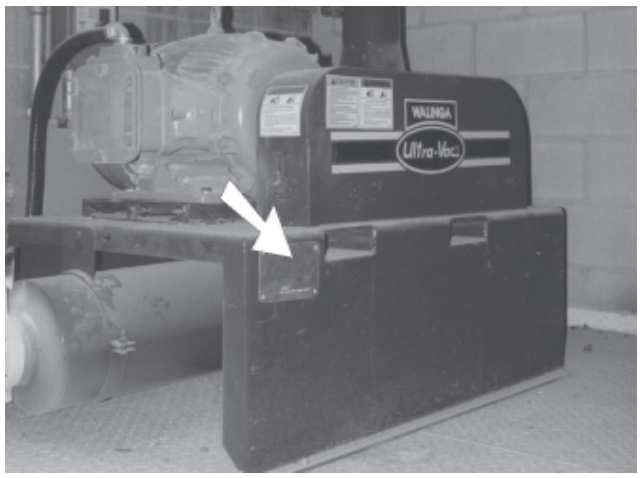
WALINGA® INC.

Central-Vac®

CENTRAL VACUUM SYSTEM
OPERATOR'S MANUAL

SERIAL NUMBER LOCATION

Always give your Dealer the Serial Number of your Walinga Central Vacuum System when ordering parts or requesting service or other information.



Machine Serial Number

_____

Blower Serial Number

_____

Airlock Serial Number

_____

Dear Customer,

Thank you for choosing WALINGA TRANSPORTATION EQUIPMENT. For you convenience, should you require any information related to Parts, Service or Technical Engineering, please contact one of the following Walinga Personnel:

TECHNICAL - ENGINEERING:
Anthony Vis (ext: 239) ajv@walinga.com
Ken Swaving (ext 248) cms@walinga.com

WARRANTY CLAIMS:
Amy Vanderzwaag (ext:254) anv@walinga.com

SERVICE MANAGER:
Chris Ecclestone (ext: 261)

PARTS MANAGER:
Jack Lodder (ext: 224) jel@walinga.com

MACHINE SERIAL NUMBER LOCATION

The machine serial number plate is located on the frame of the body. Please mark the serial number and the date of manufacture of the body in the space provided for easy reference.
DATE OF MANUFACTURE: _____

SERIAL NUMBER:_____

WALINGA® INC.

HEAD OFFICE: RR#5 Guelph, Ontario,N1H 6J2
PHONE (519) 824-8520 FAX (519) 824-5651
www.walinga.com

FACTORY DISTRIBUTION AND SERVICE CENTRES:

- 1190 Electric Ave.Wayland, MI.USA 49348
  Tel (800) 466-1197 Fax (616) 877-3474
- 70 3rd Ave. N.E. Box 1790 Carman, Manitoba Canada R0G 0J0
  Tel (204) 745-2951 Fax (204) 745-6309
- 220 Frontage Rd. Davidson, Saskatchewan Canada S0G 1AO
  Tel: (306) 567-3031 Fax: (306) 567-3039

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PART #34-19004-6

CENTRAL VACUUM SYSTEM

Warranty Registration Form
Inspection Report

WARRANTY REGISTRATION

This form must be filled out by the dealer and signed by both the dealer and the customer at the time of delivery.

Customer's Name _____ Dealer Name _____

Address _____ Address _____

City, Prov./State, Code _____ City, Prov./State, Code _____

Phone Number (____) _____

Serial Number _____ Blower Serial Number _____

Delivery Date _____ Airlock Serial Number _____

DEALER INSPECTION REPORT

____ Blower and Airlock Turn Freely
____ Airline Connections Tight
____ Airline Intake Caps Secured
____ Airlock Access Door Closed and Secured
____ Drive Chains and Belts Tensioned and Aligned
____ Lubricate Machine
____ Check Oil Level in Reservoirs

SAFETY

____ Belt and Chain Guards Installed and Secured
____ All Safety Signs Installed
____ Review Operating and Safety Instructions

I have thoroughly instructed the buyer on the above described equipment which review included the Operator's Manual content, equipment care, adjustments, safe operation and applicable warranty policy.

Date _____ Dealer's Rep. Signature _____

The above equipment and Operator's Manual have been received by me and I have been thoroughly instructed as to care, adjustments, safe operation and applicable warranty policy.

Date _____ Owner's Signature _____

WHITE	YELLOW	PINK
WALINGA	DEALER	CUSTOMER

WALINGA INC.
WARRANTY

The Seller warrants to the Buyer that the Equipment manufactured by the Seller will be free from defect in material, workmanship and title for a period of one (1) year from the date of delivery to the Buyer. This warranty is subject to the following:

a) The Seller's obligation under said warranty shall be limited to repairing or replacing (at the Seller's option) EXW (Ex Works) Guelph, Ontario, Canada, any part of the Equipment which, if properly installed, used and maintained, proves defective in material or workmanship, provided that notice of any such defect and satisfactory proof thereof is promptly given by the Buyer to the Seller;

b) All costs of the installation or transportation pursuant to this warranty are for the account of the Buyer;

c) The obligations set forth in this clause are conditional upon:

   i) Proper storage, installation (except where installation is supervised by or performed by the Seller), use, maintenance and compliance with any applicable recommendations of the Seller; and,

   ii) The Buyer promptly notifying the Seller of any defect and obtaining authorization prior to proceed with repairs, and if required, promptly making the goods available for correction;

d) In respect of any Equipment or part thereof supplied hereunder which are manufactured by others, the Seller gives no warranty whatsoever, and the warranty given by the manufacturer, if any, shall apply;

e) The Seller shall not be liable for any cargo loss, loss of equipment, use or any other incidental or consequential damages resulting from any defective part or parts, the Seller's liability and the Buyer's exclusive remedy being expressly limited to the replacement of defective parts as provided herein;

f) The warranty set out within this paragraph does not apply to:

   i) tires, accessories, and other items including the items, if any listed on the face hereof as "Buyers Specified Items", manufactured by others and the Buyer shall rely solely on the warranty, if any, of the manufacturer of such tires, accessories and other items; nor

   ii) to any equipment, otherwise subject to this warranty, which shall have been repaired, modified or altered in any way by anyone other than the Seller or one of its duly authorized service representatives.

g) With respect to used equipment sold hereunder, regardless of manufacture, the Seller makes no warranty whatever, and all warranties, express or implied are hereby excluded. With respect to such used equipment, the Buyer agrees to accept such used equipment on an "as is, where is" basis.

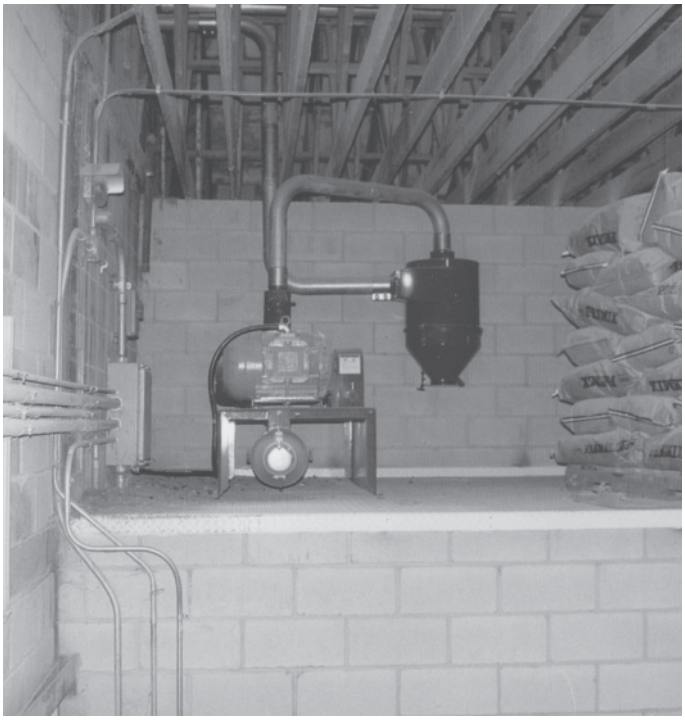
WARRANTY VOID IF NOT REGISTERED

TABLE OF CONTENTS

1 INTRODUCTION

Congratulations on your choice of a Walinga Central Vacuum System to complement your manufacturing, food processing or feed milling operation. This equipment has been designed and manufactured to meet the needs of the discriminating buyer for the efficient moving of granular or powder products.

Safe, efficient and trouble free operation of your Central Vacuum System requires that you and anyone else who will be operating or maintaining the machine, read and understand the Safety, Operation, Maintenance and Trouble Shooting information contained within the Operator's Manual.



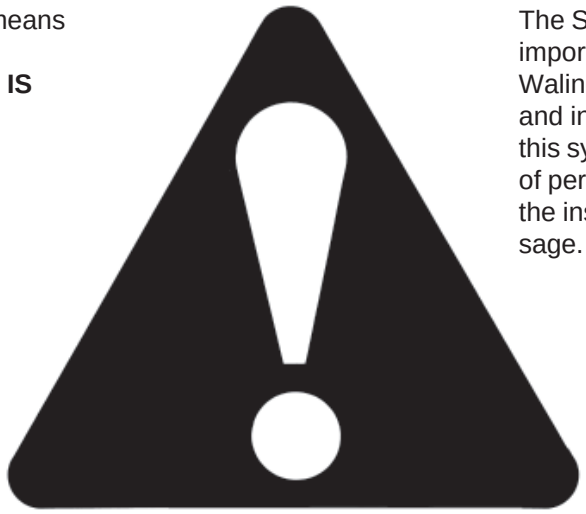
This manual covers all Central Vacuum Systems made by Walinga Inc. Many systems are custom designed for the specific application. However they are all similar and specific differences are explained where appropriate.

Keep this manual handy for frequent reference and to pass on to new operators or owners. Call your Walinga dealer if you need assistance, information or additional copies of the manual. Contact your dealer for a complete listing of parts.

2 SAFETY

SAFETY ALERT SYMBOL

This Safety Alert symbol means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!**



The Safety Alert symbol identifies important safety messages on the Walinga Central Vacuum System and in the manual. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.

Why is SAFETY important to you?

3 Big Reasons

Accidents Disable and Kill
Accidents Cost
Accidents Can Be Avoided

SIGNAL WORDS:

Note the use of the signal words **DANGER, WARNING** and **CAUTION** with the safety messages. The appropriate signal word for each message has been selected using the following guide-lines:

DANGER - Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations, typically for machine components that, for functional purposes, cannot be guarded.

WARNING - Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.

CAUTION - Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

SAFETY

YOU are responsible for the **SAFE** operation and maintenance of your Walinga Central Vacuum System. **YOU** must ensure that you and anyone else who is going to operate, maintain or work around the Central-Vac be familiar with the operating and maintenance procedures and related **SAFETY** information contained in this manual. This manual will take you step-by-step through your working day and alerts you to all good safety practices that should be adhered to while operating the vacuum.

Remember, **YOU** are the key to safety. Good safety practices not only protect you but also the people around you. Make these practices a working part of your safety program. Be certain that **EVERYONE** operating this equipment is familiar with the recommended procedures and follows all the safety precautions. Remember, most accidents can be prevented. Do not risk injury or death.

- Central-Vac owners must give operating instructions to operators or employees before allowing them to operate the equipment, and at least annually thereafter.

- The most important safety feature on this equipment is a **SAFE** operator. It is the operator's responsibility to read and understand **ALL** Safety and Operating instructions in the manual and to follow these. Most accidents can be avoided.

- Walinga feels that a person who has not read, understood and been trained to follow all operating and safety instructions is not qualified to operate the equipment. An untrained operator exposes himself and bystanders to possible serious injury or death.

- Do not modify the equipment in any way. Unauthorized modification may impair the function and/or safety of the equipment and affect the life of the machine.

- Think SAFETY! Work SAFELY!

2.1 GENERAL SAFETY

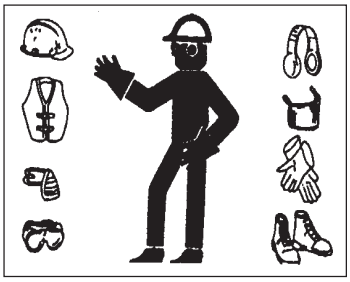
1. Read and understand the Operators Manual and all safety signs before operating, maintaining, adjusting or unplugging the Central-Vac.

2. Only trained competent persons shall operate the Central-Vac. An untrained operator is not qualified to operate the machine.

3. Have a first-aid kit available for use should the need arise and know how to use it.

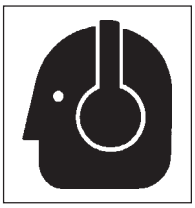
4. Have a fire extinguisher available for use should the need arise and know how to use it.

6. Wear appropriate protective gear. This list includes but is not limited to:
   - A hard hat
   - Protective shoes with slip resistant soles
   - Protective goggles
   - Heavy gloves
   - Hearing protection



7. Before servicing, adjusting, repairing or maintaining unit, ensure that unit power source is completely shut down, and can not start-up.

8. Wear appropriate hearing protection when operating for long periods of time.



9. Ground all lines, hoses and wands to prevent static build-up and electrical discharge/shocks.

10. Review safety related items annually with all personnel who will be operating or maintaining the Central-Vac.

2.2 OPERATING SAFETY

1. Read and understand the Operator's Manual and all safety signs before using.

2. Before servicing, adjusting, repairing or maintaining unit, ensure that unit power source is completely shut down, and can not start-up.

3. Do not operate when any guards are damaged or removed. Install and secure guards before starting.

4. Lock out tag out master panel before opening airlock access door.

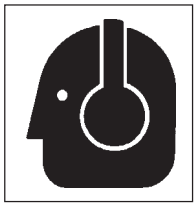
5. Keep hands, feet, clothing and hair away from all moving and/or rotating parts.

6. Clear the area of all bystanders, especially small children, before starting.

7. **Ground all lines, hoses and wands to prevent static build-up and electrical discharge/shocks**.

8. **Maintain electrical continuity between material intake and airlock/blower to prevent sparks, shocks, or electrical discharge.**

9. Wear appropriate ear protection when operating for long periods of time.



10. Do not place intake nozzle near feet when standing on the top of material.

11. Review safety items with all personnel annually.

2.3 MAINTENANCE SAFETY

1. Follow ALL the operating, maintenance and safety information in the manual.

2. Support the machine with blocks or safety stands when working beneath it.

3. Follow good shop practices:
   - Keep service area clean and dry.
   - Be sure electrical outlets and tools are properly grounded.
   - Use adequate light for the job at hand.

4. Use only tools, jacks and hoists of sufficient capacity for the job.

5. Before servicing, adjusting, repairing or maintaining unit, ensure that unit power source is completely shut down, and can not start-up.

6. Make sure all guards are in place and properly secured when maintenance work is completed.

7. Keep hands, feet, hair and clothing away from all moving and/or rotating parts.

8. Lock out tag out master panel before performing any maintenance or service work on machine or opening airlock access door.

