JUMBOTRON

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

DOC-10033 REV 4.0

TABLE OF CONTENTS

1 SAFETY INFORMATION

This manual provides important information for all personnel involved with the safe installation, operation and proper maintenance of this product. Even if you feel you are familiar with this or similar equipment, you should read this manual before operating the Jumbotron.

1A DANGER, WARNING, CAUTION AND NOTICE

Throughout this manual there are steps and procedures which, if not followed, may result in a hazard. The following signal words are used to identify the level of potential hazard

Danger is used to indicate the presence of a hazard which *will* cause *severe* injury, death, or substantial property damage if the warning is ignored

Warning is used to indicate the presence of a hazard which *can* cause *severe* injury, death, or substantial property damage if the warning is ignored

Caution is used to indicate the presence of a hazard which *will* or *can* cause injury or property damage if the warning is ignored

Notice is used to notify people of installation operation or maintenance information which is important but not Hazard related

1B SAFETY SUMMARY

The National Safety Council, Accident Prevention Manual for Industrial Operations, Eighth Edition and other recognized safety sources make a common point: employees who work near suspended loads or assist in hooking on or arranging a load should be instructed to keep out from under the load. From a safety standpoint, one factor is paramount: conduct all lifting or pulling operations in such a manner that if there were an equipment failure, no personnel would be injured. This means keep out from under raised load and keep out of the intended path of any load.

The Occupational Safety and Health Act of 1970 generally places the burden of compliance with the user, not the manufacturer. Many OSHA requirements are not concerned with manufactured product but are, rather, associated with the final installation. It is the owner's and user's responsibility to determine the suitability of a product for any particular use. It is recommended that all applicable industry, trade association, federal, state and local regulations be checked. Read all operating instructions and warnings before operation

Rigging: It is the responsibility of the operator to exercise caution and be familiar with proper rigging techniques. Referred to ASME B30.9 for rigging information. American National Standards Institute, 1430 Broadway New York, NY 10018.

Plumbing: It is the responsibility of the installer to ensure that all plumbing connections are made in accordance with GHT guidelines, applicable trade standards and best practices.

This manual has been produced by GHT to provide dealers, mechanics, operators and company personnel with the information required to install, operate, maintain and repair the products described herein.

It is extremely important that mechanics and operators be familiar with servicing procedures of these products, or like or similar products, and are physically capable of conducting the procedures. These personnel shall have a general working knowledge that includes:

1. Proper and safe use and application of mechanics common hand tools
2. Safety procedures, precautions and work habits established by accepted industry standards

GHT cannot know of, or provide, all the procedures by which product operations or repairs may be conducted and hazards and/or results of each method. If operation or maintenance procedures not specifically recommended by the manufacturer are conducted, it must be ensured that product safety is not endangered by the actions taken. If unsure of an operation and maintenance procedure or step, personnel should place the product in a safe condition and contact supervisors and/or the factory for technical assistance.

1C SAFE OPERATING INSTRUCTIONS

Stay clear of unit when in operation. Do not operate unit without all guards and covers in place.

1D WARNING LABELS AND TAGS

Each unit is shipped from the factory with the following safety labels attached. If the labels are not attached to your unit, order new labels and install. Refer to page 24 for numbers.

2 GENERAL INFORMATION

2A RECEIVING & INSPECTION

Upon receiving your Jumbotron unit, check all items against packing slip and Bill of Lading to ensure all parts have been received. If items are missing, contact a GHT representative immediately. Check all components for damage, paying close attention to the cooler core(s). Any damage must be immediately reported to the carrier and a damage claim filed. GHT is not responsible for unreported damage or for damage claimed after the unit has been delivered.

Jumbotron part number and serial number can be found on nameplate mounted on one of the legs (Figure 1). These numbers should be included with any inquiry about this unit.

Figure 1: Jumbotron Nameplate

2B LIFTING & MOVING JUMBOTRON

Whenever Jumbotron is moved, observe the following:

- Lifting must be done slowly to prevent sudden shock loads, twisting and dropping.
- Observe proper lifting and rigging techniques.
- Do not place forks directly under Jumbotron bottom channels (Figure 2).
- Do not lift complete unit by the top plates on legs (Figure 3).
- Do not lift complete unit by the motor mount (Figure 4).
- If overhead crane is not available for moving, use forklift to lift wood skid on which Jumbotron is shipped (Figure 5).
- If possible, lift with overhead crane using recommended 10,000lb capacity lift eye (GHT PN 72000047, not provided) in lift plate. (Figure 6, Figure 7)

