

SERVICE BULLETIN

Original Issue Date: 10/06

Model: 1350-2800 kW (Detroit Diesel Series 4000 Engine)

Market: Industrial

Subject: Fan Pulley Alignment with Tensioning Arm Idler Pulley Design

Introduction

Use this service bulletin when aligning the fan pulley and engine drive pulley with the tensioning arm design; see Figure 1. Perform the alignment procedure at initial startup or when reassembling the generator set after component replacement. Failure to perform this procedure may cause generator set cooling system problems and/or premature poly-V belt failure.

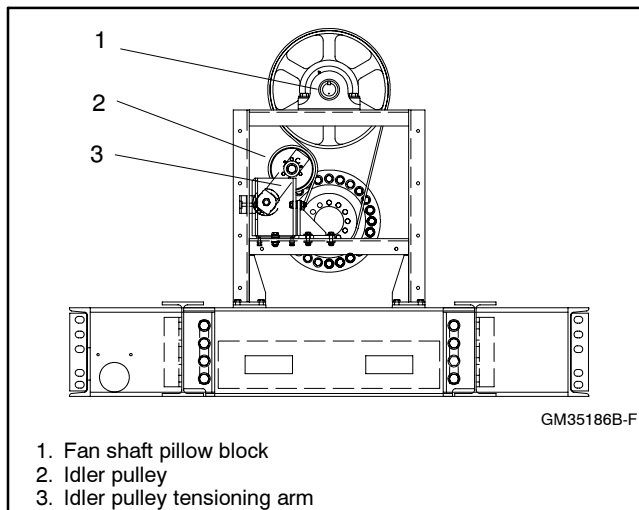


Figure 1 Tensioning Arm Design

Required Tools and Supplies

- Straight edge (machinist's ruler), 610 mm (24 in.)
- Poly-V belt tension gauge (Kent-Moore BT-3384 or equivalent)
- PERMA-LOC® MM-115 (blue) or equivalent thread locking compound

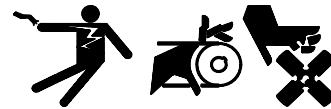
Observe the following safety precautions while performing the fan pulley alignment procedure.

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Safety Precautions

⚠ WARNING

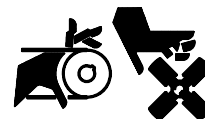


Accidental starting.
Can cause severe injury or death.

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.

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.

⚠ WARNING



Rotating parts.
Can cause severe injury or death.

Operate the generator set only when all guards, screens, and covers are in place.

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.

Alignment Procedure

1. Remove the generator set from service.

- 1.1 Place the generator set master switch in the OFF position.
- 1.2 Disconnect the power to the battery charger and block heater, if equipped.
- 1.3 Disconnect the generator set engine starting battery(ies), negative (-) lead first.

2. Align the idler pulley.

- 2.1 Remove the belt guards, as necessary, to access the poly-V belt and pulleys, if not already removed.
- 2.2 Check the alignment of the idler pulley to the engine drive pulley.

Place a straight edge (machinist's ruler) on the engine drive pulley and check the distance that the idler pulley is set back from the front of the engine drive pulley at four opposing points (rotate the idler pulley 90° per check). See Figure 2. **The offset should be 7 mm (0.275 in.) and the difference between each measurement should not exceed 4 mm (0.015 in.).**

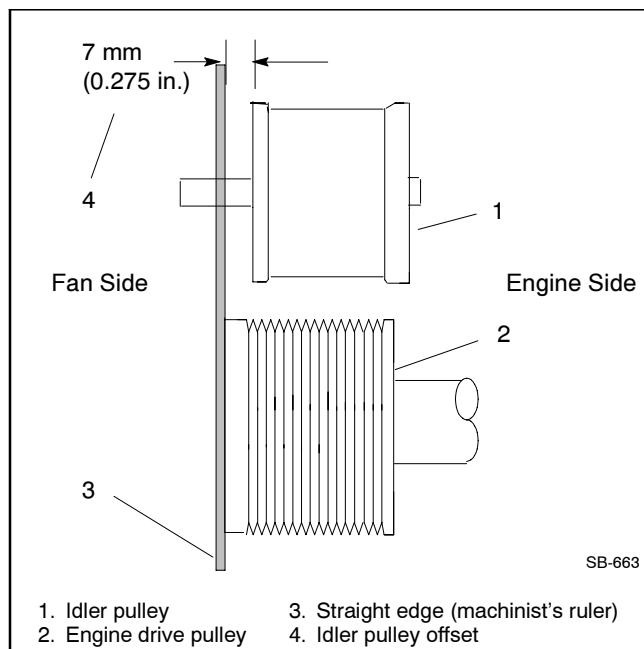


Figure 2 Pulley Alignment, Side View

If the alignment is correct, go to step 3.

