# SB-10049579-7351

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Title: Horton Stratis Fan Hub Diagnostics

Applies To: Prostar, LoneStar, TranStar, WorkStar, IBB

### DESCRIPTION

Horton VMaster Ultra (Stratis) Viscous Fan Drive Troubleshooting Guide Engine feature code 12THX

### **GENERAL OPERATION (ALL ENGINES)**

- Horton VMaster is a variable speed drive. It does not function like an on/off drive. Even when the drive is off the fan will spin between 50-300 rpm.
- When drive is commanded off by ECU, fan speed should be 50 to 300 rpm.
- When drive is commanded on by ECU, fan speed should be approximately 125% of the engine speed.
- Example: At 2100 engine rpm x 1.25 fan drive ratio, the fully engaged fan speed should be approximately between 2490 and 2600 rpm
   After first start of the day (A/C in off position) Time for fan to disengage
- At high idle (2100 engine rpm), disengagement may take up to 2 minutes after disengagement command, depending on the ambient temperature
   At low idle (600 engine rpm), disengagement occurs approximately 25 to 30 minutes after disengagement command.
   Warm truck (A/C in off position) Time for fan to disengage
- Warm ruck (A/C in on position) rime for fail to disengage
   At high idle (2100 engine rpm), disengagement occurs approximately 20 seconds after disengagement command.
  - At light ble (2100 engine rpm), disengagement occurs approximately 25 to 30 minutes after disengagement command.
     At low idle (600 engine rpm), disengagement occurs approximately 25 to 30 minutes after disengagement command.
- Caution: This fan clutch has left hand threads.

### N13 and EPA10 MaxxForce 11 / 13

### TROUBLESHOOTING

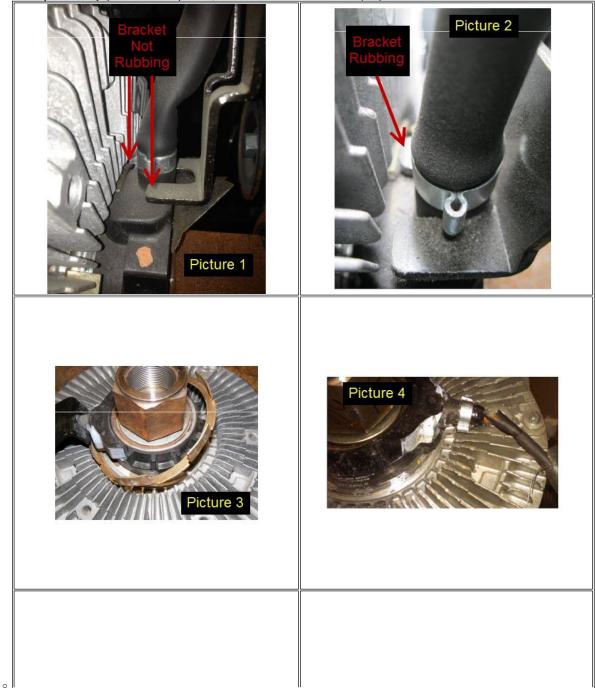
- 1. Visual Inspection
  - Check for rubbing on wire

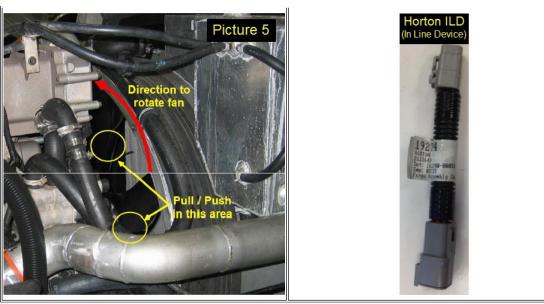


- If rubbing is present and inside wires are visible, but no copper is visible apply heat shrink over the harness.
- If copper can be seen, check to see if it is only one single wire, or multiple wires.
  - If it is one wire, place electrical tape over the wire.
  - Using 4:1 heat shrink will allow the heat shrink tubing to pass over the connector as shown. P/N: ZBJE849565 or equivalent