9. Clear the area of bystanders, especially small children, when carrying out any maintenance and repairs or making any adjustments.

10. Be sure that all lines, hoses and wands are grounded when maintenance work is completed.

2.4 ELECTRO-STATIC SAFETY

1. **Ground all lines, hoses and wands to prevent static build-up and electrical discharge/shocks/sparks.**

2. **Maintain electrical continuity between material intake and airlock/blower to prevent sparks, shocks or electrical discharge. Check using an ohmmeter to be sure.**

2.5 STORAGE SAFETY

1. Store unit in an area away from human activity.

2. Do not permit children to play on or around the stored machine.

3. Lock out tag out master panel to prevent unexpected start-up.

2.6 INSTALLATION SAFETY

1. Use only licensed electricians to provide power to machine. Follow all applicable codes during installation.

2. **Keep all components grounded to the master panel to prevent sparks, shocks, and electrical discharges. Use an ohmmeter to verify electrical continuity through all the components.**

3. **Vent discharge air from blower to outside.**

2.7 SAFETY SIGNS

1. Keep safety signs clean and legible at all times.

2. Replace safety signs that are missing or have become illegible.

3. Replaced parts that displayed a safety sign should also display the current sign.

4. Safety signs are available from your Distributor or the factory.

How to Install Safety Signs:

- Be sure that the installation area is clean and dry.
- Be sure temperature is above 50°F (10°C).
- Decide on the exact position before you remove the backing paper.
- Remove the smallest portion of the split backing paper.
- Align the sign over the specified area and carefully press the small portion with the exposed sticky backing in place.
- Slowly peel back the remaining paper and carefully smooth the remaining portion of the sign in place.
- Small air pockets can be pierced with a pin and smoothed out using the piece of sign backing paper.

How to Reorder Your Safety Signs:

1. Call you local dealer, or the factory branch nearest you.

FACTORY DISTRIBUTION AND SERVICE CENTRES:

Head Office:
RR#5, Guelph, Ontario, N1H 6J2
PHONE (888) 925-4642
FAX (519) 824-5651

-1190 Electric Ave. Wayland, MI. USA 49348
Tel (800) 466-1197 Fax (616) 877-3474

-70 3rd Ave. N.E. Box 1790 Carman, Manitoba
Canada R0G 0J0
Tel (204) 745-2951 Fax (204) 745-6309

-220 Frontage Rd. Davidson, Saskatchewan
Canada S0G 1AO
Tel: (306) 567-3031 Fax: (306) 567-30

2.8 SIGN-OFF FORM

Walinga Inc. follows the general Safety Standards specified by the American Society of Agricultural Engineers (ASAE) and the Occupational Safety and Health Administration (OSHA). Anyone who will be operating and/or maintaining the Central Vacuum System must read and clearly understand ALL Safety, Operating and Maintenance information presented in this manual.

Do not operate or allow anyone else to operate this equipment until such information has been reviewed. Annually review this information with all personnel.

Make these periodic reviews of SAFETY and OPERATION a standard practice for all of your equipment. We feel that an untrained operator is unqualified to operate this machine.

A sign-off sheet is provided for your record keeping to show that all personnel who will be working with the equipment have read and understand the information in the Operator's Manual and have been instructed in the operation of the equipment.

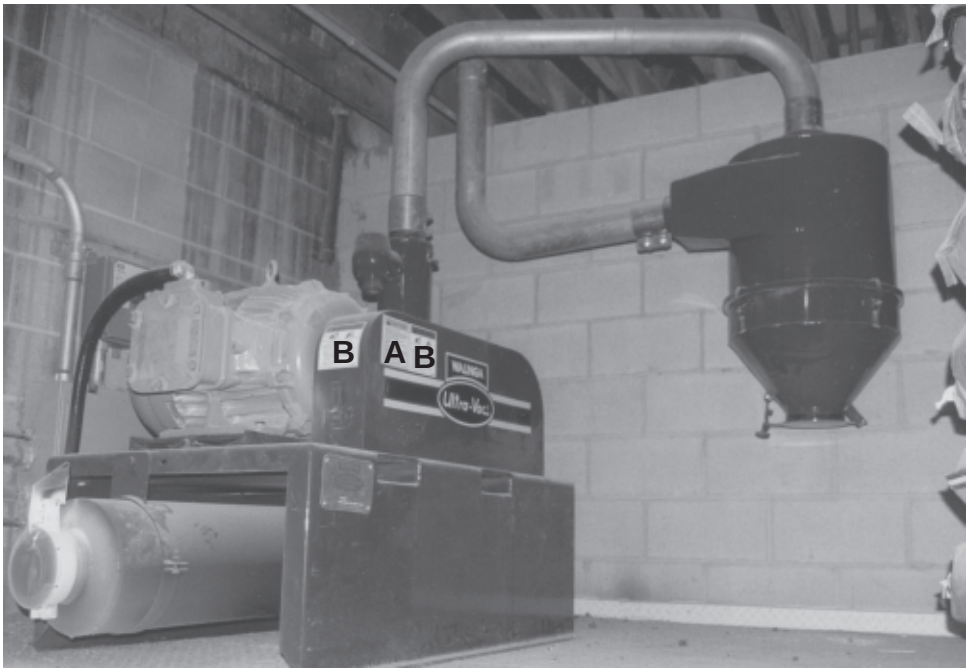
SIGN-OFF FORM

DATE	EMPLOYEE'S SIGNATURE	EMPLOYER'S SIGNATURE

3 SAFETY SIGN LOCATIONS

The types of safety signs and locations on the equipment are shown in the illustration below. Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!



A

CAUTION

1. **Read Operator's Manual before starting.**
2. **Before servicing, adjusting, repairing or maintaining unit, ensure that unit power source is completely shut down, and can not start up.**
3. **Install and secure all shields before operating.**
4. **Keep hands, feet, hair and clothing away from moving parts.**
5. **Clear the area of bystanders, especially small children, before starting.**
7. **Wear hearing protection for prolonged exposure to excessive noise.**
8. **Review safety instructions annually.**

B

WARNING

ROTATING PART HAZARD

To prevent serious injury or death from rotating parts:

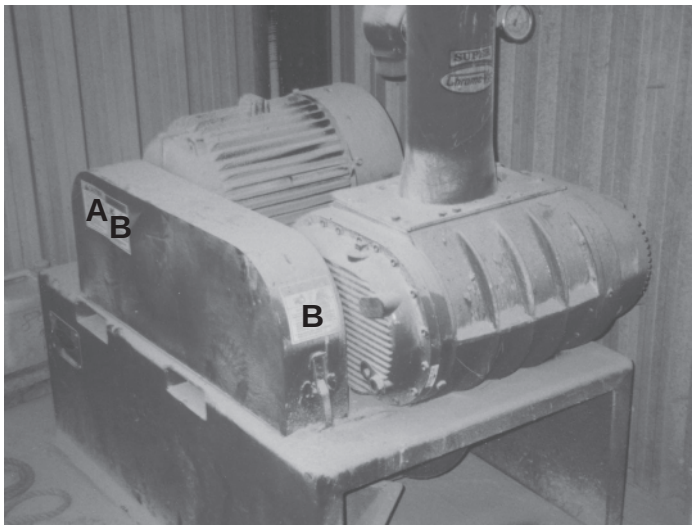
1. **Close and secure guard before operating.**
2. **Before servicing, adjusting, repairing or maintaining unit, ensure that unit power source is completely shut down and can not start up.**
3. **Keep hands, feet, hair and clothing away from moving parts.**

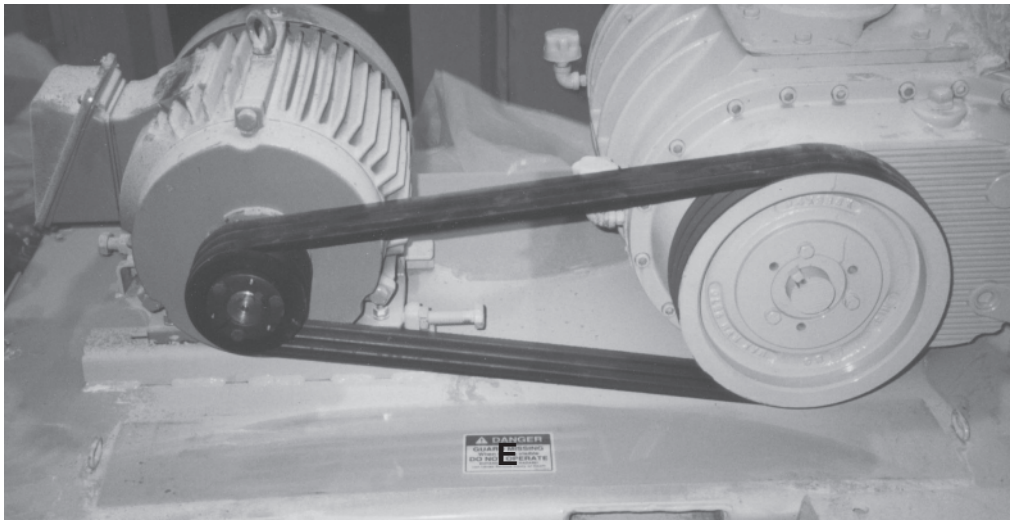
53-18288-6

REMEMBER - If safety signs have been damaged, removed, become illegible or parts replaced without signs, new signs must be applied. New signs are available from your authorized dealer or factory direct.

The types of safety signs and locations on the equipment are shown in the illustration below. Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!





C

WARNING

ROTATING AIRLOCK BLADES HAZARD

To prevent serious injury or death:

1. **Place all controls in neutral, stop engine, remove ignition key and wait for all moving parts to stop before opening access door.**
2. **Close access door before operating.**
3. **Keep hands, feet, hair and clothing away from moving parts.**

53-04730-6

E

DANGER

GUARD MISSING

When this is visible

DO NOT OPERATE

ENTANGLEMENT HAZARD

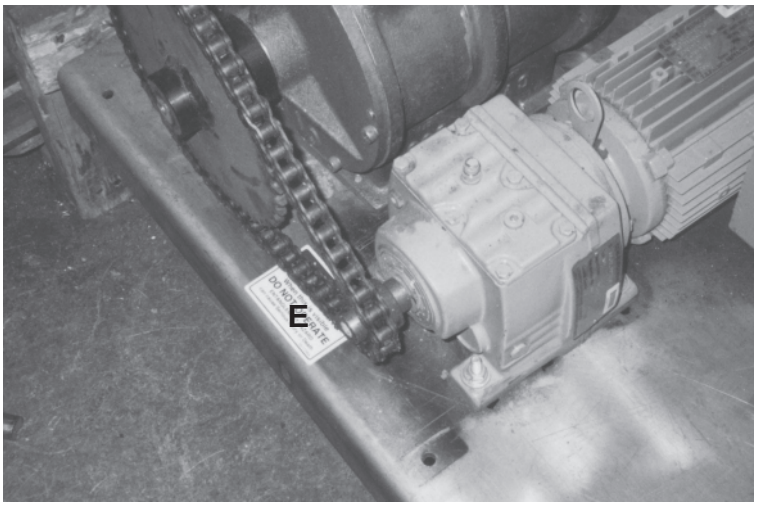
can cause Serious Injury or Death

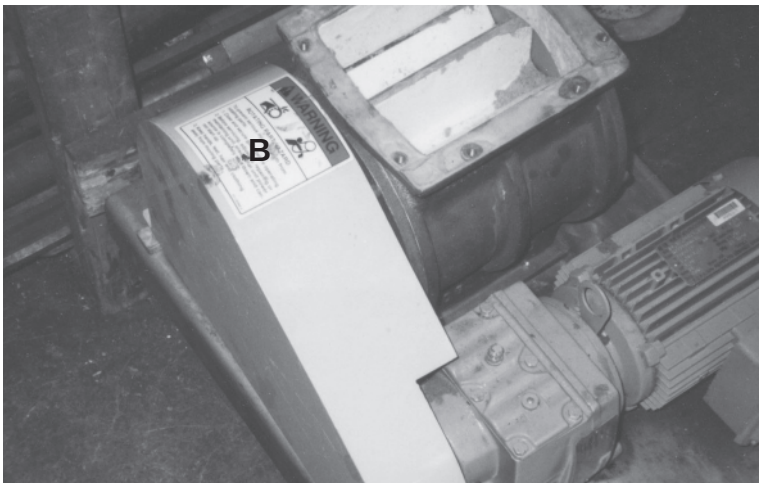
53-17704-6

REMEMBER - If safety signs have been damaged, removed, become illegible or parts replaced without signs, new signs must be applied. New signs are available from your authorized dealer or factory direct.

The types of safety signs and locations on the equipment are shown in the illustration below. Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!





D

DANGER

ELECTRO-STATIC HAZARD

To prevent serious injury or death:

1. **Make sure conveying lines and work area are dust and fire hazard free.**
2. **Use Original Equipment / Hoses Only.**
3. **Do not use plastic hoses and / or piping, unless those are properly grounded.**

53-18290-6

F

DANGER

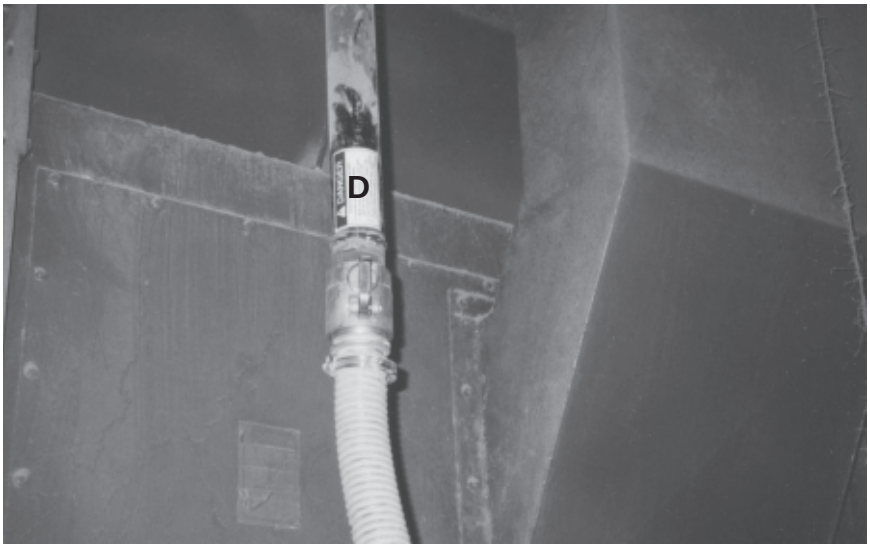
Do not place intake tube near feet when standing on top of material. Sufficient material can be removed to draw operator and intake tube into material. Submersion in material can cause suffocation.