If the alignment is incorrect, go to step 2.3 and/or step 2.4.

2.3 Adjust the idler pulley parallel alignment. Use this adjustment to correct for nonparallel alignment with the engine drive pulley.

2.3.1 Adjust the idler pulley assembly using the adjusting screws shown in Figure 3.

2.3.2 Check that the inside and outside left-to-right screws are tight.

2.3.3 Loosen the pivot screw on the idler arm mounting bracket.

2.3.4 Loosen the pivot screw on the 3-hole mounting plate.

2.3.5 Loosen the front-to-back adjusting screws.

2.3.6 Loosen the two adjusting screws and mounting bracket screw.

2.3.7 Adjust, as necessary, the idler pulley horizontal parallel alignment to the engine drive pulley. This adjustment is made by lightly tapping the idler arm mounting bracket and 3-hole mounting plate with a hammer.

2.3.8 Tighten the two front-to-back adjusting screws and pivot screw on the 3-hole mounting plate.

2.3.9 Loosen the inside and outside left-to-right adjusting screws.

2.3.10 Temporarily install (user-supplied) two screws M10-1.5 x 30, grade 8.8 (M933-10030-60) with nuts M10-1.5 as shown in Figure 3. Use these two screws to adjust the vertical parallel alignment of the idler arm mounting bracket. Use the nuts to lock to screw positions.

Keep these screws/nuts installed until instructed to remove them later in the belt tension procedure.

