

TMS-NTC-14021
February 25, 2014

Recall Management Division
National Highway Traffic Safety Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

Re: Toyota Safety Recall 13V-395 Dealer Notification (Remedy)

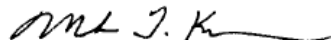
To whom it may concern,

Please find attached the Dealer Notification Letter (Remedy) for Toyota Safety Recall 13V-395 on the following Lexus vehicles:

- Certain 2006 to 2011 Model Year IS 350
- Certain 2010 to 2011 Model Year IS 350C
- Certain 2007 to 2011 Model Year GS 350 Vehicles

If you have any questions regarding this matter, please contact me at (310) 468-5316.

Sincerely,



Quality Compliance Assistant Manager

Attachments:

- Lexus 13V-395 (DLG) Dealer Notification (Remedy)



October 9, 2013

Subject: Safety Recall DLG - Remedy Available
Certain 2006 to 2011 Model Year IS 350, Certain 2010 to 2011 Model Year IS 350C
and Certain 2007 to 2011 Model Year GS 350 Vehicles
2GR-FSE Intake VVT Actuator Gear

Dear Dealer Principal:

As previously communicated, on September 4, 2013, a Defect Information Report (DIR) was filed with the National Highway Traffic Safety Administration (NHTSA) informing the agency of our intent to conduct a voluntary Safety Recall on certain 2006 to 2011 model year IS 350, certain 2010 to 2011 model year IS 350C and certain 2007 to 2011 model year GS 350 vehicles.

Lexus has completed remedy preparations and will now begin mailing the remedy owner letter.

Condition

The engines in the subject vehicles are equipped with a Variable-Valve Timing (VVT) system which controls the camshafts to provide optimal valve timing under certain driving conditions. The bolts used to secure the housing and sprocket of the intake-side VVT gear assembly could become loose due to abnormal impacts generated within the gear assembly immediately after a cold start-up. If this occurs, the VVT gear will not control the intake valves correctly. In certain cases, the VVT gear housing and sprocket could separate and result in the engine stopping while the vehicle is being driven, increasing the risk of a crash.

Please review this entire package with your staff to familiarize them with this notification and implementation requirements.

Remedy

Lexus dealers will replace the intake VVT actuator gears at **NO CHARGE** to the vehicle owner. For additional information on the repair procedures, please refer to TIS.

Owner Notification

Lexus will begin mailing Safety Recall Notices by first class mail in phases beginning in Mid-October, 2013. The owner letters will be spread over several weeks consistent with parts availability and service capacity. A sample owner letter is attached.

Lexus tries very hard to obtain current customer name and address information when mailing owner letters. In the event your dealership receives a notice for a vehicle that was sold prior to the Safety Recall announcement, it is the dealership's responsibility to forward the owner letter to the customer who purchased the vehicle.

Please note that only owners of the covered vehicles will be notified. If your dealership is contacted by an owner who has not yet received the notification, please **verify coverage by confirming through Dealer Daily/TIS.**

Pre-Owned Vehicles in Dealer Inventory

Lexus requests dealers to conduct the remedy on any pre-owned vehicles currently in dealer inventory that are covered by this Safety Recall prior to delivery to the customer.

Also, as a reminder, Lexus CPO policy prohibits the certification of any vehicle with an outstanding Special Service Campaign or Safety Recall, such as this Safety Recall DLG. Thus, no affected units may be sold or delivered as a CPO vehicle until the Safety Recall has been completed on that vehicle.

Number and Identification of Covered Vehicles

There are approximately 101,500 vehicles covered by this Safety Recall in the United States.

MODEL	WMI	VDS	MY	Start of SERIAL	Finish of SERIAL		
GS350	JTH	BE1KS	2010	0046992	0051057		
		BE1KS	2011	0051058	0054036		
		BE96S	2007	0007608	0028367		
			2008	0023566	0043034		
			2009	0043035	0047088		
		CE1KS	2010	0024324	0028153		
			2011	0028154	0030546		
		CE96S	2007	0001838	0013164		
			2008	0013166	0021655		
			2009	0021657	0024397		
		IS350	JTH	BE262	2006	0001001	0003002
						2000000	2007084
						5000005	5011869
				BE262	2007	2006942	2013016
5011870	5017246						
2011547	2016302						
BE262	2008			5017247	5021818		
				2016235	2017388		
BE262	2009			5021000	5023468		
				2017389	2017712		
				5023469	5025230		
BE5C2	2010			5024742	5028032		
		5000104	5001811				
CE5C2	2011	5000104	5001811				
IS350C	JTH	FE2C2	2010	2500004	2505028		
			2011	2504989	2506857		

Please note that only owners of the covered vehicles will be notified. If your dealership is contacted by an owner who has not yet received the notification, please **verify coverage by confirming through TIS**. Dealers must perform the procedure as outlined in the Technical Instructions located on TIS.

Remedy Procedures

Refer to TIS for the appropriate Technical Instructions (TI). Technical instructions will be posted on TIS on October 10, 2013.

Conduct all applicable, non-completed Safety Recall and service campaigns on the vehicle during the time of the appointment.

Repair Quality Confirmation

The repair quality of covered vehicles is extremely important to Lexus. To help ensure that all vehicles have the repair performed correctly, please designate at least one associate (someone other than the individual who performed the repair) to verify the repair quality of every vehicle prior to customer delivery.

Parts Ordering

To assure sufficient availability of parts for scheduled appointments, the Safety Recall DLG kits have been placed on the Dealer Order Solution process. Please refer to the information sent by the facing PDC to each dealer's parts manager for specific information on daily order limits.

Part Number	Part Description	Quantity Per Vehicle Remedied
04002-67131	Camshaft Timing Gear Kit	1
04003-18131	Fuel Hose Kit	1
04002-79131	Gasket Kit*	1

*Please refer to the Technical Instructions for additional information about the gasket kit.

IMPORTANT PARTS ORDERING UPDATE

All Safety Recall, Service Campaign (SSC/LSC) and Customer Support Program (CSP) parts are eligible for the Monthly Parts Return Program. Please refer to Service and Parts Operations Communication 2011-20 for campaign parts that are currently returnable under the Monthly Parts Return Program and additional details.

Technician Training Requirements

The repair quality of covered vehicles is extremely important to Lexus. All dealership associates involved in the recall process are required to successfully complete E-Learning course LSC13A. To ensure that all vehicles have the repair performed correctly; technicians performing this recall repair are required to have one of the following certifications:

- Lexus Senior or Master Service Technician
- Lexus Senior or Master Diagnostic Specialist

It is the dealership's responsibility to select technicians with the above certification level or greater to perform this Safety Recall repair. Carefully review your resources, and the technician skill level and ability, before assigning technicians to this repair. It is important to consider technician days off and vacation schedules to ensure there are properly trained technicians available to perform this repair at all times.

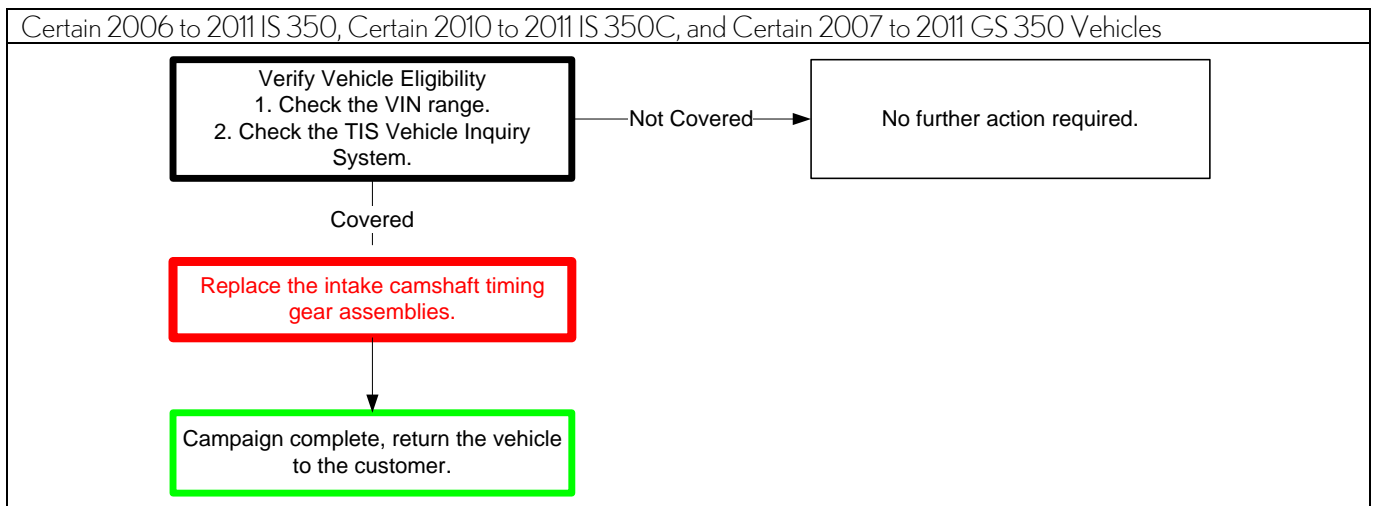
Tools, Supplies and Equipment

In a separate shipment, which is scheduled to arrive on Thursday October 10, your dealership was sent a package containing special service tools for this campaign. When received, the package will have a fluorescent (green, orange, yellow, or pink) label like the sample shown below for easy identification.

**ATTN: SERVICE MANAGER
CAMPAIGN DLG
TOOLS**

These tools are needed when performing the Intake VVT actuator gear replacement campaign. These tools *ARE NOT* available through normal parts or tools channels. There is a very limited supply of tools, but if additional tools are needed, contact your area representative.

Warranty Reimbursement Procedures



Safety Recall	Model	Opcode	Description	Flat Rate Hour
DLG	GS	3528HA	Replace the camshaft timing gear assembly	6.5 hr./vehicle
	IS	3528HB	Replace the camshaft timing gear assembly	6.7 hr./vehicle

- The flat rate times include 0.1 hours for administrative cost per unit for the dealership.

Lexus' usual customer care amenities of car wash and fuel tank fill apply to this Safety Recall. Additionally, one day of rental vehicle expense (to a maximum of \$45/day) **or** the cost of pick-up and delivery of the customer's vehicle may be claimed if required and subject to the guidelines published in the Safety Recall/Special Service Campaign/Limited Service Campaign General Procedures document on TIS.

Media Contacts

It is imperative that all media contacts (local and national) receive a consistent message. In this regard, all media contacts must be directed to Cindy Knight (310) 468-2170 in Toyota Corporate Communications. (Please do not provide this number to customers. Please provide this contact to only media associates.)

Customer Contacts

A Q&A is attached to assist you in responding to any customer questions or concerns. If the customer has any further questions, they are requested to contact the Lexus Customer Assistance Center at 1-800-255-3987 Monday through Friday, 5:00 am to 6:00 pm PST, or Saturday, 7:00 am through 4:00 pm PST.

Please review this notification with your entire service and parts staff to familiarize them with the proper step-by-step procedures required to implement this Safety Recall.

Thank you for your understanding and cooperation.

Lexus, a Division of Toyota Motor Sales, USA, Inc.

Attachments

- Cc: Customer Satisfaction Manager
 General Manager
 Parts Manager
 Pre-owned Manager
 Service Manager
 Warranty Administrator



Safety Recall DLG - **Remedy Notice**

Certain 2006 to 2011 Model Year IS350

Certain 2010 to 2011 Model Year IS350C

Certain 2007 to 2011 Model Year GS350

2GR-FSE Intake VVT Actuator Gear

As previously announced, on September 4, 2013, a Defect Information Report (DIR) with the National Highway Traffic Safety Administration (NHTSA) informing the agency of our intent to conduct a voluntary Safety Recall on certain 2006 to 2011 Model Year IS350, Certain 2010 to 2011 Model Year IS350C, and certain 2007 to 2011 Model Year GS350 vehicles.

Lexus has completed remedy preparations and will now begin to notify owners.

Q1: What is the condition?

A1: The subject vehicles are equipped with a Variable-Valve Timing (VVT) system which controls the camshafts to provide optimal valve timing under certain driving conditions. The bolts used to secure the housing and sprocket of the intake-side VVT gear assembly could become loose due to abnormal impacts generated within the gear assembly immediately after a cold start-up. If this occurs, the VVT gear will not control the intake valves correctly. In certain cases, the VVT gear housing and sprocket could separate and result in the engine stopping while the vehicle is being driven, increasing the risk of a crash.

