

T-SB-0094-09

March 19, 2009

2GR-FE Engine Ticking Noise and / or MIL ON P0014, P0015, P0024, P0025, P0017, or P0018

Service Category Engine/Hybrid System

Section Engine Mechanical

Market USA

Toyota Supports
 ASE Certification 

Applicability

YEAR(S)	MODEL(S)	ADDITIONAL INFORMATION
2005 – 2009	Avalon	
2007 – 2009	Camry	VDS(s): BK46K
2008 – 2009	Highlander	
2006 – 2009	RAV4	Engine(s): 2GR VDS(s): BK31V, BK32V, BK33V, BK34V, BK35V, ZK31V, ZK32V, ZK33V, ZK34V, ZK35V
2007 – 2009	Sienna	

Introduction

Some 2005 – 2009 model year vehicles with 2GR-FE engines may exhibit a ticking/clicking type noise from the cylinder head cover area which may be accompanied by a MIL "ON" and one or more VVT-i related Diagnostic Trouble Codes (DTCs). Please use the following repair procedure to address customer concerns.

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Warranty Information

MODEL	OP CODE	DESCRIPTION	DRIVE-TRAIN	TIME	OFF	T1	T2
Avalon	EG8053	R & R Exhaust VVT-I Gear, Camshaft, Camshaft Housing	2WD	16	13080-31030 13080-0P020	91	99
Camry			2WD	14.3			
Highlander			2WD	16.6			
			AWD	17.1			
RAV4			2WD	15.4			
			AWD	16			
Sienna			2WD	14.1			
			AWD	14.3			
-	Combo A	Add R & R Intake VVT-I Gear	-	.2			
-	Combo B	Add R & R Exhaust VVT-I Gear, Camshaft & Camshaft Housing (Opposite Bank)	-	1.2			
-	Combo C	Add R & R Exhaust & Intake VVT-I Gear, Camshaft, & Camshaft Housing (Opposite Bank)	-	1.4			

APPLICABLE WARRANTY

- This repair is covered under the Toyota Powertrain Warranty. This warranty is in effect for 60 months or 60,000 miles, whichever occurs first, from the vehicle's in-service date.
- Warranty application is limited to correction of a problem based upon a customer's specific complaint.

Parts Information

PREVIOUS PART NUMBER	CURRENT PART NUMBER	PART NAME	QUANTITY		
			BANK 1 REPAIR ONLY	BANK 2 REPAIR ONLY	BOTH BANKS REPAIR
11103-3102# 11103-0P01#	11103-0P014	Housing Sub-assembly, Camshaft, RH	1	0	1 ✓
13502-31040 13502-0P020	13502-0P021	Camshaft Sub-assembly No.2	1	0	1 ✓
11104-3102# 11104-0P010	11104-0P011	Housing Sub-assembly, Camshaft, LH	0	1	1 ✓
13054-31030 13054-0P020	13054-0P021	Camshaft Sub-assembly No.4	0	1	1 ✓

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Parts Information (Continued)