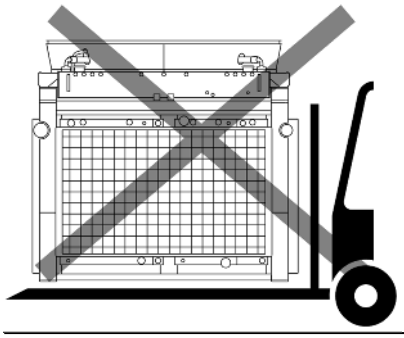


Figure 2: No lift by forks under unit

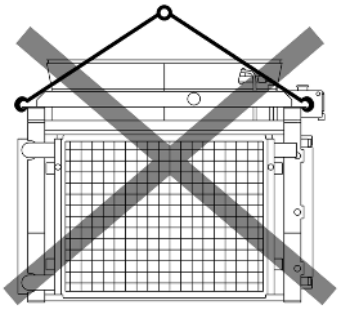


Figure 3: No lift by top plates

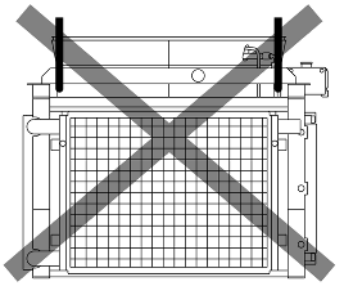


Figure 4: No lift by motor mount

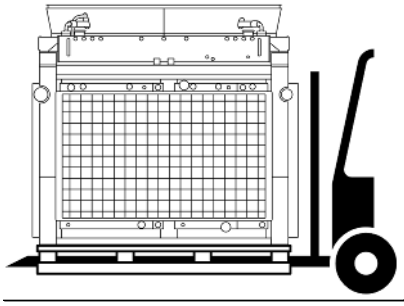


Figure 5: Approved lift with GHT skid

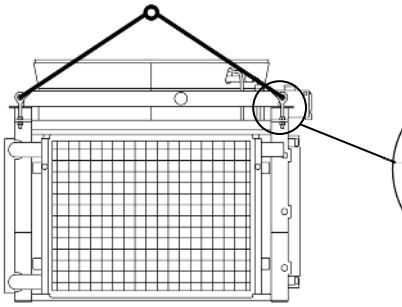


Figure 6: Approved lift with lift eye

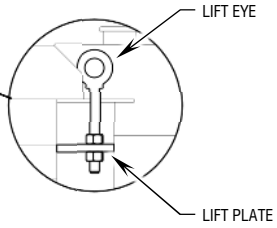


Figure 7: Lift Eye Detail

3 STORAGE

3A JUMBOTRON

All units are painted prior to being shipped with customer specified finish coat. No further coating is necessary.

If cooling package is to be stored prior to installation, unit should be stored in a clean, dry environment, with as stable a temperature and humidity as possible. Temperature changes in the storage area causes condensation to form inside the cooling system, which leads to failure not covered by the warranty.

All open inlets, outlets, and fittings are to be capped. Avoid storing unit on unlevel ground or surface for extended periods of time, as weight of the unit could permanently deform gasket-sealed surfaces. This may also result in permanent deformation of the frame, fan misalignment, and inefficient operation.

GHT does not recommend storing Jumbotrons outside for long periods of time due to high humidity or sudden and severe temperature changes that may result in corrosion and/or damage that is not covered by warranty.

STORAGE TERM:

6 Months – No specific internal corrosion protection is required. All openings should be sealed with plastic plugs or covered with aluminum tape.

6 to 24 Months – Coolers should be flushed with corrosion inhibited Glycol and all openings should be resealed with plastic plugs or aluminum tape.

24+ Months – Coolers should be flushed, inspected, and resealed every 24 months.

To preserve warranty, per manufacturer's requirements (ref Bosch-Rexroth RE 91001-01-B/02.2011):

6.2 Storing the axial piston unit

Requirement

- The storage areas must be free from corrosive materials and gases.
- To prevent damage to the seals, ozone-forming equipment (e.g. mercury-vapor lamps, high voltage equipment, electric motors, sources of electrical sparks or electrical discharges) must not be operated in storage areas.
- The storage areas must be dry.
- Ideal storage temperature: +5 °C to +20 °C.
- Minimum storage temperature: -50 °C.
- Maximum storage temperature: +60 °C.
- Avoid high light irradiation (e.g. bright windows or direct fluorescent lighting).
- Do not stack axial piston units and store them shock-proof.
- Do not store the axial piston unit on sensitive attachment parts, e.g. speed sensors.
- For other storage conditions, see table 7.

▸ Check the axial piston unit monthly to ensure proper storage.

After delivery

The axial piston units are provided ex-works with corrosion protection packaging (corrosion protection film).

The following table lists the maximum permissible storage times for an originally packed axial piston unit as per data sheet RE 90312.

Table 7: Storage time with factory corrosion protection

Storage conditions	Standard corrosion protection	Long-term corrosion protection
Closed, dry room, uniform temperature between +5 °C and +20 °C. Undamaged and closed corrosion protection film.	Maximum 12 months	Maximum 24 months

The entitlement under warranty is rendered void if the requirements and storage conditions are not adhered to or after expiration of the maximum storage time (see table 7).

Procedure after expiration of the maximum storage time:

1. Check the entire axial piston unit for damage and corrosion prior to installation.
2. Check the axial piston unit for proper function and leaks during a test run.
3. If the storage time exceeds 24 months, the shaft seal ring must be replaced.

After expiry of the maximum storage time, we recommend that you have the axial piston unit inspected by your responsible Bosch Rexroth Service partner.