Q1a: What does the VVT Actuator Gear do?

A1a: The VVT Actuator phases the camshaft to vary the open and close timing of the valves in accordance with driving conditions such as engine speed and load. This results in optimization of horsepower, torque, idle speed, fuel economy and emissions.

Q1b: What is the cause of this condition?

A1b: The lock pin contained inside the VVT actuator holds the inner rotor to the outer rotor upon startup. If the lock pin does not lock, the inner rotor can rotate and contact the outer rotor, resulting in an abnormal impact. This abnormal impact can cause the VVT actuator bolts to loosen over time.

Q2: What is Lexus going to do?

A2: In Mid-October, 2013 Lexus will send an owner notification by first class mail to owners of vehicles covered by this Safety Recall.

Any authorized Lexus dealer will replace the Intake VVT Actuator Gears at **No Charge** to you.

Q2a: How does Lexus obtain my mailing information?

A2a: Lexus uses an industry provider who works with each state's Department of Motor Vehicles (DMV) to receive registration or title information, based upon the DMV records. Please make sure your registration or title information is correct.

Q2b: Do I need my owner letter to have the remedy performed?

A2b: You do not need an owner letter to have this recall completed; however, to assist the dealer in confirming vehicle eligibility, we request that you present this notice at the time of your service appointment.

Q3: Are there any warnings that this condition exists?

A3: An early warning of this condition can be identified by a brief rattle noise for approximately 1 second upon a cold start-up.

Q3a: What should I do if I notice a rattle noise upon a cold-start?

A3a: If you notice a brief rattle (approximately 1 second) upon a cold start-up, please contact your local authorized Lexus dealer for diagnosis and repair. If the condition is related to this Safety Recall the repair will be performed at **no charge** to you.

Q4: Which and how many vehicles are covered by this Safety Recall?

Q4: There are approximately 101,500 vehicles covered by this Safety Recall in the U.S.

Model Name	Model Year	Production Period	Appx. UIO
IS350	Certain 2006 to 2011 Model Year	Late May, 2005 through Mid-July 2011	37,000
IS350C	Certain 2010 to 2011 Model Year	Late November 2008 through Mid-July, 2011	6,100
GS350	Certain 2007 to 2011 Model Year	Mid-June, 2006 through Mid-July 2011	58,500

Q4a: Are there any other Lexus/Toyota/Scion vehicles covered by this Safety Recall in the U.S.?

A4a: No, there are no other vehicles covered by this Safety Recall.

Q4b: Why is the exhaust VVT actuator gear not affected by this condition?

A4b: The exhaust VVT actuator gear is of a different design.

Q4c: Why are other models not covered by this Safety Recall?

A4c: Engines installed in other models have camshafts and valve springs which are of a different design specification. Therefore this condition only occurs in models equipped with the 2GR-FSE engine. (GS450h is not affected due to lower engine speed specifications at start up).

Q5: What if I previously paid for repairs to my vehicle for this condition?

A5: Reimbursement consideration instruction will be provided in the remedy owner letter.

Q6: What if I have additional questions or concerns?

A6: If you have additional questions or concerns, please contact the Lexus Customer Assistance Center at 1-800-255-3987 Monday through Friday, 5:00 am to 6:00 pm, or Saturday 7:00 am through 4:00 pm Pacific Time.

Certain 2006 to 2011 IS350, Certain 2010 to 2011 IS350C, and
Certain 2007 to 2011 GS350 Vehicles
2GR-FSE Intake VVT Actuator Gear
IMPORTANT SAFETY RECALL
This notice applies to your vehicle: [VIN]

URGENT SAFETY RECALL
This is an important Safety Recall.
The remedy will be performed at **NO**
CHARGE to you.

Dear Lexus Owner:

This notice is being sent to you in accordance with the requirements of the National Traffic and Motor Vehicle Safety Act. Lexus has decided that a defect, which relates to motor vehicle safety, exists in certain 2006 to 2011 IS350, certain 2010 to 2011 IS350C, and certain 2007 to 2011 GS350 Vehicles

You received this notice because our records, which are based primarily on state registration and title data, indicate that you are the current owner.

What is the Condition?

The engines in the subject vehicles are equipped with a Variable-Valve Timing (VVT) system. The bolts used to secure the housing and sprocket of the intake-side VVT gear assembly could become loose due to abnormal impacts generated within the gear assembly immediately after a cold start-up. In certain cases, the VVT gear housing and sprocket could separate and result in the engine stopping while the vehicle is being driven, increasing the risk of a crash.

What will Lexus do?

Any authorized Lexus dealer will replace the Intake VVT Actuator Gears at **No Charge** to you.

What should you do?

This is an important Safety Recall

Please contact any authorized Lexus dealer to schedule an appointment to have the remedy performed as soon as possible.

The repair will take approximately 1 day. However, depending on the dealer's work schedule, it may be necessary to make your vehicle available for a longer period of time. A rental vehicle is available while your vehicle is being repaired.

You do not need an owner letter to have this recall completed; however, to assist the dealer in confirming vehicle eligibility, we request that you present this notice at the time of your service appointment.

If you would like to update your vehicle ownership or contact information, you may do so by registering at www.lexus.com/ownersupdate. You will need your full 17-digit Vehicle Identification Number (VIN) to input the new information.

What if you have other questions?

- *Your local Lexus dealer will be more than happy to answer any of your questions and set up an appointment to perform the repair.*
- You can find additional information and locate a Lexus dealer in your area by going online and visiting www.lexus.com.
- If you require further assistance, you may contact the Lexus Customer Assistance Center at 1-800-255-3987, Monday through Friday, 5:00 am to 6:00 pm, Saturday 7:00 am through 4:00 pm Pacific Time.

If you believe that the dealer or Lexus has failed or is unable to remedy the defect within a reasonable time, you may submit a complaint to the Administrator, National Highway Traffic Safety Administration, 1200 New Jersey Avenue S.E., Washington, D.C. 20590, or call the toll free Vehicle Safety Hot Line at 1-888-327-4236 (TTY: 1-800-424-9153), or go to <http://www.safercar.gov>.

What if you have previously paid for repairs to your vehicle for this specific condition?

If you have previously paid for repair to your vehicle for this specific condition prior to receiving this letter, please mail a copy of your repair order, proof-of-payment and proof-of-ownership to the following address for reimbursement consideration:

Lexus Customer Assistance Center L201
19001 South Western Avenue
Torrance, CA 90509

Please note that the dealer must complete the Safety Recall remedy before reimbursement consideration requests can be processed.

If you are a vehicle lessor, Federal law requires that any vehicle lessor receiving this recall notice must forward a copy of this notice to the lessee within ten days.

We have sent this notice in the interest of your continued satisfaction with our products, and we sincerely regret any inconvenience this condition may have caused you.

Thank you for driving a Lexus.

Sincerely,

LEXUS, A DIVISION OF TOYOTA MOTOR SALES, U.S.A., INC.

TECHNICAL INSTRUCTIONS

FOR

SAFETY RECALL DLG

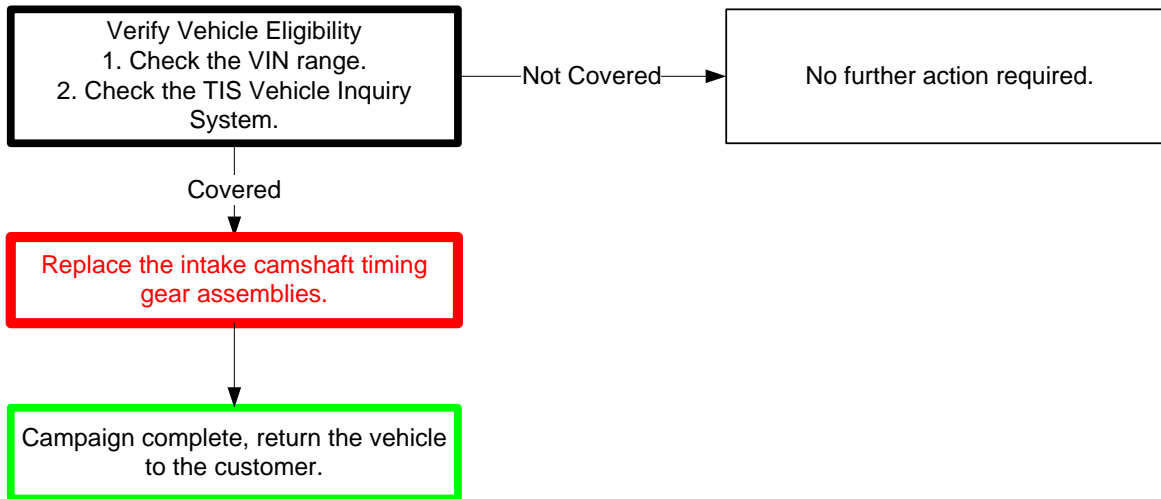
INTAKE VVT ACTUATOR GEAR

**CERTAIN 2006 – 2011 MODEL YEAR IS350
CERTAIN 2010 – 2011 MODEL YEAR IS350C
CERTAIN 2007 – 2011 MODEL YEAR GS350**

Only Lexus Senior or Master Service Technicians OR Lexus Senior or Master Diagnostic Specialists can conduct this repair.

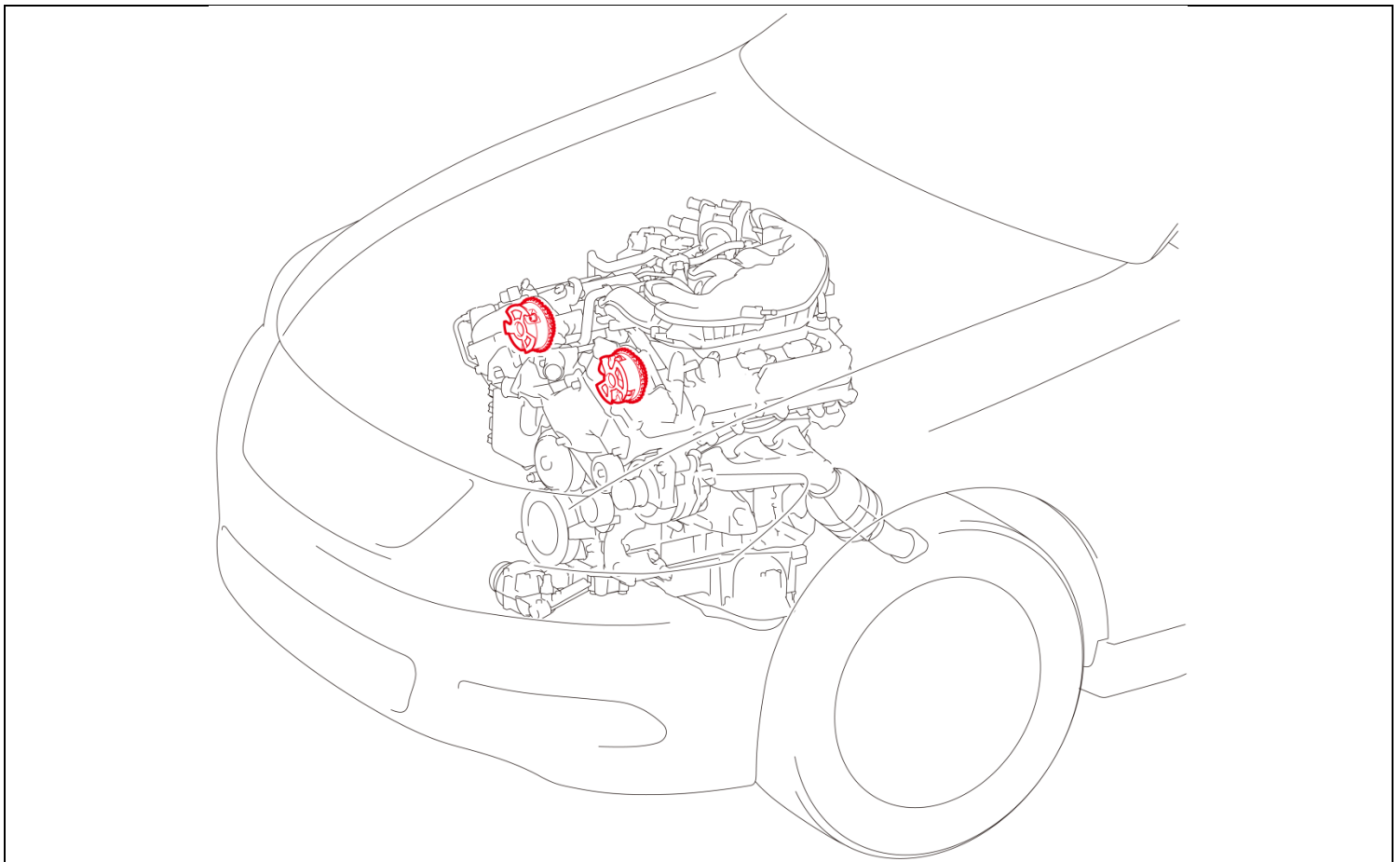
I. OPERATION FLOW CHART

The flow chart is for reference only. **DO NOT** use it in place of the full technical instructions. Follow **ALL** steps as outlined in the full technical instructions to confirm the campaign is completed correctly.



