INSTALLATION INSTRUCTIONS

WALL MOUNT
ENERGY RECOVERY VENTILATOR
WITH EXHAUST

Models:
ERVF-A5
ERVF-C5

For Use With Bard
3-1/2 through 5 Ton
Wall Mount™ Air Conditioners
and Heat Pumps
The Wall Mount Energy Recovery Ventilator was designed to provide energy efficient, cost effective ventilation to meet I.A.Q. (Indoor Air Quality) requirements while still maintaining good indoor comfort and humidity control for a variety of applications such as schools, classrooms, lounges, conference rooms, beauty salons and others. It provides a constant supply of fresh air for control of airborne pollutants including CO₂, smoke, radon, formaldehyde, excess moisture, virus and bacteria.

The ventilator incorporates patented rotary heat exchanger technology to remove both heat and moisture. It is designed as a single package which can be easily factory or field installed for new installations or retrofit to the new Bard W**A and W**H Series wall mounted units. The package consists of a unique rotary Energy Recovery Cassette that can be easily removed for cleaning or maintenance. The ERVF-*5 has two 15-inch diameter heat transfer wheels for efficient heat transfer. The heat transfer wheels use a permanently bonded dry desiccant coating for total heat recovery.

Ventilation is accomplished with (2) blower/motor assemblies each consisting of a drive motor and dual blowers for maximum ventilation at low sound levels. The intake and exhaust blowers can be operated at the same speed (airflow rate) or different speeds to allow flexibility in maintaining desired building pressurization conditions. Factory shipped on medium intake and low exhaust. See Figure 8A to change speeds. The rotating energy wheels provide the heat transfer effectively during both summer and winter conditions. Provides required ventilation to meet the requirements of ASHRAE 62.1 standard.

**NOTE:** During operation below 5 degrees F outdoor temperature, freezing of moisture in the heat transfer wheel can occur. Consult the factory if this possibility exists.

**GENERAL INFORMATION**

**NOTE:** This manual covers both factory and field installed ERVF assemblies. For factory installed ERVF, skip information pertaining to installation of the ERVF system.

The ventilator should only be installed by a trained heating and air conditioning technician. These instructions serve as a guide to the technician installing the ventilator package. They are not intended as a step-by-step procedure, with which the mechanically-inclined owner can install the package. The ventilator housing is shipped in one carton which contains the following:

1. Energy Recovery Ventilator
2. Service Door
3. Rain Hood and Mist Eliminator
4. Installation Instructions

**UNPACKING**

Upon receipt of the equipment, be sure to compare the model number found on the shipping label with the accessory identification information on the ordering and shipping document to verify that the correct accessory has been shipped.

Inspect the carton housing of each ventilator as it is received, and before signing the freight bill, verify that all items have been received and that there is no visible damage. Note any shortages or damage on all copies of the freight bill. The receiving party must contact the last carrier immediately, preferably in writing, requesting inspection by the carrier’s agent. Concealed damage not discovered until after loading must be reported to the carrier within 15 days of its receipt.

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**MODEL NOMENCLATURE LEGEND**

Energy Recovery Ventilator (ERV)

2-Piece Front Door

Wall Mount™ – Cabinet Size

2 = W18-24A, L and H
3 = W30-36A, L and H
5 = W42-60A, L and H

**ELECTRICAL SPECIFICATIONS**

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## PERFORMANCE AND APPLICATION DATA – ERVF*5

### SUMMER COOLING PERFORMANCE

#### INDOOR DESIGN CONDITIONS 75°DB/62°WB

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### WINTER HEATING PERFORMANCE

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**Legend:**
- VLT = Ventilation Load – Total
- VLS = Ventilation Load – Sensible
- VLL = Ventilation Load – Latent
- HRT = Heat Recovery – Total
- HRS = Heat Recovery – Sensible
- WHR = Winter Heat Recovery

*Note: All performance data is based on operating intake and exhaust blower on the same speed.*
**BASIC INSTALLATION**  
(FIELD INSTALLATION)

1. Unpack the ventilator assembly which includes the integral ventilator with attached electrical harness and miscellaneous hardware.