In the event of questions regarding repair and spare parts, contact your responsible Bosch Rexroth Service partner or the service department of the manufacture's plant for the axial piston unit, see chapter "10.5 Spare parts" for further information.

After removal

If a dismounted axial piston unit is to be stored, it must be preserved against corrosion for the duration of the storage.

The following instructions only refer to axial piston units which are operated with a mineral-oil based hydraulic fluid. Other hydraulic fluids require preservation methods that are specifically designed for them. In such a case, consult with Bosch Rexroth Service, see chapter 10.5 “Spare parts” for address.

Bosch Rexroth recommends the following procedure:

1. Clean the axial piston unit, see chapter 10.1 “Cleaning and care”.
2. Empty the axial piston unit.
3. For storage time up to 12 months: Moisten the inside of the axial piston unit with mineral oil and fill with approx. 100 ml mineral oil.
   For storage time up to 24 months: Fill the axial piston unit with corrosion protection medium VCI 329 (20 ml).
   Fill via the reservoir port $\mathbf{T_1}$ or $\mathbf{T_2}$, see chapter 7.4 “Installing the axial piston unit”, Fig. 12 to 15.
4. Seal all ports airproof.
5. Moisten the unpainted surfaces of the axial piston unit with mineral oil or a suitable, easily removed corrosion protection agent, e.g. acid-free grease.
6. Package the axial piston unit airproof together with desiccant in corrosion protection film.
7. Store the axial piston unit so that it is protected against jolts, see “Requirement” in this chapter.

4 INSTALLATION

4A PLACEMENT

Unit must be located so that adequate and unrestricted airflow is available on each vertical intake side, and also on top exhaust side. There should be no obstructions to air stream within a distance of approximately one and a half times width of radiator on either side to avoid re-circulation. Care should be taken to select a location that has reasonably clean air. Dirty air may plug cores and cause overheating.

4B LOW AMBIENT ENVIRONMENT

GHT coolers are designed to be heavy duty; however, extreme cold requires special consideration. Allowance must be made for high oil viscosity and potential freeze-up. Hot jacket water suddenly entering cold cores, or cold ambient air suddenly forced over hot cores, may cause thermal shock.

GHT recommends that users design a bypass to slowly heat up cooling system in extreme cold conditions. This may include use of thermostatically controlled shutters and fan motor controls, two speed fan motors, and heaters and pumps in bypass piping circuit to pre-warm cooler core. Inadequate liquid flow or thermal shock may result in premature failure of radiator cooler. GHT is not liable for any failures due to thermal shock of the cooling system.

4C MOUNTING

Unit must be mounted on a frame that supports the full wet weight of the Jumbotron. See page 26 for unit wet weight.

Unit must be isolated from vibration using suitable vibration damping mounting. Recommended isolation mount Lord CB-2205-10 (GHT PN 71004661), mounted as shown Figure 8, Figure 9

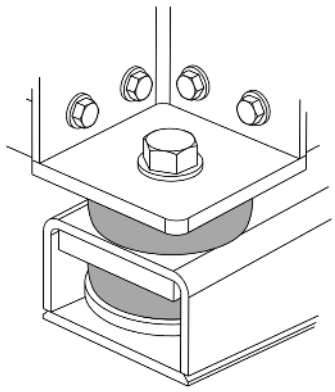


Figure 9: Isolator mount

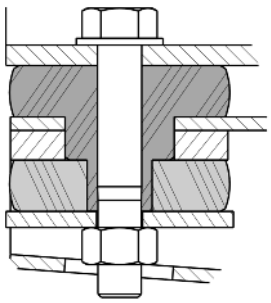


Figure 8: Isolator section view

4D PIPING

Avoid long runs of hose or pipe that are supported only by the connection to the radiator. Piping and hose connected to the radiator should be independently supported per standard pipe fitting practice. Whenever possible use vibration dampening flexible connections to inlet ports, outlet ports, and fittings. Pipe and line diameter should be matched to port or fitting it is connected to. Using pipes or lines that are too small may result in excessive pressure drop and flow restriction. Use as few bends and elbows in the line as possible. Install safety devices to keep hoses secured (whip checks).

For proper function, it is important that the expansion tank be the highest point in the system. If it is necessary to run piping above the expansion tank, a ¼" vent line should be run from the highest point in the system back to the top tank/surge tank. If piping is run below the bottom tank, install a drain valve at the lowest point in the circuit.

Improper plumbing circuitry can result in too low fluid flow through the radiator/cooler core, which causes hot and cold areas and induced stresses by differing thermal expansion rates.

Jumbotron radiators are de-aerated. Connection of the de-aeration system must be in accordance to the engine manufacturer's recommendations.

Ensure system is properly plumbed and all inlet/outlets are connected to their respective engine connections:

1. Cooler Jacket water inlet should be connected to engine coolant outlet.
2. Cooler Jacket water outlet should be connected to engine coolant inlet or return.
3. Auxiliary inlet should be connected to engine outlet.
4. Auxiliary outlet should be connected to engine inlet or return.

