INSTALLATION INSTRUCTIONS

WALL MOUNT
ENERGY RECOVERY VENTILATOR
WITH EXHAUST

Models:
WERV-A2B
WERV-A3C
WERV-C2B
WERV-C3C

For Use With Bard
1-1/2 Through 3 Ton
Wall Mount™ Air Conditioners
and Heat Pumps
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BRYAN, OHIO USA 43506
MODEL NOMENCLATURE LEGEND

W = Wall Mount
ERV - A 3 C

Modification Code

Wall Mount™ - Cabinet Size
2 = WA, WH181, 241
3 = WA, WH301, 361
5 = WA, WH421, 601

Energy Recovery Ventilator

Electrical
A = 230/208 volt
C = 460 volt

ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>Voltage</th>
<th>Amps</th>
<th>Control Voltage</th>
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<tbody>
<tr>
<td>WERV-A2B</td>
<td>230/208</td>
<td>2.2</td>
<td>24V</td>
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<tr>
<td>WERV-A3C</td>
<td>230/208</td>
<td>2.2</td>
<td>24V</td>
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<tr>
<td>WERV-C2B</td>
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<td>WERV-C3C</td>
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<td>24V</td>
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GENERAL DESCRIPTION

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 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 WA and WH series wall mounted units. The package consists of a unique rotary Energy Recovery Cassette that can be easily removed for cleaning or maintenance. The WERV-*3C has two 13 inch diameter heat transfer wheels, and the WERV-*2B has one 13-inch wheel 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 6A 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

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.
### PERFORMANCE AND APPLICATION DATA – WERV-2*2B

#### SUMMER COOLING PERFORMANCE

(INDOOR DESIGN CONDITIONS 75°DB/62°WB)

<table>
<thead>
<tr>
<th>Ambient O.D.</th>
<th>VENTILATION RATE 250CFM 62% Efficiency</th>
<th>VENTILATION RATE 225 CFM 63% Efficiency</th>
<th>VENTILATION RATE 200 CFM 63% Efficiency</th>
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<tbody>
<tr>
<td>DB/WB F</td>
<td>VLT</td>
<td>VLS</td>
<td>VLL</td>
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<tr>
<td>105</td>
<td>75</td>
<td>11925</td>
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<td></td>
<td>95</td>
<td>17550</td>
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#### WINTER HEATING PERFORMANCE

(INDOOR DESIGN CONDITIONS 70° F DB)

<table>
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<th>VENTILATION RATE</th>
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<td></td>
<td>250 CFM 74% Eff</td>
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<tr>
<td>DB F</td>
<td>WVL</td>
</tr>
<tr>
<td>65</td>
<td>1350</td>
</tr>
<tr>
<td>60</td>
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<td>50</td>
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<tr>
<td>45</td>
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<tr>
<td>40</td>
<td>8100</td>
</tr>
<tr>
<td>35</td>
<td>9450</td>
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<td>20</td>
<td>13500</td>
</tr>
<tr>
<td>15</td>
<td>14850</td>
</tr>
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**LEGEND:**
- **VLT** = Ventilation Load – Total
- **VLS** = Ventilation Load – Sensible
- **VLL** = Ventilation Load – Latent
- **HRT** = Heat Recover – Sensible
- **HRS** = Heat Recovery – Total
- **HRL** = Heat Recovery – Latent
- **WVL** = Winter Ventilation Load
- **WHR** = Winter Heat Recovery

**Note:** All performance data is based on operating intake and exhaust blower on the same speed.
## PERFORMANCE AND APPLICATION DATA – WERV-3C

### SUMMER COOLING PERFORMANCE

<table>
<thead>
<tr>
<th>Ambient</th>
<th>VENTILATION RATE</th>
<th>400 CFM</th>
<th>VENTILATION RATE</th>
<th>325 CFM</th>
<th>VENTILATION RATE</th>
<th>250 CFM</th>
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<tbody>
<tr>
<td>O.D.</td>
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<td>64% Efficiency</td>
<td>65% Efficiency</td>
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<tr>
<td>DB/DB F</td>
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### WINTER HEATING PERFORMANCE

<table>
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<tr>
<th>Ambient O.D.</th>
<th>VENTILATION RATE</th>
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<th>250 CFM 77% Eff</th>
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<tbody>
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<td>WHR</td>
<td>WVL</td>
<td>WHR</td>
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<td>14671</td>
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</tbody>
</table>

**LEGEND:**
- VLT = Ventilation Load – Total
- VLS = Ventilation Load – Sensible
- VLL = Ventilation Load – Latent
- HRT = Heat Recover – Total
- HRS = Heat Recovery – Sensible
- HRL = Heat Recovery – Total
- WVL = Winter Ventilation Load
- 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.