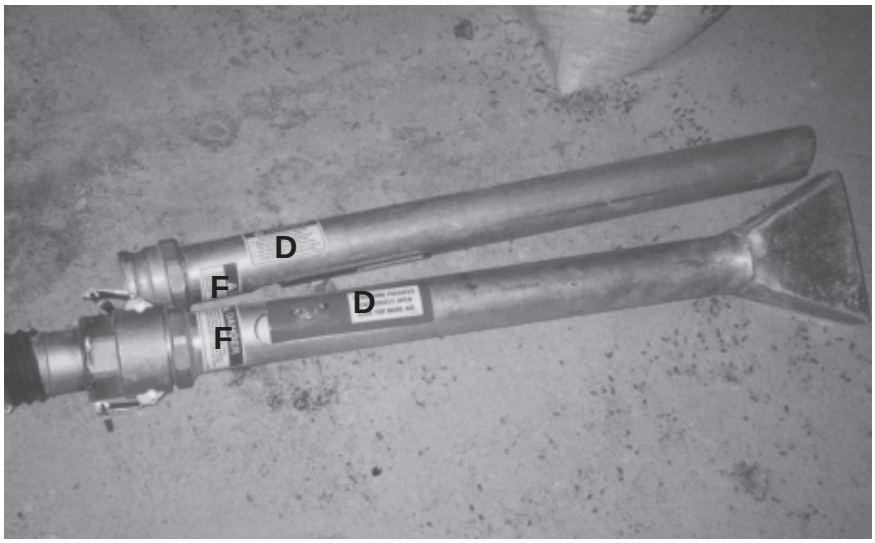
53-15639-6

REMEMBER - If safety signs have been damaged, removed, become illegible or parts replaced without signs, new signs must be applied. New signs are available from your authorized dealer or factory direct.

The types of safety signs and locations on the equipment are shown in the illustration below. Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!





REMEMBER - If safety signs have been damaged, removed, become illegible or parts replaced without signs, new signs must be applied. New signs are available from your authorized dealer or factory direct.

4 OPERATION

OPERATING SAFETY

1. Read and understand the Operator's Manual and all safety signs before using.
2. Before servicing, adjusting, repairing or maintaining unit, ensure that unit power source is completely shut down, and can not start-up.
3. Do not operate when any guards are damaged or removed. Install and secure guards before starting.
4. Lock out tag out master panel before opening airlock access door.
5. Keep hands, feet, clothing and hair away from all moving and/or rotating parts.
6. Clear the area of all bystanders, especially small children, before starting.
7. Ground all lines, hoses and wands to prevent static build-up and electrical discharge/ shocks.
8. Maintain electrical continuity between material intake and airlock/blower to prevent sparks, shocks, or electrical discharge.
9. Wear appropriate ear protection when operating for long periods of time.
10. Do not place intake nozzle near feet when standing on the top of material.
11. Review safety items with all personnel annually.

4.1 TO THE NEW OPERATOR OR OWNER

The Walinga Central Vacuum System is specifically designed to vacuum up grain, powder or other granular material and move it in a stream of pressurized air to an airlock discharge. A high capacity air pump moves the air through the machine creating a vacuum on the intake side to draw the material into the system. Be familiar with all operating and safety procedures before starting.

It is the responsibility of the owner and operator to read this manual and to train all other operators before they start working with the machine. Follow all safety instructions exactly. Safety is everyone's business. By following recommended procedures, a safe working environment is provided for the operator. Bystanders and the area around the worksite. Untrained operators are not qualified to operate the machine.

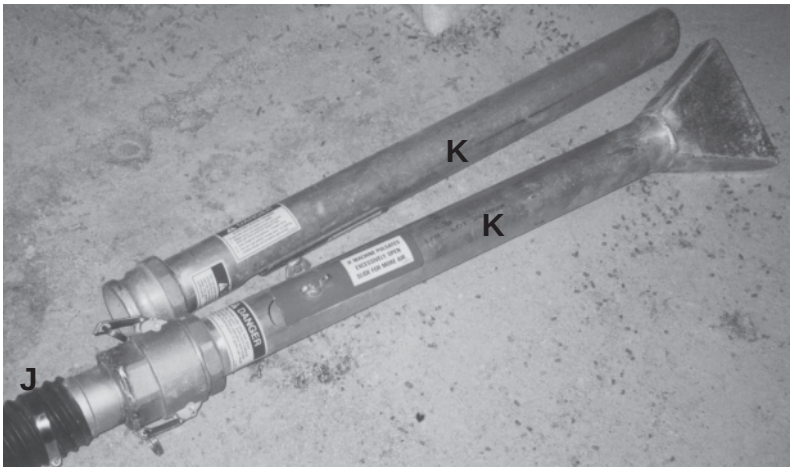
Many features incorporated into this machine are the result of suggestions made by customers like you. Read this manual carefully to learn how to operate the machine safely and how to set it to provide maximum efficiency. By following the operating instructions in conjunction with a good maintenance program, your Central Vacuum System will provide many years of trouble-free service.

4.2 MACHINE COMPONENTS

The machine is designed with an air pump or blower drawing air and material into the intake wands, hose and piping. An electric motor powers the blower through a set of belts. A large filter on the intake side removes dust from the air intake before it enters the blower.

Seed, powder or other loose granular material is drawn into the system through the wands and hose/pipes. Material drops out of the air stream when it enters the cyclone. From the receiver cyclone, the material drops into the turning airlock that discharges it from the system.

A Electric Motor
B Belt Drive
C Blower
D Intake Filter
E Air Lines
F Collector Cyclone
G Air Lock
H Chain Drive
J Intake Hose
K Intake Wand
L Discharge Line



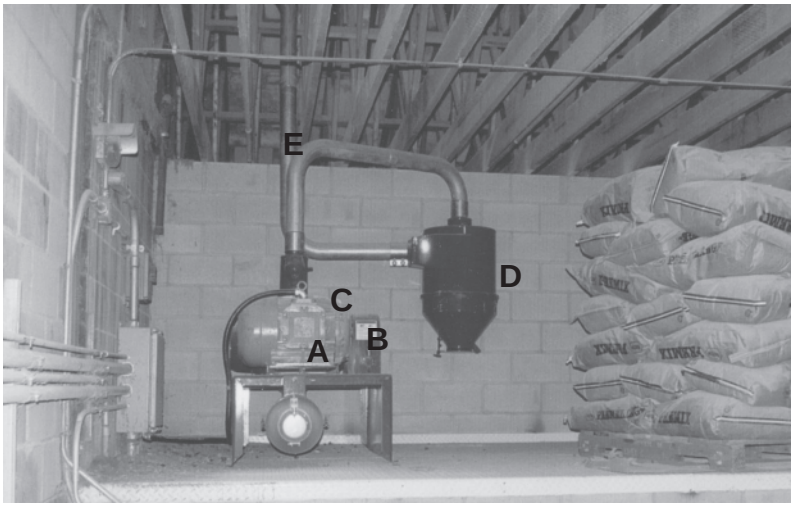


Fig. 1 MACHINE COMPONENTS

4.3 BREAK-IN

Although there are no operational restrictions on the Central Vacuum System when used for the first time, it is recommended that the following mechanical items be checked:

A. **After operating for 1/2 hour:**

1. Retorque all fasteners and hardware.
2. Turn blower and airlock by hand. Be sure that they turn freely.
3. Open and clean the pre-cleaner door and tank.
4. Check that no hoses are pinched, rubbing or being crimped. Re-align as required.
5. Check oil level in reservoirs. Add as required.
6. Lubricate all grease fittings.

B. **After operating for 5 hours and 10 hours:**

1. Retorque all bolts, fasteners and hardware.
2. Check hose routing.
3. Check that blower and airlock turn freely.
4. Check oil level in reservoirs.
5. Then go to the normal servicing and maintenance schedule as defined in the Maintenance Section.

4.4 PRE-OPERATION CHECKLIST

Efficient and safe operation of the Walinga Central Vacuum System requires that each operator reads and understands the operating procedures and all related safety precautions outlined in this section. A pre-operation checklist is provided for the operator. It is important for both the personal safety and maintaining the good mechanical condition of the Central Vacuum that this checklist is followed.

Before operating the Vacuum and each time thereafter, the following areas should be checked off:

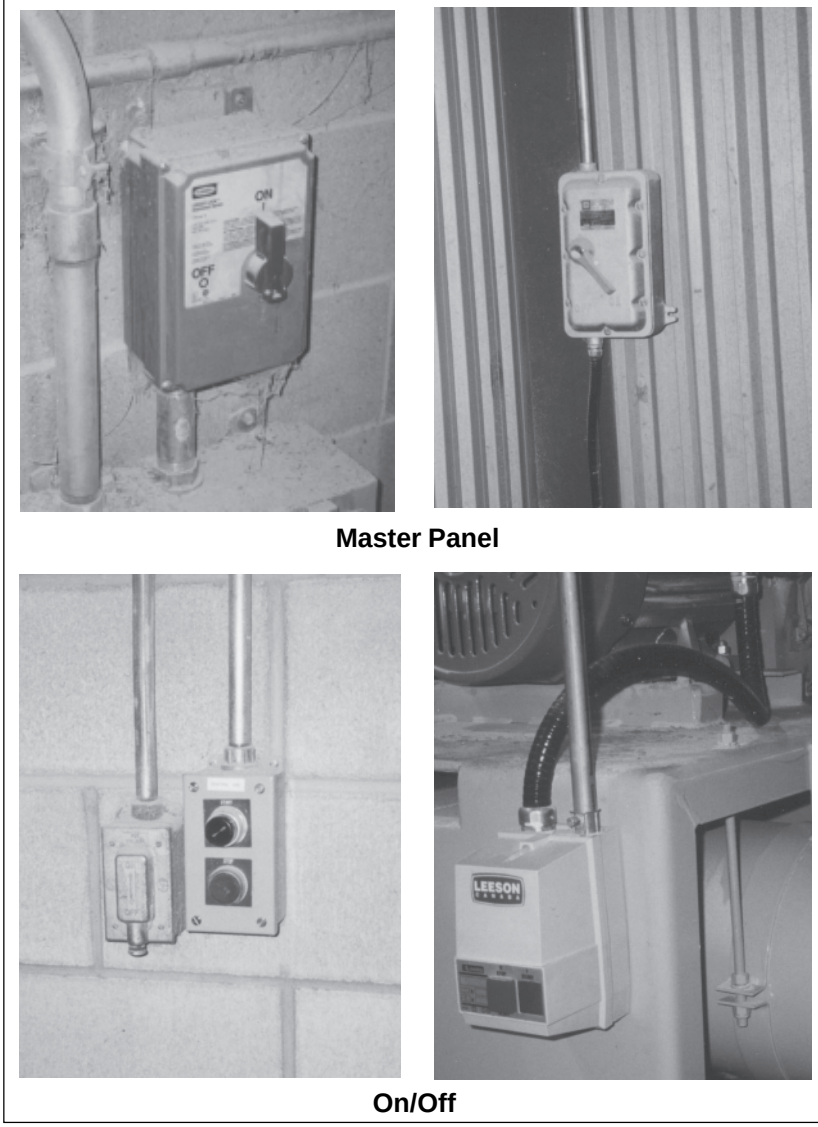
1. Lubricate the machine per the schedule outlined in Section 5 Service and Maintenance.
2. Check the oil level in the blower reservoirs.
3. Inspect all air lines, hoses, fittings and camlock couplers for tightness.
4. Open intake filter cannister door and remove coarse material from assembly.
5. Check that the blower and airlock turn freely.
6. Check for and remove entangled material.
7. Close and secure all guards.

4.5 CONTROLS

All controls for the machine are provided by the customer. Each installation should have provisions to lock out tag out the master panel for maintenance. Review your installation carefully to familiarize yourself with the function and movement of each control before starting.

1. **Electrical Switches:**
   It is recommended that the electrical controls be set up to include a master panel with the capabilities of lock out tag out for service/ maintenance and an on/off switch.

   Review your installation details before starting.



Master Panel

On/Off

Fig. 2 CONTROLS (TYPICAL)

4.6 OPERATING

OPERATING SAFETY

1. Read and understand the Operator's Manual and all safety signs before using.
2. Before servicing, adjusting, repairing or maintaining unit, ensure that unit power source is completely shut down, and can not start-up.
3. Do not operate when any guards are damaged or removed. Install and secure guards before starting.
4. Lock out tag out master panel before opening airlock access door.
5. Keep hands, feet, clothing and hair away from all moving and/or rotating parts.
6. Clear the area of all bystanders, especially small children, before starting.
7. Ground all lines, hoses and wands to prevent static build-up and electrical discharge/ shocks.
8. Maintain electrical continuity between material intake and airlock/blower to prevent sparks, shocks, or electrical discharge.
9. Wear appropriate ear protection when operating for long periods of time.
10. Do not place intake nozzle near feet when standing on the top of material.
11. Review safety items with all personnel annually.

When operating the Central Vacuum System, follow this procedure:

1. Clear the area of bystanders, especially small children, before starting.
2. Review and follow the Pre-Operation Checklist (See Section 4.4).
3. Attach the components required to pick up the dust or granular material as appropriate for your application:
   a. Attach hose to cam lock coupler.

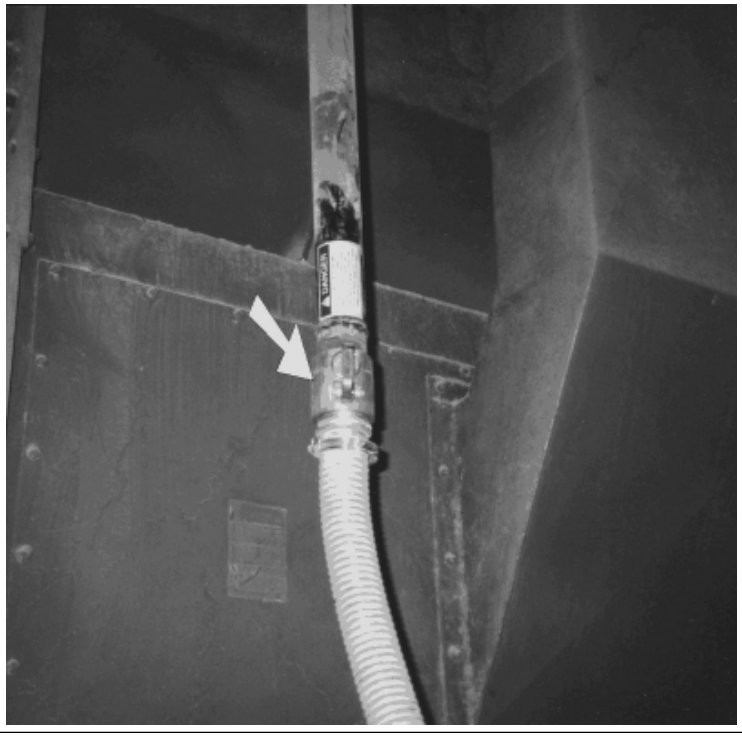
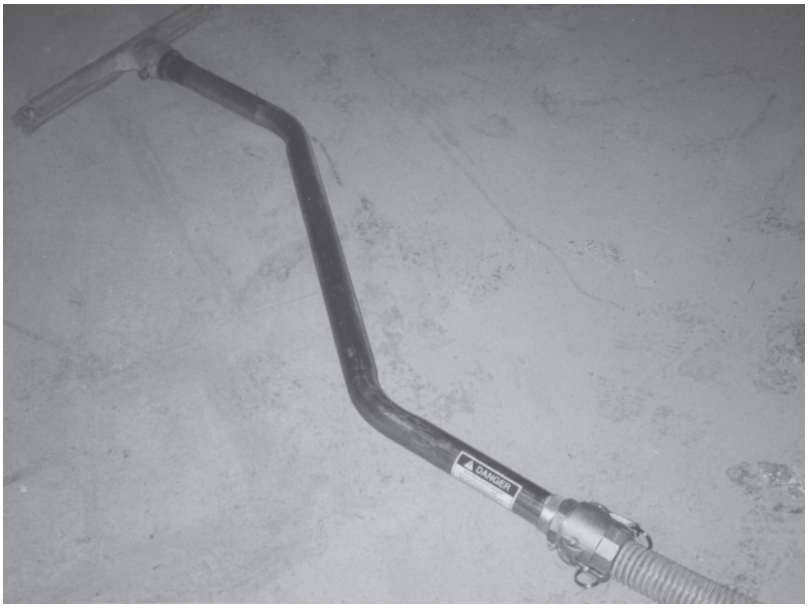


Fig. 3 CAM LOCK COUPLER

b. Attach wand or tube to the end of hose.

