Solution K10216390
Monday, June 3, 2019 7:09:39 PM CEST

** SOLUTION **

Title	** Tech Tip ** - TT-019-2016 Automated Manual Transmission (AMT) Bearing And Gear Shaft Inspection

Mack Models

Mack Model	AN - Anthem , CHU - Pinnacle, Axle back , CXU - Pinnacle, Axle front , GR - Granite , GU - Granite , PI - Pinnacle , TD - Titan

Volvo Models

Volvo Model	VNL , VNM , VNR , VNX , VAH , VHD , VT

Engine family

Engine family	11L Engine , 13L Engine , 16L Engine , MP7 , MP8 , MP10

Transmission

Transmission	AMT-F With Crawler Gears , AMT-F Without Crawler Gears , AMT-C , AMT-D , AMT-F , AMT-C , AMT-D , AMT-F With Crawler Gears , AMT-F Without Crawler Gears

** SOLUTION **

Cause	The customer has a driveability complaint for the vehicle bucking, slipping, or engine surging when in reverse.

Solution

Codes associated with this complaint:

- P1071- Split Engagement System, FTB 96 Unintentional disengagement of direct split
- P1057- Main Shaft Speed Sensor, FTB 21 Data valid but below operational range

Most probable cause:

Loss of main shaft pre-load from a spigot bearing failure

Recommended Actions: Review pictures and perform instructions below

Towing Related Failure (Image 1)

Towing Related Failure (Image 2)

Spalled bearing failure (Image 3)

Spalled bearing race (Image 4)

Additional checks:

Reviewing DTC readout can be helpful in determining spalled vs. towing damaged spigot bearing. Main shaft speed codes prior to any towing event can indicate that the loss of main shaft pre-load may have begun before the truck was towed to the shop. This means that the bearing started to spall before the unit was towed improperly.

Spalled Bearing Failure (Image 5)

Spalled Bearing Race (Image 6)

These images (5 & 6) represent a failure that went ignored for some time.

While the main shaft does not have evidence of heat as in the towing example (image 1), there are additional parts that have been affected:

• Contact with the main shaft nut
• Rollers missing and race worn down
• Oil distribution tube twisted off and closed
• P1 bearing damaged
• Split synchro ring broken

Clues that this may have been a spalled, or otherwise damaged, spigot bearing is:

1. The ridge in the input shaft. This is similar to what is seen in the spalled spigot bearing failure **image 3**.
2. The DTC readout, as in the example below. The vehicle clock is incorrect however you can assume that the "Last Occurrence" has to be close to the readout day. In this example you can see that there had been main shaft codes for ~2 mo and split shift codes for ~3mo

DTC Readout : N/A

Start Time:		Work Order:	User ID:	Partner ID:	
5/5/2016 11:23:58 AM		142439	M667103	US5257	
Vehicle/Machine Time:			Engine Hours:		
1/1/1753 3:00:00 AM			7091.17		
Control Unit:	**DTC:**		**Status:**	**First Occurrence:**	**Last Occurrence:**	**Count:**
Transmission ECU (TECU)	P107196: Split Engagement System, Component Internal Failure		Inactive	6/22/2016 12:59:32 AM	9/19/2016 4:26:55 AM	24
Transmission ECU (TECU)	P105594: Brake Switch Status, Unexpected Operation		Inactive	6/26/2016 7:23:49 PM	8/12/2016 8:00:51 PM	24
Transmission ECU (TECU)	P105721: Main Shaft Speed Sensor (SESM), Signal Amplitude Less Than Minimum		Inactive	6/26/2016 11:43:08 PM	8/22/2016 4:00:17 AM	6
Transmission ECU (TECU)	P106074: Clutch Plate Load, Actuator Slipping		Inactive	6/27/2016 3:51:17 AM	9/14/2016 8:53:13 PM	10
Engine Management System (EMS)	P040A13: Exhaust Gas Recirculation Temperature Sensor "A", Circuit Open		Inactive	7/22/2016 5:40:11 AM	9/19/2016 8:40:46 PM	1492
Engine Management System (EMS)	P246300: Particulate Filter Restriction - Soot Accumulation Bank 1, No Sub Type Information		Inactive	12/31/1984 8:00:00 PM		0