II. BACKGROUND

The subject vehicles are equipped with a Variable-Valve Timing (VVT) system which controls the camshafts to provide optimal valve timing under certain driving conditions. The bolts used to secure the housing and sprocket of the intake-side VVT gear assembly could become loose due to abnormal impacts generated within the gear assembly immediately after a cold start-up. If this occurs, the VVT gear will not control the intake valves correctly. In certain cases, the VVT gear housing and sprocket could separate and result in the engine stopping while the vehicle is being driven, increasing the risk of a crash



III. IDENTIFICATION OF AFFECTED VEHICLES

A. COVERED VIN RANGE

MODEL	WMI	Year	VDS	Start	Finish
GS350	JTH	2010	BE1KS	0046992	0051057
		2011		0051058	0054036
		2007	BE96S	0007608	0028367
		2008		0023566	0043034
		2009		0043035	0047088
		2010	CE1KS	0024324	0028153
		2011		0028154	0030546
		2007	CE96S	0001838	0013164
		2008		0013166	0021655
		2009		0021657	0024397
IS350	JTH	2006	BE262	0001001	0003002
				2000000	2007084
		2007		5000005	5011869
				2006942	2013016
				5011870	5017246
		2008		2011547	2016302
				5017247	5021818
		2009		2016235	2017388
				5021000	5023468
		2010		BE5C2	2017389
	5023469	5025230			
2011		5024742	5028032		
	CE5C2	5000104	5001811		
IS350C	JTH	2010	FE2C2	2500004	2505028
		2011		2504989	2506857

NOTE:

- Check the TIS Vehicle Inquiry System to confirm the VIN is involved in this Safety Recall, and that the campaign has not already been completed prior to dealer shipment or by another dealer.
- TMS warranty will not reimburse dealers for repairs conducted on vehicles that are not affected or were completed by another dealer.

IV. PREPARATION

A. PARTS

Part Number	Part Description	Quantity
04002-67131	Camshaft Timing Gear Kit*	1
*The kit above includes the following parts.		
13050-31163	Camshaft Timing Gear Assembly	2

Part Number	Part Description	Quantity
04003-18131	Fuel Hose Kit*	1
*The kit above includes the following parts.		
23273-31050	No.2 Fuel Hose	1
96137-41301	Hose Clip	2

Part Number	Part Description	Quantity
04002-79131	Gasket Kit*	1
*The kit above includes the following parts.		
11159-31010	Camshaft oil hole gasket	4
11213-31040	Valve cover gasket RH	1
11214-31020	Valve cover gasket LH	1
11328-31030	Tensioner cover gasket	1
17176-31060	Air surge tank to intake manifold gasket	1
22271-31020	Throttle body gasket	1
23256-74010	No.1 fuel injector back up ring	1
23257-74010	No.2 fuel injector back up ring	1
23258-28011	No.3 fuel injector back up ring	1
23279-74010	Gasket (for pulsation damper hose)	2
23915-46011	Fuel pump insulator	1
90210-06013	Seal washer (for cylinder head cover)	3
90301-06016	O-ring (fuel)	1
90430-10024	O-ring (bearing cap)	2
90430-16012	No.1 gasket (upper VVT pipe)	4
90523-05007	E-ring (fuel)	1
These parts will not be used for the standard repair. Only use if coolant needs to be drained or if the VVT pipes need to be fully removed.		
16492-21050	Packing (for radiator drain cock)	1
90430-16016	No.2 gasket (lower VVT pipe gasket)	2

B. MATERIALS

- Engine Oil
- FIPG: 00295-00103
- Toyota General Adhesive 1324: 08833-00070, or equivalent thread locker

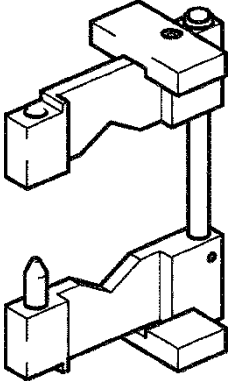

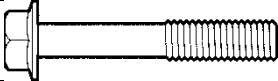

C. TOOLS & EQUIPMENT

- Standard hand tools
- Wire or rope
- Torque wrench
- Techstream
- Protective tape
- Paper towels

SST – This is an essential special service tool that the dealership should have.

Part Number	Part Name
09617-24011	Steering Rack Wrench

CAMPAIGN TOOLS – These tools are provided to the dealership. These tools are necessary when performing this repair.

Image	Name	Quantity
	Camshaft Holding Tool	1
	Fuel Pipe Removal Stud Bolts	2
	Camshaft Housing Hold-down Bolts	17
	Hold-down Washers	34

NOTE: These tools **CANNOT** be ordered through the parts or tools system. There is a very limited supply of tools, but if additional tools are needed, contact your area representative.

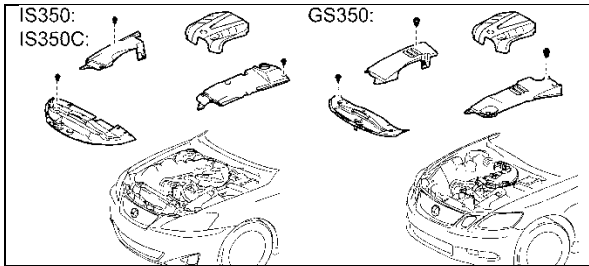
V. FUEL PRESSURE RELEASE

1. CHECK AND RECORD DTCs

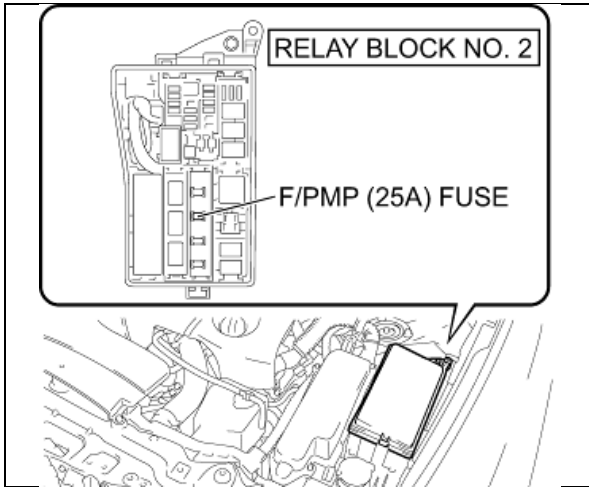
- a) Check and record any DTCs.

2. RECORD CUSTOMER SETTINGS

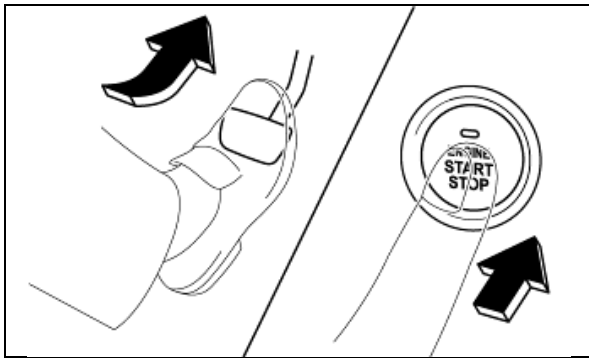
- a) Record all settings that will reset when the battery is disconnected – audio, seat, etc.



3. REMOVE THE ENGINE ROOM COVERS



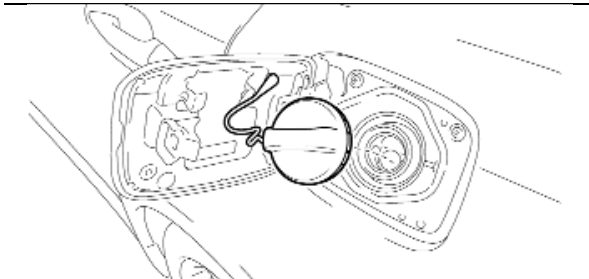
4. REMOVE THE FUEL PUMP FUSE



5. DISCHARGE THE FUEL PRESSURE

- a) Run the engine until the vehicle stalls, then confirm it will not start.
- b) Turn the vehicle off.

6. REINSTALL THE FUEL PUMP FUSE



7. REMOVE THE FUEL CAP

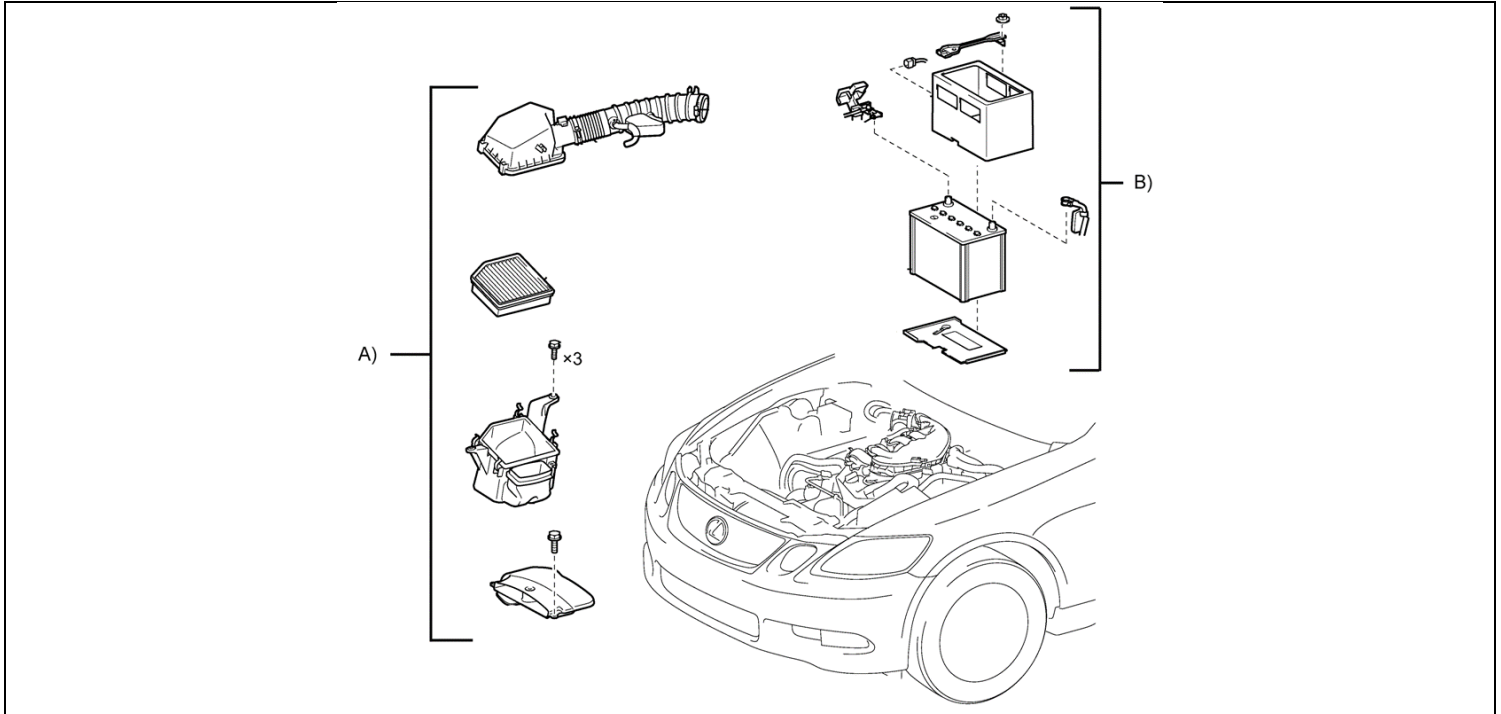
NOTE: DO NOT reinstall the cap until instructed. The pressure and temperature in the fuel tank can increase throughout the repair process, which may cause fuel spillage through the open lines.

