Operating Instructions for the BB4-3K and BB2-3K Cabinet Systems

EMPIRE
ABRASIVE EQUIPMENT

Model Number: _____ Serial Number: _____

Date of Purchase: _____ Date of Installation: _____

Distributor Purchased From:

        Name: _____

        Address: _____

        Phone: _____

<div align="center">* * * * *</div>

Manufactured by: EMPIRE ABRASIVE EQUIPMENT COMPANY
                       2101 West Cabot Boulevard
                       Langhorne, PA 19047-1893
                       Phone: 215-752-8800, Fax: 215-752-9373

Empire equipment should be properly maintained per the operating instructions. For peak performance of your equipment, use only genuine Empire replacement parts; accept no substitutes! **The use of non-Empire parts will void the warranty.**

<div align="center">

PARTS AND SERVICE
1-800-497-4543

</div>

To order Empire replacement parts, contact your local authorized Empire distributor. For the name of your local distributor, call Empire Customer Service, 1-800-497-4543, or fax us at 215-752-9373, or e-mail us on our website www.empire-airblast.com and we will call you back.

<div align="center">

CAUTION
NEVER USE SILICA BASED ABRASIVES IN EMPIRE BLAST SYSTEMS

</div>

Operating Instructions
for the
BB4-3K and BB2-3K Cabinet Systems

Empire Abrasive Equipment Company

2/18/04

Table of Contents

Introduction

Congratulations on your selection of the BB4-3K and BB2-3K Cabinet System from Empire Abrasive Equipment Company. This manual is provided to help your with the unpacking, assembly, use, and maintenance of your BB4-3K and BB2-3K Cabinet System.

Please read this manual carefully and keep it in the handy plastic pouch attached to your system for future reference. If you have any questions about the operation or maintenance of your equipment, contact your Empire distributor.

Empire: The leader in air-blast technology.

Empire specializes in the design and manufacture of air-blast equipment, and has continued as an industry leader of more than 50 years. Today, Empire produces the most extensive line of air-blast products in the world. In addition to BB4-3K and BB2-3K Basket Systems, our product line includes PRO-FINISH™ Systems, ProFormer Cabinets, ECON-O-FINISH™ Cabinets, Modified Systems, Automated Blast Systems, Blast Rooms, and SuperBlast™ Portable Blasters.

Empire Abrasive Equipment Company's reputation as a leader in air-blast technology is the result of meeting our customer's demand for quality equipment and systems that deliver increased productivity. We support our equipment with training, service, and testing programs. When you need advice, assistance, or equipment on short notice, our national network of distributors assures that help is nearby.

Figure 1 - BB4-3K and BB2-3K Cabinet System

1.0 Preparing for Installation

1.1 Hand Tools Required

The following tools are suggested for the installation of your BB4-3K or BB2-3K Cabinet system:

- 7/16" wrench or socket
- 6" adjustable wrench
- 9/16" wrench or socket

- Medium flat-blade screwdriver
- 14" Pipe wrenches
- Medium Phillips head screwdriver
- Channel lock pliers

2.0 Installation

Step 1: Unwrap and uncrate the components.

Step 2: Position the Reclaimer and Storage Hopper behind the Blast Cabinet. Provide access to the Media Regulators, Hopper Door, Reclaimer Door, and Reclaimer Tuning Band.

Step 3: Attach one end of the Conveying Hose to the Cabinet Hose Adapter. Attach the other end of the hose to the Reclaimer Inlet. See Figure 2. This connection must be airtight.

Step 4: Install the Dust Hose between the Reclaimer Outlet and the Dust Collector Inlet.

Step 5: Secure the hose ends with the clamps provided. This connection must be airtight.

Step 6: Connect your system to utilities as described in section 2.3 and 2.4.

Your BB4-3K or BB2-3K system consists of three fully assembled modular packages: the Dust Collector, the Reclaimer/Storage Hopper, and the Blast Cabinet. All equipment must be

mounted on a level surface and electrically grounded. *DO NOT* place your BB4-3K or BB2-3K system on a rubber mat or a floor subject to wet conditions.
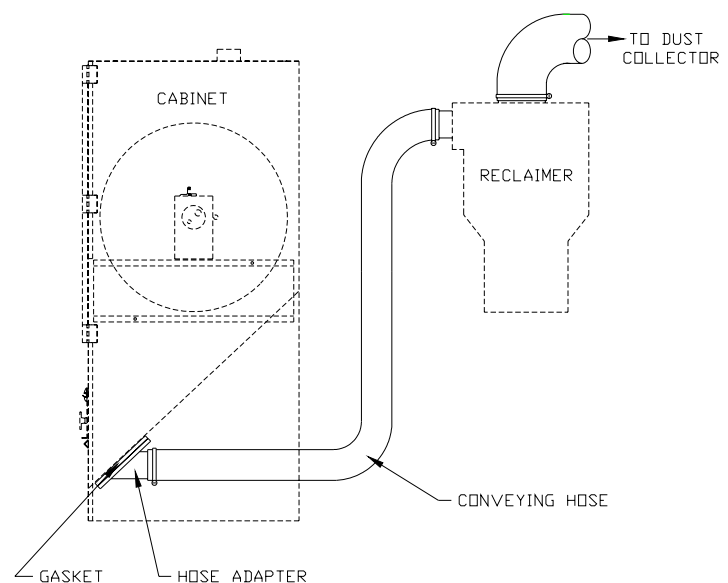

Figure 2 - Conveying Hose Installation

2.1 Installing the Dust Collector

The Dust Collector should be installed before the Blast Cabinet. In most instances, the Dust Collector will be located behind the Blast Cabinet. Install the Dust Collector as follows:

Step 1: Place the Dust Collector on a level surface behind or adjacent to the location of the BB4-3K or BB2-3K cabinet.

Step 2: Make sure the Access Door and Pneumatic Bag Shaker Pushbutton on the Dust Collector are readily accessible and the Dust Hose Inlet is directed toward the Blast Cabinet.

Step 3: Allow room for maintenance and to remove dust from the Dust Collector Hopper.

Step 4: Stabilize the Dust Collector by adjusting the leveling bolts to compensate for any unevenness of the floor.

Step 5: A separate ¼" air line is supplied for the Dust Collector Bag Shaker. It is located on the Pipe String. Attach the free end of this air line to the Dust Collector Compressed Air Inlet connection.

2.2 Installing the Cabinet

Step 1: Place the Blast Cabinet on a level surface. Insure that there is enough space around the system for easy access to components. Allow enough space for the Blast Cabinet Access Door to swing freely. For the BB4-3K, allow space for Oscillator movement.

Step 2: Stabilize the cabinet by adjusting its leveling bolts to compensate for an uneven floor.
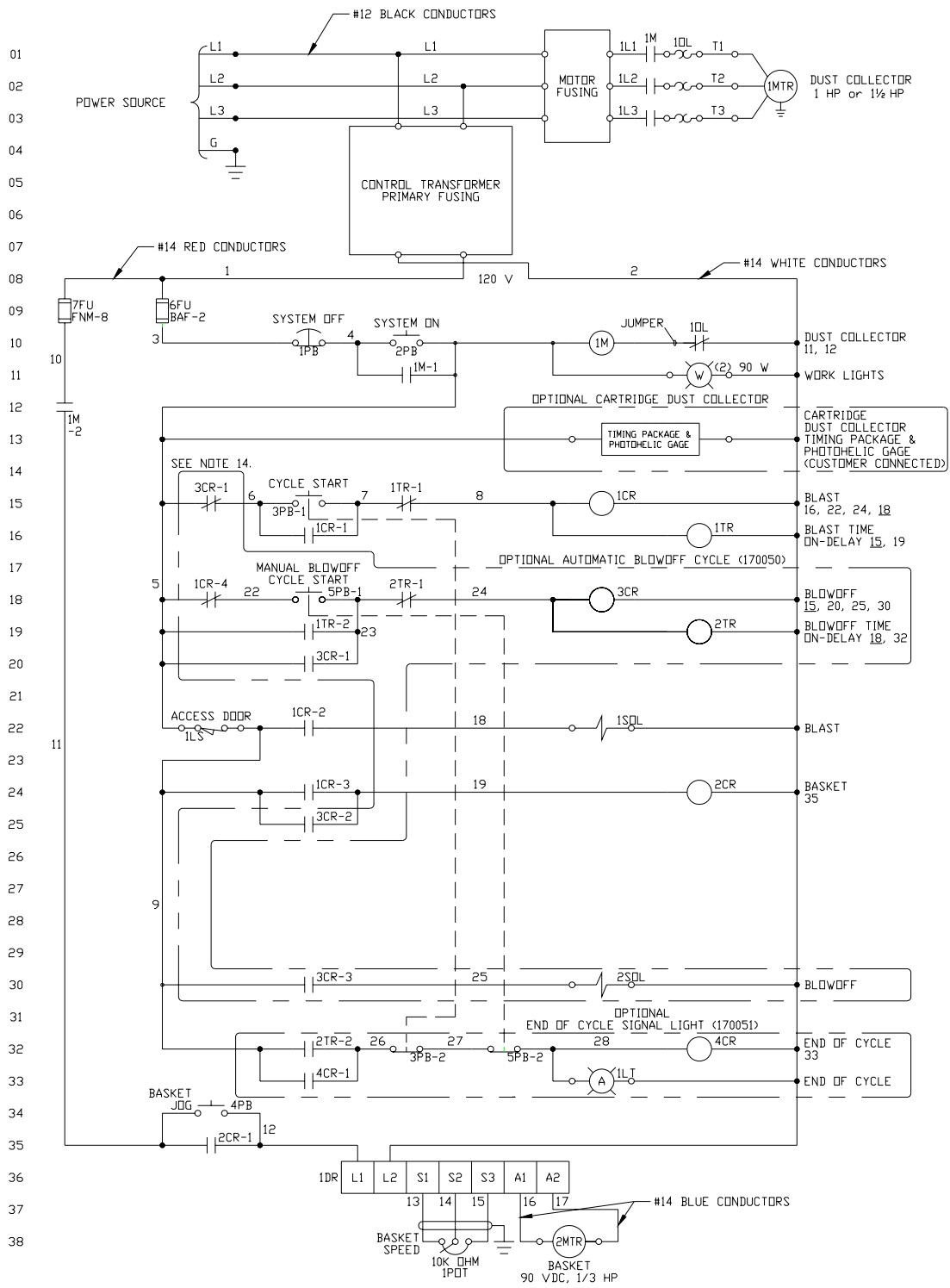
2.3 Electrical Connection

The standard power source required for the BB4-3K and BB2-3K systems is 240-volts/60 cycle/three-phase. The BB2-3K utilizes a 1 HP Dust Collector, the BB4-3K utilizes a 1 ½ HP Dust Collector. See Figures 3 through 5.