Ensure fill and vent lines are properly connected:

1. Fill lines are sized to provide optimum fill rate for entire system. Fill lines should be connected to lowest spot in cooling system including piping. Usually this will be attached in return line to pump or to outlet of their respective tank (jacket water/auxiliary). This allows system to fill bottom up pushing any trapped air into expansion tank.
2. Vent lines are required to purge any trapped air. Vent lines must be connected to highest spot in cooling system.
    a. Jumbotron coolers are provided with cooler-to-expansion tank vent lines pre-plumbed inside the unit.
    b. Customer is responsible for connecting vent lines from engine to expansion tank.
3. Fill and vent lines must slope continuously down, away from expansion tank, and must not be restricted or kinked in any way.

4E INITIAL COOLANT FILL

After initial startup, coolant level should be checked and topped as necessary. Check coolant level regularly per engine manufacturer's prescribed maintenance schedule.

See engine manufacturer's manual for proper coolant mixtures and maintenance. For oil coolers, always use proper oil and do not mix different oil types.

Proper procedure for initial fill of GHT Jumbotron is as follows. Refer to Figure 10.

Ensure all piping is properly connected per Section 4D, Piping, page 13

1. With thermostat closed, fill through radiator cap(s) with engine manufacturer approved coolant. Correct fill level is indicated by center point of sight glass.
2. After initial startup, coolant level should be checked and topped as necessary.

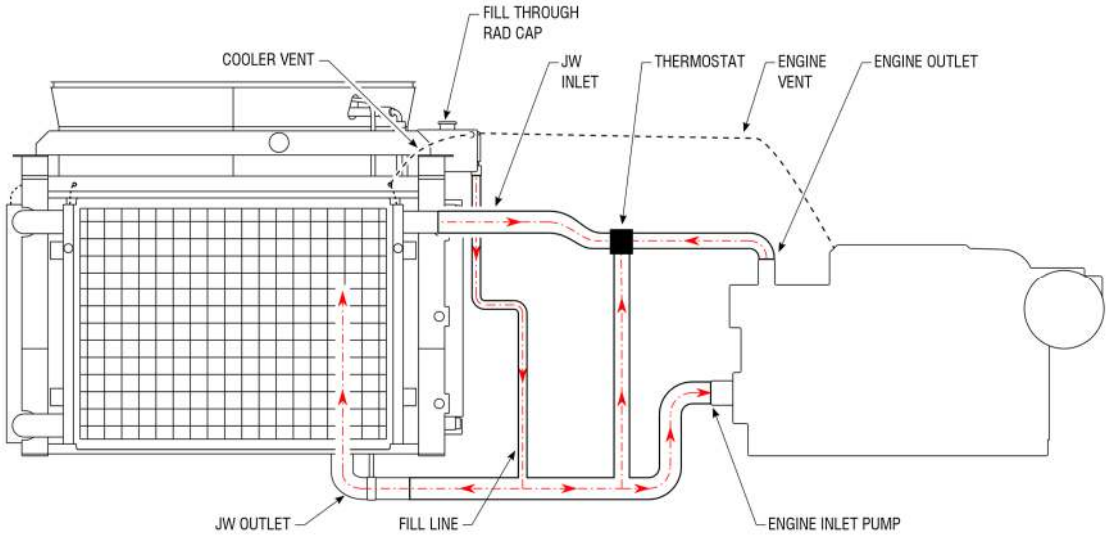


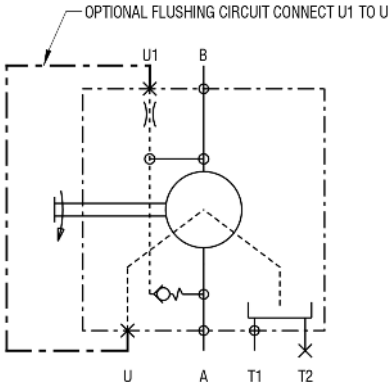
Figure 10: Jumbotron fill diagram

4F HYDRAULIC FAN MOTOR

Hydraulic motor is an axial piston type unit. Refer to fan motor manual for hydraulic fluid selection.

Connect Hydraulic Fan Motor to power unit using Code 62 Flange connections. See page 26 for flange bolt and motor mount bolt torques.

Case drain must be connected unobstructed to HPU hydraulic reservoir.



PORT A: POWER 1-1/8" SAE CODE 62
PORT B: RETURN 1-1/8" SAE CODE 62
PORT T1: CASE DRAIN #10 SAE ORB

Motor is provided with optional bearing flushing circuit. Request GHT PN 20025941

Motor is provided with optional speed sensing circuit. Request GHT PN 72006017

Figure 11: Hydraulic Fan Drive Schematic

4G FAN INSTALLATION & POSITIONING

Jumbotron units are typically shipped from factory with fan, motor, and drive components installed. Apart from any scheduled and routine maintenance, further adjustment should not be required.