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**WARNING**

Open and lock unit disconnect switch before installing this accessory to prevent injury or death due to electrical shock or contact with moving parts. Turn thermostat to OFF.

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**CAUTION**

Be sure the correct model and voltage Energy Recovery Ventilator is used with the correct air conditioner or heat pump to insure correct voltage compatibility.

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2. Remove exhaust blower assembly from back of ventilator and discard shipping plate. (See Figure 1.)

3. Remove the existing exterior blower access, filter access and vent access panels on the Bard Wall Mount unit. Save the blower access panel and filter access panels and discard vent option access panel. (See Figure 2.)

4. Remove and save existing unit air filter. Remove and discard the exhaust cover plate and remove center screw from condenser grille. (See Figure 3.)

5. Install exhaust blower assembly in exhaust opening and secure with four (4) screws. Position 4 pin connector so it is accessible. (See Figure 4.)

6. Install ventilator into the unit to the left side. Once the ventilator is fully inserted, slide the ventilator to the right until it is tight against the back of the control panel. (See Figure 5.)

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**IMPORTANT NOTE:** Position front lip of ventilator over front grille and on top of condenser partition. (See Figure 5 inset.) This is important to insure proper drainage of any water entering damper assembly.

7. Remove access panel and plug in exhaust blower. (See Figure 5.) Replace access panel.

8. Open control panel to gain access to unit low voltage terminal block. (Insure all power is OFF prior to opening the control panel.)

9. Route electrical harness leads through the 7/8” bushing in control panel (Figure 5) into low voltage box.

10. Connect black lead with fork terminal to terminal strip F or O1 depending if heat pump or air conditioner. (See Figure 6 and wiring diagram.)

**NOTE:** These 24 volt control wires control the starting and stopping of the Energy Recovery Ventilator and can be independently controlled by an energy management control or timer. See separate section on Control Wiring for suggested control schemes.

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11. Remove female plug of high voltage wiring harness from the heat recovery assembly and snap into unit control panel. Wire to terminal block. (See Figure 6 and wiring diagram.)

12. Plug male plug from female at side of control panel. (See Figures 5.)

13. Close control panel cover.

14. Replace filter and one (1) screw in condenser grille. (See Figure 3)

15. Ventilator checkout
   A. Resupply power to unit.
   B. Energize the evaporator blower by switching thermostat to the manual fan position with Heat/Cool in OFF position.
   C. Ventilator heat transfer wheels should rotate slowly (49 RPM). Intake and exhaust blowers should run. (See Figure 8.)
   D. De-energize the evaporator blower. Energy Recovery wheels, and fresh air and exhaust air blowers should stop.
   E. This completes ventilator checkout.

16. See section on Recommended Control Sequences for permanent connection of the orange control wire that was connected to G for checkout.

17. Reinstall the blower access and filter access panels at top of unit and secure with sheet metal screws. (See Figure 2.)
18. Replace the lower service access panel with the new panel provided. Attach air intake hood with screws provided. (See Figure 7.) Be sure to insert the top flange of the air intake hood into and through the slot in the service door and between the door and insulation to prevent bowing of the door.

19. Apply Certification label, included with Installation Instructions, next to unit Serial Plate.

20. Ventilator is now ready for operation.

FIGURE 1
REMOVE BLOWER ASSEMBLY AND DISCARD SHIPPING PLATE
FIGURE 3
REMOVE AIR FILTER AND EXHAUST COVER PLATE
FIGURE 4
INSTALL EXHAUST BLOWER ASSEMBLY

- Fasten lower blower assy. to cond. partition with (4) screws.
- Condensor partition cut away so to show grv lower blower assy. relationship to unit.
- (Important) Mitred edge towards cond. coil.

RIGHT SIDE REMOVED FOR CLARITY
FIGURE 5
PLUG EXHAUST BLOWER INTO CONTROL PANEL

REMOVE ACCESS PANEL AND PLUG IN EXHAUST BLOWER. REPLACE ACCESS PANEL.

WHEN INSTALLING ERV POSITION SO THAT HOLE IN FRONT LIP IS CENTERED OVER HOLE IN CONDENSER GRILLES TO INSERT A SELF DRILLING SCREW.

