
INSTALLATION INSTRUCTIONS

Original Issue Date: 11/99

Model: 2000 kW (Detroit Diesel 20V-149TIB)

Market: Industrial

Subject: Fan Service Kit GM11778

This instruction sheet covers the replacement procedure for the 2000 kW generator set radiator fan.

If you are making a warranty claim, keep the old fan blades and hub for return to the factory. The factory will issue a GWR (Generator Warranty Return) upon receipt of the claim.

This fan kit fits generator sets having a 203 mm (8 in.) idler pulley. If the generator set has a 152 mm (6 in.) idler pulley obtain the Idler Pulley Upgrade Service Kit GM11779.

Special tools required:

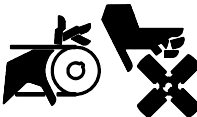
Torque wrench 0–203.4 Nm (0–150 ft-lbs.)

Machinist's Protractor with 1° adjustment increments

Black permanent marker

Belt tension gauge

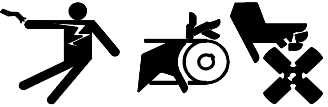
Observe the following safety precautions while installing the kit:

⚠ WARNING

<p>Rotating parts. Can cause severe injury or death.</p> <p>Operate the generator set only when all guards, screens, and covers are in place.</p>

Servicing the generator set when it is operating. Exposed moving parts can cause severe injury or death. Keep hands, feet, hair, clothing, and test leads away from the belts and pulleys when the generator set is running. Replace guards, screens, and covers before operating the generator set.

Disable the Generator

1. Place the generator set master switch in the OFF position.
2. Disconnect the power to the battery charger, if equipped.
3. Disconnect the generator set engine starting battery(ies), negative (-) lead first.

⚠ WARNING

<p>Accidental starting. Can cause severe injury or death.</p> <p>Disconnect the battery cables before working on the generator set. Remove the negative (-) lead first when disconnecting the battery. Reconnect the negative (-) lead last when reconnecting the battery.</p>

Disabling the generator set. Accidental starting can cause severe injury or death. Before working on the generator set or connected equipment, disable the generator set as follows:

- (1) Move the generator set master switch to the OFF position.
- (2) Disconnect the power to the battery charger.
- (3) Remove the battery cables, negative (-) lead first. Reconnect the negative (-) lead last when reconnecting the battery.

Follow these precautions to prevent starting of the generator set by an automatic transfer switch, remote start/stop switch, or engine start command from a remote computer.

Remove Blades

1. Remove the upper left and right fan guard sections and the cross support for the cooling lines.
2. Remove the belt guard and release the tension on the drive belts to facilitate the rotation of the fan assembly.
3. Remove both air cleaner assemblies that are located closest to the radiator by loosening the T-bolt clamps at the turbo inlet. To allow easier access to the fan assembly remove the band clamps that secure the air cleaner canister to the mounting plate. See Figure 1-1.
4. Label each blade, clamp and hub position with a black permanent marker before they are removed. Example: Label each blade, clamp, and hub position AAA, BBB, CCC, etc. See Figure 1-2 and Figure 1-4.
5. Remove the fan blades.

Note: Be careful not to damage the radiator core when removing the blades.



Figure 1-1 Air Cleaner Band Clamps



Figure 1-2 Hub marks

Remove Hub

1. Mark the hub-to-shaft location with a permanent marker. The mark will be used as a point of reference for the new hub location. See Figure 1-3.
2. Remove the 3 hub bushing bolts.
3. Press out the hub bushing by inserting the 3 hub bolts into the threaded extraction holes located in the hub bushing. Tighten the 3 hub bolts evenly in a circular pattern.
4. Hold the hub in place and slide the hub bearing out of the hub and off the fan shaft.
5. Remove the hub bushing. To ease the removal of the hub bushing, lightly spread the bushing by tapping a small chisel into the split of the bushing.
6. Remove the hub.

Note: Be careful not to damage the radiator core when removing the hub.

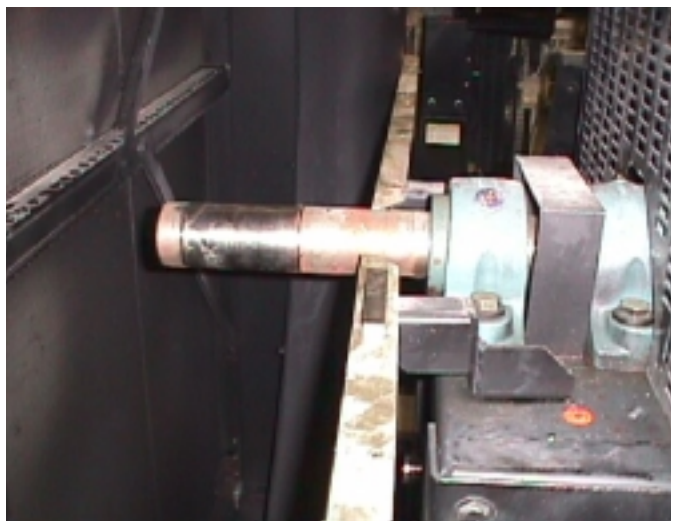


Figure 1-3 Hub Placement Marks

Install Hub

Note: Handling the hub is a two-person operation. Do not drop or strike the hub with a hard object as the hub could crack or be damaged.