The following chart shows the amount of current required for each of the available voltages:

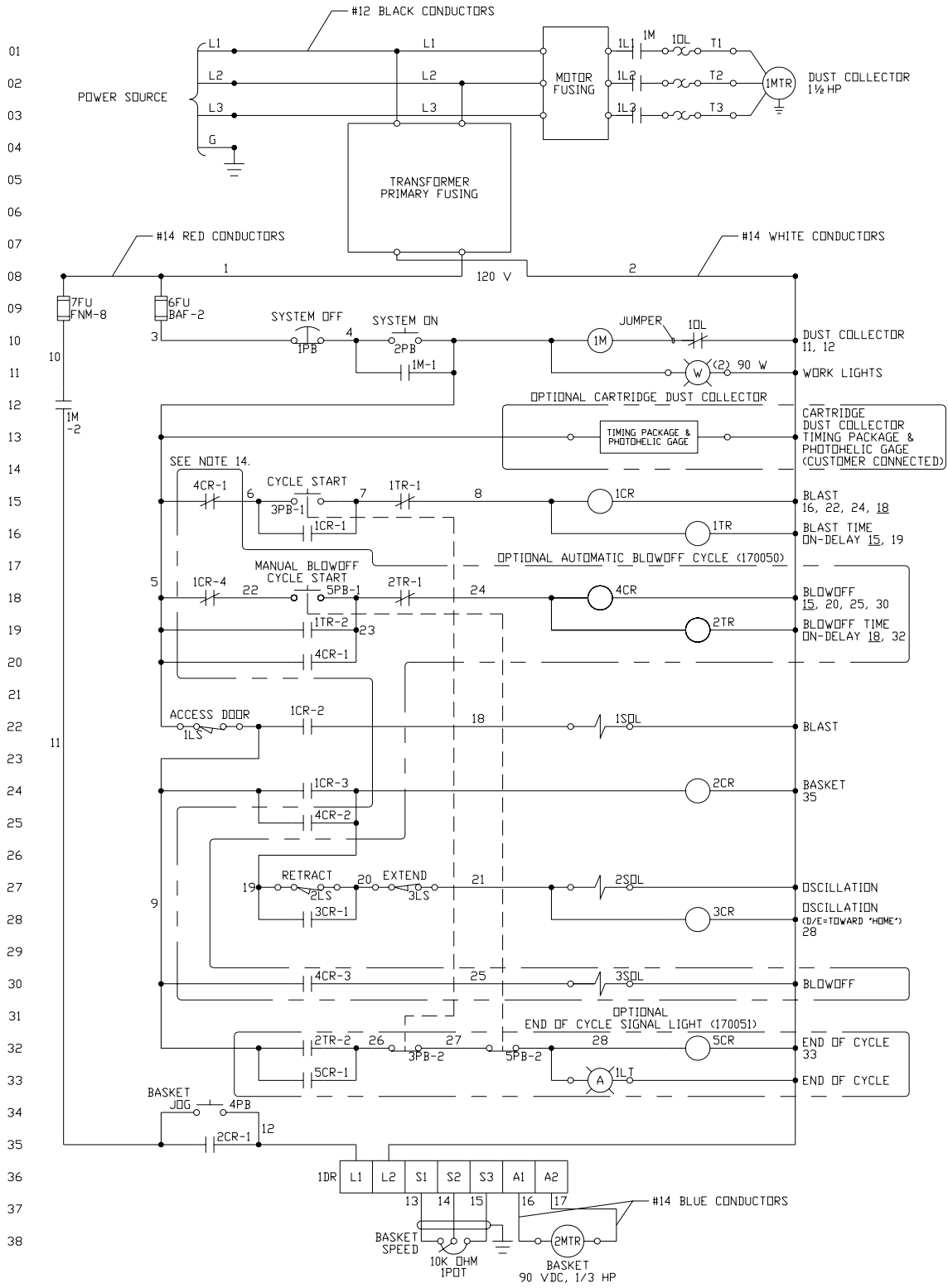| SOURCE VOLTAGE	MOTOR (HP)	CURRENT (A)
208V/60HZ/3-PH	1	12.0
220-240V/60HZ/3-PH	1	10.5
440-480V/60HZ/3-PH	1	5.2
550-600V/60HZ/3-PH	1	4.2
380/50HZ/3-PH	1	6.9
208V/60HZ/3-PH	1-1/2	14.1
220-240V/60HZ/3-PH	1-1/2	12.3
440-480V/60HZ/3-PH	1-1/2	6.1
550-600V/60HZ	1-1/2	4.9
380V/50HZ	1-1/2	8.9

<u>NOTE</u>
All electrical connections to BB4-3K or BB2-3K systems should be made by a qualified electrician following the adopted codes, standards and procedures specified by the authority having jurisdiction for that location. The customer is responsible for providing appropriate disconnecting means adjacent to the equipment for each incoming power circuit.

#12 BLACK CONDUCTORS

01 L1   L1   1L1 1M 1OL T1
02 L2   L2   MOTOR FUSING   1L2   T2   1MTR   DUST COLLECTOR 1 HP or 1½ HP
03 L3   L3   1L3   T3
POWER SOURCE
04 G
05 CONTROL TRANSFORMER PRIMARY FUSING
06
07 #14 RED CONDUCTORS
08 1   120 V   2   #14 WHITE CONDUCTORS
09 7FU FNM-8   6FU BAF-2
10 3   SYSTEM OFF   4   SYSTEM ON   JUMPER 1OL   1M   DUST COLLECTOR 11, 12
  1PB   2PB
11 1M-1   W (2) 90 W   WORK LIGHTS
  OPTIONAL CARTRIDGE DUST COLLECTOR
12 1M -2
13 TIMING PACKAGE & PHOTOHELIC GAGE   CARTRIDGE DUST COLLECTOR TIMING PACKAGE & PHOTOHELIC GAGE (CUSTOMER CONNECTED)
14 SEE NOTE 14.
15 3CR-1   6   CYCLE START   7   1TR-1   8   1CR   BLAST 16, 22, 24, 18
  3PB-1
16 1CR-1   1TR   BLAST TIME ON-DELAY 15, 19
  OPTIONAL AUTOMATIC BLOWOFF CYCLE (170050)
17 MANUAL BLOWOFF CYCLE START
18 5   1CR-4   22   5PB-1   2TR-1   24   3CR   BLOWOFF 15, 20, 25, 30
19 1TR-2 23   2TR   BLOWOFF TIME ON-DELAY 18, 32
20 3CR-1
21
22 ACCESS DOOR   1CR-2   18   1SOL   BLAST
  1LS
23
24 1CR-3   19   2CR   BASKET 35
25 3CR-2
26
27
28 9
29
30 3CR-3   25   2SOL   BLOWOFF
31 OPTIONAL END OF CYCLE SIGNAL LIGHT (170051)
32 2TR-2   26   27   28   4CR   END OF CYCLE 33
  3PB-2   5PB-2
33 4CR-1   A 1LT   END OF CYCLE
  BASKET JOG
34 4PB
35 2CR-1 12
  11
36 1DR L1 L2 S1 S2 S3 A1 A2
37 13 14 15 16 17   #14 BLUE CONDUCTORS
38 BASKET SPEED   2MTR   BASKET 90 VDC, 1/3 HP
  10K OHM 1POT

