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# OPERATION INSTRUCTIONS

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## ENERGY RECOVERY VENTILATOR WITH EXHAUST

**Model: QERV-A4B**

**For Use With Bard  
2 Thru 5 Ton  
QH Series Heat Pumps**



BARD MANUFACTURING COMPANY  
Bryan, Ohio 43506

*Since 1914...Moving ahead, just as planned.*

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Supersedes: 2100-310B  
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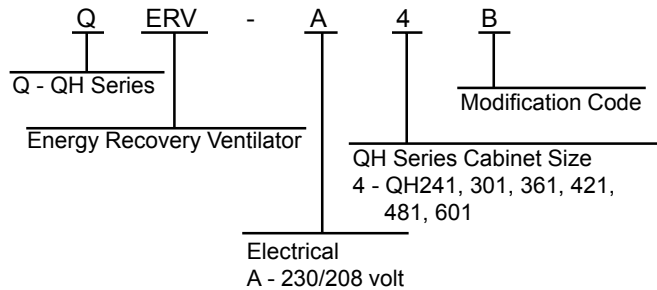
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## MODEL NOMENCLATURE



## ELECTRICAL SPECIFICATIONS

| Model    | Voltage   | Amps | Control Voltage |
|----------|-----------|------|-----------------|
| QERV-A4B | 230 / 208 | 2.2  | 24V             |

## GENERAL DESCRIPTION

The 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 CO<sub>2</sub>, smoke radon, formaldehyde, excess moisture, virus and bacteria.

The ventilator incorporates patented rotary heat exchange state-of-the-art technology to remove both heat and moisture.

It is designed as a single package which is factory installed. The package consists of a unique rotary Energy Recovery Cassette that can be easily removed for cleaning or maintenance. It 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. Air is exhausted at the same rate that fresh air is brought into the structure thus not pressuring the building. The rotating energy wheels provide the heat transfer effectively during both summer and winter conditions. Provides required ventilation to meet the requirements of ASHRAE 62-2001 standard.

*NOTE: Operation is not recommended below 5° F outdoor temperature because freezing of moisture in the heat transfer wheel can occur.*

| Model    | For Use With Following Units   | Electrical              |
|----------|--|-------------------------|
| QERV-A4E | QH241-A, -B<br>QH301-A, -B<br>QH361-A, -B<br>QH421-A, -B<br>QH481-A, -B<br>QH601-A, -B | 230/208<br>1 or 3 Phase |
|          | QH241-C<br>QH301-C<br>QH361-C<br>QH421-C<br>QH481-C<br>QH601-C                         | 460<br>3 Phase          |

## CONTROL REQUIREMENTS

1. Indoor blower motor must be run when ever the QERV is run.
2. Select the correct motor speed on the QERV. Using Table 1 of the QERV 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 QERV-A4B 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 would effect the overall efficiency of the air conditioning system. System operation costs would also increase.
3. Run the QERV only during periods when the conditioned space is occupied. Running the QERV during unoccupied periods wastes energy, decreases the expected life of the QERV, and can result in a large moisture buildup in the structure. The QERV removes 60 to 70% of the moisture in the incoming air, not 100% of it. Running the QERV 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.

## IMPORTANT

Operating the QERV during unoccupied periods can result in a build up of moisture in the classroom.

## RECOMMENDED CONTROL SEQUENCES

Several possible control scenarios are listed below:

1. Use a programmable electronic thermostat with auxiliary terminal to control the QERV based on daily programmed occupancy periods. Bard markets and recommends the White-Rodgers 1F94-80 (Bard Part No. 8403-034), programmable electronic thermostat for heat pump applications.
2. Use a motion sensor in conjunction with a mechanical thermostat to determine occupancy in the classroom. Bard markets the CS2000 for this use.
3. Use a DDC control system to control the QERV based on a room occupancy schedule to control the QERV.
4. Tie the operation of the QERV 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 QERV for a specific number of hours.
6. Use a programmable mechanical timer to energize the QERV and indoor blower during occupied periods of the day.