2.3.11 Tighten the pivot screw on the idler arm mounting bracket.

2.3.12 Tighten the inside and outside left-to-right adjusting screws.

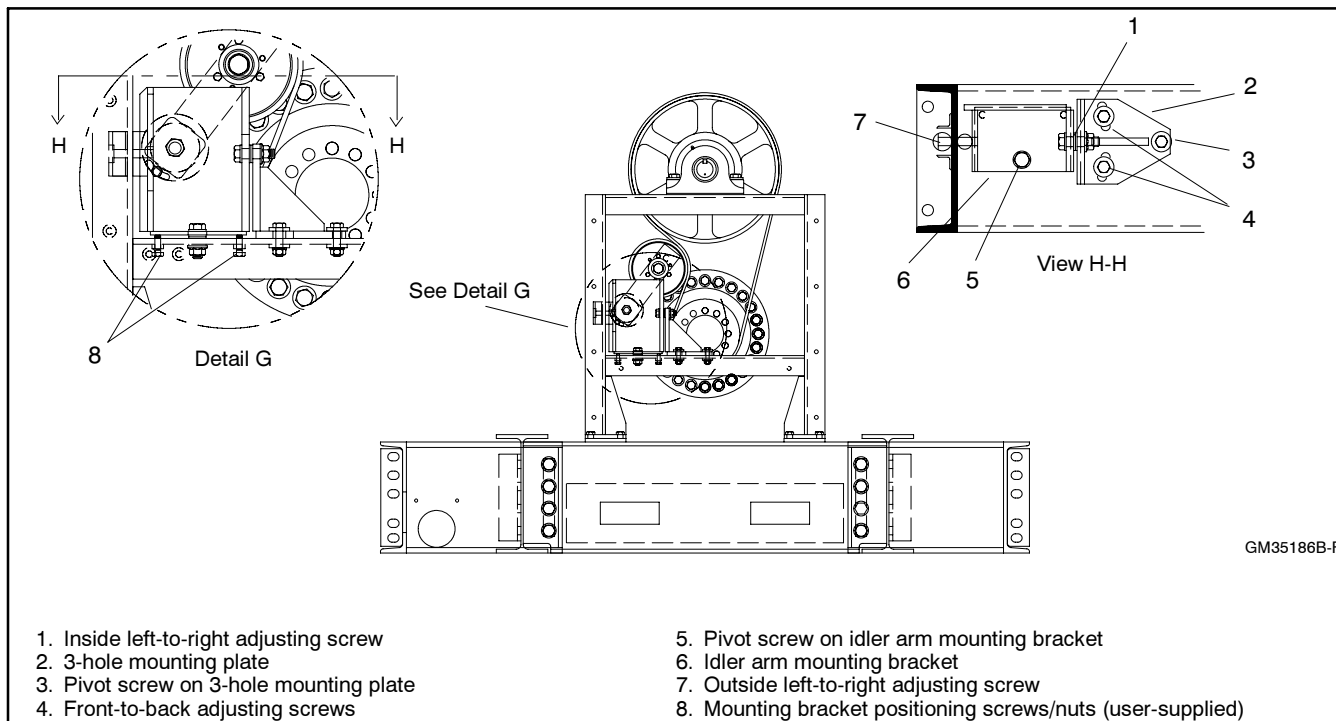


Figure 3 Idler Pulley Arm Bracket and Plate Adjustment

2.3.13 Recheck that the idler pulley is parallel to the engine drive pulley.

2.3.14 Recheck the idler pulley offset.

2.3.15 If the alignment is correct, go to step 3. If the idler pulley offset is incorrect, go to step 2.4 to change the offset.

2.4 Adjust the idler pulley offset alignment. Use this adjustment to change the offset of the idler pulley from the engine drive pulley.

Adding a washer decreases the offset and removing a washer increases the offset. Use at least one washer and do not exceed three washers.

2.4.1 Remove the tensioner arm nut. See Figure 4.

2.4.2 Remove the idler pulley and hardware from the tensioner arm.

Note: Mark the hole in the tensioner arm that mounts the idler pulley.

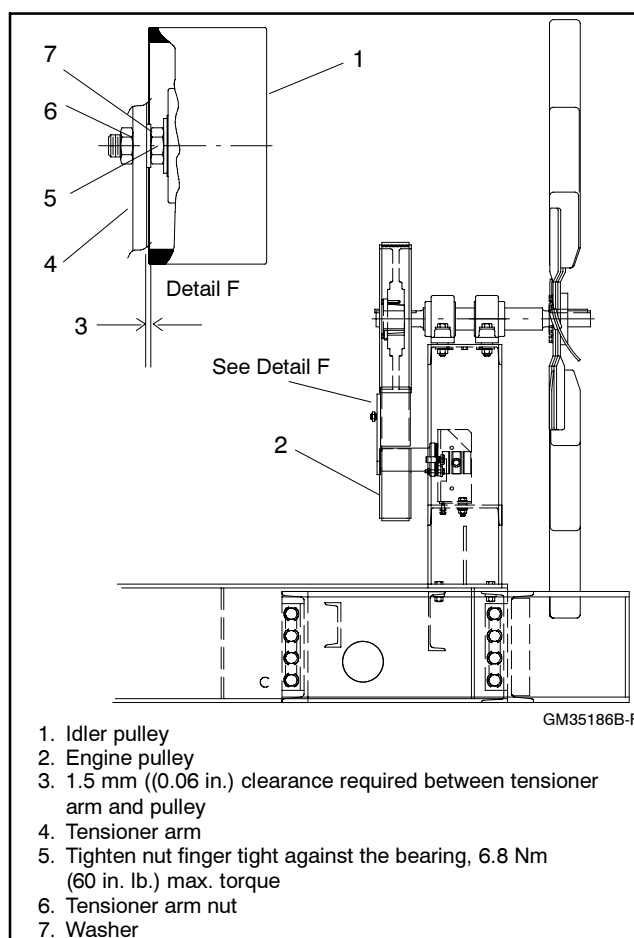


Figure 4 Idler Pulley Arm and Pulley Assembly

- 2.4.3 Add one plain washer X-25-29, 20.62 x 37.31 x 3.4 mm (0.812 x 1.469 x 0.134 in.), to the tensioner arm bolt for a total of three washers to decrease the offset.