If multiple wires are showing copper, remove and replace the fan hub assembly.
Reroute the wiring harness at outlined in <u>IK0900071</u>
Check to see if ARB is touching the target wheel. Refer to Picture 1 and Picture 2.
If it is touching, reposition ARB to clear the target wheel as shown in Picture 1.
Check to see if the target wheel is loose, moves, or spins freely.
If it is loose, moves, or spins freely replace the fan hub assembly.
An improperly positioned ARB or loose target wheel can cause the damage in Picture 4.
Pull / Push on fan - refer to Picture 5.
Rotating the fan by hand, the hub should provide a smooth and consistent resistance.
If it rotates freely approximately 1" or more before resistance is felt, replace the fan hub assembly.
If you have any questions on this process, call Horton customer service at 1 (800) 621-1320 for assistance.





#### 2. Electrical Inspection

- Ensure the truck is turned off and the key is removed from the ignition.
   Unplug the fan hub from the chassis connector.

- Using a digital multimeter, measure the resistance between pins on the fan hub Deutsch connector.
   Terminal 1 to Terminal 2 (1-2) Spec (>1MΩ)
   If it fails this test, use In Line Device (ILD) shown in photo. This failure is usually associated with a 3512 code.
   Terminal 1 to Terminal 3 (1-3) Spec (6Ω to 16Ω)
   Terminal 2 to Terminal 5 (2-5) Spec (2.5KΩ to 4KΩ)
   If it foils this test, repleave the fan bub associated with a 3512 code.

  - If it fails this test, replace the fan hub assembly.

Double check any resistance that are out of spec to ensure an accurate reading

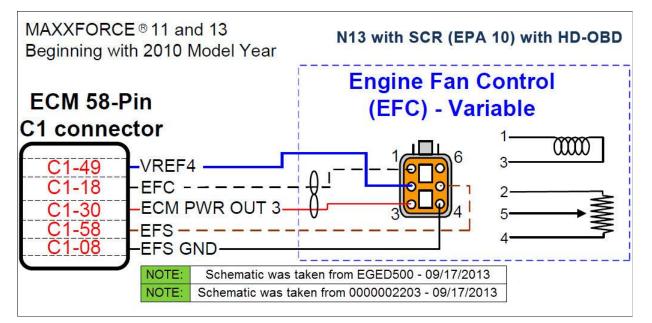
SPN	FMI	DESCRIPTION	REPAIR PROCEDURE		
	3	EFC Short to PWR	Check coil resistance.		
647	4	EFC Short to GND	Spec: 6Ω to 16Ω		
	5 EFC Open Load / Cir	EFC Open Load / Circuit	Replace fan hub assembly if out of spec. EPA10 only.		
	3	EFS Unrealistically HIGH			
1639	4	EFS Unrealistically LOW	<ul> <li>Do not replace the fan hub assembly.</li> <li>Undete ECM selferation to 3.5.4 er later.</li> </ul>		
	8	8 EFS Frequency Signal Error     Update ECM calibration to 3.5.4 or later.	- Opdate ECIVICalibration to 5.5.4 of later.		
3512	14	VREF4 Voltage Deviation ECM Terminals: C1-37, C1-43, C1-49, C2-08, E1-58, E1-91	Install Horton ILD (In Line Device) P/N 800922R91 Replace fan hub assembly if both codes 3512 and 647 are present. EPA10 only.		