THREE PHASE SCHEMATIC

Figure 3 – BB2-3K Electricals Showing All Options

THREE PHASE SCHEMATIC

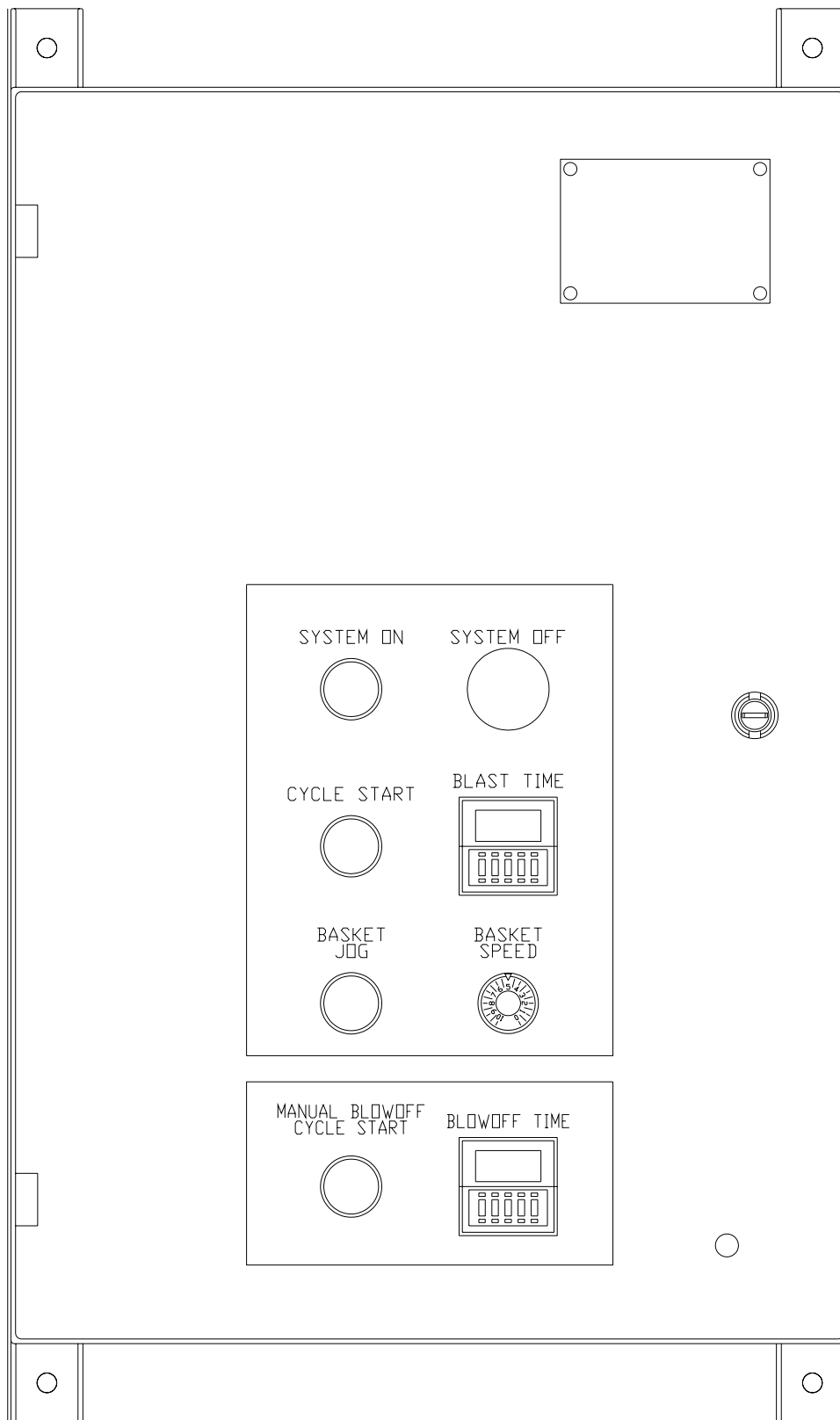**Figure 4 - BB4-3K Electricals Showing All Options**

Figure 5 - Control Panel With Optional Automatic Blowoff

SYSTEM ON   SYSTEM OFF

CYCLE START   BLAST TIME

BASKET
JOG   BASKET
SPEED

MANUAL BLOWOFF
CYCLE START   BLOWOFF TIME

2.4 Compressed Air Supply Connection

Step 1: Use the following two charts to determine the proper air volume required for your BB4-3K or BB2-3K system. The volume of air required for efficient operation of your system depends on the size of the nozzle/air jet (5/16" nozzle 5/32" air jet standard) and the desired Blast Pressure. The chart lists the minimum air requirements in SCFM for various nozzle, air jet, and pressures.

AIR REQUIREMENTS (SCFM) FOR SUCTION BLAST NOZZLES
(MULTIPLY BY 3 FOR BB4 OR MULTIPLY BY 2 FOR BB2)

	40 psi	60 psi	80 psi	100 psi
¼" nozzle, 1/8" air jet	12	17	21	26
5/16" nozzle, 5/32" air jet *	**19**	**27**	**34**	**42**
3/8" nozzle, 3/16" air jet	29	39	50	62
7/16" nozzle, 7/32" air jet	38	52	66	80

* Standard nozzle/air jet

Step 2: Use the chart below to determine the size of the air line required for your system. Even if the compressor is the correct size, the air line that connects to your system must be sufficient to avoid a large pressure drop which will cause inefficient blasting.

Example:

If your systems includes:
  (a) A 125-foot long airline, which requires a 1" line (according to the table).
  (b) An air volume of 80 CFM, which requires a 1-1/4" line size.

Choose the larger line size (1-1/4").

Line Size (in)	Length of Air Line (ft)	Air Volume (SCFM)
¾	Up to 95	13 to 38
1	95 to 190	38 to 59
1-1/4	190 to 350	59 to 85

IMPORTANT
For proper operation, your BB4-3K or BB2-3K system requires clean, dry air. Moisture or oil in the compressed air supply will contaminate the abrasive, which may prevent it from flowing freely and cause inefficient blasting. Though your system is equipped with a general-purpose filter to remove small amounts of condensed water and oil from the compressed air supply, it is not sufficient to clean grossly contaminated air.

3.0 General Equipment Operation

3.1 Media Selection and Use

Media selection strongly affects the efficiency of the blasting operation. The choice of media depends on whether cleaning, deburring, smoothing sharp edges, coating removal, preparation for coatings, etc. is to be performed. The size of the media will also affect the required results.

Fine media creates more impacts per second over a given area, and therefore is preferred for simple blasting jobs, such as the removal of light rust from steel.

Large media creates fewer impacts, but each impact has more force, and therefore is more suitable for difficult blasting jobs such as removal of mill scale.

Sometimes large and fine media may be combined to optimize results.

The chart below lists the range of media recommended for BB4-3K or BB2-3K systems. Certain media, such as sand and slag, are **not recommended** due to health reasons and because they pulverize on impact and become useless dust.

Media	Aluminum Oxide or Garnet		Glass Beads		Steel Grit		Steel Shot		Walnut Shells or Plastic
Size	46-80 Mesh	100-300 Mesh	25-180 Mesh	200-300 Mesh	G-16 to G-50	G-80 to G-200	S-390 to S-170	S-110 to S-70	Any Size
With Reclaimer	R	R*	R	R*	NR	R	NR	R	R

R – Recommended   * Recommended optional vibrating screen for mesh sizes 200 to 300 or when high humidity is a problem.
NR – Not Recommended   ** Recommended optional vibrating screen and aerated media regulator for mesh sizes 200 to 300.

Spherical media such as glass beads are used for general purpose cleaning and finishing where a satin-like finish is desired with little dimensional change. Glass beads are effective when used with pressures in the 20 to 60 psi range. Above 60 psi, excessive bead breakdown will occur.

Angular aggressive media, such as aluminum oxide, steel grit, and garnet generally provide faster cleaning and produce a less-polished finish compared to glass beads. Aluminum oxide and steel grit are suitable for use at pressures up to 100 psi. Garnet breaks down quickly at pressures greater than 40 psi.

Shells, corncob, starch, bi carbonate of soda, and plastic media are used on delicate parts. They are also used for cleaning and paint/coating removal without damaging the substrate, and when a polished finish is required.

20 to 100 psi Blast Pressures of may be used depending on the application. Media will break down rapidly at pressures above 50 psi.

NOTE
When changing media types, clean all hoses, the Storage Hopper, and Blast Cabinet interior thoroughly to avoid contamination of the new media. Refer to Section 4.3.

> **NOTE**
>
> If your application requires the use of the most abrasive medias such as aluminum oxide, garnet, or steel grit, Empire strongly recommends that you use an Ultrawear lined reclaimer and boron nozzles to prevent premature wear. If these options were not included with your system, they may be added. Consult your Empire distributor for details.

3.2 Media Loading

Step 1: With the system off, load media in the Suction Hopper Access Door.

Total capacity for the system is shown below.

	Glass Beads	Aluminum Oxide	Steel Shot or Grit	Walnut Shells or Plastic
Weight	320 lb.	600 lb.	1120 lb.	160 lb.

3.3 Equipment Startup

Step 1: After checking that all pipe and hose connections are tightly fastened and safety pins are installed in the quick couplings, turn on the plant compressed air to the system. Check for air leaks. Press the System On pushbutton.

Step 2: The lights will illuminate and the Dust Collector Blower will start.

Step 3: Place parts to be blast-treated in the basket. The parts must be free of oil, grease, and moisture.

Step 4: Replace the basket door and close the Blast Cabinet Door.

Step 5: Set the Blast Pressure Regulator and, if equipped, the Blowoff Pressure Regulator to the desired pressure. Recommended operating pressure ranges for various media are listed in the table below. Do not exceed 125 psi blast pressure.

Step 6: Set the Blast Timer, Basket Speed and, if equipped, Blowoff Timer. Press the Cycle Start pushbutton.

Step 7: The Basket rotates and the blast continues until the Blast Time expires. If equipped with a Blowoff Timer, a Blowoff Cycle will start with the basket rotating until time expires. The optional Cycle Complete strobe will start to flash.

Step 8: Press the Basket Jog push button until the basket door is located in front of the cabinet window. Open the Blast Cabinet Door, remove the Basket Door, press the Basket Jog pushbutton until the opening is at the bottom dumping parts onto the Blast Cabinet floor.

Step 9: Open the Dump Door permitting parts to fall out of the Blast Cabinet into a container.

Media	Blast Pressure (psi)
Glass Beads	30-60
Aluminum Oxide	30-100
Steel shot or grit	80-100
Walnut shells or plastic	20-100

3.4 Equipment Shutdown

Step 1: Press the red mushroom head System Off pushbutton.

Step 2: Shut off the plant air supply to the system.