Hose



Wands

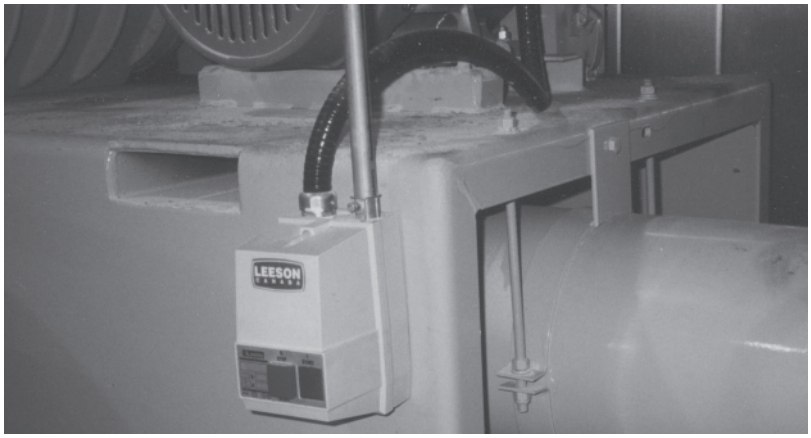
Fig. 4 GATHERING COMPONENTS

4. **Starting Machine:**
   a. Check that the master panel is not locked out. If it is, identify cause and retrieve the tag. Turn master panel on.

   b. Turn machine on at the On/Off switch.

5. **Stopping Machine:**
   Turn the machine off using the On/Off switch. This will shut down both the blower and the airlock.

Master



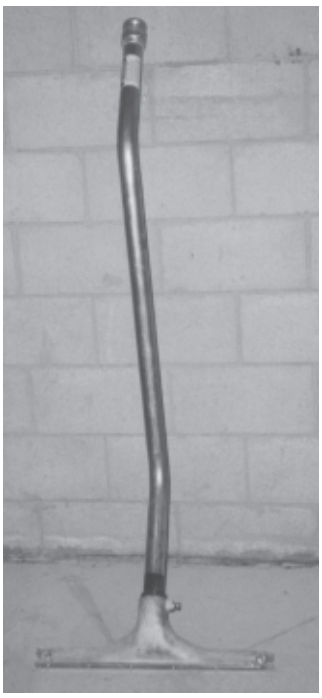
On/Off

Fig. 5 SWITCHES (TYPICAL)

6. **Gathering Material:**
   a. Use the open end of the bore to pick up the material.

   b. Use the tube or spread wands to pick up material.

   c. Several types of tubes or wands are available to use. The operator can select the one most appropriate for their application.



Wand **Clean-Up**

Fig. 6 GATHERING MATERIAL

7. **Air Slide:**
   Each wand is designed with an air slide on the tube that can be used to control the amount of air entering the machine along with gathered material. Always move the wand so that sufficient air enters the system to move the material and cool the blower. Do not starve the system for air.

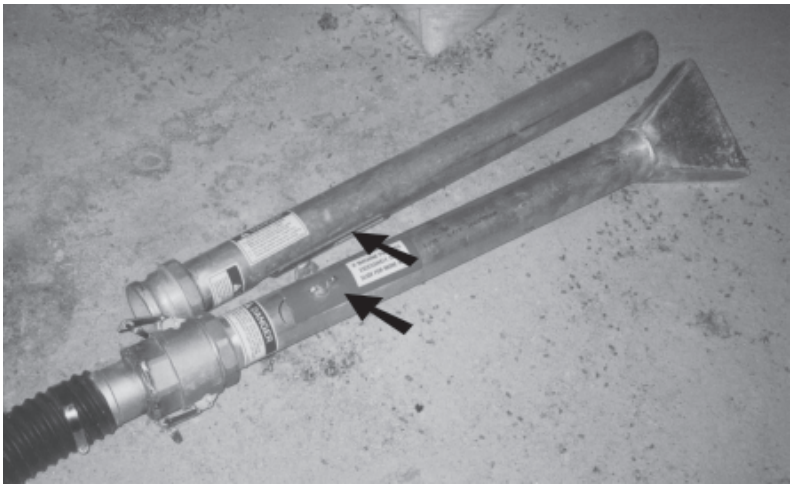


Fig. 7 AIR SLIDE (TYPICAL)

DANGER

Do not place intake tube near feet when standing on top of material. Sufficient material can be removed to draw operator and intake tube into material. Submersion in material can cause suffocation. 53-15639-6

8. **Nozzle Position:**
   Do not place the nozzle between your feet when picking up a deep pile of granular material. The nozzle can pick up sufficient material to draw the operator into the pile and suffocate them. Always pick up material away from nozzle.

9. **System Grounding:** Granular material flowing through pipes, hoses or lines can generate an electrical charge that will create electrical discharges, static and/or sparks. In high dust environments sparks or electrical discharges can set off an explosion. This static charge condition can be very annoying to an operator.

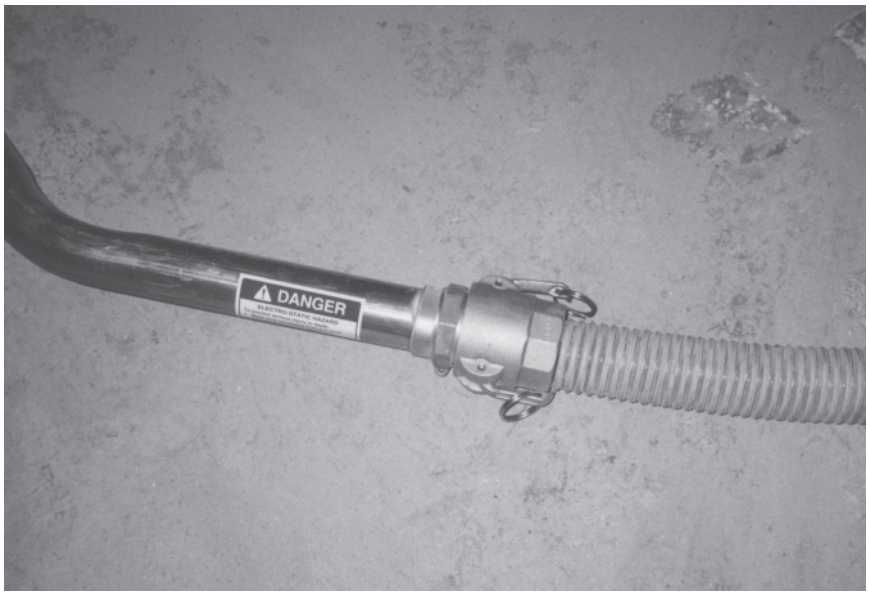


Fig. 8 CAM LOCK GROUNDING (TYPICAL)

The system is designed using steel lines, metal arm lock couplers on all fittings, a metal spiral strand in the hose that is attached to each fitting and metal pick-up components to maintain electrical ground continuity and through the entire system. Only when non-metal components are used or the electrical continuity is broken can sparks or shocks occur. Use an ohmmeter to check the electrical continuity of the system on a weekly basis as a maintenance item and/or if anyone feels a shock.

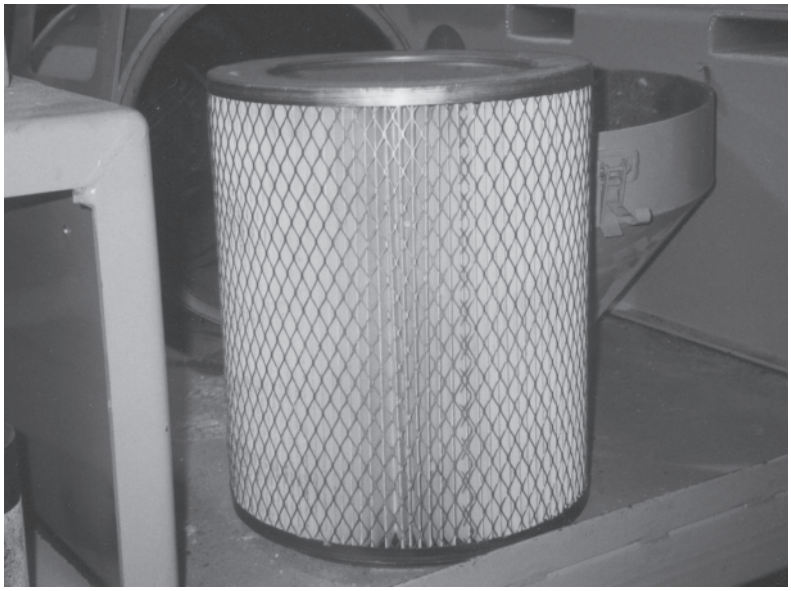
10. **System Filter:**
The system is designed with a large filter in the blower inlet line to stop dirt, dust and contaminants from going through the blower. With the intended operation in dusty and dirty environments, the blower life is not compromised from contaminants entering the system.

Open the flapper valve on the bottom of the filter cannister and remove the accumulated material at the start of each day.

Remove the filter and clean whenever the vacuum valve goes over relief. After several cleanings replace the filter.

Flapper Valve

Access



Out

Fig. 9 FILTER

11. **Airlock:**
The system is designed with an airlock to remove material from the air flow. It is located under the receiver tank and the collected material drops into an airlock compartment as it turns. As the rotor turns and a compartment moves from its up position to its down position, the material in the rotor compartment will fall out.

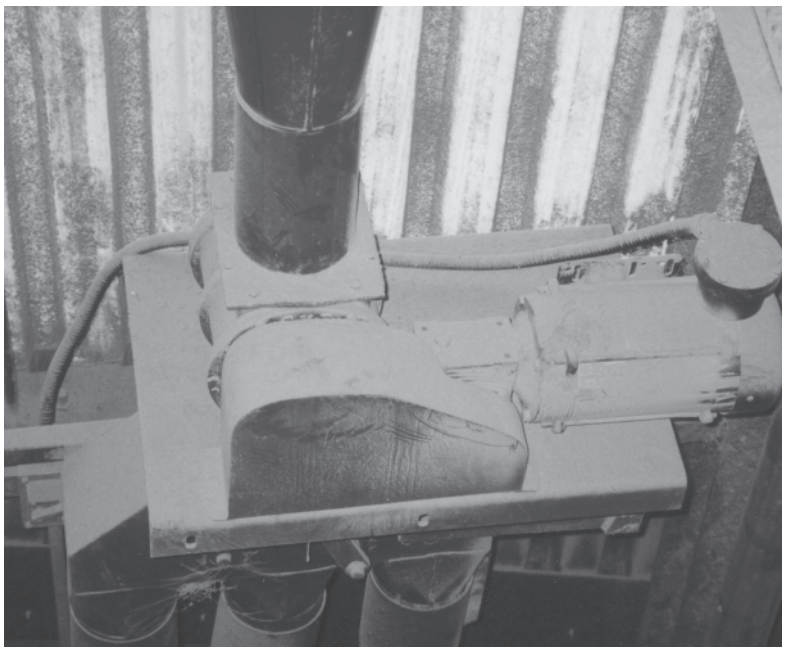


Fig. 10 AIRLOCK

12. **Airlock Unplugging:**
If a large piece of debris is drawn into the intake, it can get into the airlock, stall it and have to be removed. To unplug, lock out tag out master panel and remove obstruction through the access door on the receiver tank. Rotate airlock by hand after obstruction is removed to be sure airlock turns freely and has not been damaged. Repair airlock if damaged before resuming work.

Open **Closed**

Fig. 11 ACCESS DOOR

13. **Lock Out Tag Out Procedure:**
It is recommended that the customer institute a formal lock out tag out procedure for their workplace. In simple terms, this policy would require every person that will be servicing, adjusting, maintaining or unplugging the system to lock out the master panel and place a tag on it before working on the unit. Only the person with the tag can unlock the master switch to allow it to be turned on. This prevents unauthorized people from starting up the system and maintains control by the serviceman working on the system.

WARNING

Machine is shown with guard removed for illustrative purposes only. Do not operate machine with guard removed.

14. **Operating Hints:**
    a. **Lock out tag out master panel before performing any service or maintenance work on machine or unplugging airlock.**

    b. Maintain electrical continuity through all components to prevent sparks, shock or electrical discharges. Do not use plastic components.

    c. Clean the intake filter whenever the vacuum relief valve goes off. Replace filter when cleaning frequency is too short.

    d. Remove obstructions from airlock through access door in receiver tank after the master panel is locked out tagged out.

    e. When on top of material, do not push the nozzle into the pile next to the feet. The suction will pull the nozzle and the operator into the pile. If the pile is deep enough, the operator can be submerged under the material and suffocated.

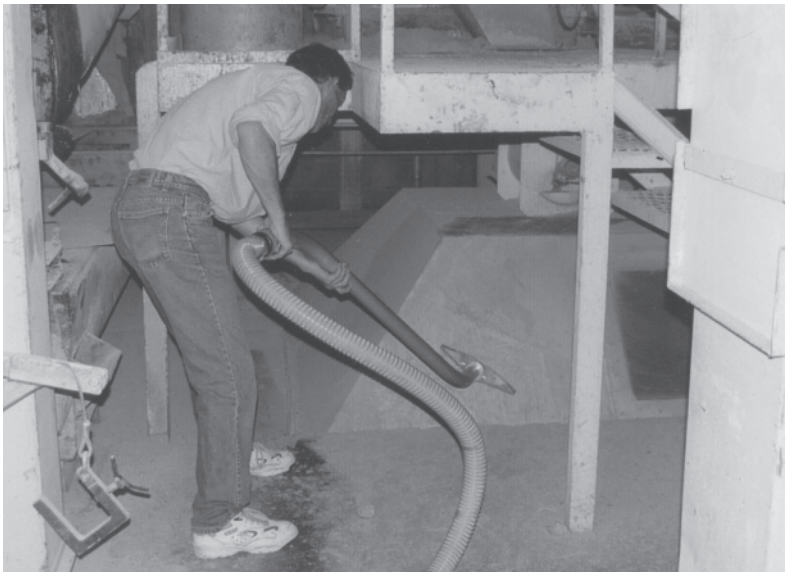


Fig. 12 OPERATING

DANGER

Do not place intake tube near feet when standing on top of material. Sufficient material can be removed to draw operator and intake tube into material. Submersion in material can cause suffocation.