## VENTILATION AIR FLOW

The QERV-A4B is 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  
VENTILATION AIR (CFM)**

|            | <b>High Speed<br/>(Black)</b> | <b>Midium Speed<br/>(Blue)</b> | <b>Low Speed<br/>(Red)</b> |
|------------|-------------------------------|--------------------------------|----------------------------|
| <b>CFM</b> | 450                           | 375                            | 300                        |

The units are wired from the factory on low speed. The speed can be changed by rotating the speed switch on the front of the QERV to the desired speed.

# PERFORMANCE AND APPLICATION DATA

**TABLE 2  
SUMMER COOLING PERFORMANCE  
(INDOOR DESIGN CONDITIONS 75° DB / 62° WB)**

| Ambient<br>O.D. | VENTILATION RATE – 450 CFM<br>65% Efficiency |       |       |       |       |      | VENTILATION RATE – 375 CFM<br>66% Efficiency |       |       |       |       |      | VENTILATION RATE – 300 CFM<br>67% Efficiency |       |      |       |       |      |       |
|-----------------|--|-------|-------|-------|-------|------|--|-------|-------|-------|-------|------|--|-------|------|-------|-------|------|-------|
|                 | DB/WB<br>DegreesF                            | VLT   | VLS   | VLL   | HRT   | HRS  | HRL  | VLT   | VLS   | VLL   | HRT   | HRS  | HRL  | VLT   | VLS  | VLL   | HRT   | HRS  | HRL   |
| 105             | 75   | 21465 | 14580 | 6884  | 13952 | 9477 | 4475   | 17887 | 12150 | 5737  | 11805 | 8018 | 3786   | 14310 | 9720 | 4590  | 9587  | 6512 | 3075  |
|                 | 70   | 14580 | 14580 | 0     | 9477  | 9477 | 0  | 12150 | 12150 | 0     | 8018  | 8018 | 0  | 9720  | 9720 | 0     | 6512  | 6512 | 0     |
|                 | 65   | 14580 | 14580 | 0     | 9477  | 9477 | 0  | 12150 | 12150 | 0     | 8018  | 8018 | 0  | 9720  | 9720 | 0     | 6512  | 6512 | 0     |
| 100             | 80   | 31590 | 12150 | 19440 | 20533 | 7897 | 12635  | 26325 | 10125 | 16200 | 17374 | 6682 | 10692  | 21060 | 8100 | 12960 | 14110 | 5427 | 8683  |
|                 | 75   | 21465 | 12150 | 9314  | 13952 | 7897 | 6054   | 17887 | 10125 | 7762  | 11805 | 6682 | 5123   | 14310 | 8100 | 6210  | 9587  | 5427 | 4160  |
|                 | 70   | 12352 | 12150 | 202   | 8029  | 7897 | 131  | 10293 | 10125 | 168   | 6793  | 6682 | 111  | 8235  | 8100 | 135   | 5517  | 5427 | 90    |
|                 | 65   | 12150 | 12150 | 0     | 7897  | 7897 | 0  | 10125 | 10125 | 0     | 6682  | 6682 | 0  | 8100  | 8100 | 0     | 5427  | 5427 | 0     |
|                 | 60   | 12150 | 12150 | 0     | 7897  | 7897 | 0  | 10125 | 10125 | 0     | 6682  | 6682 | 0  | 8100  | 8100 | 0     | 5427  | 5427 | 0     |
| 95              | 80   | 31590 | 9720  | 21870 | 20533 | 6318 | 14215  | 26325 | 8100  | 18225 | 17374 | 5345 | 12028  | 21060 | 6480 | 14580 | 14110 | 4341 | 9768  |
|                 | 75   | 21465 | 9720  | 11744 | 13952 | 6318 | 7634   | 17887 | 8100  | 9787  | 11805 | 5345 | 6459   | 14310 | 6480 | 7830  | 9587  | 4341 | 5246  |
|                 | 70   | 12352 | 9720  | 2632  | 8029  | 6318 | 1711   | 10293 | 8100  | 2193  | 6793  | 5345 | 1447   | 8235  | 6480 | 1755  | 5517  | 4341 | 1175  |