3.5 Equipment Adjustments

Reclaimer Adjustment

All BB4-3K and BB2-3K reclaimers may be adjusted to control the average size of media retained. The Reclaimer is supplied with a tunable secondary air adjustment band. When this band is properly adjusted, reusable media will be returned to the Storage Hopper. Unwanted dust and broken down media (fines) will be removed from the system and conveyed to the Dust Collector.

Empire's new reclaimer design has vertical slots with a solid tuning band. The original Pro-Finish reclaimers have horizontal slots in both reclaimer and tuning band.

Fine tuning adjustments of both reclaimers are similar. Move the band in the direction of the reclaimer slots: for horizontal slots rotate the band, for vertical slots slide the band up or down.

The tuning band is joined at both ends by a bolt that must be loosened before the band can be adjusted. The slot pattern around the reclaimer body has one slot omitted. The joined ends of the tuning band must be located over the area of the omitted slot and no reclaimer slots should be visible.

Step 1: Adjust the band in one direction until 1/16" of opening is visible between the band and Reclaimer slots.

HELPFUL HINT
Place a pencil mark on the band and a corresponding reference mark on the reclaimer body.

Step 2: Operate the system for at least one hour.

NOTE
Dust Collectors require a light coating of dust on the filter elements (dust bag or cartridge) to achieve maximum filter efficiency. This coating of dust is referred to as "seasoning" the filters.

Step 3: Turn the system off.

Step 4: After the optional Auto Bag Shake completes its cycle, dump the waste from the Dust Collector. Inspect the waste for reusable media.

Step 5: If no media is found in the waste, adjust the tuning band to expose 1/16" more reclaimer body slot area.

Step 6: Make a new reference mark on the Reclaimer body.

Step 7: Repeat Steps 2 through 7 until a small amount of media is found in the Dust Collector waste. Adjustment is complete.

NOTE
As a new system is used, the filters become "seasoned" and the airflow in the recovery system will decrease to the normal operating rate. This will affect the previous reclaimer tuning band adjustments.

If more than a small amount of media is found in the Dust Collector waste, additional reclaimer tuning band adjustment may be required. Follow Steps 8 through 14.

Step 8: Adjust the tuning band back to the previous reference mark on the reclaimer body.

Step 9: Operate the system for at least one hour.

Step 10: Turn the system off.

Step 11: After the optional Auto Bag Shake completes its cycle, dump the waste from the Dust Collector. Inspect the waste for reusable media.

Step 12: If no media is found in the waste, adjust the tuning band to expose 1/16" more reclaimer body slot area.

Step 13: Make a new reference mark on the Reclaimer body.

Step 14: Repeat Steps 8 through 14 until a small amount of media is found in the Dust Collector waste. The adjustment is complete.

The schematic diagram in Figure 6 illustrates:

    (1) The basic operation of the system.
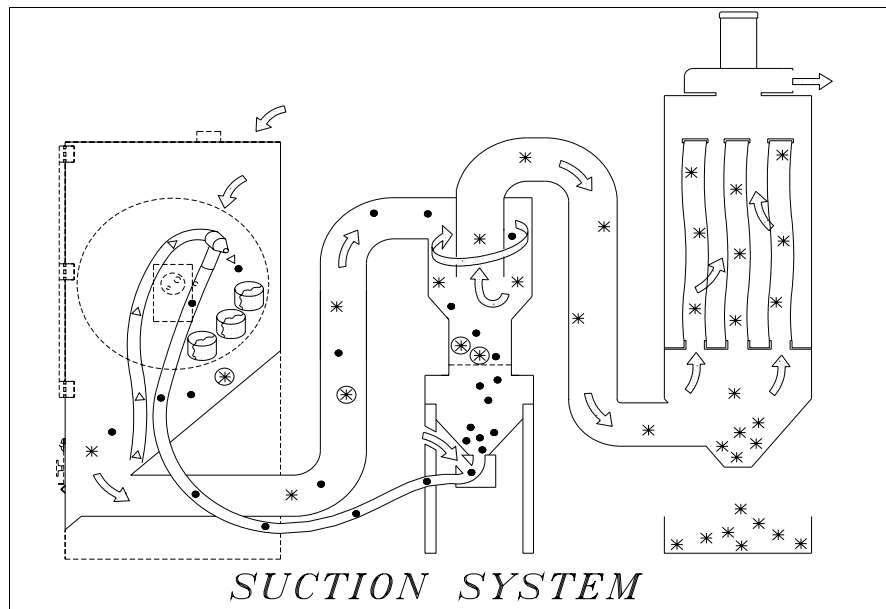   (2) The air and media flow before and after blasting.

RECOVERY AIR FLOW
COMPRESSED AIR
MEDIA
DUST
DEBRIS

SUCTION SYSTEM

Figure 6 - Operating Principles

IMPORTANT

An insufficient volume of secondary air entering the Reclaimer will cause dust to accumulate with the "good" media in the Storage Hopper. This accumulation leads to inefficient blasting. Conversely, too much secondary air will cause useful useable media to be carried to the Dust Collector and be wasted. To avoid these conditions, adjust the tuning band to meet the specific system requirements. When a system is new, it will be necessary to readjust the tuning band periodically until the Dust Collector filters are "seasoned".

HAZARDOUS DUST

ADDITIONAL FILTRATION IS REQUIRED FOR DUST CONTAINING TOXINS AS DEFINED BY OSHA REGULATIONS (STANDARD-29 CFR) 1910.1000 "AIR CONTAIMINANTS, SUBPART Z, TOXIC AND HAZARDOUS SUBSTANCES" OR MAY OTHERWISE PRESENT A HAZARD TO PERSONNEL.

COMBUSTABLE DUST

A CONCENTRATION OF COMBUSTABLE DUST MAY BE IGNITED BY SPARK, FLAME, OR HEAT SOURCE. REFER TO NFPA 497M FOR INFORMATION ON COMBUSTABLE DUST. USE EXTERE CARE WHEN EMPTYING THE DUST COLLECTOR WASTE OFTEN AND DISPOSE OF PROPERLY.

REMOVING DUST COLLECTOR WASTE

CONSULT OSHA REGULATIONS (STANDARD-29 CFR) 1910.120, "GENERAL DESCRIPTION AND DISCUSSION OF LEVELS OF PROTECTION AND PROTECTIVE GEAR." ALWAYS WEAR APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT (PPE) WHEN EMPTYING THE DUST COLLECTOR, DISPOSING OF COLLECTOR WASTE, AND CHANGING DUST BAGS. EMPTY THE DUST COLLECTOR AFTER EVERY CLEANING OF THE COLLECTOR BAG FILTERS.

CLEAN FILTERS OFTEN

CLEAN DUST COLLECTOR FILTERS AFTER EVERY 2-4 HOURS OF SYSTEM OPERATION. CLEAN FILTERS MORE OFTEN WHENCABINET VISIBILITY IS REDUCED. WHEN USING FINE OR ANGULAR BLAST MEDIA, THE DUST "CAKES" FROM HIGH HUMIDITY WHEN STATIC ELECTRICITY IS PRESENT. AN AUTOMATIC BAG SHAKE OPTION IS AVAILABLE FOR PRO-FINISH BAG TYPE DUST COLLECTORS. CONTACT YOUR EMPIRE DISTRIBUTOR FOR INFORMATION.

Media Flow Adjustments (Suction)

BB4-3K and BB2-3K Suction Blast Systems are equipped with the SAR-2 media regulator to control the flow of media to the Suction Blast Gun. The regulator is located at the bottom of the Storage Hopper assembly inside the inlet component access door.

The amount of media entering the hose is controlled by how far the media hose is inserted into the regulator. For normal operation, approximately ½ of the air inlet port is blocked by the media hose. This may vary slightly when changing media size nozzle size, and/or blast pressure.

To find a uniform media flow, loosen the thumbscrew and slide the media hose into the SAR-2 regulator to increase and withdraw the hose to decrease media flow at the nozzle. To determine if media is flowing, look through the media regulator air inlet while the gun is operating. Listen for the sound of the blast to be smooth and constant.

3.6 Helpful Hints for More Efficient Blasting

The efficiency of your blasting operation depends on four factors:

1) Equipment selection
2) Media selection
3) Operating procedures
4) Maintenance

With the help of your Empire Distributor and/or Empire factory representative, you now own equipment that will properly meet your blasting requirements.

You can select the proper media, operating procedures, and maintenance steps by following the recommendations in this manual. If you need more information about any aspect of your system's operation or the blasting process, contact your Empire distributor or the factory.

The following measures will also help you improve the efficiency of your blasting operation:

1) To accomplish more in less time, use the largest nozzle practical for your operation. Of course, nozzle diameter may be limited by the volume of compressed air available, an increased volume of compressed air is often justified by reduced labor costs.

2) For faster cleaning, use the highest-pressure practical for your operation. Maximum pressure for a given operation is limited by type of media (e.g. glass beads break down rapidly at high pressure) and amount of material which must be removed from parts.

3) *Never underestimate the importance of clean, dry air.* More operational problems are traceable to the lack of clean dry air than any other single factor. If the supply air is not clean and dry, media quickly becomes contaminated, causing flow problems, which wastes media and leads to excessive operation downtime.

4.0 Maintenance

4.1 Daily Maintenance

Step 1: Check the condition of the media. If it is contaminated or broken down into dust, thoroughly clean the inside of the cabinet and recovery system and reload with new media.

Step 2: Adjust the tuning band if you observe a dusty condition.   See Section 3.5.

Step 3: Check the light bulbs.

Step 4: Remove debris from the reclaimer screen.

Step 5: Open the manual drain on the general-purpose filter in the cabinet pipe string and drain any accumulated moisture and oil. Close the drain.

Step 6: Check the media level. For optimal operation, the level should not drop below one-half the capacity.

