no other warranty or representation of any kind, except that of title, and all other warranties, express or implied, including warranties of merchantability and fitness for a particular purpose, are hereby expressly disclaimed.

22. Illustrated Parts Breakdown



Consumables

Ref	Part No	Description
2	690-A0031	Bag Filter
3	627-516H	HEPA Filter

User Serviceable / Replaceable Parts

Ref	Part No	Description
1	500-A4012	End Cap
4	940-011	Compressed Air Coupler 1/4"
7	940-08P	Compressed Air Plug 1/2"
5	911-075	Rubber Rails (each)
6	930-027	Carry Handle
	500-4016	Backpack Harness
	500-420	Cooling Wand
	500-415-1	FOD Wand

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