|                 | 65   | 9720  | 9720  | 0     | 6318  | 6318 | 0  | 8100  | 8100  | 0     | 5345  | 5345 | 0  | 6480  | 6480 | 0     | 4341  | 4341 | 0     |
|                 | 60   | 9720  | 9720  | 0     | 6318  | 6318 | 0  | 8100  | 8100  | 0     | 5345  | 5345 | 0  | 6480  | 6480 | 0     | 4341  | 4341 | 0     |
| 90              | 80   | 31590 | 7290  | 24300 | 20533 | 4738 | 15794  | 26325 | 6075  | 20250 | 17374 | 4009 | 13365  | 21060 | 4860 | 16200 | 14110 | 3256 | 10854 |
|                 | 75   | 21465 | 7290  | 14175 | 13952 | 4738 | 9213   | 17887 | 6075  | 11812 | 11805 | 4009 | 7796   | 14310 | 4860 | 9450  | 9587  | 3256 | 6331  |
|                 | 70   | 12352 | 7290  | 5062  | 8029  | 4738 | 3290   | 10293 | 6075  | 4218  | 6793  | 4009 | 2784   | 8235  | 4860 | 3375  | 5517  | 3256 | 2261  |
|                 | 65   | 7290  | 7290  | 0     | 4738  | 4738 | 0  | 6075  | 6075  | 0     | 4009  | 4009 | 0  | 4860  | 4860 | 0     | 3256  | 3256 | 0     |
|                 | 60   | 7290  | 7290  | 0     | 4738  | 4738 | 0  | 6075  | 6075  | 0     | 4009  | 4009 | 0  | 4860  | 4860 | 0     | 3256  | 3256 | 0     |
| 85              | 80   | 31590 | 4860  | 26730 | 20533 | 3159 | 17374  | 26325 | 4050  | 22275 | 17374 | 2672 | 14701  | 21060 | 3240 | 17820 | 14110 | 2170 | 11939 |
|                 | 75   | 21465 | 4860  | 16605 | 13952 | 3159 | 10793  | 17887 | 4050  | 13837 | 11805 | 2672 | 9132   | 14310 | 3240 | 11070 | 9857  | 2170 | 7416  |
|                 | 70   | 12352 | 4860  | 7492  | 8029  | 3159 | 4870   | 10293 | 4050  | 6243  | 6793  | 2672 | 4120   | 8235  | 3240 | 4995  | 5517  | 2170 | 3346  |
|                 | 65   | 4860  | 4860  | 0     | 3159  | 3159 | 0  | 4050  | 4050  | 0     | 2672  | 2672 | 0  | 3240  | 3240 | 0     | 2170  | 2170 | 0     |
|                 | 60   | 4860  | 4860  | 0     | 3159  | 3159 | 0  | 4050  | 4050  | 0     | 2672  | 2672 | 0  | 3240  | 3240 | 0     | 2170  | 2170 | 0     |
| 80              | 75   | 21465 | 2430  | 19035 | 13952 | 1579 | 12372  | 17887 | 2025  | 15862 | 11805 | 1336 | 10469  | 14310 | 1620 | 12690 | 9587  | 1085 | 8502  |
|                 | 70   | 12352 | 2430  | 9922  | 8029  | 1579 | 6449   | 10293 | 2025  | 8268  | 6793  | 1336 | 5457   | 8235  | 1620 | 6615  | 5517  | 1085 | 4432  |
|                 | 65   | 4252  | 2430  | 1822  | 2764  | 1579 | 1184   | 3543  | 2025  | 1518  | 2338  | 1336 | 1002   | 2835  | 1620 | 1215  | 1899  | 1085 | 814   |
|                 | 60   | 2430  | 2430  | 0     | 1579  | 1579 | 0  | 2025  | 2025  | 0     | 1336  | 1336 | 0  | 1620  | 1620 | 0     | 1085  | 1085 | 0     |
| 75              | 70   | 12352 | 0     | 12352 | 8029  | 0    | 8029   | 10293 | 0     | 10293 | 6793  | 0    | 6793   | 8235  | 0    | 8235  | 5517  | 0    | 5517  |
|                 | 65   | 4252  | 0     | 4252  | 2764  | 0    | 2764   | 3543  | 0     | 3543  | 2338  | 0    | 2338   | 2835  | 0    | 2835  | 1899  | 0    | 1899  |
|                 | 60   | 0     | 0     | 0     | 0     | 0    | 0  | 0     | 0     | 0     | 0     | 0    | 0  | 0     | 0    | 0     | 0     | 0    | 0     |