VI. AUXILIARY ENGINE COMPONENT REMOVAL

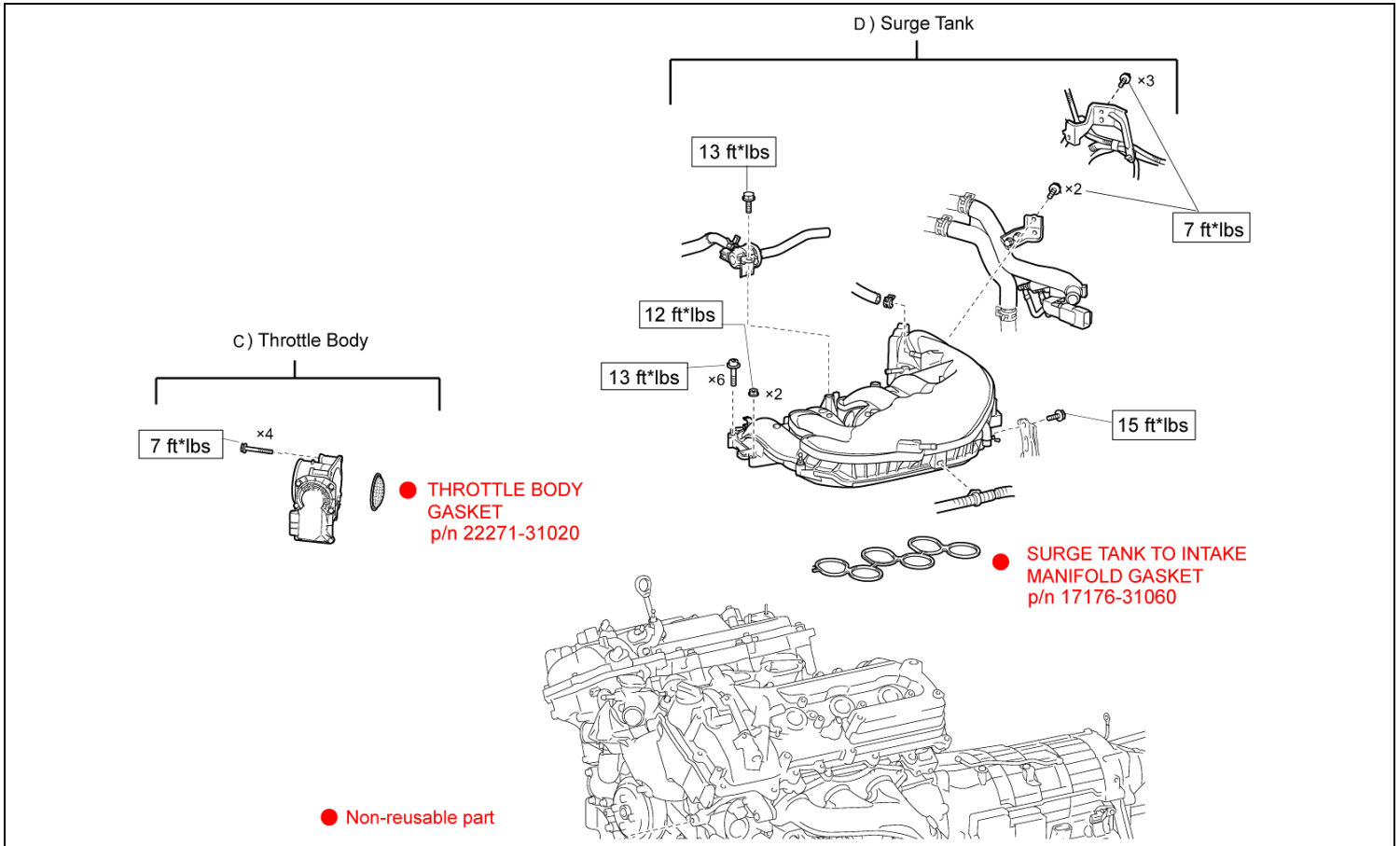
1. REMOVE COMPONENT GROUPS A-B

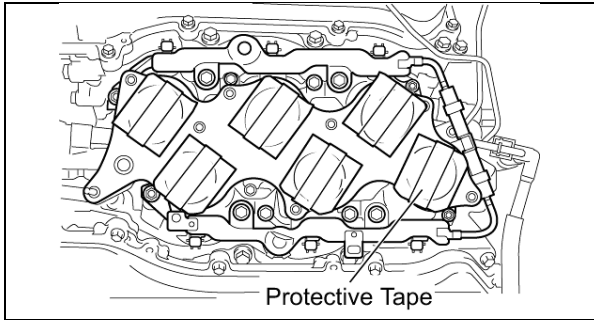


Wait 6 minutes after turning the ignition off before disconnecting the battery if the vehicle is equipped with HDD navigation. 6 minutes is required to store the memory.



2. REMOVE COMPONENT GROUPS C-D

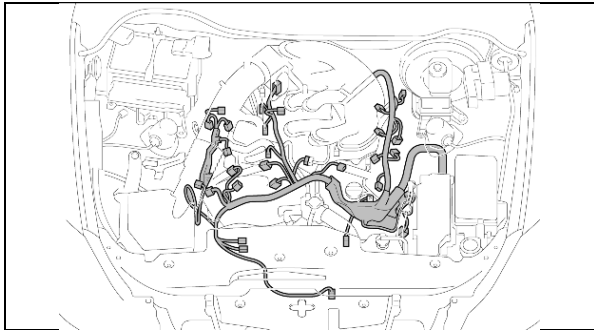




Protective Tape

3. COVER THE INTAKE MANIFOLD WITH TAPE

NOTE: This will prevent foreign objects from falling into the engine.



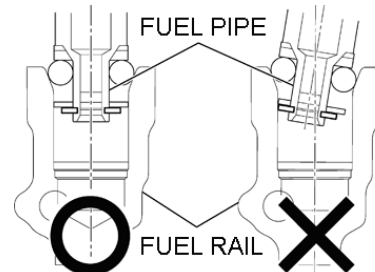
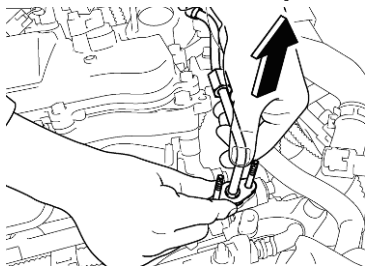
4. DISCONNECT THE WIRE HARNESS

5. REMOVE THE FUEL COMPONENTS

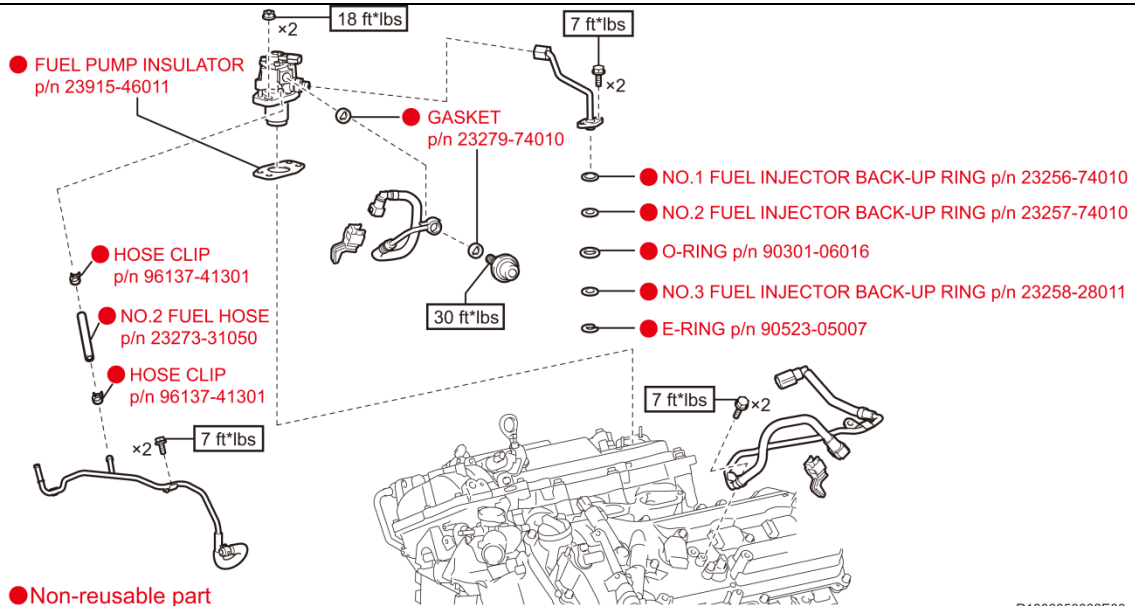


- **NEVER** have an ignition source nearby when working on the fuel system.
- **ALWAYS** wear protective eyewear when working on the fuel system.
- To prevent fuel from spraying, cover the fuel lines with towels before disconnecting.

Pull the fuel pipe straight up to prevent fuel rail damage.
Use the provided campaign tool stud bolts for assistance.

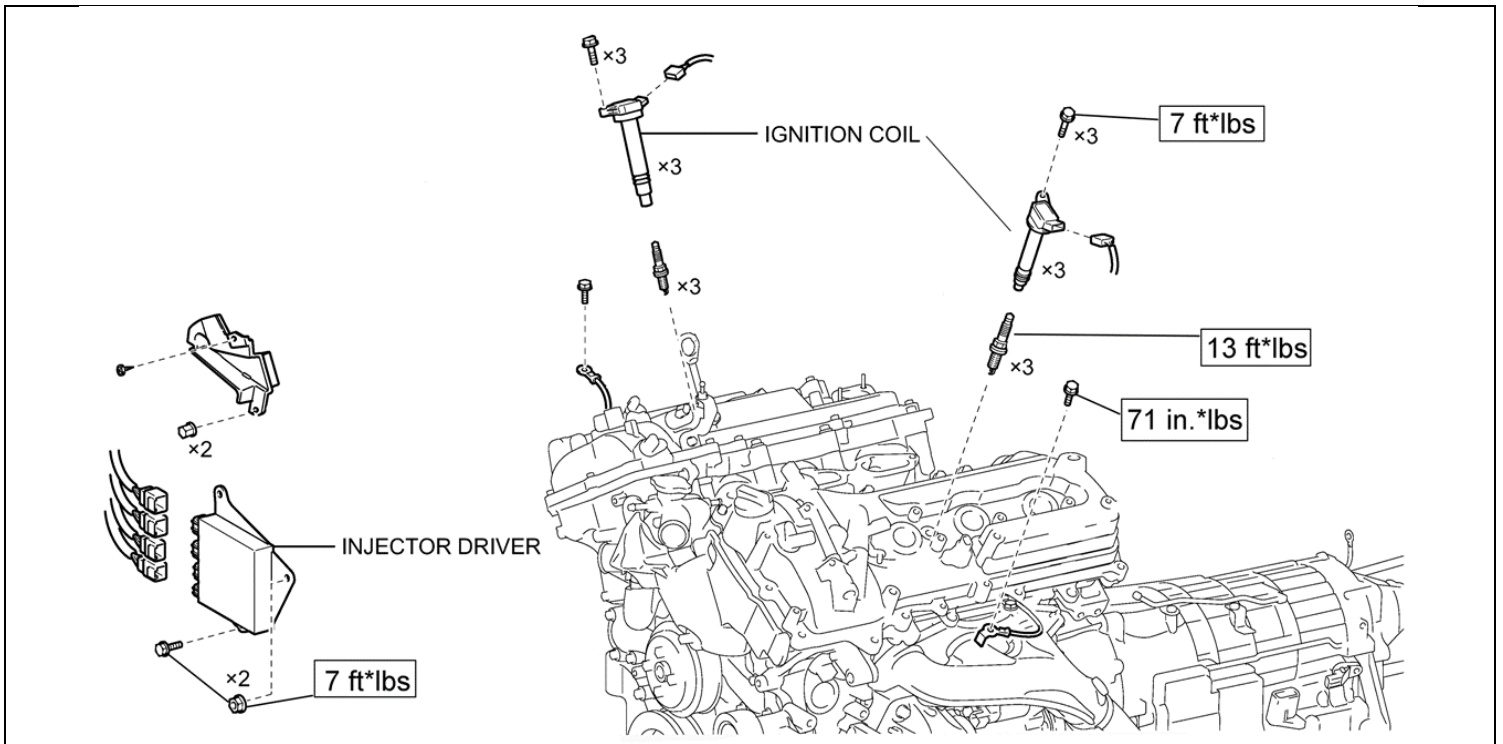


Pulling at an angle can cause scratches and nicks which will potentially cause fuel leaks.