PREVIOUS PART NUMBER	CURRENT PART NUMBER	PART NAME	QUANTITY		
			BANK 1 REPAIR ONLY	BANK 2 REPAIR ONLY	BOTH BANKS REPAIR
13080-31030 13080-0P020	13080-0P040	Gear Assembly, Camshaft Timing, Exhaust, LH	1	1	2 ✓
13050-0P#### 13050-31####	13050-0P070	Gear Assembly, Camshaft Timing	1*	1*	2* ✓
17176-0P020	Same	Gasket, Air Surge Tank to Intake Manifold	3	3	3 ✓
17177-0P020	Same	Gasket, Intake Manifold to Head, No.1	1	1	1 ✓
17178-0P020	Same	Gasket, Intake Manifold to Head, No.2	1	1	1 ✓
11159-0P010	Same	Gasket, Camshaft Bearing Cap Oil Hole	4	4	4 ✓
90430-A0001	Same	O-ring (standard part)	2	2	2 ✓
90430-12031	Same	Gasket, Oil Pan Drain Plug	1	1	1 ✓
15147-0P020	Same	Gasket, Oil Strainer	1	1	1 ✓
12151-0P010	Same	Gasket, Oil Pan	2	2	2 ✓
96721-19010	Same	O-ring, for Oil Level Gauge Guide, No. 2	1	1	1 ✓
90301-12018	Same	O-ring, for Oil Level Gauge Guide	1	1	1 ✓
15193-0P010	Same	Gasket Oil Pump	1	1	1 ✓
11213-0P010	Same	Gasket, Cylinder Head Cover	1	1	1 ✓
11214-0P040	Same	Gasket, Cylinder Head Cover No. 2	1	1	1 ✓
90430-16016	Same	Gasket, Oil Pipe No. 2	2	2	2 ✓
90430-16012	90430-16017	Gasket, Oil Pipe No. 1	4	4	4 ✓
90311-A0005	Same	Seal, Oil, for Timing Gear Case	1	1	1 ✓
11328-0P010	Same	Gasket, Timing Gear Cover	1	1	1 ✓
96761-24021	Same	O-ring (standard part), Coolant Pipe	1	1	1 ✓
90301-79006	Same	O-ring (for Oil Filter Cap)	1	1	1 ✓

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Parts Information (Continued)

PREVIOUS PART NUMBER	CURRENT PART NUMBER	PART NAME	QUANTITY		
			BANK 1 REPAIR ONLY	BANK 2 REPAIR ONLY	BOTH BANKS REPAIR
96723-35028	Same	O-ring (for Oil Filter Cap Drain Plug)	1	1	1
16325-31010	Same	Gasket, Water Inlet Housing No. 2	1	1	1
90080-43036	Same	Gasket, Exhaust Pipe	1	1	1
04152-31090	04152-YZZA1	Element Kit, Oil Filter	1	1	1
16271-0P010	Same	Gasket, Water Pump	1	1	1

* Part may not be needed based on inspection.

Required Tools & Equipment

REQUIRED MATERIAL	PART NUMBER	QTY
Three Bond 1324 or Equivalent	-	As Needed
FIPG Sealant or Equivalent	08826-00080	As Needed
Toyota Genuine Seal Packing Black, Three Bond 1207B, or Equivalent	-	As Needed
Toyota Genuine Seal Packing Black, Three Bond 1282B, or Equivalent	-	As Needed
Toyota Genuine Adhesive 1344, Three Bond 1344, or Equivalent	-	As Needed
ILSAC GF-4 Multi-grade SAE 5W-30	00279-1QT5W-01	6.0 U.S. qts. (5.7 liters)
Super Long Life Coolant (SLLC)	00272-SLLC2	9.5 U.S. qts. (9.0 liters)
Oil Filter Wrench*	<u>09228-06500-02</u>	1
Companion Flange Holding Tool*	<u>09330-00021</u>	1
NOTE: All Components from this kit/set are required.		
Universal Puller Set "C"	<u>09950-50013-01</u>	1
NOTE: All Components from this kit/set are required.		
Gasket Seal Cutter*	<u>09032-00100</u>	1

* Essential SST.

NOTE
Additional SSTs may be ordered by calling 1-800-933-8335.

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Required Tools & Equipment (Continued)

REQUIRED EQUIPMENT	SUPPLIER	PART NUMBER	QTY
R134-a Refrigerant Recovery/Recycling Machine	ADE	Robinair ROB34200* (or equivalent)	1

NOTE

Additional refrigerant service equipment may be ordered by calling Toyota Approved Dealer Equipment (ADE) at 1-800-368-6787.

Inspection Procedure

1. Start the engine and listen for any ticking/clicking type noises coming from the VVT-i gear area of the engine.

NOTE

This condition may or may not be accompanied by one or more of the following DTCs stored in the Engine Control Module (ECM) (SAE term: Powertrain Control Module/PCM).