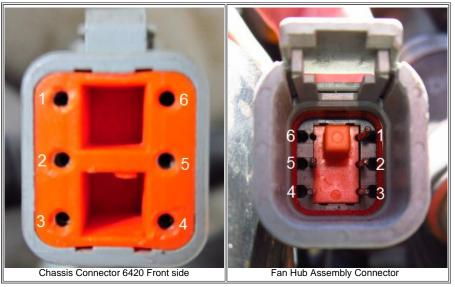
- 0 3. Functional Test
  - o Manually apply 12 volts to Pin 3 and Ground to Pin 1, checking fan operation. It should be disengaged. Some surging may be normal depending on the temperature of the fan hub.
  - $_{\odot}\,$  Bring engine to operating temperature. 175°F-180°F.
  - o Connect with ServiceMaxx and perform "Engine Fan Test".
  - o The entire test (5 test points) must be recorded and submitted with the warranty claim.
  - o If the visual, electrical and functional tests all check OK, the fan hub is not the cause of the customer complaint. Do NOT replace the fan hub.

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Engin	e Type: MaxxForce 11/13 (2010 - 201	AFT Regen Status				
		Descentaria Descense				
Software Identif		DPF Differential Press.				

# **OPERATION**

- The default state of the fan is ON. Ground is required to turn the fan OFF.
- ECM C1-18 controls the fan by supplying a Ground PWM signal.
- ECM C1-58 is feedback for the fan speed.





## EPA07 MaxxForce 11 / 13

This fan hub is controlled by the EIM using a Pulse Width Modulated (PWM) control. 100% duty cycle indicates the fan is off. The lower the duty cycle the faster the fan operates.

- Desired Fan Speed and Actual Fan Speed may not always match due to the fan speed to engine ratio and normal viscous delays.
  The fan hub may seem to surge or operate erratically. This may be normal operation.
  The fan may be commanded on for a data link message from other modules, such as A/C demand or Transmission temperature.
  Any engine temperature sensor input to the ECM can cause the EIM to turn the fan on.

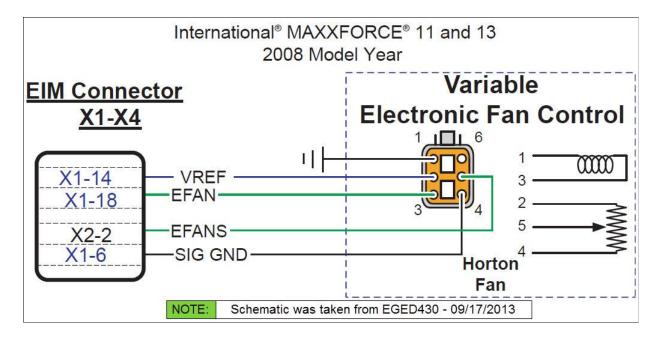
## TROUBLESHOOTING

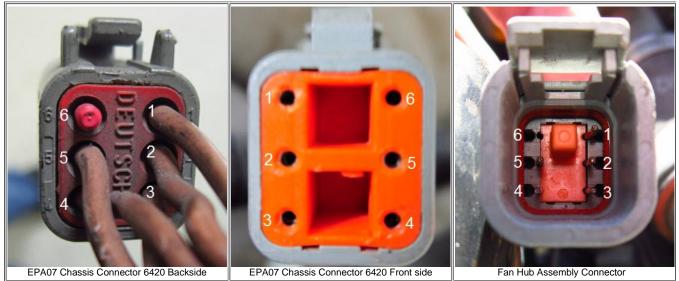
- Perform the visual inspection on the harness as shown in the section above.
  The "Engine Fan Test" is not available for the EPA07 engine.
- Measure resistance from Terminal 1 to Terminal 3 (1-3) Spec (  $6\Omega$  to  $16\Omega$  )
- Manually apply 12 volts to Pin 3 and Ground to Pin 1, checking fan operation. It should be disengaged. Some surging may be normal depending on the temperature of the fan hub.
- Open a Programming session in ServiceMaxx and view the Engine Fan tab to monitor signals.

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#### **OPERATION**

- The default state of the fan is ON. B+ is needed to turn the fan OFF.
  EIM X1-18 controls the fan by supplying a B+ PWM signal.
  EIM X2-2 is feedback for the fan speed.





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