Step 7: All quick coupling connections must be equipped with safety pins. Inspect all couplings and blast hoses splits, bubbles, soft spots, etc. Screws should be flush with coupling surfaces. Tighten the screws, if necessary.

4.2 Weekly Maintenance

Step 1: Repeat the daily maintenance procedures.

Step 2: Inspect all media-carrying hoses for wear by feeling along the length of the hose for soft spots. Hoses with soft spots should be replaced.

Step 3: Check the nozzles for wear. When the nozzle is worn 1/8" oversize, replace it. A drill bit may be inserted into the nozzle to check its size.

Step 4: Check the air jet for wear.

Step 5: Loosen the setscrew on the side of the gun body and remove the gun body for the air jet. See Fig. 7.

Step 6: Check the nozzle adapter and gun body for wear. Replace if necessary.

Step 7: Check the window gaskets for leaks. Replace if necessary.

Step 8: Check your spare parts inventory. Ensure that you have an adequate supply of replacement items.

ELBOW, $\frac{1}{2}$ NPT

COUPLING, $\frac{1}{2}$ NPT

AIR JET

FIGURE 7. AIR JET MOUNTING

IMPORTANT

If an air jet is allowed to wear completely through, it will cause premature wear and destroy the gun body and nozzle.
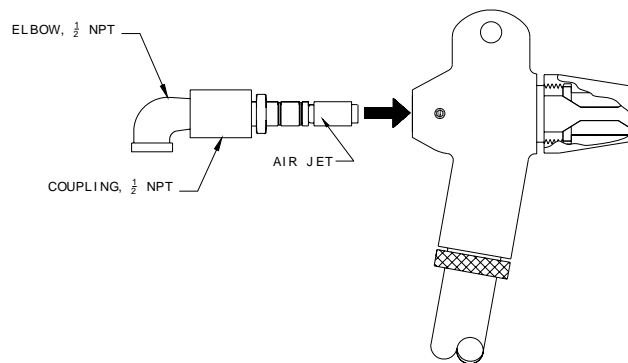

4.3 Storage or Temporary Non-Use

If your BB4-3K or BB2-3K system will not be used for several days or longer, drain all the media from the Storage Hopper to prevent the media from caking inside the machine. Drain the general-purpose filter, then keep the drain valve closed.

5.0 Troubleshooting

5.1 Troubleshooting Chart

Trouble	Probable Cause	Remedy
1. Good media is carried to the Dust Collector.	New bags.	Continue to use until bag "cake" forms after approximately eight hours of operation.
	Tuning band is open too far.	Adjust tuning band.
	Insufficient media in Suction Hopper allows secondary air to enter.	Add media to recommended media level.
	Very fine media.	Close tuning band.
	Fan rotation backward.	Reverse fan rotation.
2. Media escaping to the work area from the Dust Collector.	Hole in dust bag(s) or loose bag(s).	Replace leaking bag(s)or refasten bag(s).
3. Poor visibility when blasting.	Reclaimer not adjusted properly.	Adjust reclaimer air inlet settings. See 3.6 *Equipment Adjustments.*
	Clogged dust bag(s).	Shake dust bag or Dust Collector bags.
	"Blinded" filters (reduced air flow due to age of bag).	Over a period of years dust may penetrate the dust bag to the extent that normal airflow is restricted even when bags are shaken regularly. When this condition is reached, replace the filters.
	Media has high dust content.	Replace media and adjust reclaimer tuning band.
	Return hose blocked.	Remove return hose, inspect for obstruction.
	Cabinet air inlet plugged	Blow filter clean with air line.
	Dust Collector door leaks air	Tighten door, and replace gasket if necessary.
	Blast Nozzle or Air Jet too large	Replace worn nozzle with recommended size: maximum ¼" diameter, maximum 7/32" air jet for suction.
	Operating air pressure too high.	Decrease pressure to within recommended range.
4. No air or media flow from nozzle.	Compressed air line closed.	Open all air valves from compressor.
	Doors not tightly closed.	Close cabinet doors.
	Nozzle clogged.	Disassemble and clean nozzle.
5. Poor production rate.	Regulator adjusted to zero.	Adjust regulator.
	Low blast air pressure.	Increase pressure within the specified range.

Trouble	Probable Cause	Remedy
	Nozzle too small. The smaller the nozzle, the smaller the blast pattern.	Install a larger nozzle and air jet to accommodate production needs.
	Improper media.	See 3.1 *Media Selection and Use.*
	Improper media flow.	See 3.5 *Equipment Adjustments.*
	Low media level.	Add media to maintain recommended level.
	Parts to be blasted are oily or wet.	Parts to be processed must be absolutely dry and free of oil, grease, etc.
	Media has high dust content. Blast media breaks down and must be replaced on a regular basis.	Remove old media from system and replace with new. Adjust reclaimer tuning band. See Section 3.5.
6. Static charge build-up and discharge irritates the operator.	Low quality blast hose (poor conductor of static charge).	Replace blast hose with one of high quality. Static charges can be created and built up by the air and media moving at high velocity through the blast hose.
	System grounded improperly.	Earth ground the system.
	Low ambient humidity.	Anti-static wrist strap 510411.
7. Blast air flow, but intermittent or no media flow.	Blast air pressure too low.	Adjust and maintain pressure within recommended range.
	Clogged nozzle.	Disassemble and clean nozzle.
	Damp media. If media stays formed in a ball after squeezed in the palm of the hand, it is too damp to flow properly.	Remove damp media from system and replace with new, dry media. Check compressed air supply filters. Do not blast wet or oily parts.
	Improper air jet nozzle combination.	Nozzle orifice size must be twice the air jet orifice size. A 1/8"diameter air jet requires minimum ¼" diameter nozzle.
	Media hose improperly installed.	Adjust media hose in media regulator. Check media hose at entry to the suction gun body, hose clamp nut, o-ring, and hose must create an airtight seal.
	Clogged media hose.	Remove the Media Hose from the Media Regulator at the bottom of the Storage Hopper. Bring that end of the hose through the open door of the Blast Cabinet. Remove the nozzle from the Suction Gun. Insert the Blowoff Nozzle into the open end of the media hose, and blow the accumulated media and/or debris out.

6.0 Recommended Spare Parts

The following chart lists the parts you should maintain in inventory to ensure continuous operation of your BB4-3K or BB2-3K system.

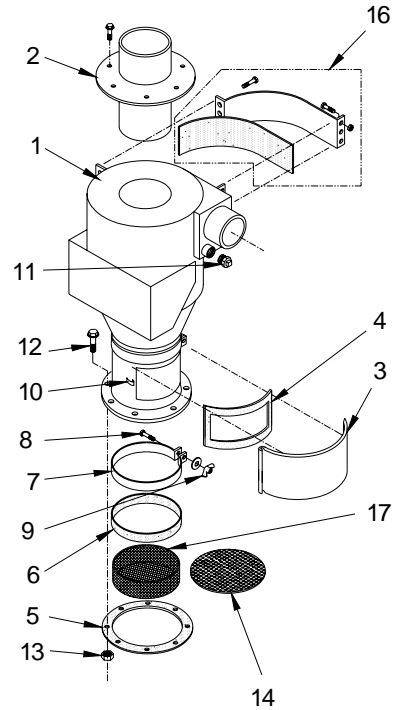| Quantity	Part Number	Description
3 (BB4) or 2 (BB2)	501331 501341 401351	¼" Di-Carb nozzle (suction) or 5/16" Di-Carb nozzle (suction) or 7/16" Di-Carb nozzle (suction)
2	532701	Floodlights
20 feet	524441	Door gasket
10	524802	5/8" blast hose
1	524451	Window gasket
1	510401	Window safety glass
2	523523	Filter
1	522351 516103	4 x 8 return hose or 6 x 3 return hose
1	753551	Media gun body MH-2
3 (BB4) or 2 (BB2)	507391 505661 505671 505691	3/32" air jet or 1/8" air jet or 5/32" air jet or 7/32" air jet

7.0 Options and Accessories

A variety of standard accessories are available for any BB4-3K or BB2-3K system. These accessories may be either factory installed or customer installed with a minimum of cabinet modification. Therefore, if your production requirements change, you may add the options you need to update your system.

| Category	Options	Description
1. Optional Electricals	220-240/50/1 208/60/3 220-240/60/3 380/50/3 440-480/60/3 550-600/60/3	Voltage/Frequency/Phase available.
2. Automatic Blowoff		Blows off part at end of blast cycle.
3. End of Cycle Light		Illuminates when the cycle is complete to notify the operator.
4. Harsh Media and Extended Wear Components		Empire's extended wear components increase service life in an aggressive or high-use environment. These components are very cost-effective because they reduce downtime, repair interval, and maintenance costs. Extended wear components are sold individually so you may tailor features to your application needs and budget.
	Inlet wear plate	An easily replaceable inlet wear plate protects the most vulnerable are of the reclaimer.
	Reclaimer urethane coating	The urethane coating extends the service life of interior wear surfaces by five times.
	Reclaimer Ultra-Wear lining	The Ultra-Wear lining increases normal service life by a factor of ten.
	Di-Carb® (tungsten carbide) nozzles	Di-Carb nozzles are for use with steel abrasives and glass beads.
	Boron carbide Nozzles	Boron carbide nozzles are for use with aluminum oxide, silicon carbide, and garnet media.
	Window protectors	Window protectors can be provided in clear plastic or as a perforated screen to reduce frosting and pitting.
5. Magnetic Reclaim Separator		Magnetic reclaim separator reduces possible damage to delicate substrates by removing steel and other ferrous contaminants from the blast media as it passes through the reclaimer. The separator consists of an industrial magnet that can be removed through the reclaimer door for cleaning.
6. Dust Collector Options. For more information about options, contact your Empire distributor	Photohelic controlled pulse jet cleaning	Automatically pulse the filters as required.