If three washers are already present, one can be removed to increase the offset.

- 2.4.4 The nut between the idler arm and pulley must be only finger tight against bearing. **Do not exceed 6.8 Nm (60 in. lb.) or bearing failure may result.**
- 2.4.5 Mount the idler pulley and hardware to the tensioner arm in the original hole as noted in step 2.4.2.
- 2.4.6 Install the tensioner arm nut and tighten.
- 2.4.7 Repeat step 2.2.

3. Align the fan pulley.

- 3.1 Check the alignment of the fan pulley with the engine drive pulley by placing a straight edge (machinist's ruler) on the engine drive pulley left side as viewed from the radiator end. The second groove of the engine drive pulley must align with first groove of the fan pulley. See Figure 5 for the straight edge position and for clearance specifications.
- 3.2 Repeat step 3.1 using the straight edge on the engine drive pulley right side as viewed from the radiator end.

If the alignment is incorrect, go to step 3.3.

If the alignment is correct, go to step 4.

- 3.3 Adjust the fan pulley shaft so that it extends 209 mm (8.23 in.) behind fan tower. See Figure 6.
- 3.4 Loosen the four fan shaft pillow block adjusting bolts.

Note: If the fan shaft pillow block is replaced, use GM30510 shims (16 ga.) as needed.

- 3.5 Loosen and remove set screws from the fan shaft pillow blocks. See Figure 6.
- 3.6 Remove thread-locking compound from set screws using solvent (lacquer thinner) or use new set screws.
- 3.7 Tighten the fan shaft pillow block adjusting bolts sufficiently to check alignment and prevent unwanted movement.