2. Remove the existing exterior blower access and service access panels on the Bard Wall Mount unit. Save the blower access panel and discard service access panel. (See Figure 1.)

3. Remove and save existing unit return air filter and left side filter support bracket by removing two screws from left side of unit. Remove and save top four (4) screws from front grille. (See Figure 2.)

4. Remove and discard the exhaust cover plate. (See Figure 2.)

5. Install ventilator by inserting the ventilator into the unit to the far left side clearing the right filter bracket. 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 3.)

   IMPORTANT NOTE: Position front lip of ventilator under front grille and on top of condenser partition. (See Figure 3 inset.) This is important to insure proper drainage of any water entering damper assembly.

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

7. Route two (2) low voltage electrical leads through the 7/8" bushing in control panel (Figure 3) into low voltage box.

8. Temporarily connect leads with fork terminal to corresponding points on terminal strip to terminals C and G. (See Figure 4.)

   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.

9. Remove female plug of high voltage wiring harness from the heat recover assembly and snap into unit control panel from the inside of the control panel in the hole provided. Wire to terminal block. (See Figure 4 and wiring diagram.)

10. Plug male plug from WERV assembly into female connector at back of control panel. (See Figures 3 & 4.)

11. Replace inner and outer control panel cover.

12. 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.
   D. De-energize the evaporator blower. Energy recovery heat transfer wheels and fresh air and exhaust air blowers should stop.
   E. This completes ventilator checkout.

14. Disconnect the wires temporarily connected in Step 8.

15. Reinstall the blower access panel at top of unit and secure with sheet metal screws.

16. Replace the lower service access panel with the new panel provided. Attach air intake hood with screws provided. (See Figure 5.) 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.

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

18. Ventilator is now ready for operation.

---

**Table:**

<table>
<thead>
<tr>
<th>Model</th>
<th>For Use With the Following Units</th>
<th>Electrical</th>
</tr>
</thead>
<tbody>
<tr>
<td>WERV-A2B</td>
<td>WA181-A, WA241-A, B WH181-A, B WH241-A, B</td>
<td>230/208 - 1 or 3 phase</td>
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<tr>
<td>WERV-A3C</td>
<td>WA301-A, B WA361-A, B SH261-A, B SH311-A, B WH301-A, B WH361-A, B</td>
<td>230/208 - 1 or 3 phase</td>
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<tr>
<td>WERV-C2B</td>
<td>WA241-C</td>
<td>460 - 3 phase</td>
</tr>
<tr>
<td>WERV-C3C</td>
<td>WA301-C, WA361-C SH261-C SH311-C WH301-C WH361-C</td>
<td>460 - 3 phase</td>
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</tbody>
</table>

---

**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.

---

**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.
BASIC INSTALLATION
(FACTORY INSTALLED MODELS)

1. Remove blower access door and service door. Room filter located above air circulation blowers. Install filter. Remove filter bracket from shipping location and install on left side.

2. Remove air intake hood from shipping location and install air intake hood on service panel. Refer to the Control Wiring Section for suggested control schemes. After wiring, replace all panels.
FIGURE 2
REMOVING FILTER AND GRILLE

REMOVE & DISCARD EXHAUST COVER PLATE

LEFT FILTER BRACKET

FILTER

THERMISTOR LOCATION

4 SCREWS
FIGURE 3

SIDE VIEW - SEE STEP 5 OF INSTRUCTIONS

SIDE SECTION

SERVICE DOOR

ENERGY RECOVERY VENTILATOR

FRONT GRILL

CONDENSER PARTITION

DRY LIP IS TO BE BETWEEN FRONT GRILL AND CONDENSER PARTITION

HIGH VOLTAGE WIRES TO PLUG IN BACK OF CONTROL PANEL

LOW VOLTAGE WIRES TO TERMINAL STRIP
FIGURE 4

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 5

INSERT FLANGE THRU SLOT IN DOOR & PUSH FLANGE UNDER THE INSULATION

SERVICE DOOR

INSULATION

FRESH AIR INTAKE HOOD & FILTER ASSY.

FILTER ACCESS SCREW

REPLACE SERVICE ACCESS PANEL AND INSTALL FRESH AIR INTAKE HOOD ASSY. AS SHOWN.