Should fan drive require installation, refer to Sections 8A and 8B, page 22

Should the fan drive require disassembly, refer to Section 7E, page 21

5 STARTUP

Initial startup procedure as follows:

1. Before startup, thoroughly inspect unit to ensure that:
    - Unit is properly anchored
    - All piping connections and fittings are tight and sealed
    - All nuts and bolts are torqued to specification
    - All moving parts are free from obstructions
    - All shrouds and safety guards are in place
    - Fluid levels are adequate
    - Fan is properly located and free to rotate
2. After initial startup, re-check for leaks.
3. Top all fluid levels.

6 MAINTENANCE

6A HYDRAULIC FAN MOTOR

No external lubrication required. See Hydraulic Motor Instruction manual for further details.

Hydraulic system:

1. Check level of hydraulic fluid in reservoir:
   Daily
2. Check the operating temperature at a comparable load condition at reservoir port and in reservoir:
   Weekly
3. Conduct analysis of hydraulic fluid: viscosity, aging and dirt contamination. Replace if required:
   Yearly or every 2000 operating hours

Axial piston unit:

4. Check axial piston unit for leakage:
   Daily
5. Check axial piston unit for unusual noise development:
   Daily
6. Check fasteners for tight seating. All fasteners must be checked when the hydraulic system is switched off, depressurized and cooled down:
   Monthly

	Daily	Weekly	Monthly	Yearly
Hydraulic System				
1. Fluid Level	✓			
2. Operating Temperature		✓		
3. Analyze Fluid				✓
Axial Piston Unit				
4. Leaks	✓			
5. Noise	✓			
6. Fasteners			✓	

Table 1: Hydraulic Fan Motor Maintenance

6B NUTS/BOLTS

All units come from factory with nuts and bolts properly torqued. All fasteners should be checked and re-torqued on a regular maintenance schedule. See page 26 for structural nuts/bolts torque specs.

CAUTION: Special attention should be given to fasteners on drive components. This includes motor, fan hub, and bushings. Check these components on a regular maintenance schedule.

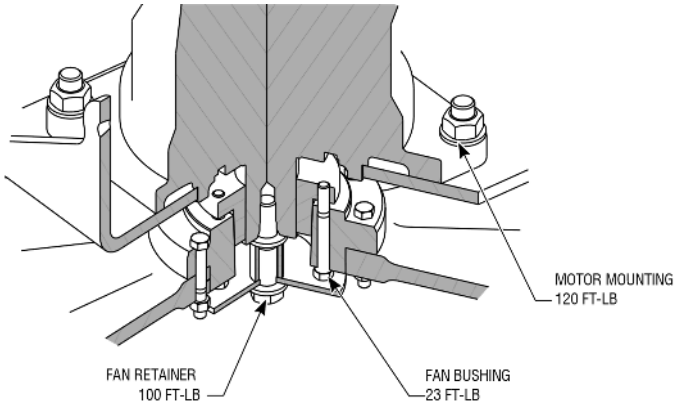


Figure 12: Fan Drive Fasteners

6C CLEANING

All radiators and coolers should be kept as clean as possible to ensure optimum performance. Common issues of concern, and how they affect the performance of the cooling system are:

1. **Cores & Cooling Fins**: The cooling fins on coolers may become clogged with debris such as mud, oil, and dirt. Failure to remove this debris may decrease cooling performance, and lead to engine overheating. Compressed air or pressure washers are effective methods of cleaning, but care must be taken not to damage cooling fins. For best results, straighten any bent fins before washing. Hold the air or water nozzle far enough away from and perpendicular to the core so that the blast does not bend fin material. When using detergent or degreaser to clean aluminum coolers, be sure the product is non-caustic and non-corrosive to aluminum.
2. **Fans:** Fan Blades should be kept clean to maximize effectiveness and provide adequate airflow through the radiator. Dirt build up on blades may reduce aerodynamic efficiency and unbalance fan blades, causing vibration and wear. Clean fan blades with compressed air or pressure washers, and avoid abrasives or corrosive materials.
3. **Hydraulic Motor:** Caution: Pressure washer jet may damage seals or electrical system! Do not point the pressure washer at sensitive components. Before cleaning, check whether all seals and fittings on connections are securely seated to ensure no moisture can penetrate into axial piston unit during cleaning. Use only water and, if necessary, a mild detergent to clean the piston unit. Never use solvents or aggressive detergents. Remove external coarse dirt and keep sensitive and important components, such as sensors and seals, clean.
4. **Frameworks:** Before cleaning, check whether all seals and fittings on the unit are securely seated to ensure no moisture can penetrate into system during cleaning. Use only water and, if necessary, a mild detergent to clean frameworks. Never use solvents or aggressive detergents.