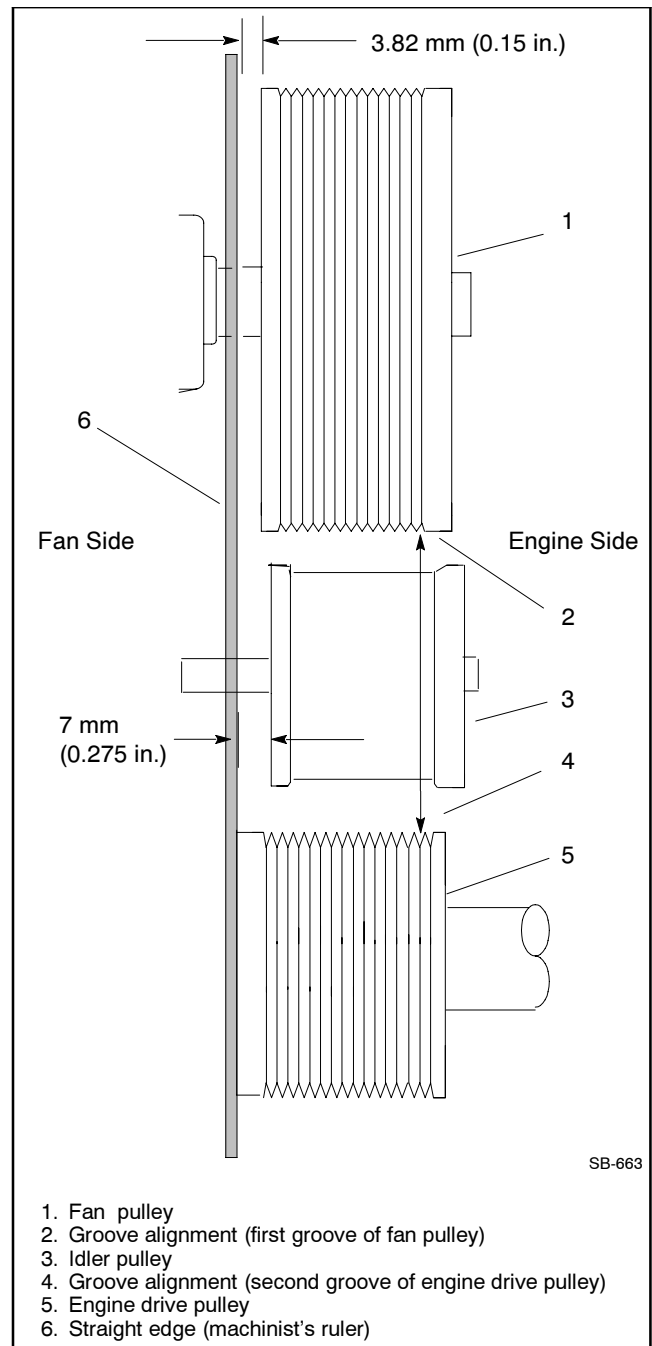


Figure 5 Pulley Alignment, Side View

- 3.8 Check that the fan pulley is parallel to the engine drive pulley by measuring the fan pulley distance from an engine machined surface. Rotate the fan pulley 180° and measure again. The two values should not differ by more than 0.4 mm (1/64 in.).

Adjust the fan shaft pillow blocks as needed to meet the specification and to center the fan blades within the radiator shroud opening.

- 3.9 Torque the four fan shaft pillow block adjusting bolts to 375 Nm (276 ft. lb.).

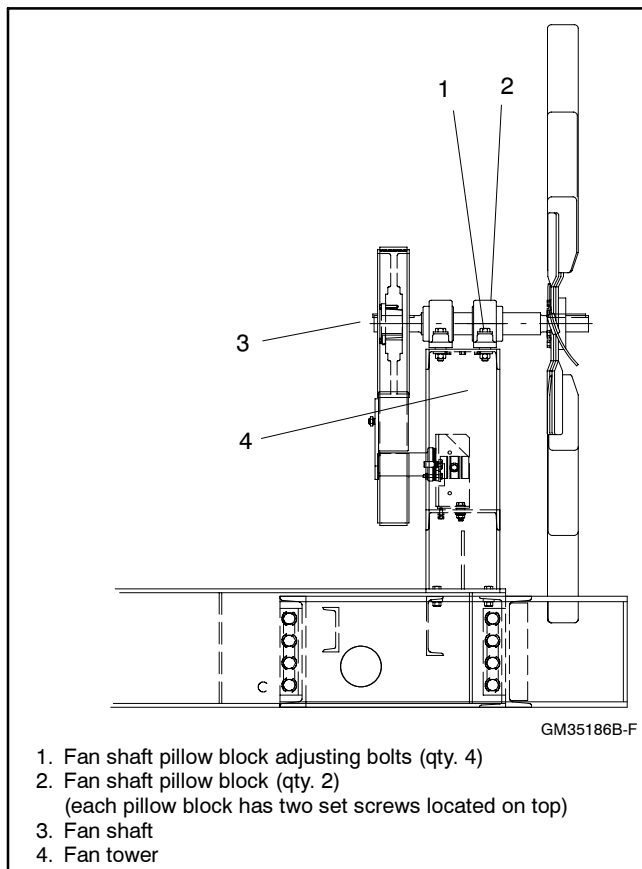


Figure 6 Idler Pulley Arm and Pulley Assembly

3.10 With the set screws clean and dry, apply PERMA-LOC® MM-115 (blue) or equivalent to the set screws and install in the fan shaft pillow blocks.

3.11 Torque the set screws to 33 Nm (24 ft. lb.).

4. Adjust the belt tension.

4.1 Inspect the poly-V belt for damage or wear. Replace the poly-V belt if it is damaged or worn.

4.2 Loosen the belt tensioner M20 screw and tension adjustment M10 screw/nut to remove the tension on the idler arm if not already done. See Figure 7.

4.3 Install the poly-V belt. Align the poly-V belt with the second groove on the engine drive pulley and the first groove on the fan pulley from the fan side. See Figure 5.

4.4 Center the idler pulley on the poly-V belt so the poly-V belt is approximately vertical.

4.5 Set the belt tension by placing a long-handled (24 in. min.) pipe wrench on the square body of the belt tensioner and turning inward toward the center of the drive and fan pulleys.

Note: It is recommended that the adjustment procedure have two technicians present; one to set the belt tension and one to check the belt tension and then tighten the screws.