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4.7 STORAGE

STORAGE SAFETY

1. Store unit in an area away from human activity.

2. Do not permit children to play on or around the stored machine.

3. Lock out tag out master panel to prevent unexpected start-up.

If the machine will not be used for a period of time, the machine should be thoroughly inspected and prepared for storage. Repair or replace any worn or damaged components to prevent any unnecessary down time when it will be used again.

Follow this procedure:

1. Clean the entire machine thoroughly using the Central-Vac to remove all dirt, debris or residue.

2. Gather all hoses, inlets and wands and store them so they will not be damaged during the down time.

3. Lubricate all grease points. Make sure all grease cavities have been filled with grease prior to storage.

4. Inspect all air hoses, fittings, lines and cam couplers. Tighten any loose fittings. Replace any hose that is badly cut, nicked or abraded or is separating from the crimped end of the fitting.

5. Check the oil level in the blower reservoirs. Bring to the recommended level.

6. Install and secure the plugs in the intake line inlets.

10. Touch up all paint nicks and scratches to prevent rusting.

5 SERVICE AND MAINTENANCE

MAINTENANCE SAFETY

1. Follow ALL the operating, maintenance and safety information in the manual.
2. Support the machine with blocks or safety stands when working beneath.
3. Follow good shop practices:
   - Keep service area clean and dry.
   - Be sure electrical outlets and tools are properly grounded.
   - Use adequate light for the job at hand.
4. Use only tools, jacks and hoists of sufficient capacity for the job.
5. Before servicing, adjusting, repairing or maintaining unit, ensure that unit power source is completely shut down, and can not start-up.
6. Make sure all guards are in place and properly secured when maintenance work is completed.
7. Keep hands, feet, hair and clothing away from all moving and/or rotating parts.
8. Lock out tag out master panel before opening airlock access door.
9. Lock out tag out master panel before performing any maintenance or service work on machine.
10. Clear the area of bystanders, especially small children, when carrying out any maintenance and repairs or making any adjustments.
11. Be sure that all lines, hoses and wands are grounded when maintenance work is completed.

5.1 SERVICE

5.1.1 FLUIDS AND LUBRICANTS

1. **Grease:**
   Use an SAE multi-purpose high temperature grease with extreme pressure (EP) characteristics. Also acceptable is an SAE multi-purpose lithium based grease.

2. **Blower Oil:**
   Use Walinga Super Duty Blower Oil.
   (Walinga Part # 98-13813-5)

   Reservoir Capacity: 1.40 litres Front
   2.50 Litres Rear

Reservior	Capacity
Front	1.40 liter (1.5 qt.)
Rear	2.50 liters (2.6 qts.)

3. **Storing Lubricants:**
   Your unit can operate at top efficiency only if clean lubricants are used. Use clean containers to handle all lubricants. Store them in an area protected from dust, moisture and other contaminants.

5.1.2 GREASING

Refer to Section 5.1.1 for recommended grease. Use the Service Record checklist provided to keep a record of all scheduled servicing.

1. Use a hand-held grease gun for all greasing.
2. Wipe grease fitting with a clean cloth before greasing, to avoid injecting dirt and grit.
3. Replace and repair broken fittings immediately.
4. If fittings will not take grease, remove and clean thoroughly. Also clean lubricant passageway. Replace fitting if necessary.

5.1.3 SERVICING INTERVALS

8 Hours or Daily

1. Open the flapper valve on the bottom of the filter canister to remove the loose material.

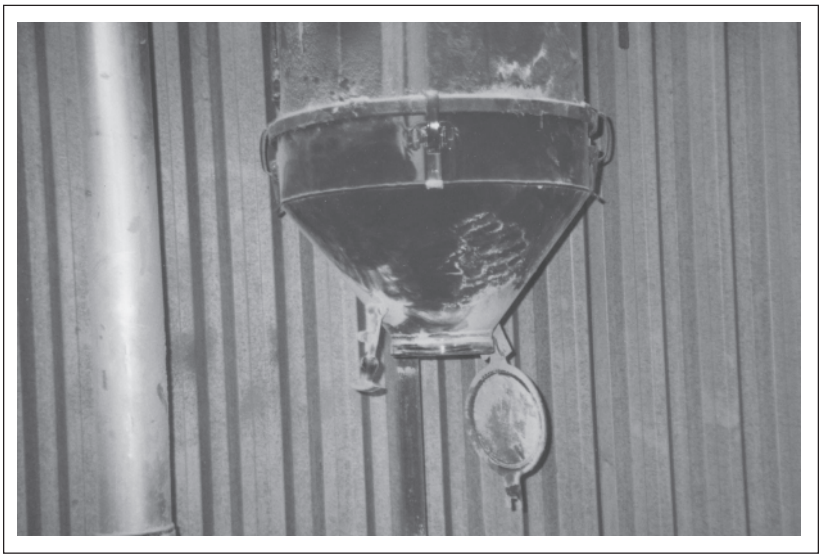


Fig. 13 FLAPPER VALVE

2. Remove the bottom cone and check the condition of the input filter. Clean or change as required.

Fig. 14 INPUT FILTER

3. Check the tension and alignment of the input drive belts. See Maintenance Section.

WARNING

Machine is shown with guard removed for illustrative purposes only. Do not operate machine with guard removed.

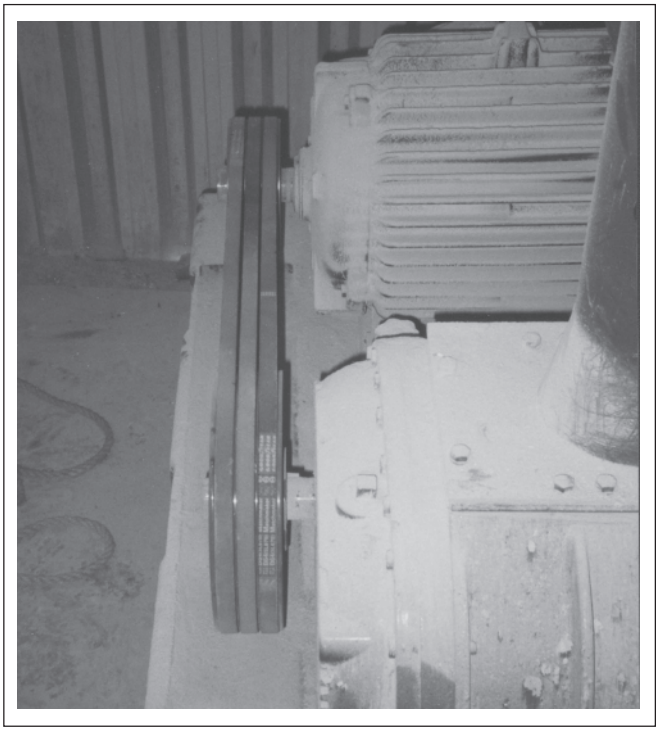
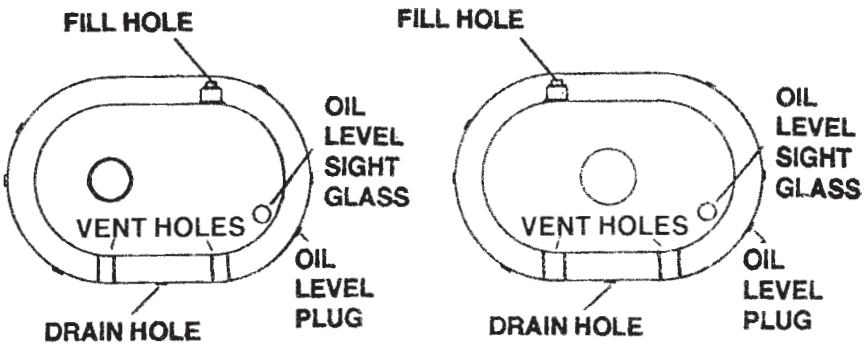
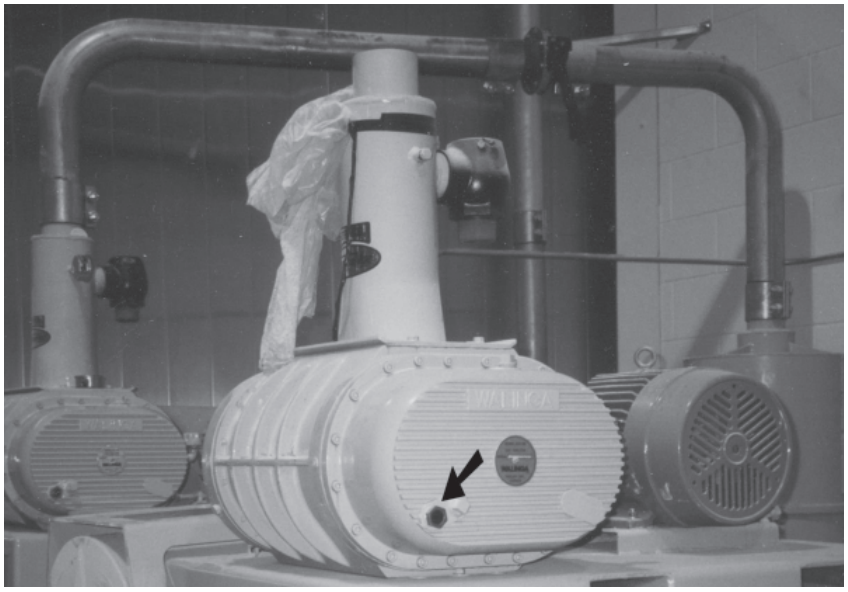


Fig. 15 DRIVE BELTS (ALIGNMENT)

4. Check the oil level in the blower reservoirs (2 locations).



Schematic



Front

Rear

Fig. 16 RESERVOIRS

40 Hours

1. Check airlock drive chain. Tension or align as required.

WARNING

Machine is shown with guard removed for illustrative purposes only. Do not operate machine with guard removed.

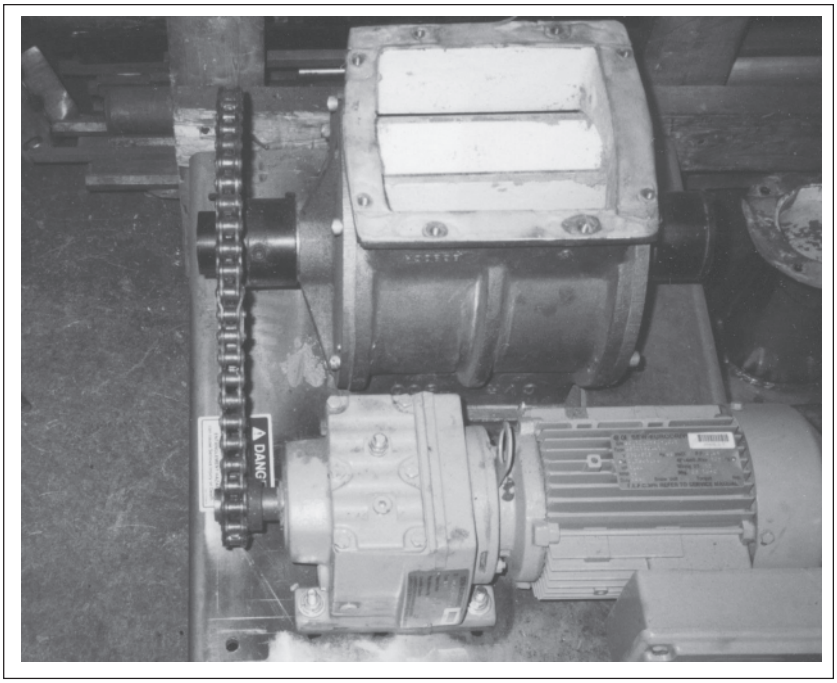


Fig. 17 DRIVE CHAIN

2. Check for component (lines, hoses and wands) grounding. Use an ohmmeter to be sure. Do not operate unless the system is completely grounded.

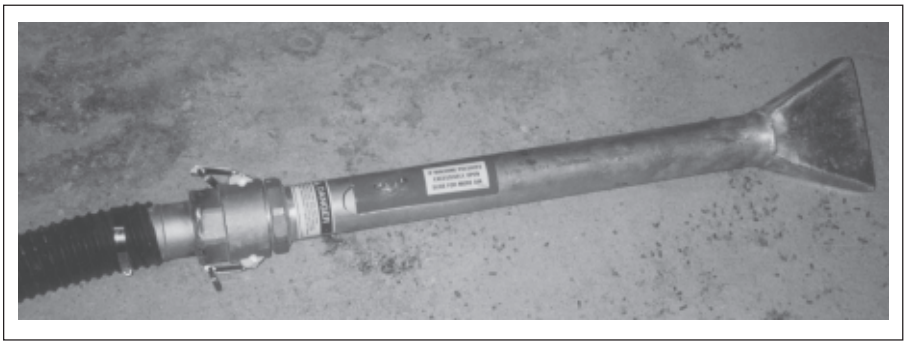


Fig. 18 HOSE (TYPICAL)