CAUTION: HOLE IN ERV MUST BE USED TO INSURE CLEARANCE FROM CONDENSER COIL TUBING.

FIGURE 5 (INSET)

SERVICE DOOR

LIP OF ERV IS TO BE BETWEEN THE CONDENSER GRILLES AND SERVICE DOOR

FRONT GRILL

SIDE SECTION

HEAT RECOVERY VENTILATOR

CONDENSER PARTITION

MIS-527
FIGURE 6
CONNECT LEADS TO TERMINALS

INSTALL 1-480701-0 CAP AS SHOWN AND WIRE PER WIRING DIAGRAM

TEMPORARY CONNECTION FOR TESTING. SEE RECOMMENDED CONTROL SEQUENCES

LOW VOLTAGE WIRES FROM HEAT RECOVERY ASSEMBLY.
FIGURE 7
ATTACH HOOD AND REPLACE ACCESS PANEL

1. Insert flange thru slot in door & push flange under the insulation.
2. Replace service access panel and install fresh air intake hood Assy. as shown.
FIGURE 8
AIRFLOW DIAGRAM

FIGURE 8A

TO ADJUST INTAKE AND
EXHAUST BLOWER SPEEDS
1. DISCONNECT POWER TO UNIT
2. REMOVE ERY CONTROL PANEL COVER
3. MOVE BLACK INSULATOR TO DESIRED
   SPEED ON TERMINAL CONNECTOR
BASIC INSTALLATION
(FACTORY INSTALLED VERSIONS)

1. Remove blower access door and service door. Room filter located above air circulation blower. Install filter.
2. Remove and install air intake hood. Refer to Item 16 of Basic Installation (Field Installation).
3. Refer to Control Wiring section for suggested control schemes for the ERVF.
4. After wiring, replace all panels.

CONTROL WIRING

The ERVF comes from the factory with the low voltage control wires not wired into the wall mount low voltage terminal strip. Care must be taken when deciding how to control the operation of the ventilator. When designing the control circuit for the ventilator, the following requirements must be met.

CONTROL REQUIREMENTS

1. Indoor blower motor must be run whenever the ERVF is run.
2. Select the correct motor speed tap in the ERVF. Using Table 1 of the ERVF Installation Instructions determine the motor speed needed to get the desired amount of ventilation air needed. For instance, do not use the high speed tap on a ERVF-A5 if only 300 CFM of ventilation air is needed. Use the low speed tap. Using the high speed tap would serve no useful purpose and significantly affect the overall efficiency of the air conditioning system. System operating cost would also increase.
3. Run the ERVF only during periods when the conditioned space is occupied. Running the ERVF during unoccupied periods wastes energy, decreases the expected life of the ERVF, and can result in a large moisture buildup in the structure. The ERVF removes 60 to 70% of the moisture in the incoming air, not 100% of it. Running the ERVF when the structure is unoccupied allows moisture to build up in the structure because there is little or no cooling load. Thus, the air conditioner is not running enough to remove the excess moisture being brought in. Use a control system that in some way can control the system based on occupancy.

RECOMMENDED CONTROL SEQUENCES

Several possible control scenarios are listed below:

1. Use a programmable electronic thermostat with auxiliary terminal to control the ERVF based on daily programmed occupancy periods. Bard markets and recommends the Bard Part No. 8403-060 programmable electronic thermostat for air conditioner and heat pump applications. (See Figures 9 and 10.)
2. Use a motion sensor in conjunction with a mechanical thermostat to determine occupancy in the structure. Bard markets the CS2000A for this use. (See Figures 11 and 12.)
3. Use a DDC control system to control the ERVF based on a room occupancy schedule to control the ERVF.
4. Tie the operation of the ERVF into the light switch. The lights in a room are usually on only when occupied.
5. Use a manual timer that the occupants turn to energize the ERVF for a specific number of hours.
6. Use a programmable mechanical timer to energize the ERVF and indoor blower during occupied periods of the day.

VENTILATION AIRFLOW

The ERVF-A5 and ERVF-C5 are equipped with a 3-speed motor to provide the capability of adjusting the ventilation rates to the requirements of the specific application by simply changing motor speeds.