R1306050002E08

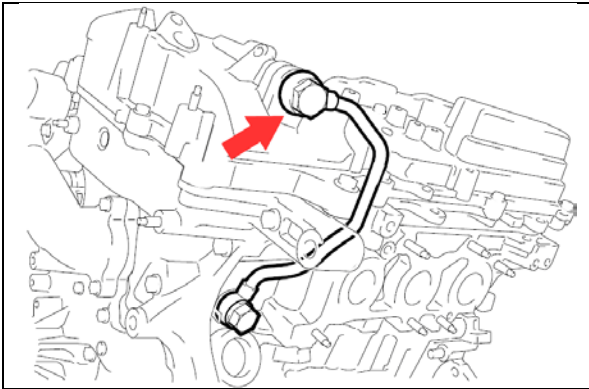
6. REMOVE THE IGNITION AND OIL COMPONENTS



7. DISCONNECT THE TOP SIDE OF THE OIL PIPES

a) Disconnect the top side of the LH and RH oil pipes.

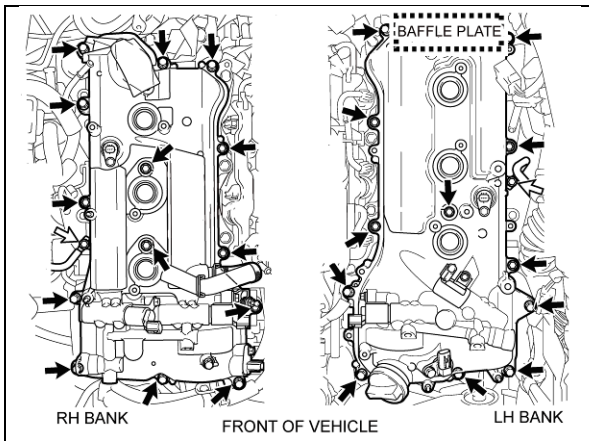
NOTE: Use caution to avoid damaging the oil control valve filter during removal.



VII. VALVE COVER AND TIMING CHAIN TENSIONER REMOVAL

1. REMOVE THE VALVE COVERS

NOTE: Use caution when removing the LH valve cover to avoid damaging the baffle plate on the underside of the cover.



CRITICAL INFORMATION – READ THOROUGHLY



2. PLUG THE OIL GALLEYS AND SPARK PLUG TUBES

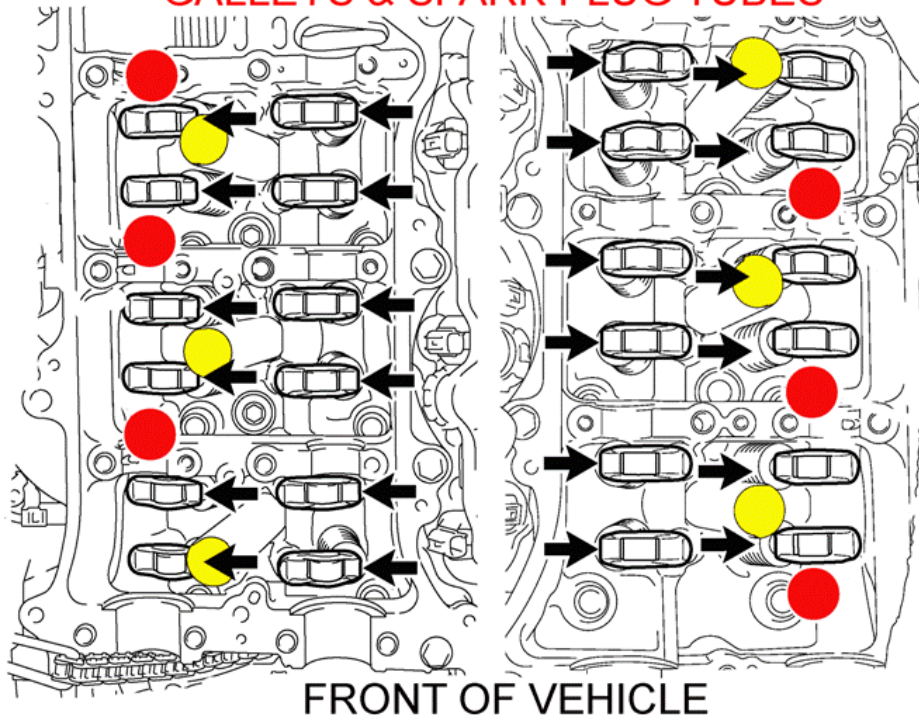
- DO NOT** drop small parts down the block.
- Cover and plug the oil galleys and spark plug tubes with shop towels.
- DO NOT** forget to remove all shop towels before reinstalling the valve covers.

PLUG THE:

Oil Galleys: ●

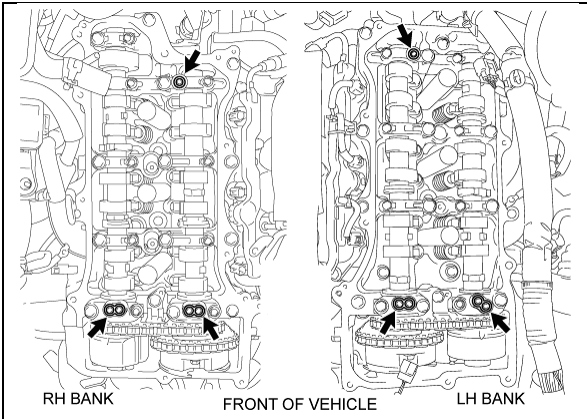
Spark Plug Tubes: ●

DON'T FORGET TO PLUG THE OIL GALLEYS & SPARK PLUG TUBES

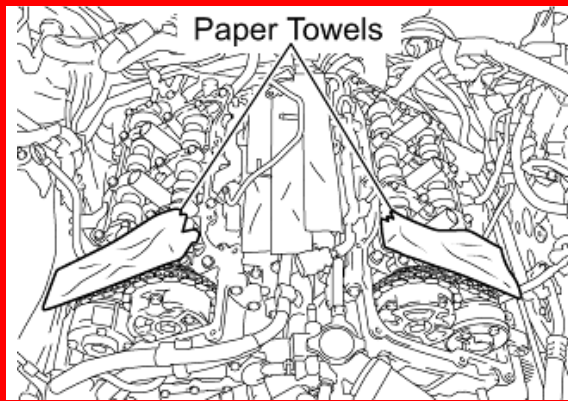


DO NOT drop valve components down the block

3. REMOVE THE O-RING FROM THE BEARING CAPS

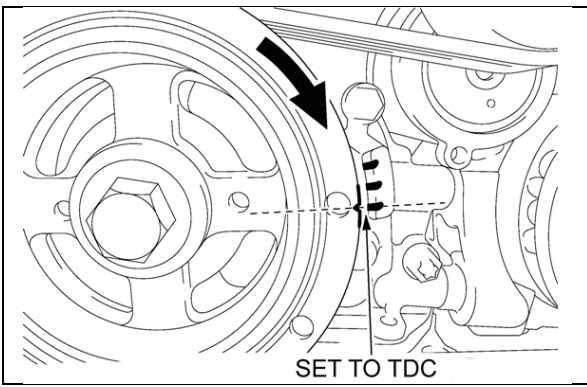


- Cover the holes to prevent injury and an unclean engine bay.
- Oil may squirt out of the oil supply camshaft cap holes when the chain spins the oil pump.



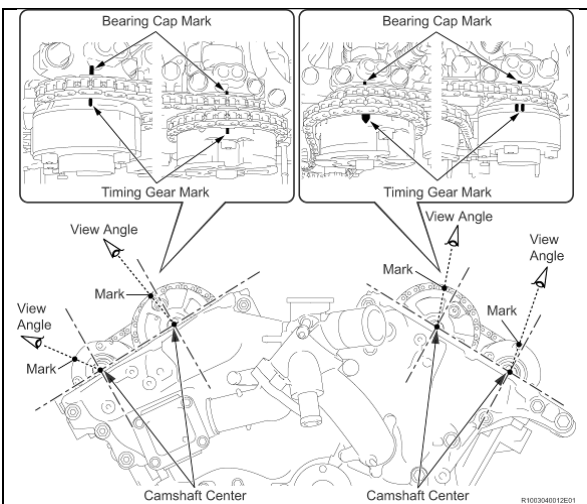
4. ALIGN CYLINDER 1 TO TOP DEAD CENTER

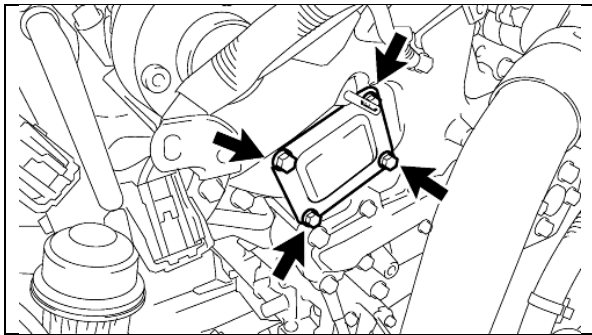
- a) Align the crankshaft pulley notch with the 3rd hash mark (0°) as shown.



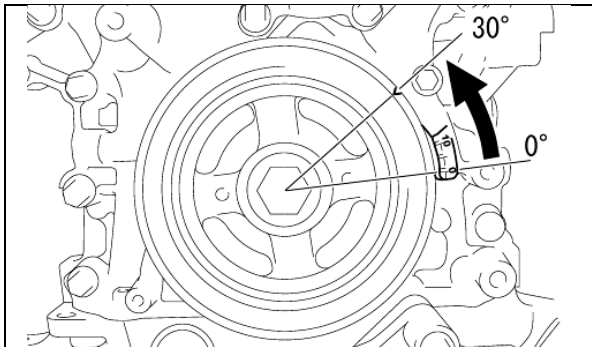
- b) Check the timing marks on the VVT gears, confirm they are facing up from a birds-eye view. If the marks are not seen rotate the crankshaft 360°.
- c) Using a paint marker, mark the timing chain, VVT gears, and bearing caps to assist with alignment during reassembly.

NOTE: reference L-SB-0156-08 to easily mark and identify the timing marks.





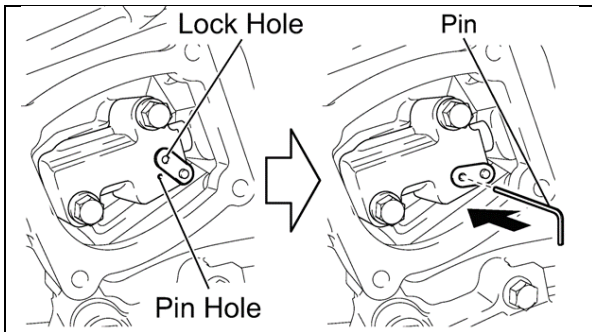
5. REMOVE THE FRONT CHAIN TENSIONER COVER



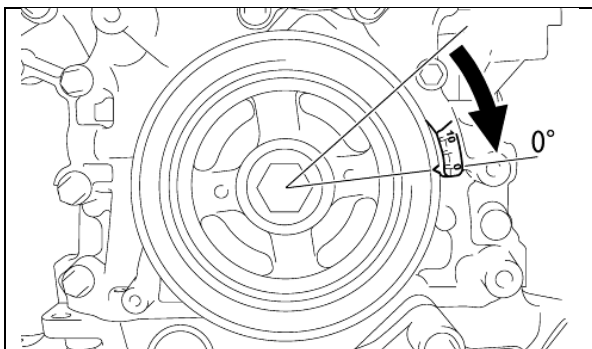
6. REMOVE THE PRIMARY CHAIN TENSIONER

a) Turn the crankshaft 30° counterclockwise.

NOTE: This action compresses the tensioner as the chain pushes against it.

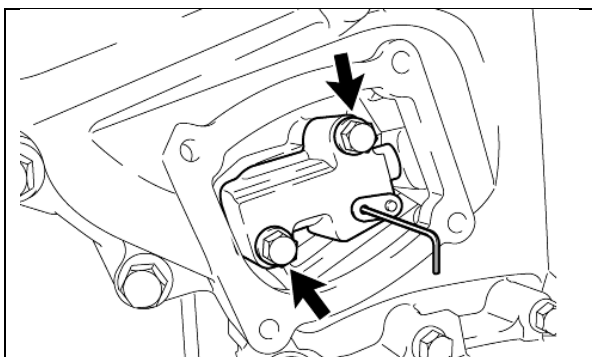


b) Insert a pin into the lock and pin holes once they are aligned.



c) Return the crankshaft back to TDC.