3. Lubricate the blower outboard bearing (1 location).

Fig. 19 OUTBOARD BEARING

100 Hours or Annually

1. Change the oil in the blower reservoirs (2 reservoirs), and clean head plate vent holes.

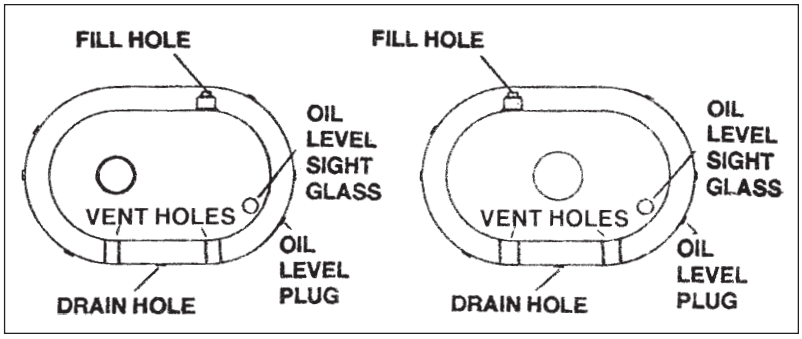


Fig. 20 BLOWER RESERVOIRS

2. Check the function of the vacuum relief valve.

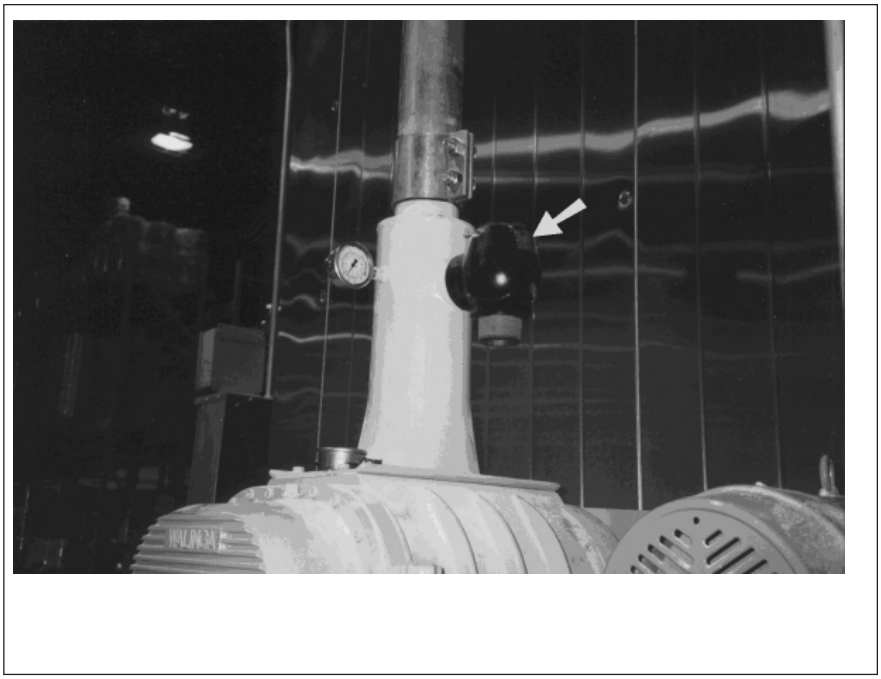


Fig. 21 RELIEF VALVE

3. Check condition of continuity across cam-locks.

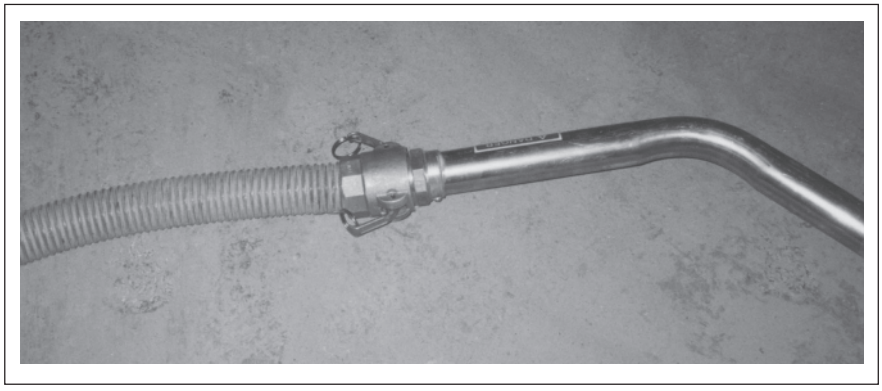


Fig. 22 CAM-LOCKS

5.1.4 SERVICE RECORD

See Lubrication and Maintenance sections for details of service. Copy this page to continue record.

ACTION CODE: L LUBRICATE C CHANGE
š CHECK CL CLEAN

HOURS / SERVICED BY / MAINTENANCE																		
8 Hours or Daily																		
CL Flapper Valve																		
š Input Filter																		
š Tens & Align Input Drive Belts																		
š Oil Level in Blower Reservoirs																		
40 Hours																		
š Airlock Drive Chain																		
š Component Grounding																		
L Blower Outboard Bearing (1)																		
100 Hours or Annually																		
C Oil in Blower Reservoirs (2)																		
š Vacuum Relief Valve																		
š Fitting Cam-Locks																		

5.2 MAINTENANCE

By following a careful service and maintenance program for your machine, you will enjoy many years of trouble-free service.

5.2.1 BELT TENSION AND ALIGNMENT

Rotational power from the electric motor is transmitted to the blower through the belt drive. To obtain efficient transmission of power and good belt life, the belts must be properly tensioned and the pulleys aligned.

Belts that are too tight will stretch and wear quickly or overload the bearings on the motor or blower. Belts that are too loose will not transmit the required power and will slip, overheat and wear quickly. Pulleys that are not aligned will result in rapid belt wear.

Follow this procedure when checking and adjusting belt tension and pulley alignment.

1. Clear the area of bystanders, especially small children.

2. Turn machine off, lock out tag out master control panel and wait for all moving parts to stop before starting maintenance work.

3. Unlatch and remove the belt cover. Lay to the side.

Table 1 BELT DEFLECTION

Model	Weight Range	Deflection
10HP (75KW)	**3.8lbs-5.7lbs (1.7kg-2.6kg)**	**5/16in. (7.9 mm)**
15HP, 20HP, 25HP (112KW, 149KW, 186KW)	**6.5lbs-9.6lbs (2.9kg - 4.4kg)**	**5/16in. (7.9 mm)**
SPECIAL DESIGN UNIT___HP (___KW)	_____	_____

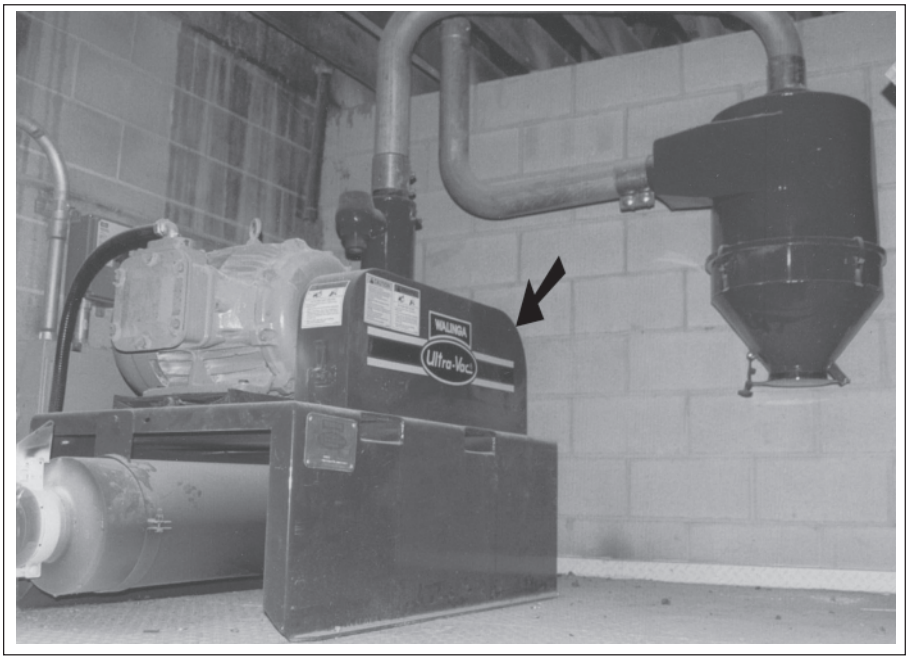


Fig. 23 COVER

4. Use the appropriate weight to determine the belt deflection in a static condition (Table 1).

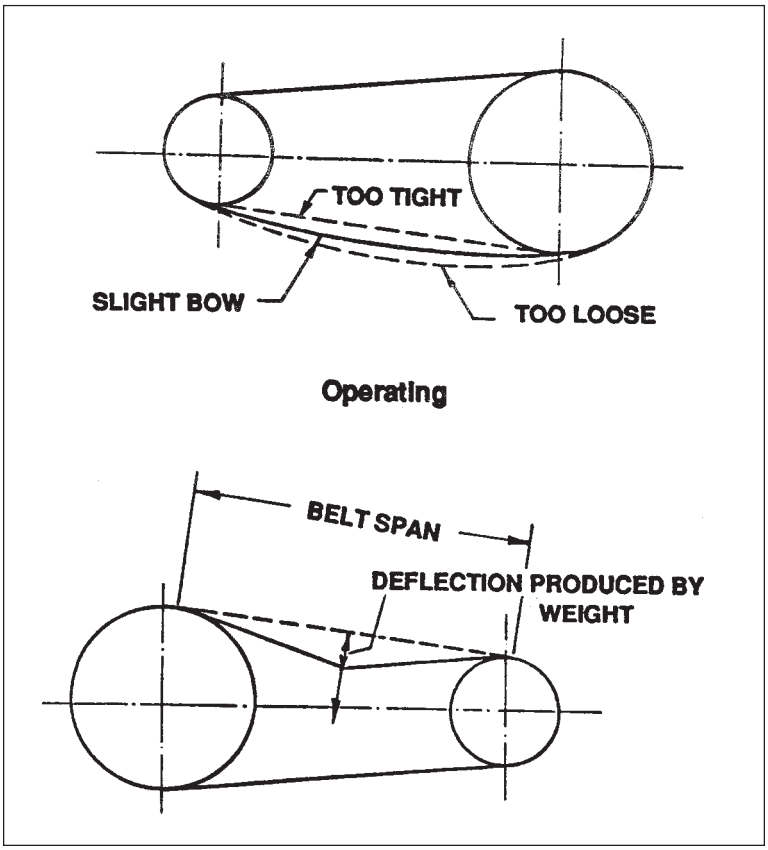


Fig. 24 BELT DEFLECTION

5. **Adjusting Tension:**

   a. Loosen the jam nuts on the motor base and position adjusting bolts. Loosen base position bolts slightly.

   b. Turn the adjusting bolt to set the tension. Turn both bolts the same amount to maintain pulley alignment.

   c. Check the tension again. Overtightening will cause belt stretching and overload the bearing. Belts that are too loose will slip, tear and wear rapidly. Check alignment, see next section.

   d. Tighten base position bolts.

   e. Tighten jam nuts.

   f. Install and secure belt covers.

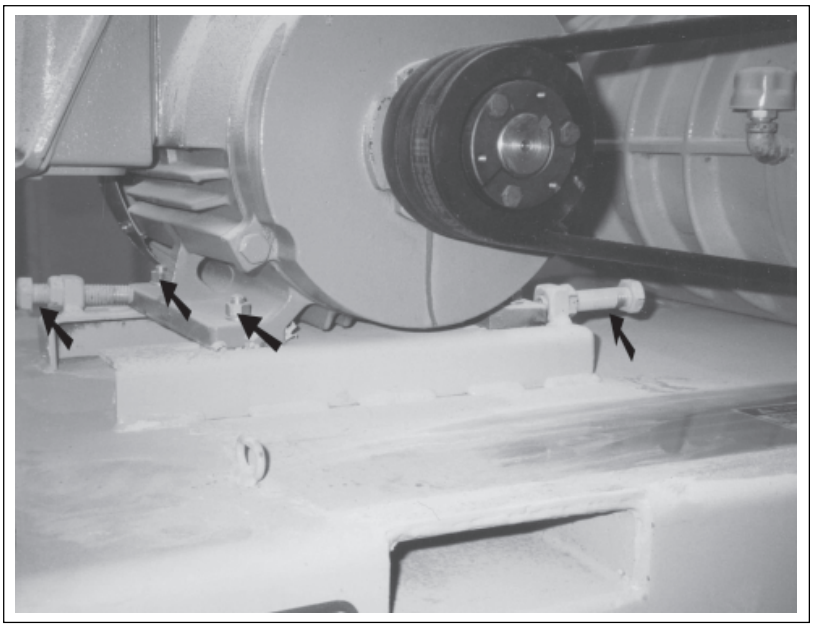


Fig. 25 ADJUSTING BOLTS

WARNING

Machine is shown with guard removed for illustrative purposes only. Do not operate machine with guard removed.

6. **Pulley Alignment:**

   a. Lay a straight-edge across the faces of the two pulleys.

WARNING

Machine is shown with guard removed for illustrative purposes only. Do not operate machine with guard removed.

   b. If the gap between the pulley and the straight-edge exceeds 1/16 inch (1.5 mm), the pulleys must be realigned.

   c. Review the types of alignment before starting.

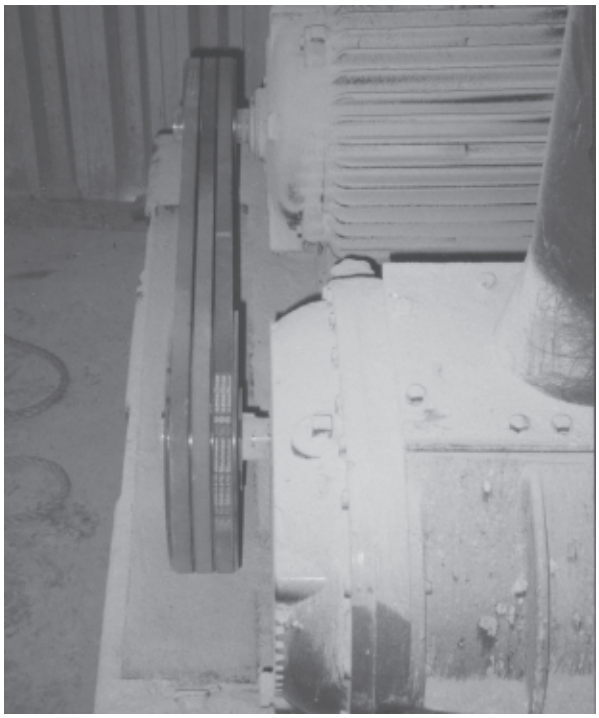
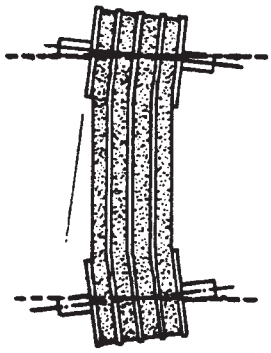
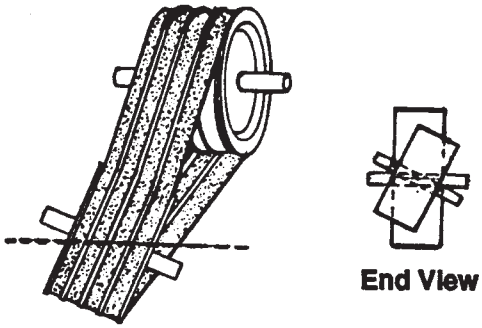


Fig. 26 PULLEYS

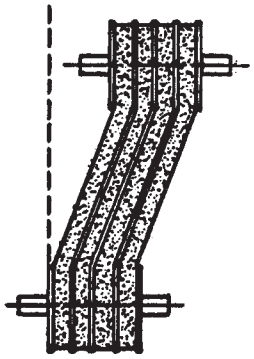
1. Shafts are not parallel to one another.