<table>
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The units are set from the factory with the exhaust blower on the low speed and the intake blower on medium speed. Moving the speed taps located in the control panel can change the blower speed of the intake and exhaust. See Figure 8A.

** IMPORTANT **

Operating the ERVF during unoccupied periods can result in a build up of moisture in the structure.

** WARNING **

Open disconnect to shut all power OFF before doing this. Failure to do so could result in injury or death due to electrical shock.
FIGURE 9
AIR CONDITIONER CONNECTION

1. REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW

2. DO NOT CONNECT "A" FROM B403-060 IF OPTIONAL CO2 CONTROLLER IS USED

3. CONNECT ORANGE WIRE TO "G" ONLY IF OPTIONAL CO2 CONTROLLER IS USED

4. CHANGE MODEL CONFIGURATION FROM HEAT PUMP TO HEAT/COLD

MIS-2479 A
FIGURE 10
HEAT PUMP CONNECTION

Low Voltage Wiring Diagram

Thermostat
Bard part #8403-060

Optional CO₂ Controller
(C7232A1008) Bard part #8403-056
Not Used

24V Low Voltage Terminal Block

Electronic Programmable

Unit

Ventilation Packages

MIS-2633

Connect orange wire to "G" only if optional CO₂ controller is used.
LIGHTING CONTROL CIRCUIT IS OPTIONAL AND FIELD SUPPLIED.

LIGHTING CONTROL RELAY REQUIRES NORMALLY CLOSED CONTACTS AND MUST BE SIZED ACCORDING TO CONTROLLED LOAD.

JUMPER IS FACTORY INSTALLED.

REQUIRED FOR 2 STAGE COOLING UNITS OR UNITS WITH ECONOMIZERS.

NEEDED WHEN 2 STAGES OF ELECTRIC HEAT ARE REQUIRED.

NOTE: IF FACTORY INSTALLED SETTINGS)。

FOR OPTIONAL DEHUMIDIFICATION CIRCUIT THAT MUST BE FACTORY INSTALLED IN AIR CONDITIONER CONNECTIONS USED ONLY.

IF OPTIONAL VENT PACKAGE IS INSTALLED, THE "G" WIRE MUST BE CONNECTED TO ASSURE CONTINUOUS BLOWER DURING OCCUPIED PERIODS WHEN VENT SYSTEM IS "OFF". THE "G" WIRE MUST ALSO BE CONNECTED FOR PRE-PURGE OPERATION (SEE STEP 2, FUNCTION SWITCH SETTINGS).

FOR PRE-PURGE OPERATION (24 HRS)

DO NOT CONNECT "L" UNTIL AFTER 8403-038 CONTROLLER IS CONFIGURED TO CS2000 = YES

BARD Ventilation Package (Optional)

NOTE: MUST BE CONFIGURED FOR HEATCOOL

THERMOSTAT THS220D1151

BARD P/N 8403-058

NOTE: MUST BE CONFIGURED FOR HEATCOOL

MANDATORY SWITCH SETTINGS SHOWN BELOW

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RECOMMENDED SWIICH SETTINGS SHOWN BELOW

FIGURE 11

AIR CONDITIONER WITH CS2000

BARD VENTILATION

BR/WR

BK

WATER OR CRW

AREA OCCUP. REM

NO C NC - *

VENT

HVAC FAN

MAN.

OVERIDE (24 HRS)

PRE-PURGE

DOOR

PRECOND

C

NC

NO

NC

C

NC

NO

C

NC

AUX

STAGE

N/C

SEARCH-TIME

RATE

MODE

PRE P

LEARN

CS2000A2

ENERGY MONITOR

BR-W

W

R

BLUE

RED

YELLOW

8403-038

H600A1014

HUMIDITY CONTROLLER

8403-047

H600-10-21-10

DEHUMIDSTAT

FACTORY JUMPER - SEE SEARCH TIME DETAIL ON PAGE 3

NEEDED WHEN 2 STAGES OF ELECTRIC HEAT ARE REQUIRED.

REQUIRED FOR 2 STAGE COOLING UNITS OR UNITS WITH ECONOMIZERS.