1. Lay the new hub down so that the blade clamps are up.
2. Number the clamps and their positions on the hub 1-10. See Figure 1-4.
3. Place an alignment mark on the hub and hub bushing. See Figure 1-5.
4. Turn the hub clamp side down, and remove all the nuts from the blade clamp bolts. See Figure 1-6.
5. Lift the hub straight up so that all of the blade clamps stay on the ground to reduce the weight of the hub and make it easier to install on the fan shaft.
6. With the blade clamp side facing the radiator, place the hub on the fan shaft using a hoist to support the weight of the hub. If a hoist is not available then two people are needed to install the hub.
7. Position the split-tapered hub bushing on the shaft and inside the hub with the bushing flange toward the radiator side of the generator set.
8. Slide the hub and bushing assembly toward the end of the shaft until the edge of the flange on the hub bearing lines up with the marked reference point on the shaft. See Figure 1-3.
9. Align the bushing with the key-way and gently tap the full length of the key into the bushing.
10. Insert the hub bushing bolts through the bushing into the hub and finger tighten. Torque the bolts sequentially to 61.0 Nm (45 ft-lbs.)

Note: Position the outside of the bushing flange approximately 31.75 mm (1.25 in.) from the end of the shaft to center the fan in the fan shroud.

Note: Do not use any lubricant or anti-seize compound on any threaded joint.



Figure 1-4 Clamp Position Numbers



Figure 1-5 Hub and Bushing Marks



Figure 1-6 Clamp Removal

Install Blades

Each fan blade box contains two factory-balanced blades that must be installed to oppose each other on the fan hub. Use caution when removing the blades from the box so that the matched pairs stay together until installation.

1. Rotate the hub until any one of the hub sockets is in the 12 o'clock position.
2. Insert the blade shank into the hub socket with the supplied plastic spacer rings positioned on the fan blade shank. Install the blade clamp with the number that corresponds to the number marked on the hub.
3. Pull the blade outward (away from the hub and toward the fan shroud) in a rocking motion until the spacer rings are resting firmly against the shoulder of the hub socket and clamp. Lightly tighten the blade clamp bolts.
4. Confirm that the leading edge of the fan blade is pointing in the direction of engine rotation and the trailing edge (thin side) of the fan is angled toward the fan discharge side (radiator side). Make adjustments by twisting the blade while it is loosely fitted into the hub socket.
5. Install the second, matching blade in the socket directly across (180°) from the first blade.
6. Repeat steps 1–6 for each matching pair of blades until all 10 blades are installed.
7. Select a reference point on the shroud at the blade tip. Slowly rotate the fan to confirm that each blade tip height is within ± 6.35 mm (.25 in.) of each other. Loosen the clamp bolts and add/remove a plastic spacer to/from the blade shank until the blade length is within the specified tolerance.

Adjust Blade Angle

1. Set a machinist's protractor to 33° from the vertical position.
2. Rotate a blade to the 3 o'clock position
3. Place the protractor on the position indicated by the label on the fan blade.

4. Tap the blade shank with a rubber mallet until the bubble on the protractor centers. The clamp bolts may have to be loosened if the blade angle does not change when tapping it with a rubber mallet.
5. When the bubble on the protractor is centered, lightly tighten the blade clamps so that the blade angle will not change when adjusting the remaining blades.
6. Recheck the blade angle.
7. Repeat steps 1–6 for all of the blades, measuring the blade angle at the same location on all of the blades.
8. Carefully tighten the bolts in an alternating pattern to 122.0 Nm (90 ft-lbs.) until all the bolts are torqued.

Final Installation/Inspection

1. Check all of the bolts for specified torque.
2. Check that the fan is centered in the fan shroud.
3. Set the belt tension to 2669 N (600 lbf.) on 60 Hz models and 2224 N (500 lbf.) on 50 Hz models.
4. Ensure that the fan turns in the specified direction.
5. Install the upper left and right fan guards and the cross support for the cooling lines.
6. Check that the generator master switch is in the OFF position.
7. Reconnect the generator set engine starting battery, negative (-) lead last.
8. Reconnect the power to the battery charger, if equipped.

Test Run the Generator Set

1. Start the generator set.
2. Check for abnormal vibration and/or noise.
3. Stop the generator immediately if abnormalities are detected.
4. If no abnormalities are detected, run the generator set for 5 minutes.
5. Stop the generator set and inspect the blade assembly.

Fan Kit

Parts List	
Kit: GM11778	
Qty.	Description
1	Hub
1	Hub bushing
10	Blade clamps
20	Blade clamp bolts
3	Hub bushing bolts
10	Blades