NOTE: This action releases chain pressure on the tensioner.



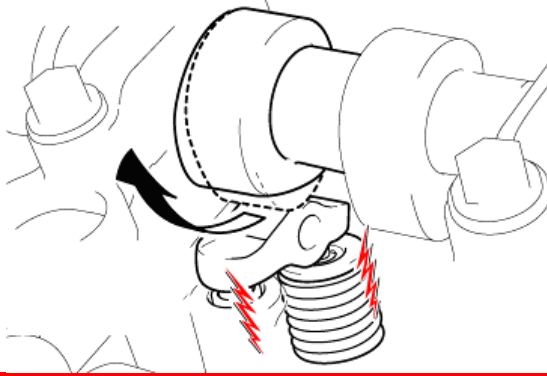
d) Remove the tensioner.

NOTE: Be careful not to let the pin fall out of the tensioner.

VIII. CAMSHAFT REMOVAL

CAUTION: The camshafts can spin quickly under the pressure of the valve springs.

Keep fingers and wire harness/electrical connectors away from moving camshaft parts.



1. DETACH THE PRIMARY TIMING CHAIN

- Using the hexagonal portion of the **intake camshaft**, slightly rotate the camshaft towards the center of the engine until the valve spring pressure releases. This will prevent the over-spinning of the camshaft due to spring force.

NOTE: If this step is skipped the valvetrain will rapidly rotate due to the valve spring pressure. This can cause the chain to bind.

(RH BANK SHOWN)

- Rotate the crankshaft clockwise until the flat surface on the exhaust gear allows space for chain removal.



When the camshafts are in this position, valve spring pressure is at a minimum for this bank only. This is a requirement when removing bearing caps. If the spring pressure is not reduced, bearing caps can break.

(RH BANK SHOWN)

- Hang the chain on the RH bank intake VVT actuator in a position where it will not fall off.

NOTE: *DO NOT* let the chain fall into the timing cover.

(RH BANK SHOWN)

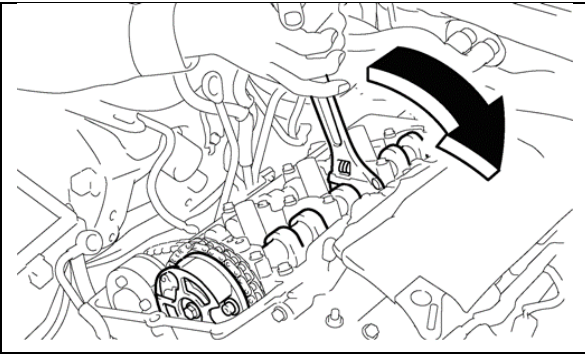
2. DECREASE SPRING TENSION

- Confirm the camshafts are in a neutral position.

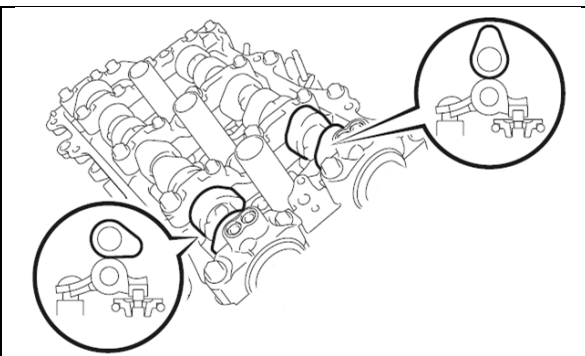
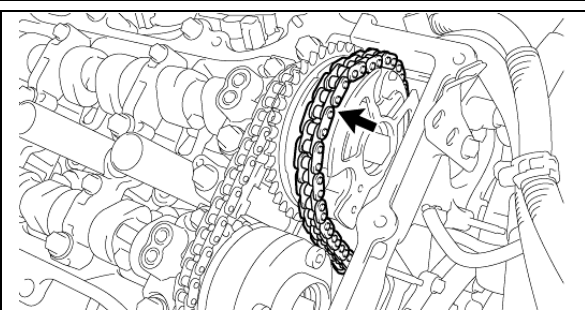
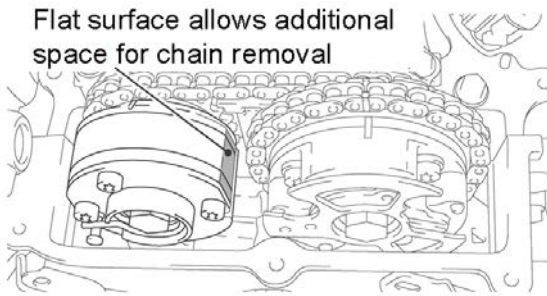


Prevent all cam lobes from compressing the valve springs before bearing cap removal or bearing caps may break.

(RH BANK SHOWN)

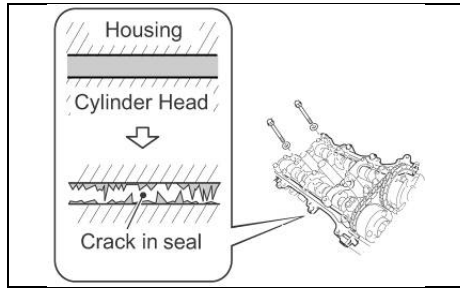


Flat surface allows additional space for chain removal





CRITICAL INFORMATION – READ THOROUGHLY



NOTE: If this step is not closely followed the FIPG seal will crack causing future oil leaks.

Loosen the bolts in several increments. Begin with the 10mm black bolt (circled on step a), one cap at a time, and *DO NOT* use air tools or the bearing caps may break.

a) Loosen the bearing cap bolts, **ONE CAP AT A TIME.**



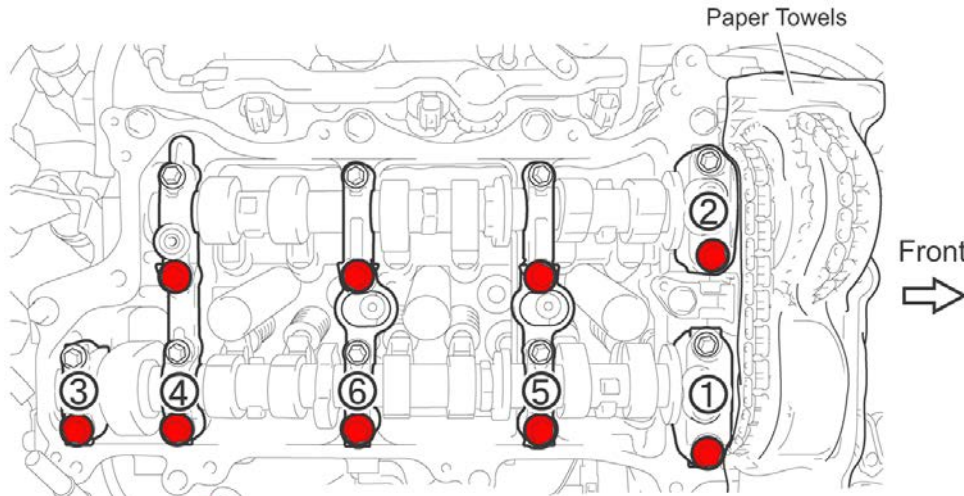
b) Install a hold-down bolt with 2 washers, **do not crush the dowel pins**



c) Torque the hold-down bolt to 7 ft.*lbs.



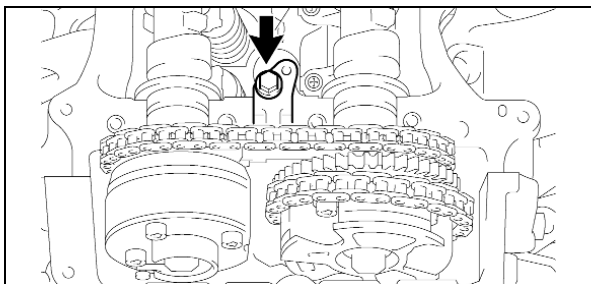
Remove the bearing caps in the sequence shown below (RH bank)



: Install hold-down bolts w/2 washers in these locations

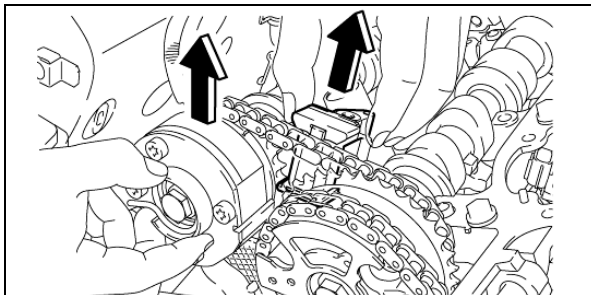
3. REMOVE THE CAMSHAFTS

a) Remove the chain tensioner bolt.

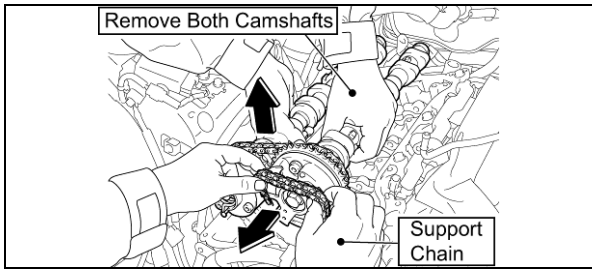


(RH BANK SHOWN)

b) Lift the exhaust camshaft and remove the chain tensioner.

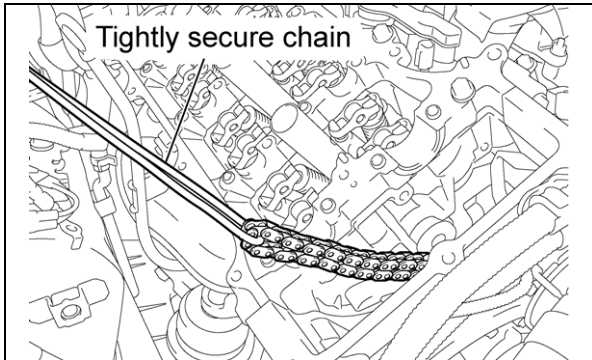


(RH BANK SHOWN)



- c) Have one person tightly hold the chain while another person removes both camshafts.

(RH BANK SHOWN)



- d) Tightly secure the timing chain.
- e) Leave just enough slack to allow chain movement when turning the crankshaft and chain.

STOP If the chain is not held tightly, it will become trapped or it may skip teeth. If the chain is dropped or trapped see the appendix for service hints.

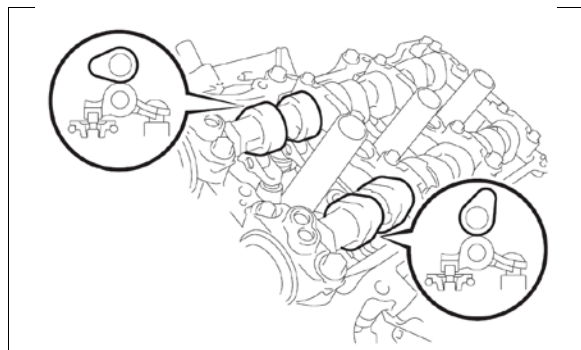
(RH BANK SHOWN)

STOP CRITICAL INFORMATION – READ THOROUGHLY **STOP**

Repeat SECTION VIII for the LH bank to remove the camshafts
All notes in the RH sequence apply to the LH bank.

NOTE: The following are different for the left and right hand banks.

- Timing marks
- Torque sequence

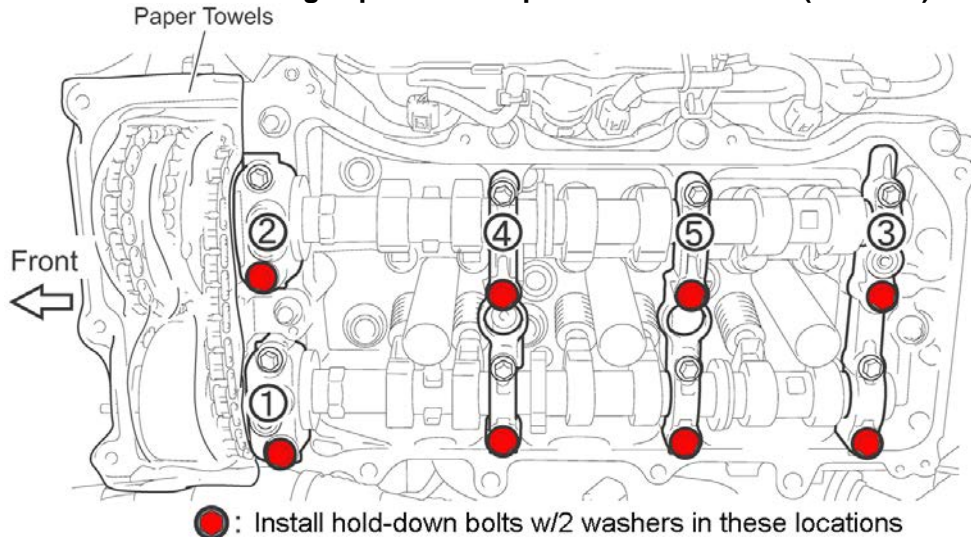


Position the camshafts in a neutral position.