**LEGEND**

VTL = Ventilation Load – Total  
VLS = Ventilation Load – Sensible  
VLL = Ventilation Load – Latent

HRT = Heat Recovery – Total  
HRS = Heat Recovery – Sensible  
HRL = Heat Recovery – Latent

**TABLE 3  
WINTER HEATING PERFORMANCE  
(INDOOR DESIGN CONDITIONS 70° F DB)**

| Ambient<br>O.D.<br><br>DB<br>Degrees F | VENTILATION RATE |       |                  |       |                  |       |
|--|------------------|-------|------------------|-------|------------------|-------|
|  | 450 CFM 80% Eff. |       | 375 CFM 81% Eff. |       | 300 CFM 802 Eff. |       |
|  | WVL              | WHR   | WVL              | WHR   | WVL              | WHR   |
| 65                                     | 2430             | 1944  | 2025             | 1640  | 1620             | 1328  |
| 60                                     | 4860             | 3888  | 4050             | 3280  | 3240             | 2656  |
| 55                                     | 7290             | 5832  | 6075             | 4920  | 4860             | 3985  |
| 50                                     | 9720             | 7776  | 8100             | 6561  | 6480             | 5313  |
| 45                                     | 12150            | 9720  | 10125            | 8201  | 8100             | 6642  |
| 40                                     | 14580            | 11664 | 12150            | 9841  | 9720             | 7970  |
| 35                                     | 17010            | 13608 | 14175            | 11481 | 11340            | 9298  |
| 30                                     | 19440            | 15552 | 16200            | 13122 | 12960            | 10627 |
| 25                                     | 21870            | 17496 | 18225            | 14762 | 14580            | 11955 |
| 20                                     | 24300            | 19440 | 20250            | 16402 | 16200            | 13284 |
| 15                                     | 26730            | 21384 | 22275            | 18042 | 17820            | 14612 |

**LEGEND**

WVL = Winter Ventilation Load  
WH = Winter Heat Recovery

*NOTE: Sensible performance only is shown for winter application.*

**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 blow 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 adsorb 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 contaminate 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 wall sleeve and can be accessed by either removing the exterior louver grille, the vent package from inside the unit, or by disconnecting the unit from the wall brackets, and rolling the unit away from the sleeve on its integral wheel system. The filter is an aluminum mesh filter and can be cleaned with water and any detergent not harmful to aluminum.
2. Inspect the comfort air filter and clean or replace as necessary. This filter is located behind the front-hinged service door.
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 the unit. Open the front-hinged service door to the unit.
5. Remove the front cassette retaining panel from the front of the QERV. Unplug the amp connectors to the cassette drive motor. Slide energy recovery cassette out of the 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