LIGHTING CONTROL CIRCUIT IS OPTIONAL AND FIELD SUPPLIED. LIGHTING CONTROL RELAY REQUIRES NORMALLY CLOSED CONTACTS AND MUST BE SIZED ACCORDING TO CONTROLLED LOAD.

NOTE: MUST BE CONFIGURED FOR HEATCOOL

BARD P/N 8403-060

TEMPERATURE/HUMIDITY CONTROLLER

BARD P/N 8403-058

THERMOSTAT THS220D1151

NOTE: MUST BE CONFIGURED FOR HEATCOOL

FACTORY INSTALLED - SEE FACTORY JUMPER (SEE PAGE 3)

BARD VENTILATION PACKAGE (OPTIONAL)

NOTE: IF FACTORY INSTALLED (SEE PAGE 3)

BARD P/N 8403-060 CONTROLLER IS CONFIGURED
Manual 2100-513
Page 18 of 21

**FIGURE 12**

**HP WITH CS2000**

**WH/SH HEAT PUMP CONNECTION DIAGRAM**

**TEMPERATURE/HUMIDITY CONTROLLER BARD P/N 8403-060**

**THERMOSTAT TH5220D1151**

**BARD P/N 8403-058**

IF OPTIONAL VENT PACKAGE IS INSTALLED, THE "G" WIRE MUST BE CONNECTED TO ASSURE CONTINUOUS BLOWER DURING OCCUPIED PERIODS WHEN VENT SYSTEM IS ON. THE "O" WIRE MUST ALSO BE CONNECTED FOR PRE-PURGE OPERATION (SEE STEP 2, FUNCTION SWITCH SETTINGS).

**BARD VENTILATION PACKAGE (OPTIONAL)**

NOTE: IF FACTORY INSTALLED DISCONNECT AND TAPE RED AND ORANGE WIRES

**REMOTE MOTION DETECTOR (OPTIONAL) NORMALLY OPEN CONTACTS**

**LIGHTING CONTROL RELAY NORMALLY CLOSED CONTACTS**

**MANUAL SWITCH FIELD SUPPLIED**

**W2W1**

**W2**

**W1/E**

**W1**

**Y1**

**Y1 B**

**Y1 YO/D**

**Y1 Y**

**Y1 NC**

**Y1 N/C**

**Y1 B**

**Y**

**C**

**B**

**R**

**W**

**E**

**NC**

**C**

**NO**

**NC**

**NO**

**C**

**C**

**NC**

**NO**

**NC**

**NO**

**C**

**C**

**BR/W**

**BK**

**WH/SH HEAT PUMP CONNECTION DIAGRAM**

**NOTE: IF FACTORY INSTALLED OVERIDE (OPTIONAL) DOOR PACKAGE (OPTIONAL) SETTINGS).**

**DO NOT CONNECT "O" UNTIL AFTER 8403-060 CONTROLLER IS CONFIGURED TO CS2000 = YES**

**RECOMMENDED SWITCH SETTINGS SHOWN BELOW**

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<td>DEMAND 1</td>
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ENERGY RECOVERY VENTILATOR MAINTENANCE

GENERAL INFORMATION

The ability to clean exposed surfaces within air moving systems is an important design consideration for the maintenance of system performance and air quality. The need for periodic cleaning will be a function of operating schedule, climate, and contaminants in the indoor air being exhausted and in the outdoor air being supplied to the building. All components exposed to the airstream, including energy recovery wheels, may require cleaning in most applications.

Rotary counterflow heat exchanges (heat wheels) with laminar airflow are “self-cleaning” with respect to dry particles. Smaller particles pass through; larger particles land on the surface and are blown clear as the flow direction is reversed. For this reason, the primary need for cleaning is to remove films of oil-based aerosols that have condensed on energy transfer surfaces. Buildup of material over time may eventually reduce airflow. Most importantly, in the case of desiccant coated (enthalpy) wheels, such films can close off micron sized pores at the surface of the desiccant material, reducing the efficiency with which the desiccant can absorb and desorb moisture.