2. Shafts are not in correct alignment although they appear parallel when seen from above.



3. Shafts are parallel and in alignment but pulleys are not in alignment.



4. Correct installation both shafts and pulleys are parallel and in alignment.

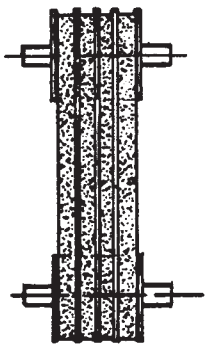


Fig. 27 MISALIGNMENT

d. Use the position adjusting bolts on the motor base to align the input pulley. Tighten motor base anchor bolts and jam nuts when alignment has been completed.

WARNING

Machine is shown with guard removed for illustrative purposes only. Do not operate machine with guard removed.

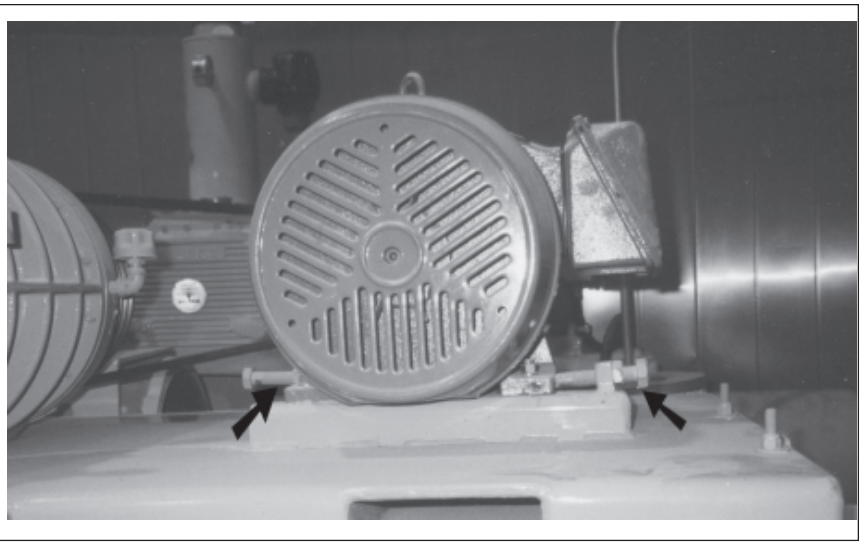


Fig. 28 ADJUSTING BOLTS

e. Set the belt tension.

f. Install and latch belt cover.

7. Be sure all guards are installed and secure before resuming work.

5.2.2 BLOWER OIL CHANGING AND BREATHER CLEANING

The gears that drive and time the blower lobes run in an oil bath for lubrication. Maintaining the correct level in the reservoirs and changing every 100 hours will insure proper lubrication.

When maintaining the blower, follow this procedure:

1. Clear the area of bystanders, especially small children.

2. Turn machine off, lock out tag out master control panel and wait for all moving parts to stop before starting maintenance work.

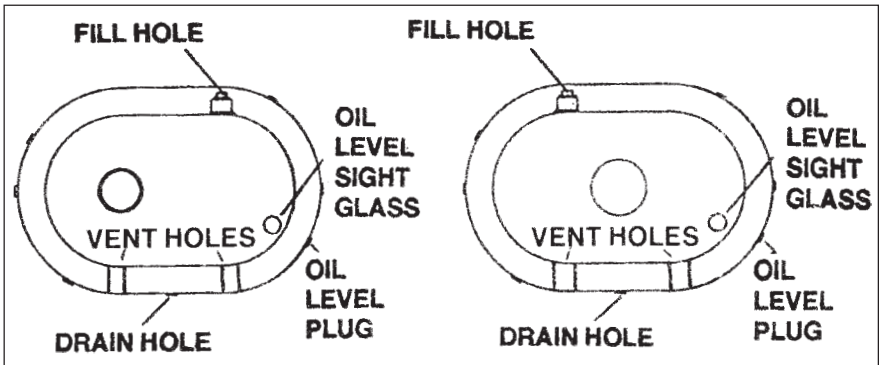
3. Unlatch and remove the belt drive covers.

4. **Checking Oil Level:**

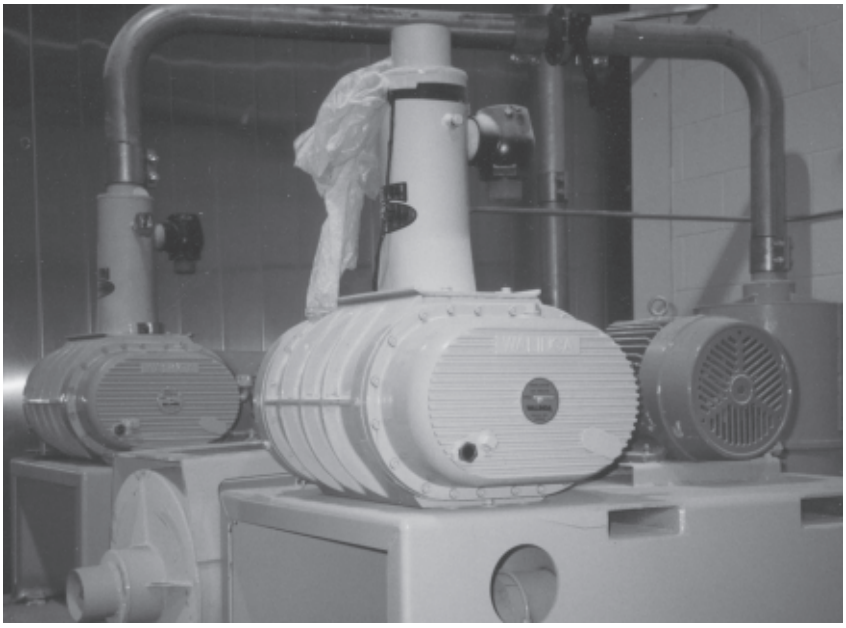
   a. Remove the level plug in each reservoir or check the sight glass.

IMPORTANT

Check the level only when the oil is cold and the machine is level.



Schematic



Rear

Fig. 29 BLOWER

   b. Oil in the reservoir should just fill the threads of the level plug hole.

   c. Add oil if low or allow the reservoir to drain if overfilled.

IMPORTANT

It is necessary to maintain the recommended oil level in the reservoir. A low level causes heating from lack of lubrication and rapid gear and bearing wear. Too much oil causes heating from oil churning and can cause seal and breather leaks.

   d. Install and tighten the level plug.

   e. Install and secure the belt covers.

5. **Changing Oil:**
   a. Place a collection pan or pail under each drain plug.

   b. Remove each drain plug.

   c. Flush each case and allow several minutes to drain.

   d. Dispose of the oil in an approved manner. Do not contaminate the worksite with used oil.

   e. Install and tighten the drain plugs.

   f. Remove fill and level plugs.

   g. Add Walinga Blower oil or equivalent to each reservoir until the oil is just starting to come out of the level plug hole.

IMPORTANT

Condensation forms and collects inside the reservoirs during machine operation. Changing oil removes this water and prevents it from damaging the gears and bearings.

   h. Install and tighten the level and fill plugs.

   i. Install and secure the belt drive covers.

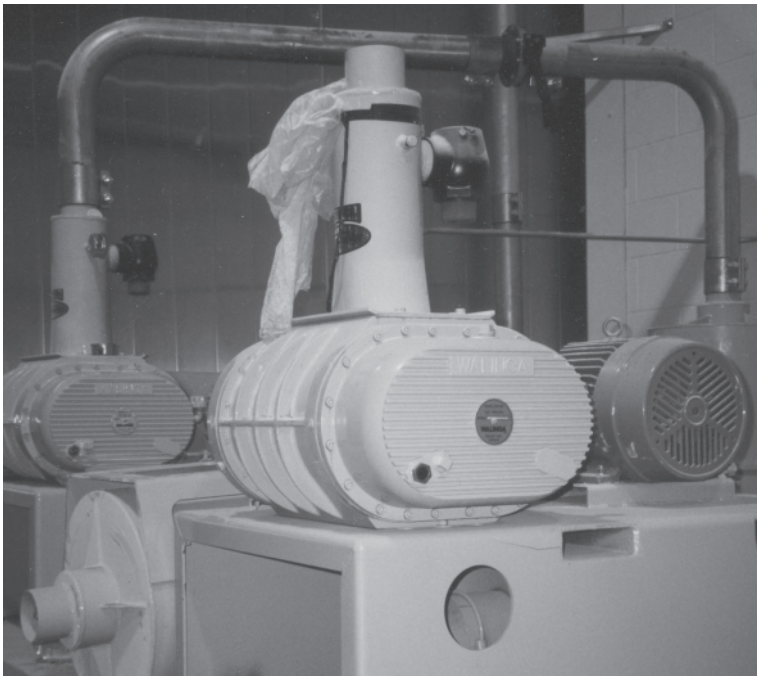
6. **Cleaning Breathers:**
   a. Remove breathers and blow out with an air hose.

   b. If dirt has caked up in the breather, soak in good solvent and then blow out. It may be necessary to use a probe to loosen the dirt.

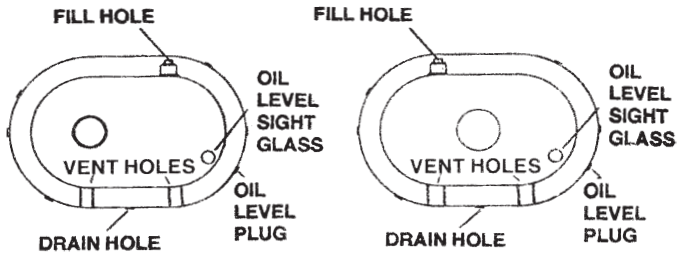
   c. Install and tighten the breather.

   d. Install and secure the belt drive covers.

   e. Clean vents in end plates located under the blower on either side of the drain plug.



Breathers



Vents

Fig. 30 BLOWER

5.2.3 AIRLOCK

The airlock acts as a seal between the vacuum and atmosphere sides of the machine and is located at the bottom of the collector cyclone tank. As the airlock rotor turns, a pocket is filled with material when it points upward. As the pocket rotates, it is moved to the bottom where the material drops out of the pocket into the discharge pipe.

Efficient operation of the airlock requires a close fit between the tips of the rotor and the case to maintain a seal between vacuum and atmosphere sides.

When checking or maintaining the airlock, follow this procedure:

1. Clear the area of bystanders, especially small children.

2. Turn machine off, lock out tag out master control panel and wait for all moving parts to stop before starting maintenance work.

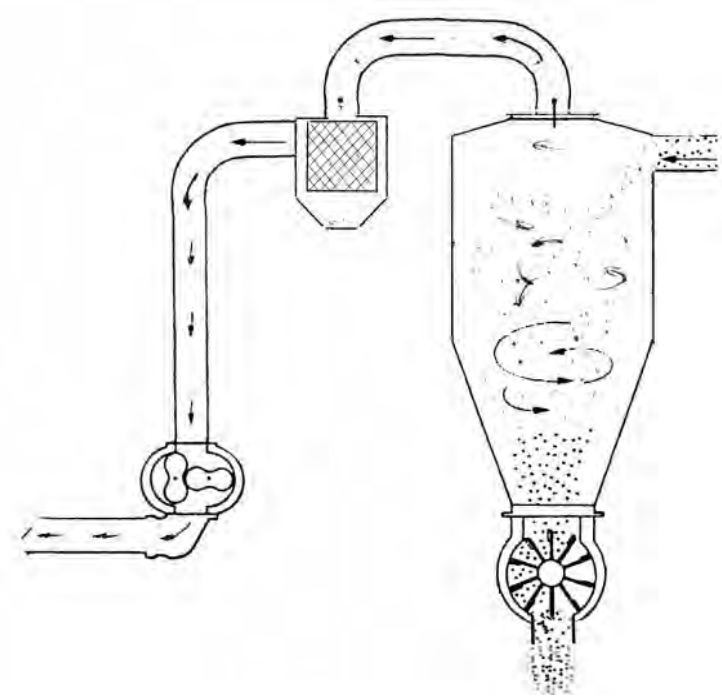


Fig. 31 AIRLOCK

3. **Checking Tip Clearance:**

WARNING

Lock out tag out master panel before inspecting or maintaining airlock.

a. Checking the airlock can be done through the inspection door.

b. Use a feeler gauge to check the clearance between the tip and the case. Inspect each tip over its entire width.

c. The clearance of the tips must be maintained at 0.004 to 0.006 inches at all times. Adjust or replace tips as required to insure system sealing.

d. Replace any tips that are bent, chipped or broken.

NOTE

Blades are reversible if not excessively damaged.

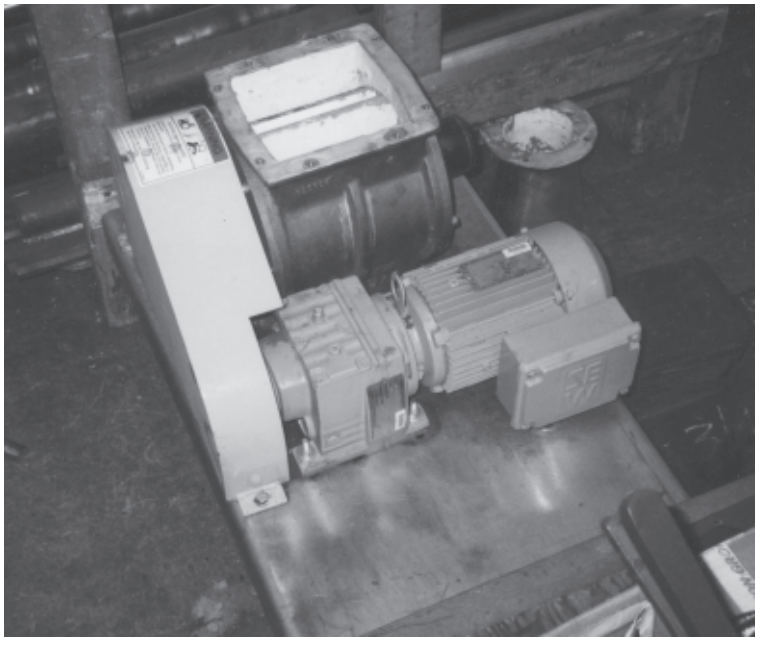


Fig. 32 AIRLOCK

4. **Wiper Blade:**

A wiper blade is located at the top of the airlock to clean the tips as the airlock turns.

To check the wiper blade, follow this procedure:

a. Open the access door on receiver tank.

b. Reach into the top of the airlock and feel the condition of the wiper blade.

c. Replace it if it is damaged in any way.

WARNING

Lock out tag out master panel before inspecting or maintaining airlock.

5. **Blade Replacement:**

a. Lock out tag out master panel.

b. Remove chain drive guard.

c. Lift the collector cyclone off the airlock.

d. Remove collector cyclone anchor bolts.

e. Remove the tips from the rotor and the wiper blade from the housing.

f. File the ends of each replacement blade so there is approximately 0.006 inches of clearance between the ends and the housing.

g. Mount the blades to their respective vane and tighten bolts finger tight.

h. Loosen and remove drive chain.

i. Rotate airlock rotor slightly to set the clearance between the blade and the case. Be sure to set it at 0.004 inches of clearance. Use a feeler gauge.

j. Tighten the center bolt first. Then the others.

k. Rotate the airlock and listen if it touches the housing anywhere. A slight touch is alright.

l. Repeat mounting procedure with the other blades.

m. Turn the rotor after each blade is installed to be sure it does not contact the case.