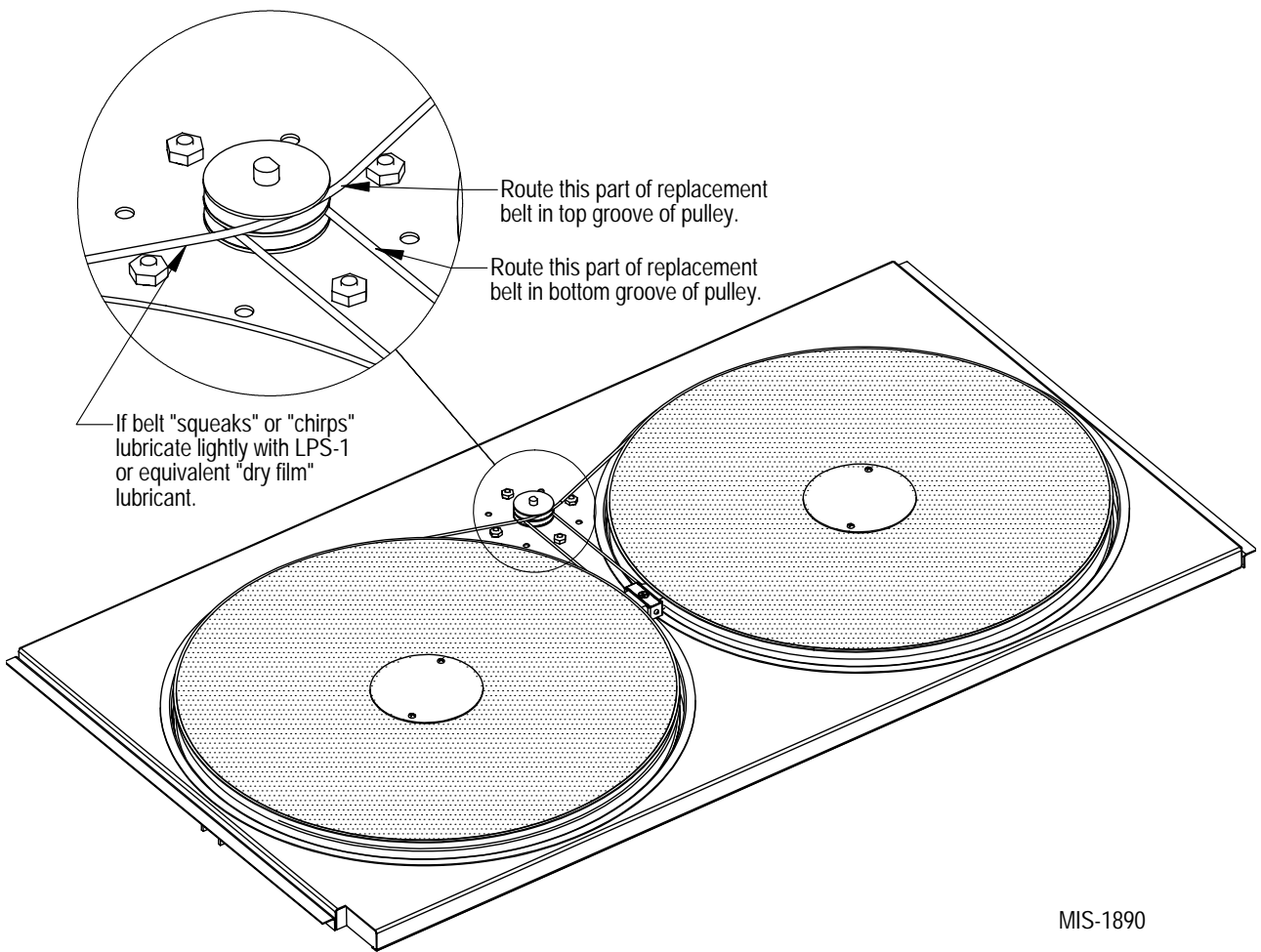
1. Inspect and conduct the same procedures as outlined under Quarterly Maintenance.
2. To maintain peak latent (moisture) removal capacity, it is recommended that the energy recovery wheels be sprayed with a diluted nonacid based evaporator coil cleaner or alkaline detergent solution such as 409.

*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.