7 DISASSEMBLY

7A EXPLODED VIEW

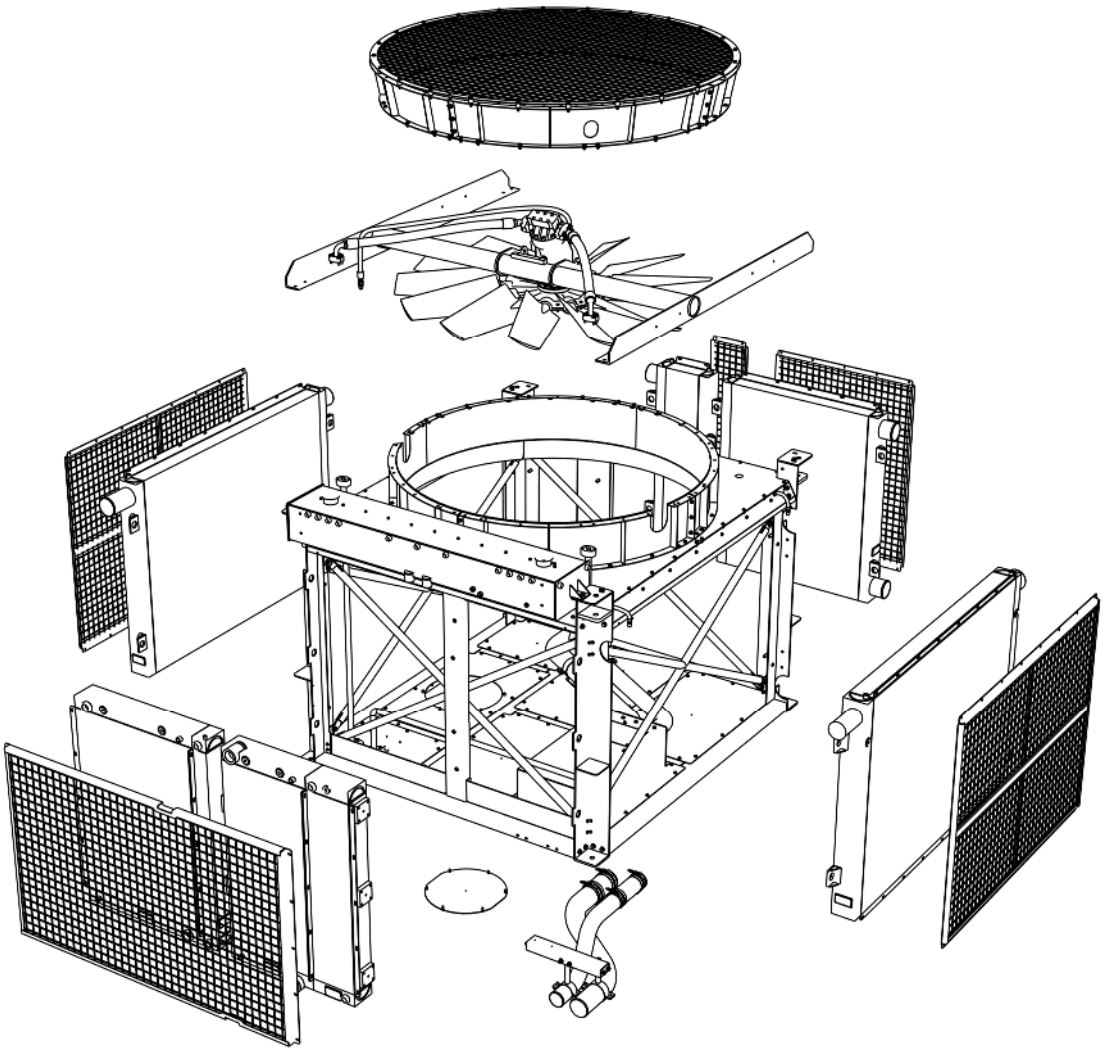


Figure 13: Typical Exploded View

7B ACCESS DOOR

To remove access door:

1. Ensure Fan drive is switched off and locked out.
2. Unbolt access door from bottom of unit.

Installation is reverse of removal. See page 26 for door bolt torque.

On some models, Jumbotron floor panels can be re-configured to move access door to a different position. Consult GHT for available options and instructions.

7C DRAINING

Ensure system is turned off, fluid is de-energized, and cooled down. If JW or AC cooler is to be drained, entire JW or AC circuit must be drained.

To drain JW or AC circuit:

1. Open cap on expansion tank.
2. Place appropriate receptacle under cooler drain plug.
3. Remove drain plug from cooler and allow system to drain.
4. Re-install drain plugs and fill cap when drained.

Alternatively, JW/AC circuit may be drained from user installed drain valve on main JW or AC connection.

To drain Lube/Hydraulic/Fuel coolers:

1. Open vent fitting at top of cooler
2. Place appropriate receptacle under cooler drain plug
3. Remove drain plug and allow cooler to drain.
4. Re-install plugs when drained.

7D COOLERS

1. Drain cooler to be removed
2. Remove core guard.
3. Support cooler using provided lift points (Figure 14):

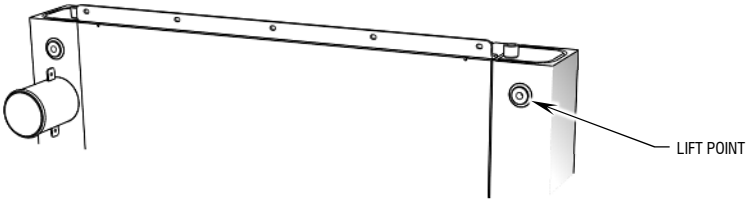


Figure 14: Cooler Lift Points

4. From inside Jumbotron, disconnect any hoses
5. Remove cooler mounting bolts.
6. Remove cooler
7. Inspect cooler seal and replace if necessary.
8. Cooler part number and serial number are indicated on cooler nameplate (Figure 15). Provide these numbers to GHT when ordering replacement coolers.