Code Description:

P1071- Split Engagement System, FTB 96 (FMI 1) Unintentional disengagement of direct split

Fault Condition:

- High split jumps out
- The split cylinder valves are inactive

Possible Symptom:

- Yellow lamp is illuminated
- Loss of torque

Possible Cause:

- N/A

P1057 (PID 160) Main Shaft Speed Sensor, FTB 21 (FMI 1) Data valid but below operational range

Fault Condition:

The sensor signal is within normal range and, the main shaft speed differs from both the value of the countershaft speed and the vehicle speed received from the vehicle ECU. The following conditions must be fulfilled for a time of 2.0 seconds in order to activate:

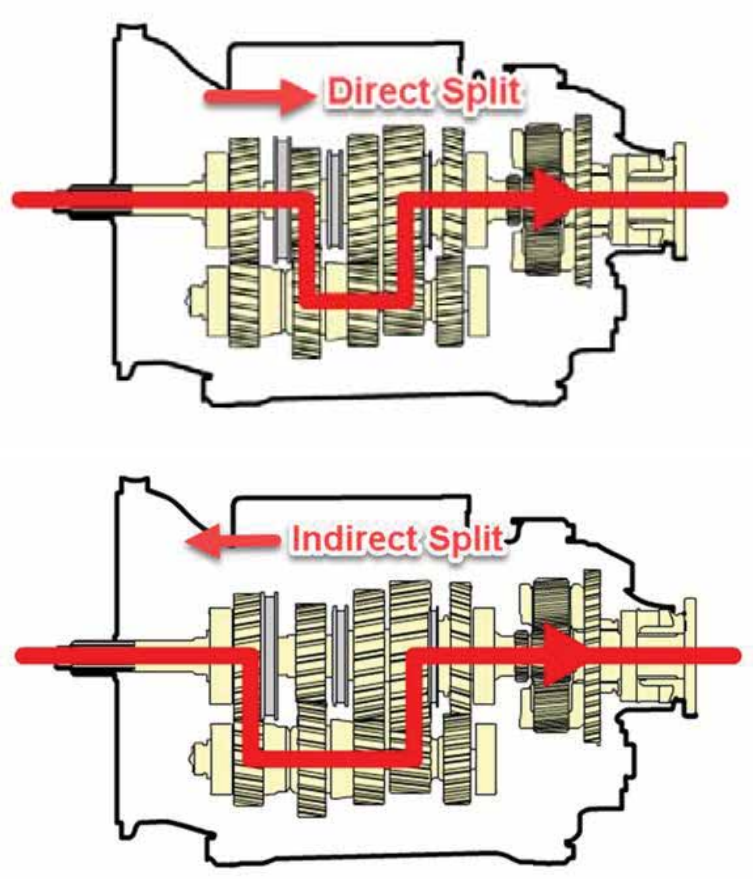
- A gear (not neutral) is engaged in the transmission
- The value of the input shaft speed calculated from the main shaft speed sensor (SESM) is more than 300 rpm
- The value of the input shaft speed calculated from the counter shaft speed sensor (SESC) is more than 300 rpm

Possible Symptom:

- Yellow lamp is illuminated
- Slow gear changes
- Rough gear changes

Possible Cause:

- N/A



Solution visibility	Dealer distribution

Function(s)/component(s) affected

Function affected	TT , engagement , Input Shaft , Main Shaft , Front Housing (Gearbox)

Function Group

Function Group	431 gearbox, manual

Customer effect

Main customer effect	judder , slipping

Fault Codes And Error Codes

OBDII Diagnostic Trouble Codes (P, U, B Format)	P1057 , P1071

Conditions

Vehicle operating mode	acceleration , in reverse , engagement , during engagement

Administration

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