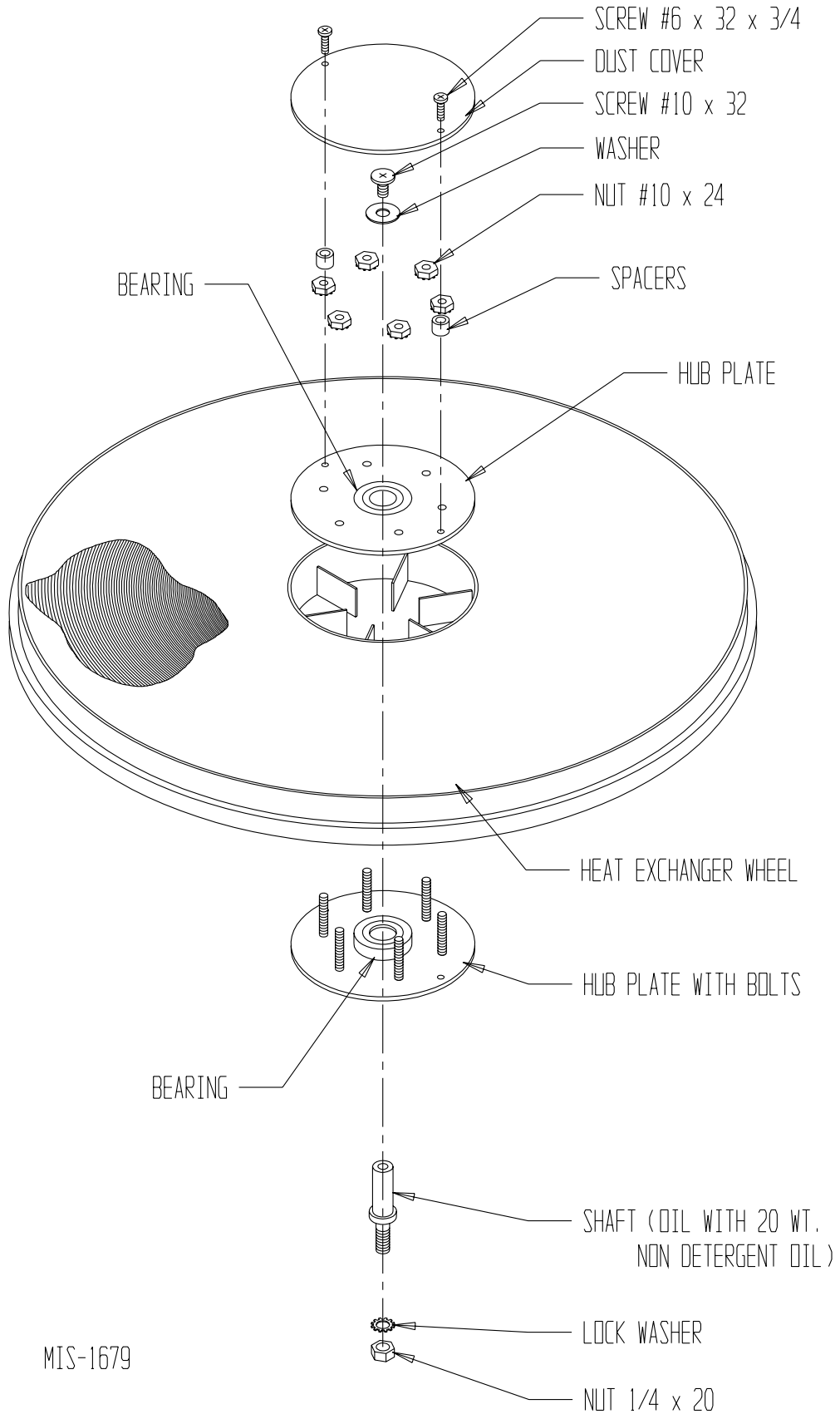
**FIGURE 1**  
**BELT REPLACEMENT INSTRUCTIONS**



MIS-1890



**FIGURE 2  
HUB ASSEMBLY WITH BALL BEARINGS**



MIS-1679