- A. P0014: Camshaft Position "B" – Timing Advanced or System Performance (Bank 1)
 - B. P0015: Camshaft Position "B" Timing Over Retarded (Bank 1)
 - C. P0017: Crankshaft Position Camshaft Position Correlation (Bank 1 Sensor B)
 - D. P0018: Crankshaft Position Camshaft Position Correlation (Bank 2 Sensor A)
 - E. P0024: Camshaft Position "B" – Timing Over-Advanced or System Performance (Bank 2)
 - F. P0025: Camshaft Position "B" – Timing Over-Retarded (Bank 2)
2. Remove the cylinder head cover and inspect the Exhaust VVT-i Gear Assembly on the affected cylinder bank.

NOTE

If no concerns are found with the VVT-i gear actuator bolts, the actuator center section alignment or actuator body this TSB does NOT apply. Refer to Repair Manual procedures for further diagnosis.

Repair Procedure

1. If any concerns are noted with the exhaust VVT-i gear bolts or actuator follow the four steps below:
 - A. Replace the camshaft housing sub-assembly, exhaust camshaft, and exhaust VVT-i gear assembly on the **affected** bank.

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Repair Procedure (Continued)

- B. Inspect the intake VVT-i gear assembly and bolts on the **affected** bank. Replace the intake VVT-i gear assembly if necessary.
- C. Inspect the **opposite** bank exhaust VVT-i gear actuator and bolts. If any concerns are noted replace the opposite bank camshaft housing sub-assembly, exhaust camshaft, and exhaust VVT-i gear assembly.
- D. Inspect the **opposite** bank intake gear actuator assembly and bolts. Replace the intake VVT-i gear assembly if necessary.

For complete disassembly procedures refer to the Technical Information System (TIS), applicable model and model year Repair Manual:

- 2005 model year Avalon Repair Manual, *Engine/Hybrid System, "Engine Mechanical: Camshaft (LH Bank) 2GR-FE : Replacement"*
- 2005 model year Avalon Repair Manual, *Engine/Hybrid System, "Engine Mechanical: Camshaft Camshaft (RH Bank) 2GR-FE : Replacement"*
- 2007/2008/2009 model year Avalon Repair Manual, *Engine/Hybrid System, "2GR-FE Engine Mechanical: Engine Unit: Disassembly"*
- 2007/2008/2009 model year Camry Repair Manual, *Engine/Hybrid System, "2GR-FE Engine Mechanical: Engine Unit: Disassembly"*
- 2008/2009 model year Highlander Repair Manual, *Engine/Hybrid System, "2GR-FE Engine Mechanical: Engine Unit: Disassembly"*
- 2006/2007/2008/2009 model year RAV4 Repair Manual, *Engine/Hybrid System, "2GR-FE Engine Mechanical: Engine Unit: Disassembly"*
- 2007/2008/2009 model year Sienna Repair Manual, *Engine/Hybrid System, "2GR-FE Engine Mechanical: Engine Unit: Disassembly"*

For complete reassembly procedures refer to the TIS, if applicable etc.

- 2007/2008/2009 model year Avalon Repair Manual, *Engine/Hybrid System, "2GR-FE Engine Mechanical: Engine Unit: Reassembly"*
- 2007/2008/2009 model year Camry Repair Manual, *Engine/Hybrid System, "2GR-FE Engine Mechanical: Engine Unit: Reassembly"*
- 2008/2009 model year Highlander Repair Manual, *Engine/Hybrid System, "2GR-FE Engine Mechanical: Engine Unit: Reassembly"*
- 2006/2007/2008/2009 model year RAV4 Repair Manual, *Engine/Hybrid System, "2GR-FE Engine Mechanical: Engine Unit: Reassembly"*
- 2007/2008/2009 model year Sienna Repair Manual, *Engine/Hybrid System, "2GR-FE Engine Mechanical: Engine Unit: Reassembly"*

2. Start engine and test drive to verify the repair.