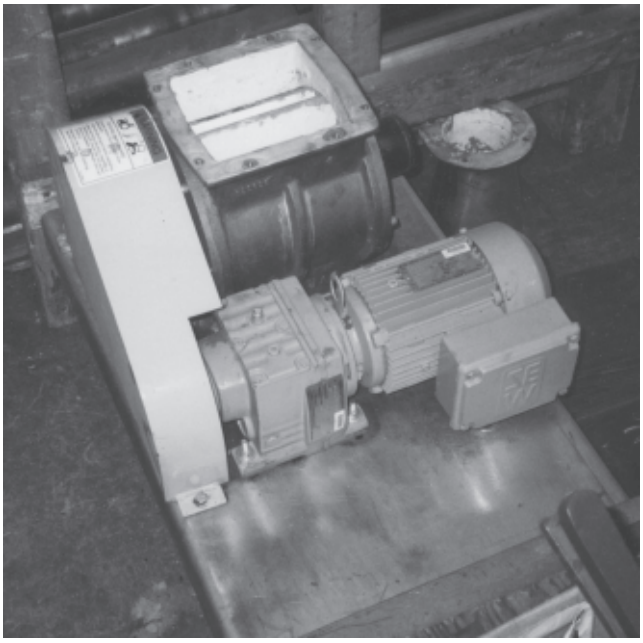


Fig. 33 AIRLOCK

n. Mount the new wiper blade. Be sure the wiper contacts each tip slightly as the airlock turns.

o. Install and set chain drive tension.

p. Install and secure chain drive guard.

q. Clean thoroughly.

5.2.4 CHAIN TENSION AND ALIGNMENT

Rotational power to drive the airlock is provided by an electric motor through a chain drive system. To obtain good chain life, the chain must be properly tensioned and the sprockets aligned. Chains that are too tight will stretch and wear quickly or over load the bearings. Chains that are too loose will not transmit the power evenly and will wear out quickly. Misaligned sprockets will rapidly wear the chain and sprockets.

When checking chain tension and alignment, follow this procedure:

1. Clear the area of bystanders, especially small children.

2. Turn machine off, lock out tag out master control panel and wait for all moving parts to stop before starting maintenance work.

WARNING

Machine is shown with guard removed for illustrative purposes only. Do not operate machine with guard removed.

3. Remove guard over chain drive system.

4. Pull on the middle of the slack side of the chain. The chain is properly tensioned when the chain will move 1/4 inch (6 mm).

5. **Adjusting Tension:**

   a. Loosen the jam nuts on the motor base and position bolts.

   b. Turn the adjusting bolts to set the tension. Turn both bolts the same amount to maintain pulley alignment.

   c. Check and set alignment is required. Refer to step 6.

   d. Tighten motor base bolts.

   e. Tighten jam nuts.

   f. Install and secure chain guard.

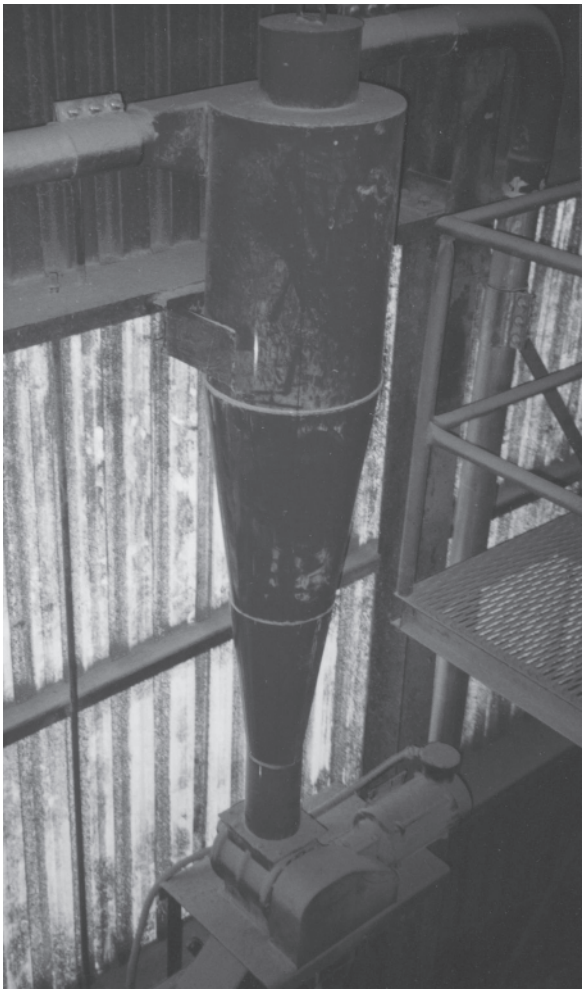


Fig. 34 CHAIN DRIVE

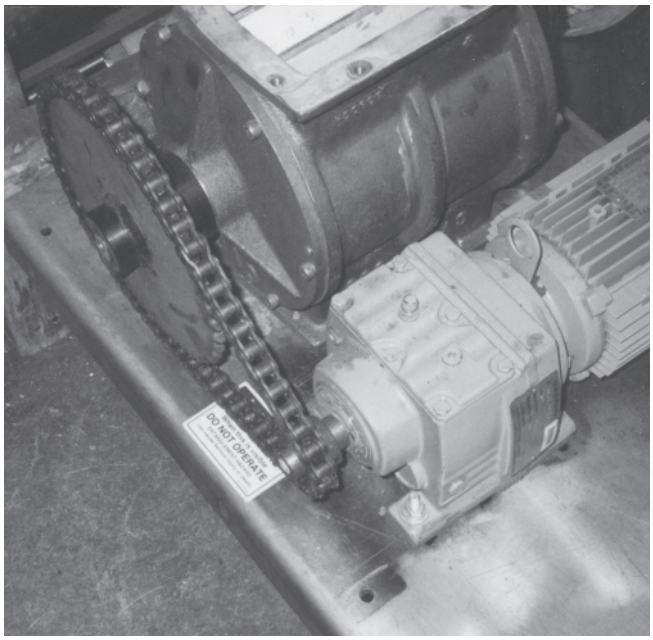


Fig. 35 TENSIONING

6. **Sprocket Alignment:**

   a. Lay a straight edge along the sides of the 2 sprockets.

   b. If there is a gap of more 1/16 inch (1.5 mm) between the sprockets and straight edge, the sprockets must be aligned.

   c. Use the position adjusting bolts on the motor base to move motor/ sprocket for alignment.

   d. Be sure chain is properly tensioned.

   e. Tighten motor base bolts and jam nuts when alignment set.

   f. Install and secure chain guard.

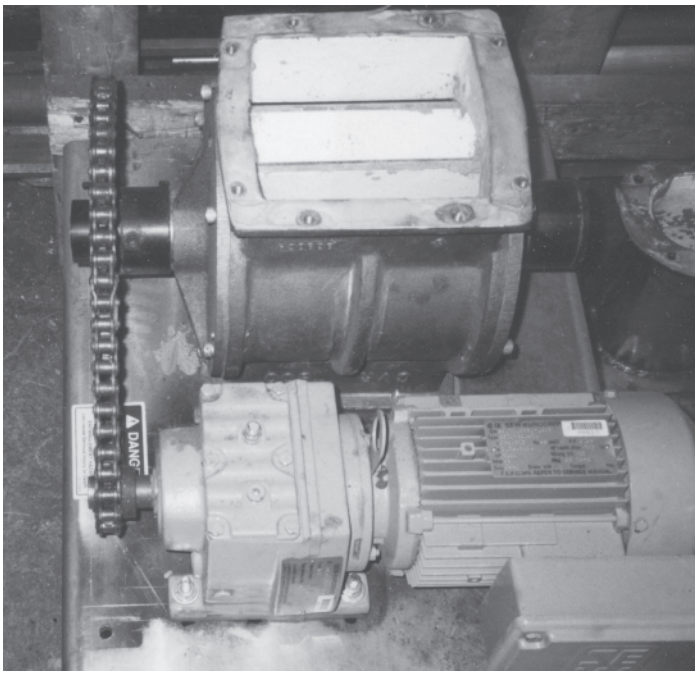


Fig. 36 CHAIN ALIGNMENT

WARNING

Machine is shown with guard removed for illustrative purposes only. Do not operate machine with guard removed.

6 TROUBLE SHOOTING

The Walinga Central Vacuum System is a high capacity air pump that creates a vacuum for picking up granular material and supplies pressurized air for moving the material. It is a simple and reliable system that requires minimum maintenance.

In the following section, we have listed many of the problems, causes and solutions to the problems that you may encounter.

If you encounter a problem that is difficult to solve, even after having read through this trouble shooting section, please call your Walinga dealer. Before you call, please have this Operator's Manual and the serial number from your Central Vac ready.

PROBLEM	CAUSE	SOLUTION
Slow pick up of material.	Air leaks.	Tighten all vacuum connections. Be sure cam locks are in good condition.
		Tighten receiver cyclone to base.
		Check airlock for tip wear.
		Check seal on pre-cleaner bottom door. Close and secure.
		Inspection door must be closed and sealed.
		Check vacuum relief valve. Replace if defective. Clear obstruction.
	Dirty or plugged intake filter.	Clean or replace intake filter.
	Defective blower.	Check clearance between lobes and case. Excessive clearance will decrease air flow. Consult your dealer.
	Improper setting of air slide.	Reset airslide.

PROBLEM	CAUSE	SOLUTION
Slow discharge of material	Air leaks.	Tighten all pressure connections. Be sure cam locks are in good condition.
	Dirty or plugged intake filter.	Clean or replace intake filter.
	Defective blower.	Check clearance between lobes and case. Excessive clearance will decrease air flow. Consult your dealer.
	Defective airlock.	Check that tip clearance is 0.004 inches. Adjust or replace tips as required.
Pulsation.	Not enough air flow.	Open air slide on wand to provide more air or allow more air into intake.
	Too many bends.	Straighten out intake hose.
Blower overheating.	Not enough air flow.	Open air slide on wand to provide more air or allow more air into intake.
	Low oil level.	Add oil as required.

PROBLEM	CAUSE	SOLUTION
Noisy airlock.	Tips hitting case.	Readjust tips where applicable.
Airlock stalls.	Airlock jammed.	Remove obstruction from airlock by opening inspection door or discharge line. Lock out tag out master panel.
		WARNING **Do not work on airlock unless you lock out tag out master panel.**
	Blades too tight.	Loosen bolts. Refer to airlock maintenance.
	Faulty airlock motor or gearbox.	Replace motor or gearbox as required.
Air loss through airlock.	Tip clearance too large.	Adjust tips to decrease clearance to 0.006 inches.
Breaking rotor blades.	Blades too tight.	Loosen bolts. Refer to airlock maintenance.
Low air volume.	Slow speed.	Check for slipping belts. Adjust belt tension as required.
	Piping blocked.	Check inlet and outlet piping. Remove obstruction.
		Check relief valve. Clean, repair or replace as required.
	Worn components.	Check clearance and replace defective components. Refer to Blower Manual.
Overheating.	Inadequate lubrication.	Check oil level in reservoirs. Add as required.
	Excessive lubrication.	Check oil level. Correct as re-quired.
	Coupling misalignment.	Check and realign.

PROBLEM	CAUSE	SOLUTION
Motor overloading.	Impellers rubbing.	Consult your nearest dealer.
Loss in drive speed.	Belts slipping.	Tighten belts as required.
	Localized belt wear.	Check cross-section dimension. a. If narrow, pulley spinning. b. If swollen, belt failing internally.
	Unequal stretch on belts.	Defective belts. Replace with matched set.
	Belts overloaded.	Belts failed or worn out. Replace belts with matched set.
	Belt separation.	Belts too tight. Replace belts and set correctly.
	Envelope seams opening.	Check for oil or rubber solvent. Eliminate contamination and replace belts.
	Abnormal envelope wear.	Check for worn sheave, misalignment or slip. Replace defective parts, adjust properly and replace belt.
	Belt softening or swelling.	Eliminate oil or rubber solvent. Replace belt.
	Belt hardening or cracking.	Eliminate heat or chemical contamination. Replace belt.

7 SPECIFICATIONS

7.1 MECHANICAL

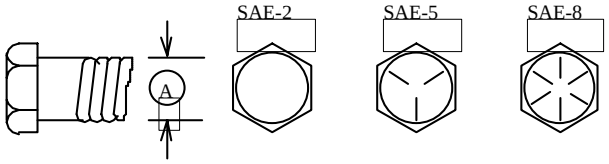
7.2 BOLT TORQUE

CHECKING BOLT TORQUE

The tables shown below give correct torque values for various bolts and capscrews. Tighten all bolts to the torques specified in chart unless otherwise noted. Check tightness of bolts periodically, using bolt torque chart as a guide. Replace hardware with the same strength bolt.

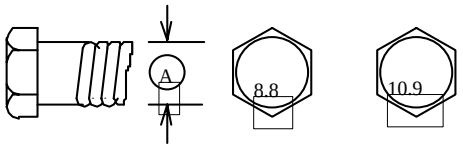
ENGLISH TORQUE SPECIFICATIONS

Bolt Diameter "A"	Bolt Torque*					
	SAE 2		SAE 5		SAE 8	
	(N.m)	(lb-ft)	(N.m)	(lb-ft)	(N.m)	(lb-ft)
1/4"	8	6	12	9	17	12
5/16"	13	10	25	19	36	27
3/8"	27	20	45	33	63	45
7/16"	41	30	72	53	100	75
1/2"	61	45	110	80	155	115
9/16"	95	60	155	115	220	165
5/8"	128	95	215	160	305	220
3/4"	225	165	390	290	540	400
7/8"	230	170	570	420	880	650
1"	345	225	850	630	1320	970



METRIC TORQUE SPECIFICATIONS

Bolt Diameter "A"	Bolt Torque*			
	8.8		10.9	
	(N.m)	(lb-ft)	(N.m)	(lb-ft)
M3	.5	.4	1.8	1.3
M4	3	2.2	4.5	3.3
M5	6	4	9	7
M6	10	7	15	11
M8	25	18	35	26
M10	50	37	70	52
M12	90	66	125	92
M14	140	103	200	148
M16	225	166	310	229
M20	435	321	610	450
M24	750	553	1050	774
M30	1495	1103	2100	1550
M36	2600	1917	3675	2710



Torque figures indicated above are valid for non-greased or non-oiled threads and heads unless otherwise specified. Therefore, do not grease or oil bolts or capscrews unless otherwise specified in this manual. When using locking elements, increase torque values by 5%.

* Torque value for bolts and capscrews are identified by their head markings.

8 INDEX

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