COMPONENTS

Item	Part Number	Description
1	140440	Reclaimer Body Assembly (includes items 1-12)
2	766741	Removable top
3	760721	Door, reclaimer
4	524331	Gasket, reclaimer door
5	524371	Gasket, reclaimer to storage hopper
6	534341	Gasket, tuning band
7	760701	Tuning Band (steel part only)
8	551782	Bolt, ¼" -20 x 2"
9	552392	Wing nut, ¼" -20
10	509581	Latch and keeper (requires welding)
11	544122	Plug, 1" NPT (Suction systems only)
12	551842	Bolt, 3/8"-16 x 1" (8 required)
13	552542	Nut, 3/8" -16 (8 required)
14	739041	Screen, fine, 11-1/2" OD (8 mesh)
	739051	Screen, coarse, 11-1/2" OD (4 mesh)
15	760711	Screen, flat, 5/16", 13" OD
16		Wearplate assembly and components
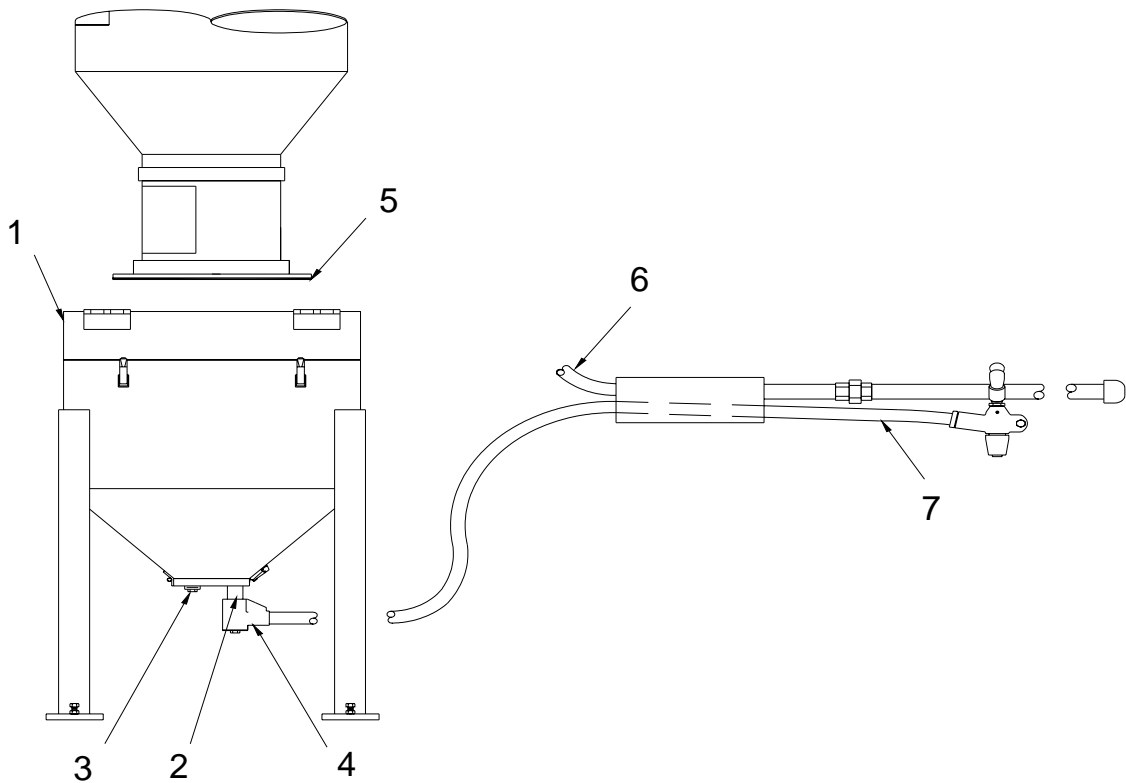
COMPONENTS

Item	Part Number	Description
1	140487	Hopper, multi-gun (4 outlet)
2	546332	Nipple, 1-1/4" NPT x 3"
3	544142	Plug, 1-1/4" NPT
4	290156	SAR-2 Media Regulator
5	524381	Gasket, reclaimer to hopper

BLAST & AIR HOSE

Item	Part Number	Description
6	520861	Air hose ½" ID (order per foot)
7	520802	Blast hose 5/8" ID (order per foot)

SAR-2 MEDIA REGULATOR

Item	Part Number	Description
4	290156	SAR-2 media Regulator, complete, 1-1/4" FPT
4A	753351	Regulator body, SAR-2
4B	510121	Plug, clean out
4C	551042	Thumb screw, ¼"-20 x 1"
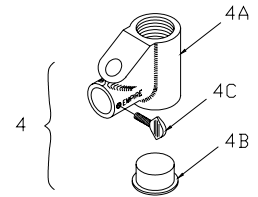
PARTS FOR MH-2 GUNS

Item	Part Number	Description
1	735551	Gun body, MH-2 long handle
	753561	Gun body, MH-2 short handle
2	505651	Air jet, 3/32" (orange)
	505661	Air jet, 1/8" (yellow)
	505671	Air jet, 5/32" (green)
	505681	Air jet, 3/16" (blue)
	505691	Air jet, 7/32" (white)
	505701	Air jet, ¼" (red)
3	520402	Hose barb, ½" FPT x ½" hose
4	505621	Connector, MH-2
5	523912	O-Ring, ½" ID x 5/8" OD (2 required)
6	526171	Sleeve, rubber, for air jet
7	505641	Nozzle adapter, plastic (standard)
	504931	Nozzle adapter, steel
8	523881	O-Ring, 1-1/16" ID x 1-5/16" OD
9	520081	Nut, hose clamp, MH-2
10	551702	Set screw, ¼"-20 x 3/8"
11	544862	Coupling, ½" NPT (BB4-3K only)
12	543532	Elbow, ½" NPT street (BB4-3K only, 2 per gun)
13		For replacement nozzles see 6.0 Recommended Spare Parts
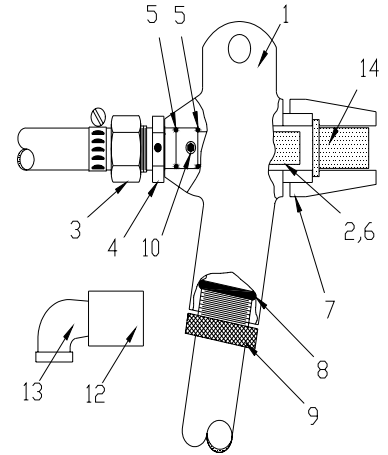
COMPONENTS

Item	Part Number	Description
1	515521	Dust Bag # Required (30) for BB4-3K (15) for BB2-3K
2	760841	Top plate DCM-80A
	760901	Top plate DCM-200 & DCM-200A
3	523551	Gasket, top plate, 1/8" x 1/4" (DCM-80A uses 8 ft; others use 12 ft.)
4	524351	Gasket, clean out door, Dust Collectors
5	525711	Gasket, access door, Dust Collectors 5/8" x 5/8" (103" section)
	525061	Gasket, 5/8"x 5/8", per foot
6	760851	Access door, Dust Collector – no paint
7	510461	Knob, 3/8"-16, (6 required)
8	551852	Bolt, 3/8"-16 x 1-1/4", (6 required)
9	551742	Bolt, leveling, 3/8"-16 x 2", (4 required)
10	515981	Air cylinder, standard Dust Collector and auto shaker
	515771	Air cylinder, auto-*pneumatic* bag shaker *only*
11	517221	Valve, pushbutton, 1/8" NPT & #10-32, "3P"
12	521101	Barbed fitting, 1/4" tube x #10-32, 1 per assembly
13	520432	Adapter, 1/4" tube x 1/8" MPT, 90° (for air cylinder)
14	521081	Adapter, 1/4" tube x 1/4" MPT (inlet)
15	510541	Tubing, 1/4" O.D. per foot (8 ft. needed)
16	523161	Hose with fittings, 1/4" x 16 ft. Dust Collector
17	760861	Bag Rack Weldment BB2-3K (DCM-80A)
	760921	BB4-3K (DCM-200)
18	523541	Rubber bumper, 8 required
19	509581	Latch and keeper (requires welding)
20	761801	Adapter, 10" ID x 6" OD, DCM-200
21	551522	Screw, #10-32 x 1/2", 2 required
22	566712	Caulk, tube
23	567401	Decal, Warning
24	564305	Decal, EMPIRE Logo
25	564301	Orange Dot Strip
	564474	Paint, touch up paint
ADDITIONAL PARTS used with Dust Collectors		
26		Blowers & blower motors
27		Ducting and adapters
28		Silencers (optional)
29		Manometer (optional)
30		Automatic bag shaker (optional)
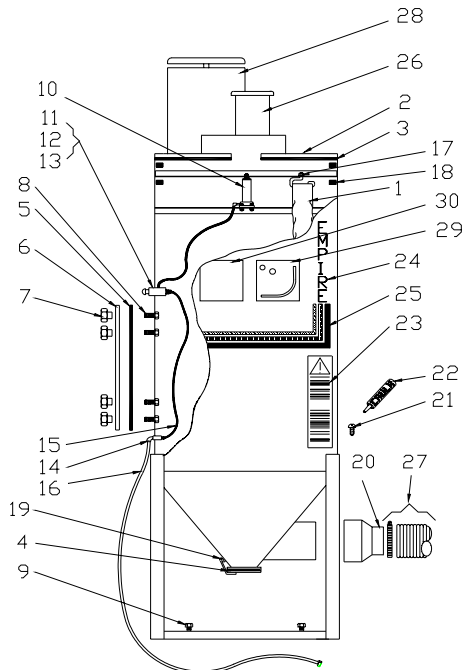
COMPONENTS