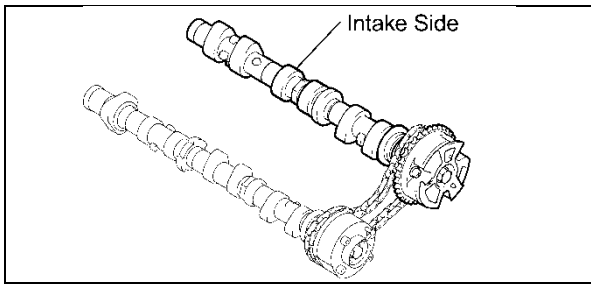
This is a requirement when removing bearing caps. If the spring pressure is not reduced, bearing caps can break.

(LH BANK SHOWN)

Remove the bearing caps in the sequence shown below (LH bank)



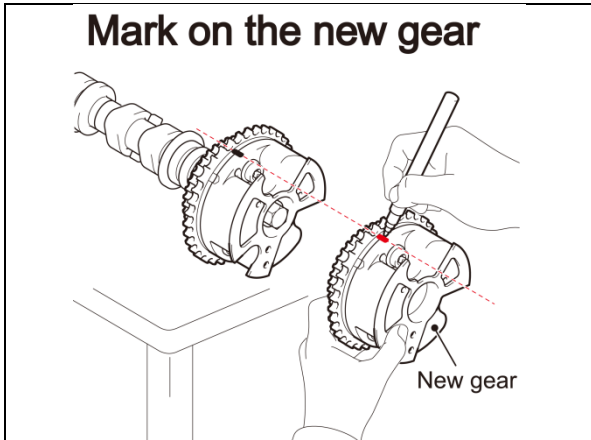
IX. CAMSHAFT TIMING GEAR REPLACEMENT



1. REPLACE THE CAMSHAFT TIMING GEAR ASSEMBLY

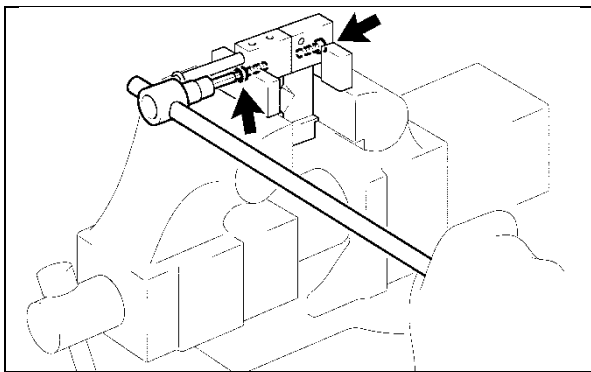
- a) Remove the intake camshaft with timing gear from the chain.

(RH BANK SHOWN)



- b) Prepare a new timing gear by marking it in the same location as the old gear.

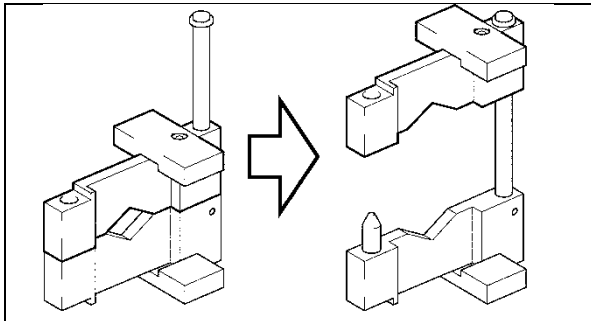
(RH BANK SHOWN)



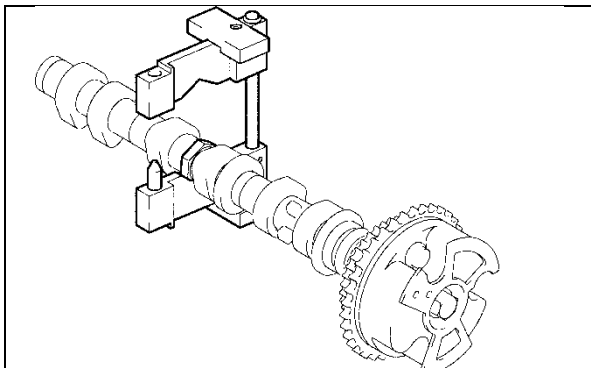
- c) Set the camshaft holding tool (campaign tool) in a vise and retorque the 2 bolts.

Torque: 71in. lbf (8.0N·m)

NOTE: If the bolts are left loose the camshaft may vibrate during work and damage the cam.

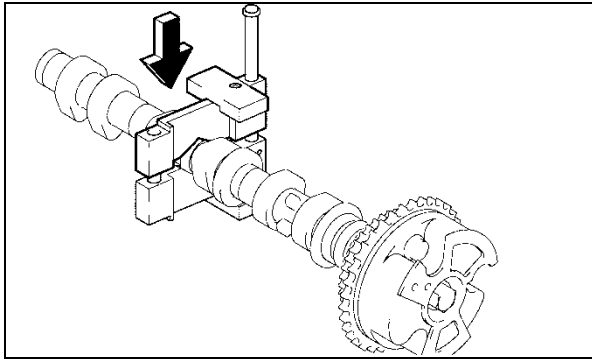


- d) Slide the tool up to open in fully.



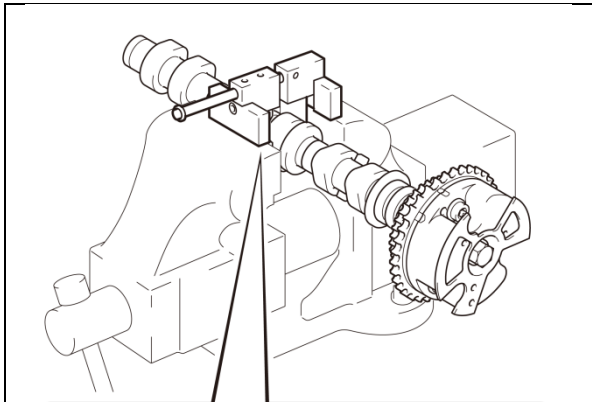
- e) Place the hexagon portion of the camshaft on the holding tool.
NOTE: DO NOT let the holding tool damage the cam lobes.

(RH BANK SHOWN)



f) Close the holding tool on the hexagonal section of the camshaft.

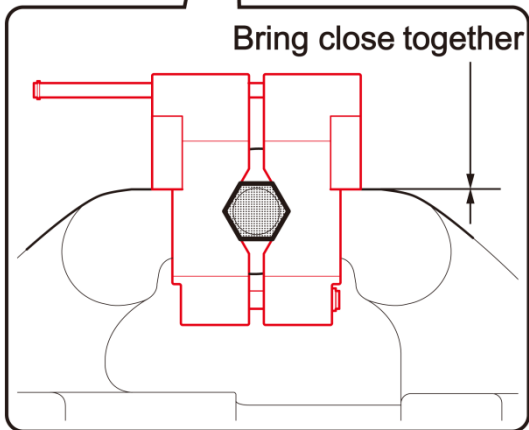
(RH BANK SHOWN)



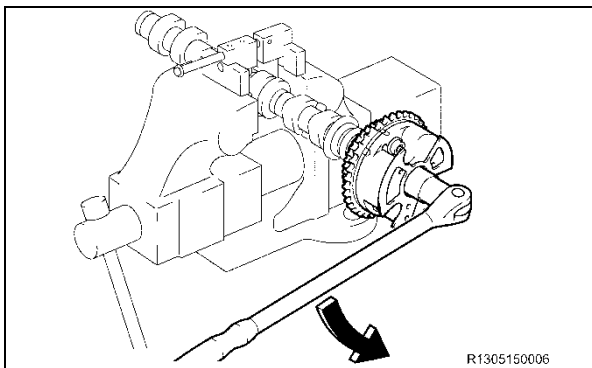
g) Set the camshaft and the holding tool in the vise.

NOTE:

- Hold the shaft and tool by hand so that they do not fall until they are fixed in the vise.
- Fix the shaft and tool firmly to remove bolts with high torque (74ft. lbf).
- When setting the shaft and tool in the vise, do not let the vise interfere with any cam lobe.



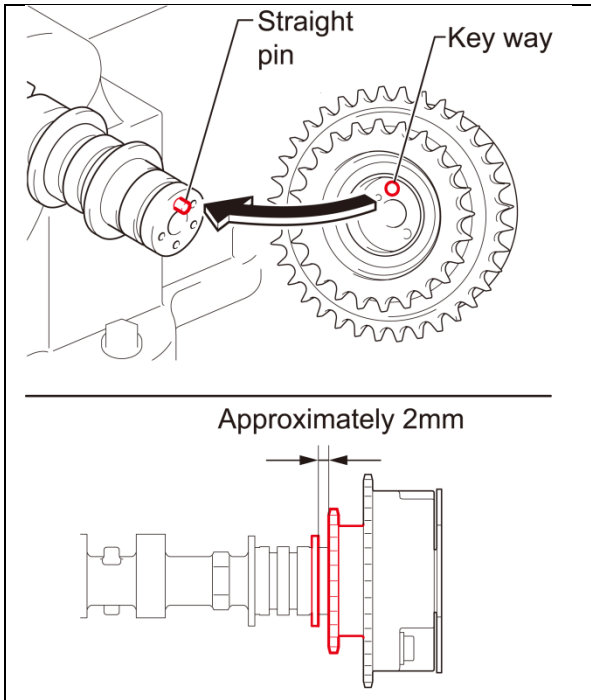
(RH BANK SHOWN)



h) Remove the bolt and the timing gear.

i) Place a mark on the removed gear so that it is not reused.

(RH BANK SHOWN)

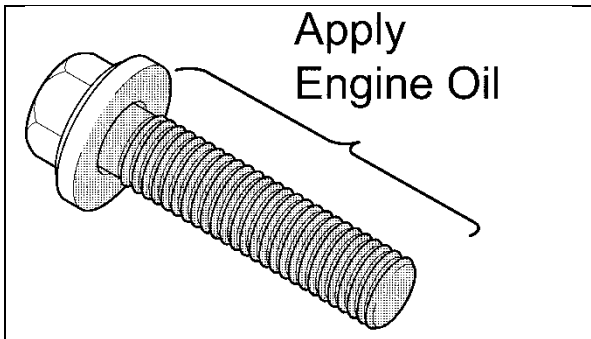


- j) Insert the camshaft straight pin into the new camshaft timing gear key way.

NOTE:

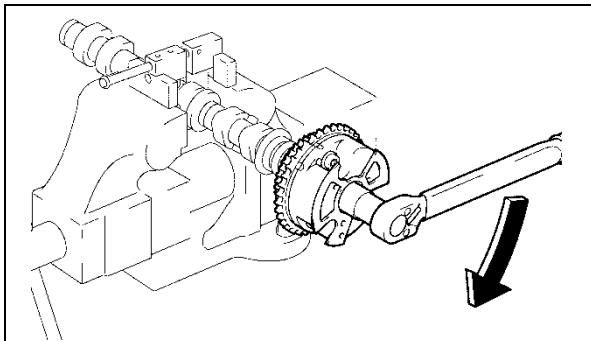
- **DO NOT** push the camshaft timing gear strongly onto the camshaft. This may cause its sealing surface to be damaged by the tip of the straight pin resulting in a sealing failure.
- If the gear is properly assembled, there will be an approximately 2 mm gap.

(RH BANK SHOWN)



- k) Apply some engine oil to the threads and face of the bolt.

(RH BANK SHOWN)



- l) Tighten the timing gear bolt.