Figure 15: Cooler Nameplate

7E FAN MOTOR AND FAN

1. Lockout, de-energize, and drain hydraulic motor supply lines
2. Remove fan guard and, if equipped, duct cone.
3. Disconnect hydraulic supply lines from motor
4. Catch any leaks in appropriate receptacle
5. Unbolt motor mount at four points from Jumbotron frame.

DANGER: MOTOR MOUNT ASSEMBLY WEIGHT 550lb

6. Use provided lift point to remove motor mount/fan motor/fan assembly from Jumbotron frame
7. Rotate assembly to access fan bushing.
8. Remove Fan retainer parts.
9. Remove existing bushing bolts and use jack screw holes to walk fan boss out of bushing. NOTE: do not remove bushing from shaft.
10. Remove fan from bushing on motor shaft.

WARNING: FAN WEIGHT 120lb

CAUTION: FRAGILE FAN BLADES

11. Rest motor mount assembly on stands with motor shaft pointing down.
12. Unbolt four bolts securing motor to mount
13. Remove motor and, if present, fan guard tray.

WARNING: MOTOR WEIGHT 161lb

Installation is reverse of removal. If fan bushing was disturbed or fan was replaced, refer to page 22 to set fan position.

8 ASSEMBLY

8A HYDRAULIC MOTOR

Before re-installing, inspect axial piston unit for damage or wear to seals and components. Installation is reverse of removal as outlined in Disassembly Section 7E, page 21. See page 26 for torque specs.

8B FAN

Fan position is based on type of duct and controlled by bushing position. Fan should be positioned according to Figures 16, 17, and 18 below and installed in accordance with instructions next page.

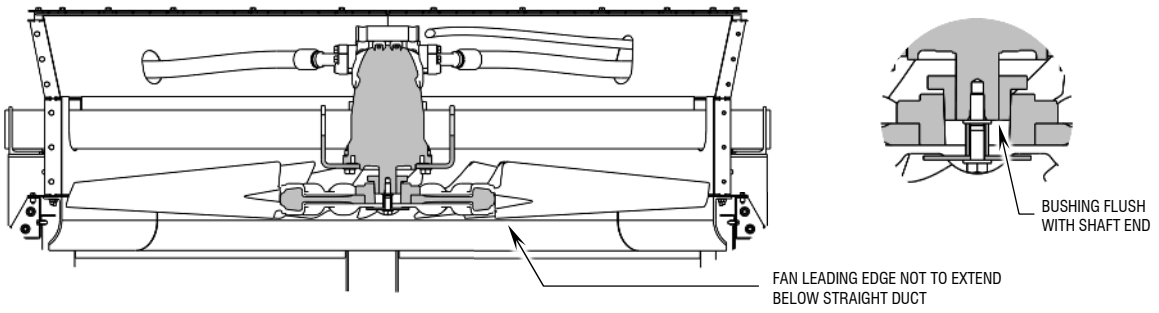


Figure 16: Airflow Improvement Duct

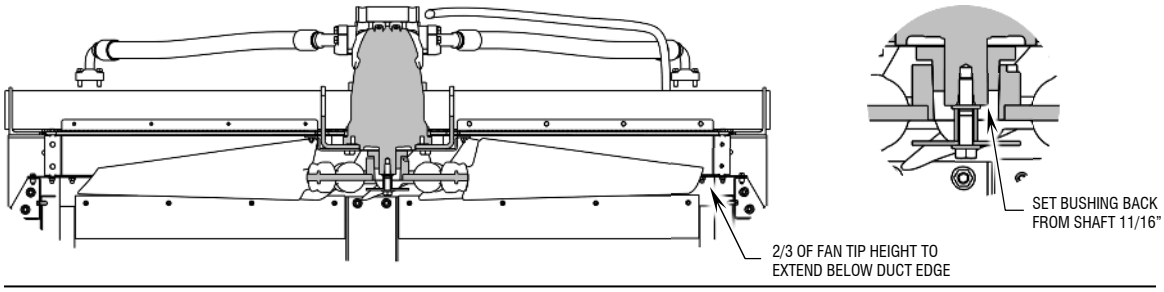


Figure 17: Standard Duct

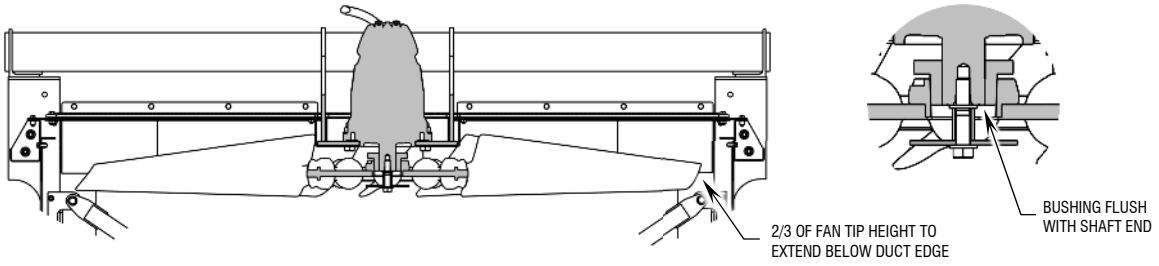


Figure 18: Low Profile Duct

To install fan:

1. Isolate motor/motor mount assembly according to steps in Disassembly Section 7E, page 21.
2. Position bushing on motor shaft according to inset view on Figure 16, 17, or 18 as applicable. This sets fan preliminary position.