Item	Part Number	Description
1	515525	Cartridge Filter, Qty. (2)
2	515526	Crank for Filter Cartridge, Qty. (2)
3	113015	16 Gallon Drum Assembly
4	554232	Screw, #8 x 5/8", Qty. (4)
5	515473	Slide Gate, 4"
6	520531	Hose Clamp, 4", Qty. (2)
7	522351	Dust Hose, 4"x8"
8	770686	Lid for 16 Gallon Drum
	504020	Locking Ring for Lid
9	504016	16 Gallon Drum
10	510461	Knob, 3/8"-16, Qty. (6)
11	760851	Access Door
12	525711	Gasket, Access Door 5/8" x 5/8"(103"long)
13	551852	Bolt, 3/8"- 16 x 1-1/4", Qty. (6)
14	551742	Bolt, Leveling 3/8" – 16 x 2", Qty. (4)
15	567415	Label, Slide Gate Open
16	524471	Gasket, 1/16" x 1"
17	550450	Mini-Helic Package, Std. on CDC
18	140851	Air Supply Assembly
19	567403	Decal Instruction/Warning
20	564305	Decal Empire Logo
21	761801	Adapter, 10" ID x 6" OD
22	566712	Caulk, Tube
ADDITIONAL PARTS used with Dust Collectors		
23		Blowers and blower motors
24		Silencers (optional)
25		Photohelic/Timer Package, (Optional)
26		Ducting and Adapters
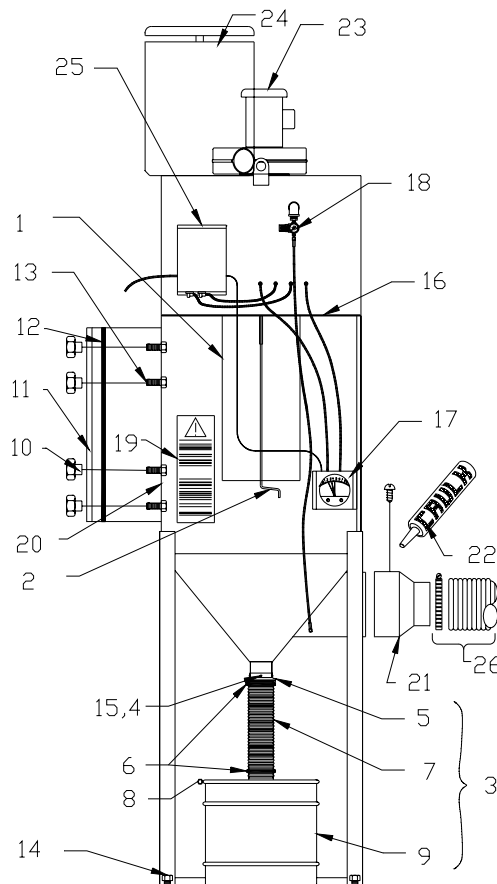
BB4-3K or BB2-3K Parts........................Blowers (fan & motor)

BLOWER ASSEMBLIES

Part Number	Horsepower	Standard Electrical	CFM @ 6" S.P.	Used With
140237	1	230/60/3	400	DCM-80A BB2 (140237)
140236	1-1/2	230/60/3	600	DCM-200/CDC-6 BB4 (140236)
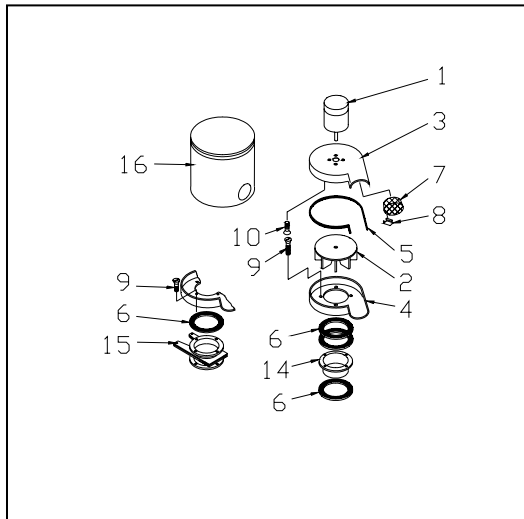
COMPONENTS

Item	All Sizes	1 HP BB2 Only	1-1/2 HP BB4 Only	Description
1	—	549531	549681	Motor, 115/230V, 60 Hz, Single phase
	—	549701	549721	Motor, 220-480V, 50/60 Hz, 3-Phase
	—	549731	549741	Motor, 550-600V, 60 Hz, 3-Phase
	—	549761	549771	Motor, 110/220V, 50 Hz, Single phase
2	—	753021	—	Impeller (fan blade), 10-5/8" diameter, 5/8" ID
	—	—	753661	Impeller (fan blade), 11-1/2" diameter, 5/8" ID
3	—	753511	753511	Housing, fan, top
4	—	753521	753521	Housing, fan, bottom
5	523251	—	—	Gasket, fan housing, 1/8" x ¼" (5' section)
6	—	524361	524361	Gasket, mounting (3 required)
7	—	739011	739011	Guard, fan outlet
8	554431	—	—	Clip, fan guard (4 required)
9	—	553182	553182	Screw, flat head 3/8"-16 x 2-1/4"
	—	551312	551312	Screw, flat head 3/8"-16 x 1-1/4" (slide gate)
10	—	552072	552072	Screw, flat head 3/8"-16 x 1"
11	—	—	—	Bolt, ¼"–20 x ¾"
12	—	—	—	Clip, ¼"-20
13	—	—	—	Bolt, ¼"-20 x 1"
14	—	751501	751501	Flange
15	—	—	—	Slide gates, see next page
16	—	140361	140361	Silencer (optional)
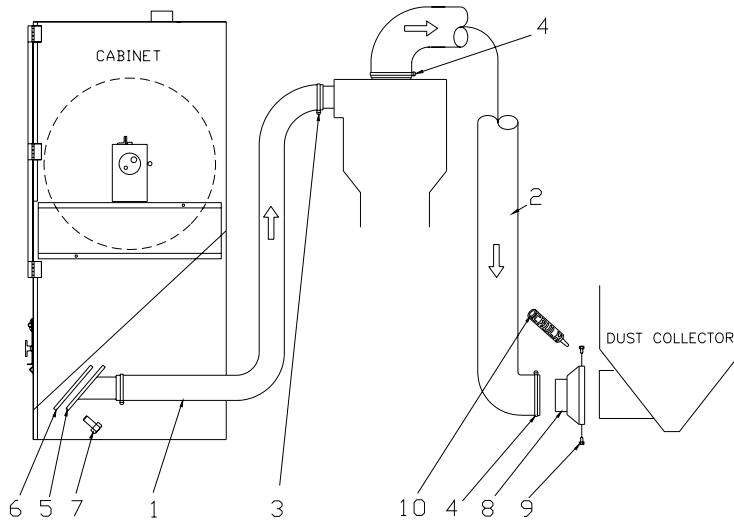
CONVEYING AND DUST HOSE

Item	Part Number	Description
1	515911	Heavy Duty Conveying Hose, 12' required
2	516101	Dust Hose, 6" x 12'

CLAMPS AND ADAPTERS

Item	Part Number	Description
3	522953	Hose Clamp, Heavy Duty Conveying Hose, 2 required
4	520551	Hose Clamp, Dust Hose, 2 required
5	760421	Outlet Adapter, Cabinet
6	524381	Gasket, Cabinet Outlet
7	551212	Bolt, ¼"-20 x 1", 4 required
8	761801	Adapter, 6" O.D. x 10" I.D., DCM-200, CDC-6
9	551522	Screw, #10-32 x ½", 2 required
10	566712	Caulk, tube
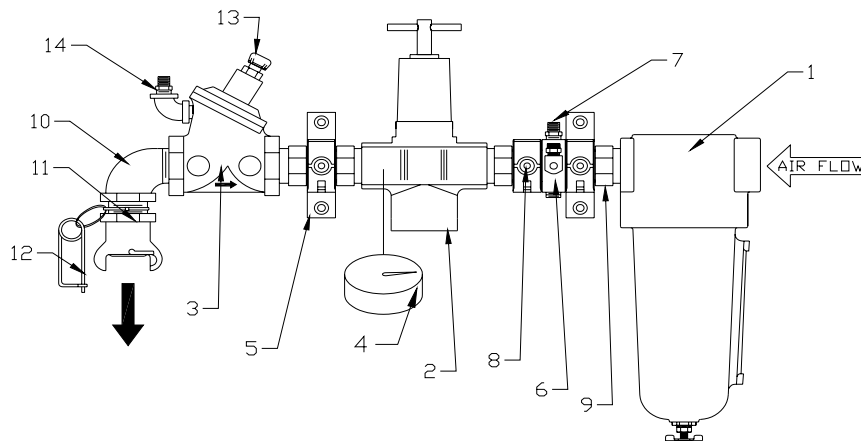
COMPONENTS