MS-488
FIGURE 6

FIGURE 6A

TO ADJUST INTAKE AND EXHAUST BLOWER SPEEDS
1. DISCONNECT POWER TO UNIT
2. REMOVE ERV CONTROL PANEL COVER
3. MOVE BLACK INSULATOR TO DESIRED SPEED ON TERMINAL CONNECTOR
CONTROL WIRING

The WERV 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 WERV is run.

2. Select the correct motor speed tap in the WERV. Using Table 1 of the WERV 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 WERV-A3C if only 200 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 WERV only during periods when the conditioned space is occupied. Running the WERV during unoccupied periods wastes energy, decreases the expected life of the WERV, and can result in a large moisture buildup in the structure. The WERV removes 60 to 70% of the moisture in the incoming air, not 100% of it. Running the WERV when the structure is unoccupied allows moisture to build up in the structure because there is little or now 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.

![Image](image.png)

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 Figure 8 and Figure 9.)

3. Use a DDC control system to control the WERV based on a room occupancy schedule to control the WERV.

4. Tie the operation of the WERV 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 WERV for a specific number of hours.

6. Use a programmable mechanical timer to energize the WERV and indoor blower during occupied periods of the day.

VENTILATION AIR FLOW

The WERV-A2B, WERV-A3C, WERV-C2B and WERV-C3C 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 1
<table>
<thead>
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<th>VENTILATION AIR (CFM)</th>
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<tr>
<td>Model</td>
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<tr>
<td>WERV-A2B WERV-C2B</td>
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<tr>
<td>WERV-A3C WERV-C3C</td>
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</table>

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 6A.

*** IMPORTANT ***

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

RECOMMENDED CONTROL SEQUENCES

Several possible control scenarios are listed below:

1. Use a programmable electronic thermostat with auxiliary terminal to control the WERV based on daily programmed occupancy periods. Bard markets and recommends the White-Rodgers 1F93-380 (Bard Part No. 8403-049) programmable electronic thermostat for air conditioner applications, and the White-Rodgers 1F93-380 (Bard Part No. 8403-049) programmable electronic thermostat for heat pump applications. (See Figure 7.)

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 7

AIR CONDITIONER

WALL MOUNT AIR CONDITIONER

HEAT PUMP

WALL MOUNT HEAT PUMP

\[\text{PROGRAM T-STAT FOR CONTINUOUS BLOWER DURING OCCUPIED PERIODS}\]
FIGURE 8
AIR CONDITIONER CONNECTION DIAGRAM

THERMOSTAT TH5220D1151
BARD PN 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 "G" WIRE
MUST ALSO BE CONNECTED FOR PRE-PURGE OPERATION
(SEE STEP 2, FUNCTION SWITCH SETTINGS).

BARD VENTILATION
PACKAGE (OPTIONAL)

LIGHTING CONTROL
RELAY NORMALLY
CLOSED CONTACTS

MANUAL SWITCH
FIELD SUPPLIED

LED LIGHTS

JUMPER IS FACTORY INSTALLED.
REQUIRED FOR 2 STAGE COOLING
UNITS OR UNITS WITH ECONOMIZERS.

FUNCTION SWITCH SETTINGS SHOWN BELOW

<table>
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<th>FUNCTION SWITCHES</th>
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4093-139 F
FIGURE 9
HEAT PUMP CONNECTION DIAGRAM

RECOMMENDED SWITCH SETTINGS SHOWN BELOW

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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, tar and dirt that can impede performance or generate odors. Washing of the desiccant surfaces is required to remove contaminant 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: Disconnect all power to unit. Remove the lower service door of the wall mount unit to gain access to the energy recovery ventilator.
5. Remove the front access panel on the ventilator. Unplug amp connectors to cassette motors. Slide energy recovery cassette out of ventilator.

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

7. 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.

8. 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.

   Do not disassemble and immerse the entire heat wheel in a soaking solution, as bearing and other damage 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 10**

**BELT REPLACEMENT INSTRUCTIONS**

(2 WHEEL CASSETTE ONLY)

- Route this part of replacement belt in top groove of pulley.
- Route this part of replacement belt in bottom groove of pulley.
- If belt "squeaks" or "chirps" lubricate lightly with LPS-1 or equivalent "dry film" lubricant.

MIS-1890
FIGURE 11
HUB ASSEMBLY WITH BALL BEARINGS

- Screw #6 x 32 x 3/4
- Dust cover
- Screw #10 x 32
- Washer
- Nut #10 x 24
- Spacers
- Hub plate
- Bearing
- Heat exchanger wheel
- Hub plate with bolts
- Bearing
- Shaft (oil with 20 wt. non detergent oil)
- Lock washer
- Nut 1/4 x 20

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