CAUTION: FAN BOSS AND BUSHING MUST NOT BE LUBRICATED

3. Install fan on fan bushing. Use bolts to draw fan boss onto bushing.
4. Install Fan retainer parts on motor shaft.
5. Install motor/motor mount/fan assembly to Jumbotron frame by reversing steps in Section 7E, page 21
6. Inspect fan location.

To adjust fan position:

7. Open access hatch per Section 7B on page 19
8. Determine amount of vertical adjustment required based on correct fan position from Figures 16, 17, and 18 as applicable

CAUTION: FAN WILL DROP WHEN BUSHING BOLTS ARE LOOSENED NEXT STEP

9. Loosen bushing bolts and use jack screws to walk fan off bushing
10. Loosen bushing setscrew and adjust height of bushing. Tighten setscrew.
11. Use bushing bolts to draw fan over bushing.
12. Re-check fan position.
13. Rotate fan by hand to confirm there is no interference.
14. Torque bushing bolts fully per specification (see page 26)
15. Exit unit and re-install access door.

8C COOLERS

Before re-installing, inspect coolers for damage. Installation is reverse of removal as outlined in Disassembly Section 7D, page 20. Cooler mounting components installed as pictured below. See page 26 for Mounting bolt torque.

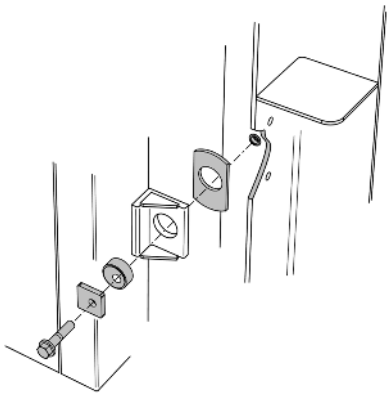


Figure 19: Cooler Isolator, Style A

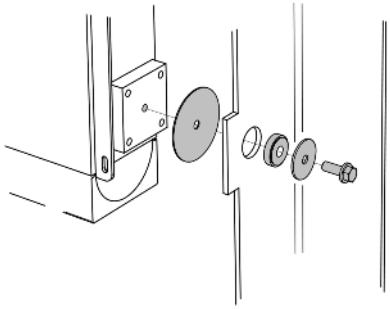


Figure 20: Cooler Isolator, Style B

9 SPARE PARTS

Standard spare parts list:

Include Jumbotron part number and serial number (see page 7) with any spare parts request.

Hydraulic motor 72005760
Motor Flushing Circuit Hose 20025941
Motor Speed Sensor 72006017

Power hose assemblies ..... varies by version
Case drain hose assembly ..... varies by version
Fan ..... varies by version

Corner connection hose 72005874
Corner connection hose clamp 71004738

Sticker, Keep Closed, Lockout 20024240
Sticker, Hot Surfaces 20023910
Sticker, Do Not Operate Without Guards 20023907

Jumbotron Mount Isolator 71004661
Style “A” cooler isolator mount 20018988
Style “B” cooler isolator mount 20018990
Lift Eye 72000047

Cooler Seal, 3/4" W x 3/8” T 72005885

10 SPECIFICATIONS

10A JUMBOTRON

Wet Weight ..... varies by model
Fluid capacity ..... varies by model
Cooler mounting bolts torque (1/2”-13 Grade 5) ..... 75-85 ft-lb (dry)

Operating Pressure ..... 15 PSIG
Operating Temperature ..... 210 °F

Fastener dry torque by nominal dia, bolt into lock nut (ft-lb)
1/4” 2-3
5/16” 5-6
3/8” 9-10
7/16” 14-16
1/2” 22-25
3/4” 78-88
1” 187-212

Fastener dry torque by nominal dia, bolt into rivet nut (ft-lb)
5/16” 17-20
3/8” 31-35
1/2” 75-85

10B HYDRAULIC MOTOR

Weight ..... 161 lb
Displacement ..... 15.3in^3/rev
Maximum flow ..... 180 US Gallons/min
Maximum operating pressure ..... 5600 psi
Mounting Fastener torque (3/4”-10 Grade 8) ..... 120 ft-lb (dry)
Fan retainer bolt torque (5/8”-11) ..... 100 ft-lb (dry)
Cleaning Procedure ..... Flow

10C FAN

Weight ..... up to 120 lb
Diameter ..... 75”
Boss-to-Bushing bolt torque (3/8”-16 Grade 5) ..... 360 in-lb (dry)