| Item	Part Number	Description
Assembly	140067	1" Pipe String Assembly
Assembly	564121	¼"-20 Socket Head Cap Screw, 4 required
Mounting	552882	¼" washer, 4 required
Hardware	552522	¼" hex nut, 4 required
1	517271	Air Filter, 1" manual
	508002	Element for air filter, 5µ
	505161	O-ring and gasket kit for Norgren air filter
2	517251	Air Pressure Regulator
	508161	Diaphragm & O-ring kit for regulator
3	517042	Main Air Valve, 1" Aquamatic
	517583	Diaphragm and seal kit for 1" Aquamatic
	518512	Special wrench for 1" Aquamatic
	517583	Repair Kit for 1" Aquamatic (includes 517582 seal kit)
4	550232	Gauge, ¼" NPT
5	522155	Mounting Feet/Quick Clamp
6	522157	Porting Block
7	520222	Hose adapter, ¼" x ¼"
8	522154	Quick Clamp
9	522156	Adapter
10	543542	Elbow, 1" NPT Street
11	505782	Coupling, 1" FPT, UF-100
12	510511	Safety pin
13	523261	Vent
14	520432	Adapter ¼" Tube x ¼" NPT 90°
	522162	O-Ring for modular pipe strings
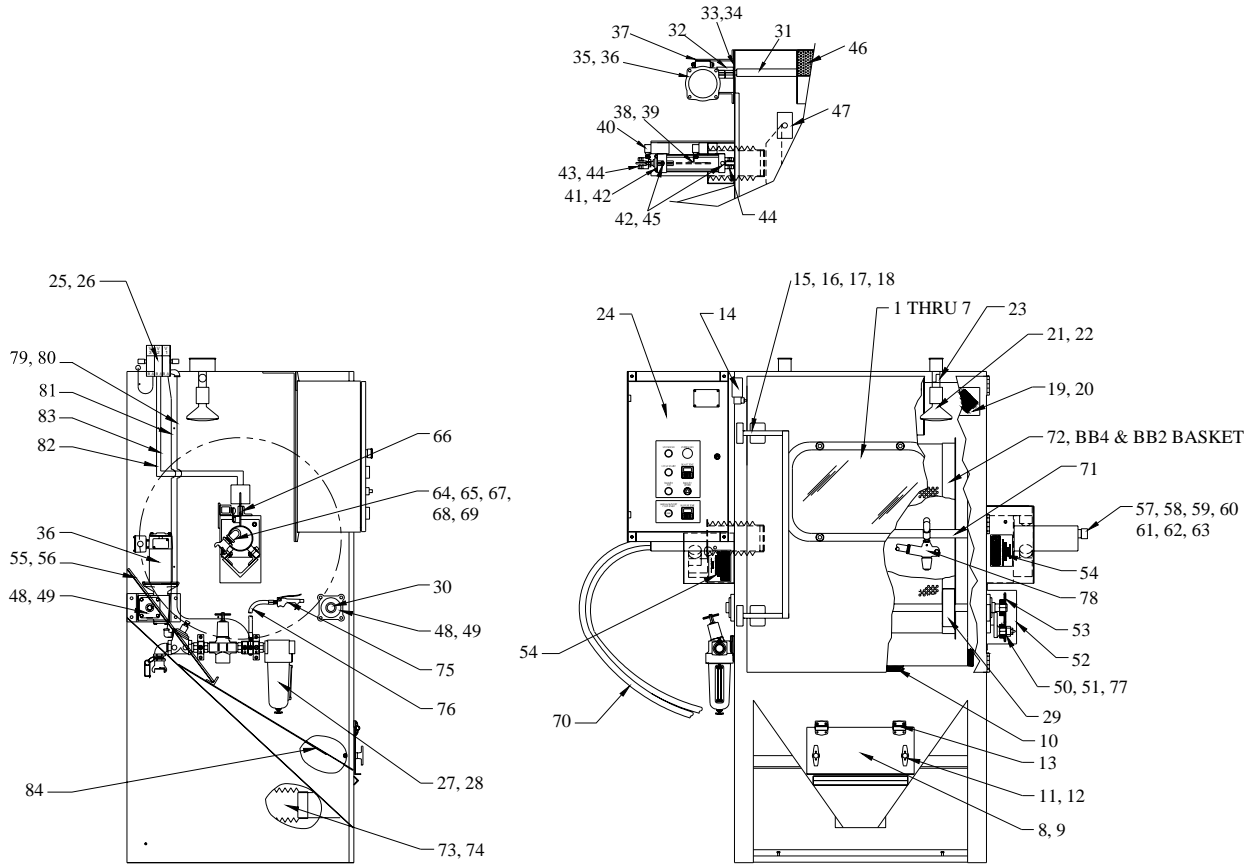
COMPONENTS

Item	BB4 and BB2	BB4 Only	BB2 Only	Description
1	510401	—	—	Safety Glass, 14" x 22". See Caution below.
2	525941	—	—	Gasket, ¼" x ¼"
3	760291	—	—	Window Frame
4	510461	—	—	Knob, 3/8"-16, 4 required
5	551852	—	—	Bolt, 3/8"-16 x 1-1/4"
6	525931	—	—	Window Spacer, 4 required
7	140544	—	—	Window Kit (items 1-6)
8	777125	—	—	Parts Door
9	524471	—	—	Gasket, 1/16" x 1" x 25', Open Cell Rubber, PSA
10	523651	—	—	Door Gasket, 1" x 1" Open Cell
11	509005	—	—	Compression Latch, 180 Degree Turn
12	777129	—	—	Latch Seal
13	555006	—	—	Hinge

Item	BB4 and BB2	BB4 Only	BB2 Only	Description
14	534333	—	—	Limit Switch
15	777119	—	—	Door Handle
16	509371	—	—	Latch, Draw Breaker
17	509381	—	—	Shim Plate
18	751242	—	—	Door Keeper
19	564305	—	—	Label, Empire Logo
20	564301	—	—	Label
21	532711	—	—	Fixture, Incandescent
22	532701	—	—	Lamp, Incandescent
23	580191	—	—	Gasket, Light Bulb
24	—	140050	—	Electrical Assembly, BB4
	—	—	140052	Electrical Assembly, BB2
25	340042	—	—	Valve Block Assembly
26	506453	—	—	Muffler
27	140067	—	—	1" BB4/BB2 Pipe String with Valve Assembly
28	770280	—	—	Spacer
29	777097	—	—	Wheel, Modified
30	777116	—	—	Front Shaft
31	777117	—	—	Back Shaft
32	570683	—	—	Coupling
33	777118	—	—	Reducer Plate
34	524771	—	—	Felt Washer
35	555003	—	—	Reducer
36	777095	—	—	Motor
37	777120	—	—	Reducer Leg
38	—	768813	—	Limit Switch Tripper
39	—	534323	—	Limit Switch
40	—	534743	—	Operating Lever
41	—	555010	—	Air Cylinder
42	—	518571	—	Valve, Flow Control
43	—	555011	—	Clevis Rod
44	—	555012	—	Clevis Pin
45	—	544452	—	Pipe Bushing
46	510521	—	—	Filter
47	535571	—	—	Outlet Box
48	570101	—	—	Flange Bearing
49	510081	—	—	Felt Washer
50	570611	—	—	Idler Sprocket
51	570621	—	—	Fixed Tensioner
52	777115	—	—	Chain Guard
53	570721	—	—	Sprocket
54	564844	—	—	Label
55	777121	—	—	Blast Plate
56	580203	—	—	Red Sheet
57	—	544112	—	Pipe Cap
58	—	777112	—	Right Guard Sleeve

Item	BB4 and BB2	BB4 Only	BB2 Only	Description
59	—	777123	—	Right Finger Guard
60	—	777093	—	Roller
61	—	555002	—	Bellows, 4"
62	—	520531	—	Hose Clamp, 4", Worm Gear
63	—	777122	—	Bellows Clamp Plate
64	—	777113	—	Left Guide Sleeve
65	—	777124	—	Left Finger Guard
66	—	777114	—	UHMW Guide
67	—	555009	—	Shoulder Bolt
68	—	552892	—	Flat Washer
69	—	552922	—	Flat Washer
70	520802	—	—	Blast Hose
71	766801	—	—	Mixing Header
72	510651	—	—	Basket Assembly
73	760421	—	—	Hose Adapter
74	524381	—	—	Gasket, Regulator and Hose Adapter
75	509821	—	—	Gun, Dust Off
76	522631	—	—	Air Hose Assembly
77	570603	—	—	Shaft Tightener
78	505571	—	—	Gun Assembly, MH-2
79	140855	—	—	Air Hose Assembly
80	520222	—	—	Connector Assembly
81	140857	—	—	Air Hose Assembly
82	140867	—	—	Air Hose Assembly
83	522671	—	—	Air Hose Assembly
84	777127	—	—	Screen, Removable, 5/16" Perforated Steel, 1/8" Optional

> ## CAUTION
> **REPLACE WINDOW WITH EMPIRE SAFETY GLASS ONLY! FAILURE TO DO SO COULD RESULT IN SERIOUS INJURY.**

8.0 Warranty

Empire Abrasive Equipment Company ("Empire") warrants all parts and equipment against defect in material and workmanship to the original purchaser for a period of ***three (3) years*** after shipment. Upon prompt notification by the buyer, to Empire, components that are determined by Empire to be defective will be repaired or replaced at not additional charge.

LIMITATIONS:

1. This warranty does not apply to normal wear items such as, nozzles, blast hose, and reclaimers or to other components that are exposed to direct contact with blast media.

2. The buyer must follow all recommended maintenance schedules; see Operating Instruction on prior pages.

3. Does not apply to misapplication of product.

4. Unauthorized service, repair, improper installation, improper operation, improper maintenance, alternations, misuse, and neglect, accidental or excessive ambient conditions will void the warranty.

5. **If genuine Empire replacement parts are not used the warranty is void.**

6. Returned Material Authorization (RMA) form must be completed and accompany all returned goods. Returns are not recognized without prior authorization and RMA number.

7. Associated installation costs are excluded.

8. Freight costs for goods returned to Empire are to be assumed by the buyer unless the parts are determined defective by Empire.

9. Parts that are not supplied by Empire are not covered. Commercial components are warranted under term of the original manufacturer.