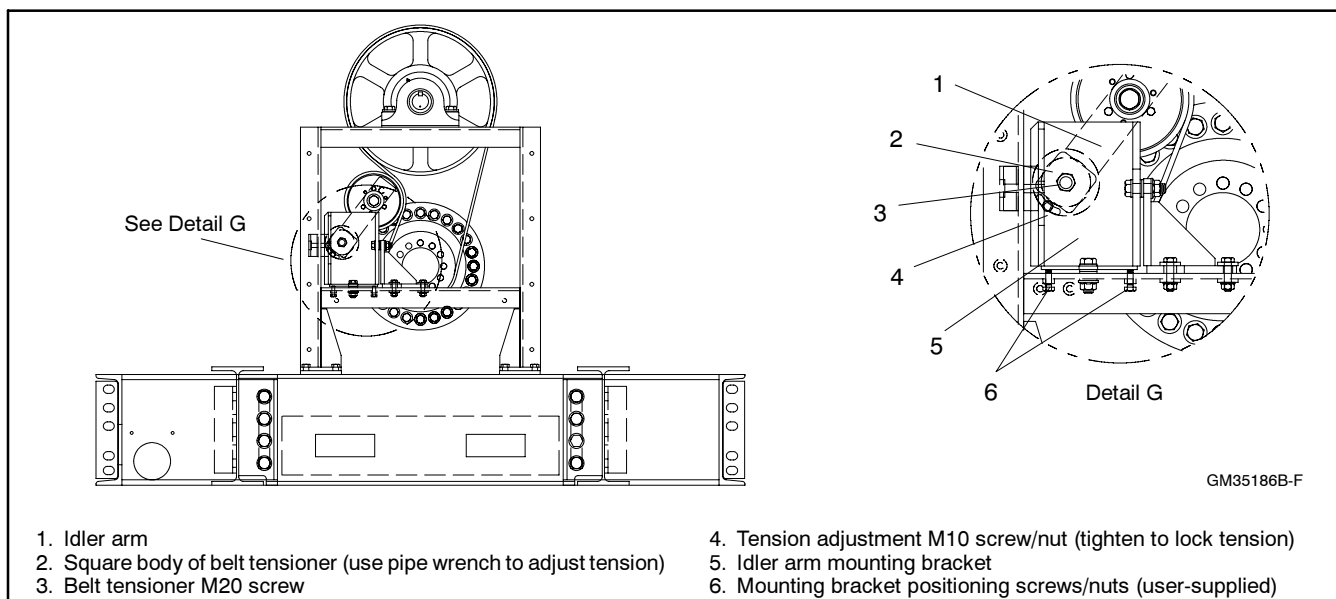


Figure 7 Belt Tension Adjustment

4.6 Check the fan belt tension using a poly-V (serpentine) belt tension gauge. See Figure 8 for belt tension specifications.

4.7 Tighten the tension adjustment M10 screw/nut.

4.8 Tighten the belt tensioner M20 screw.

Generator Set Model	New Belt, N (lbf.)	Used Belt*, N (lbf.)
1350-2800 kW	1334 ±111 (300 ±25)	1112 ±111 (250 ±25)
* A belt is considered used after 50 hours of service.		

Figure 8 Poly-V Belt Tension Specifications

4.9 Verify that the fan belt is seated in the second groove on the engine drive pulley and the first groove on the fan pulley from the fan side.

4.10 Recheck the fan belt tension using a poly-V (serpentine) belt tension gauge. See Figure 8 for belt tension specifications.

If the belt tension is correct, go to step 4.11.

If the belt tension is incorrect, go back to step 4.5.

4.11 Final tighten the tension adjustment M10 screw/nut to lock the belt tension.

4.12 Torque the belt tensioner M20 screw to 410 Nm (302 ft. lb.).

4.13 Remove the user-supplied positioning screws and nuts installed in the bottom of the mounting bracket. See Figure 7.

4.14 Reinstall the belt guards using the original hardware.

5. Restore the generator set to service.

5.1 Reconnect the generator set engine starting battery(ies), negative (-) lead last.

5.2 Move the generator set master switch to the RUN position to start the generator set.

5.3 Listen for a squeaking or squealing noise from the fan belt, which indicates a slipping belt. Stop the generator set.

If the fan belt slips, disconnect the engine starting battery(ies). Increase the belt tension to eliminate slippage using the procedure starting with step 4.5.

5.4 Reconnect the power to the battery charger and block heater, if equipped.