FREQUENCY

In a reasonably clean indoor environment such as a school, office building, or home, experience shows that reductions of airflow or loss of sensible (temperature) effectiveness may not occur for ten or more years. However, experience also shows that measurable changes in latent energy (water vapor) transfer can occur in shorter periods of time in commercial, institutional and residential applications experiencing moderate occupant smoking or with cooking facilities. In applications experiencing unusually high levels of occupant smoking, such as smoking lounges, nightclubs, bars and restaurants, washing of energy transfer surfaces, as frequently as every six months, may be necessary to maintain latent transfer efficiency. Similar washing cycles may also be appropriate for industrial applications involving the ventilation of high levels of smoke or oil-based aerosols such as those found in welding or machining operations, for example. In these applications, latent efficiency losses of as much as 40% or more may develop over a period of one to three years.

CLEANABILITY AND PERFORMANCE

In order to maintain energy recovery ventilation systems, energy transfer surfaces must be accessible for washing to remove oils, grease, tars and dirt that can impede performance or generate odors. Washing of the desiccant surfaces is required to remove contaminates buildups that can reduce adsorption of water molecules. The continued ability of an enthalpy wheel to transfer latent energy depends upon the permanence of the bond between the desiccant and the energy transfer surfaces.

Bard wheels feature silica gel desiccant permanently bonded to the heat exchange surface without adhesives; the desiccant will not be lost in the washing process. Proper cleaning of the Bard energy recovery wheel will restore latent effectiveness to near original performance.

MAINTENANCE PROCEDURES

NOTE: Local conditions can vary and affect the required time between routine maintenance procedures, therefore all sites (or specific units at a site) may not have the same schedule to maintain acceptable performance. The following timetables are recommended and can be altered based on local experience.

QUARTERLY MAINTENANCE

1. Inspect mist eliminator/prefilter and clean if necessary. This filter is located in the fresh air intake hood on the front of the unit. This is an aluminum mesh filter and can be cleaned with water and any detergent not harmful to aluminum.

2. Inspect wall mount unit filter and clean or replace as necessary. This filter is located either in the unit, in a return air filter grille assembly, or both. If in the unit it can be accessed by removing the lower service door on the front of the unit. If in a return air filter grille, by hinging the grille open to gain access.

3. Inspect energy recovery ventilator for proper wheel rotation and dirt buildup. This can be done in conjunction with Item 2 above. Energize the energy recovery ventilator after inspecting the filter and observe for proper rotation and/or dirt buildup.

4. Recommended energy recovery wheel cleaning procedures follow Steps 5 through 8.

5. Disconnect all power to unit. Remove the lower service door of the wall mount unit to gain access to the energy recovery ventilator.

6. Recommended energy recovery wheel cleaning procedures follow steps 6 through 8.

7. Disconnect all power to unit. Remove the lower service door of the wall mount unit to gain access to the energy recovery ventilator.

8. Recommended energy recovery wheel cleaning procedures follow Steps 7 through 8.
6. Remove the front access panel on the ventilator. Unplug amp connectors to cassette motors. Slide energy recovery cassette out of ventilator.

7. Use a shop vacuum with brush attachment to clean both sides of the energy recovery wheels.

8. Reverse shop vacuum to use as a blower and blow out any residual dry debris from the wheel.

**NOTE:** Discoloration and staining of the wheel does not affect its performance. Only excessive buildup of foreign material needs to be removed.

9. If any belt chirping or squealing noise is present, apply a small amount of LPS-1 or equivalent dry film lubricant to the belt.

**ANNUAL MAINTENANCE**

1. Inspect and conduct the same procedures as outlined under Quarterly Maintenance.

2. To maintain peak latent (moisture) removal capacity, it is recommended that the energy recovery wheels be sprayed with a diluted nonacid based evaporator coil cleaner or alkaline detergent solution such as 409.

**NOTE:** Do not use acid based cleaners, aromatic solvents, temperatures in excess of 170°F or steam. Damage to the wheel may result.

3. Rinse wheel thoroughly after application of the cleaning solution, and allow to drain before reinstalling.

4. No re-lubrication is required to heat wheel bearings of the drive motor, or to the intake and exhaust blower motors.

5. If any belt chirping or squealing noise is present, apply a small amount of LPS-1 or equivalent dry film lubricant to the belt.

**FIGURE 13**

**BELT REPLACEMENT INSTRUCTIONS**

![Belt Replacement Instructions Diagram](MIS-2166)