Torque: 74ft. lbf (100N·m)

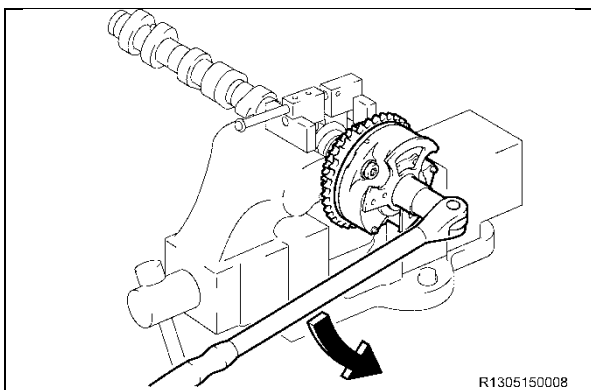
- m) Remove the camshaft and holding tool from the vise.

(RH BANK SHOWN)

2. REPLACE THE CAMSHAFT TIMING GEAR ASSEMBLY LH

- a) Repeat **STEP 1** to replace the LH timing gear.

NOTE: The position of the hexagonal section on the camshaft is different from the RH camshaft.



(LH BANK SHOWN)

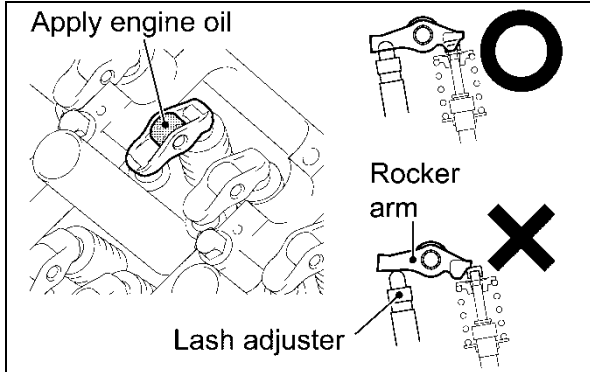
X. CAMSHAFT REINSTALLATION



CRITICAL INFORMATION – READ THOROUGHLY



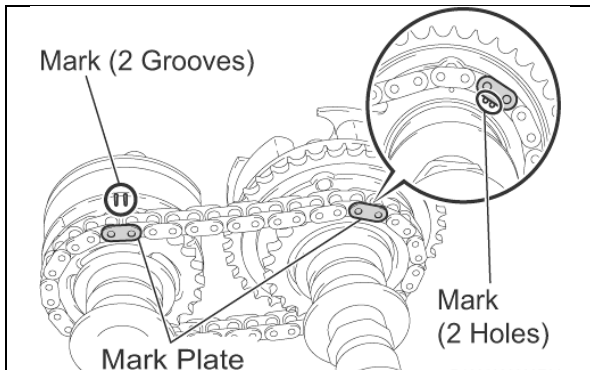
- Do not apply excessive torque to the camshaft bearing cap bolts. There is a possibility of damaging the female threads of the cylinder heads and/or the FIPG seal on the cylinder head.
- If using a beam-type torque wrench confirm torque application is being applied accurately.
- If using a click-type torque wrench **DO NOT** apply excessive torque when clicking.



1. REINSTALL THE CAMSHAFTS

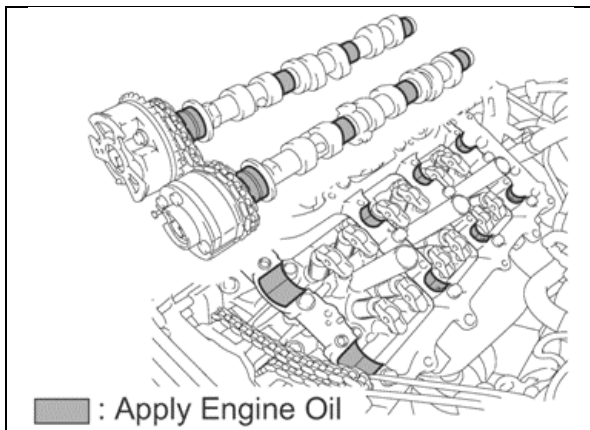
- a) Check that the rocker arms are properly placed.
- b) Apply engine oil to the roller section.

(LH BANK SHOWN)



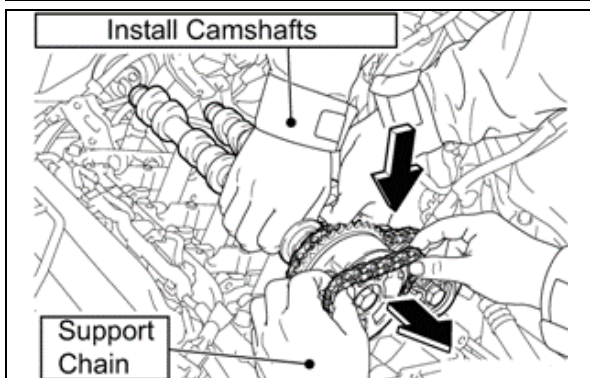
- c) Align the yellow chain link with the 2 holes on the intake VVT gear.
- d) Align the other yellow chain link with the 2 grooves on the exhaust VVT gear.

(LH BANK SHOWN)



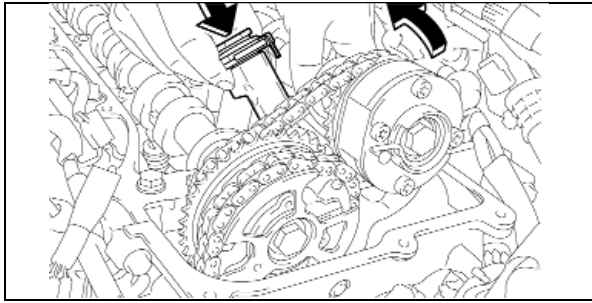
- e) Apply engine oil to the bearings and journals.

(LH BANK SHOWN)



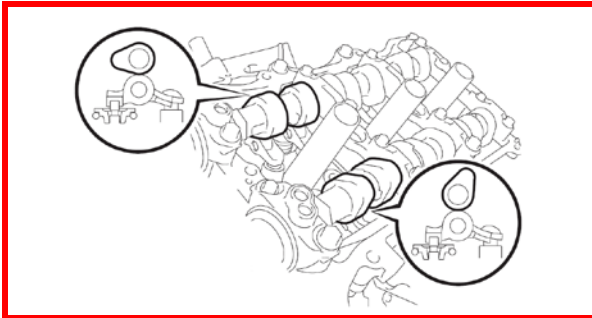
- f) Have two people perform the following steps.
 - Tightly hold the primary chain.
 - Set both camshafts in place with the timing marks facing up.
 - Place the chain on the VVT actuator in a position where it will not fall off.

(LH BANK SHOWN)



- g) Install the tensioner.
- Lift up on the exhaust camshaft
 - Install the chain tensioner.

Torque: 15 ft.lbf (21N·m)



- h) **Confirm your timing marks are still aligned.**
- i) **Confirm the camshafts are in a neutral position before tightening the bearing cap bolts, if the valve spring pressure is not reduced the bearing caps can break.**

(LH BANK SHOWN)



- **Degrease and dry the bearing cap bolts and holes before reinstallation.**
- **If oily bolts are installed they will be overtightened and stretched due to decreased friction.**

j) Reinstall the bearing caps.

1. Loosen the hold-down bolts for one cap location at a time.



2. Remove the hold-down bolt and two washers, one cap location at a time.



3. Reinstall the bearing caps, one at a time, tighten the bolts by hand and then torque to spec.



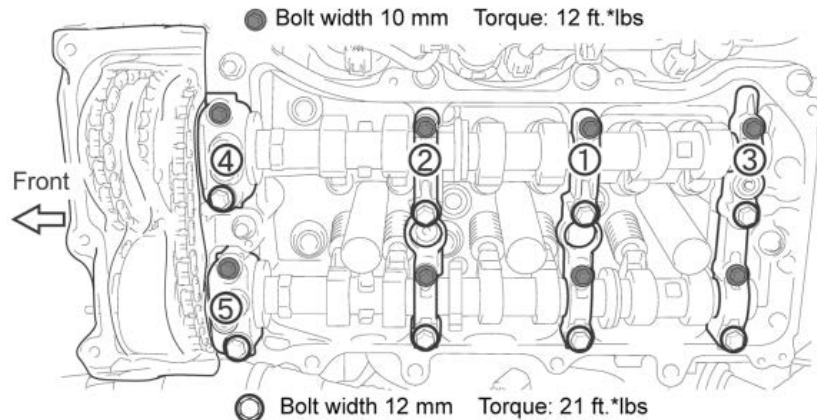
CRITICAL INFORMATION – READ THOROUGHLY

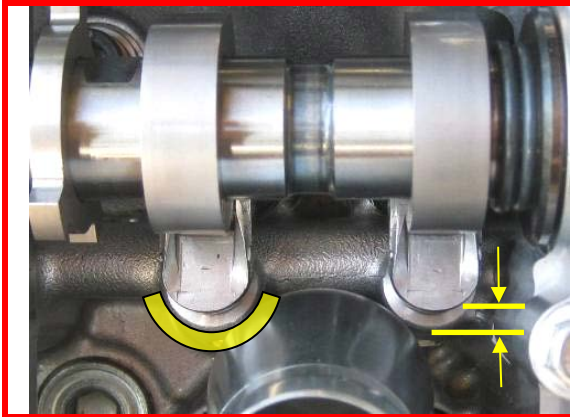


**If any binding is felt while tightening the bolts by hand, replace the bearing cap bolt.
If the bolt seems to stretch during the torque procedure, replace the bearing cap bolt.**

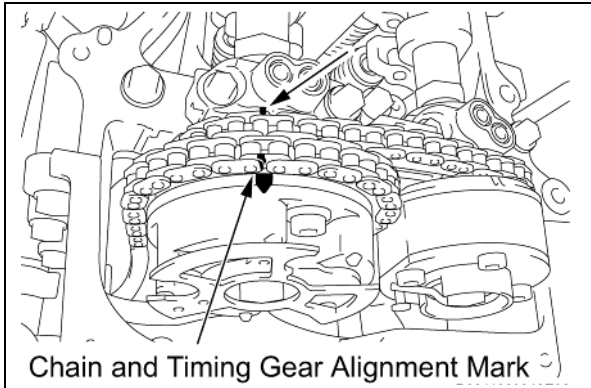
Replace the bolt if it has stretched before allowing it to break in the cylinder head.

Reinstall the bearing caps in the sequence shown below (LH bank)





- k) After installing the camshafts, confirm all rocker arms are correctly installed. Check for a consistent 'U' shape distance.



- l) Align the chain so that it matches up with the timing marks and paint marks made before disassembly.

NOTE: reference L-SB-0156-08 to easily mark and identify the timing marks.

(LH BANK SHOWN)



CRITICAL INFORMATION – READ THOROUGHLY

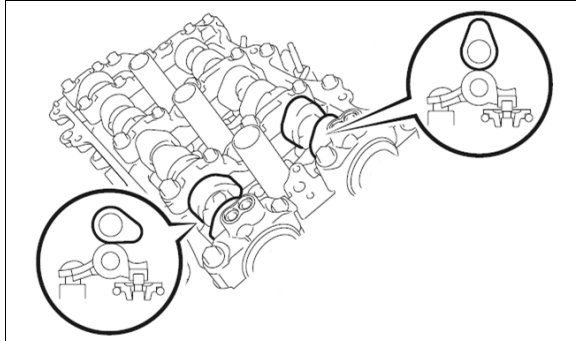


Repeat SECTION X for the RH bank

This includes replacement of the camshaft timing gear and reinstallation of the camshafts.

NOTE: The following are different for the left and right hand banks.

- Timing marks
- Torque sequence

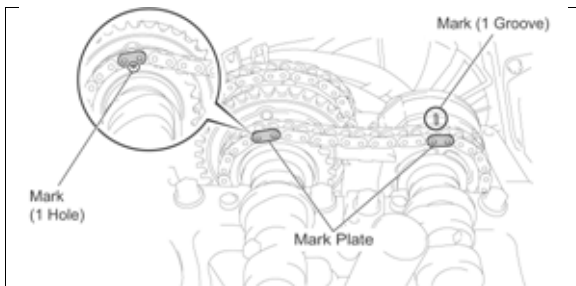


RH BANK CAMSHAFT INSTALLATION

- Confirm the camshafts are in a neutral position; this will prevent the lobes from compressing a valve spring.

NOTE: The cams should sit flush in the journals. If the cams are not flush in the journals it is probable that the cam caps will break during reinstallation.

(RH BANK SHOWN)



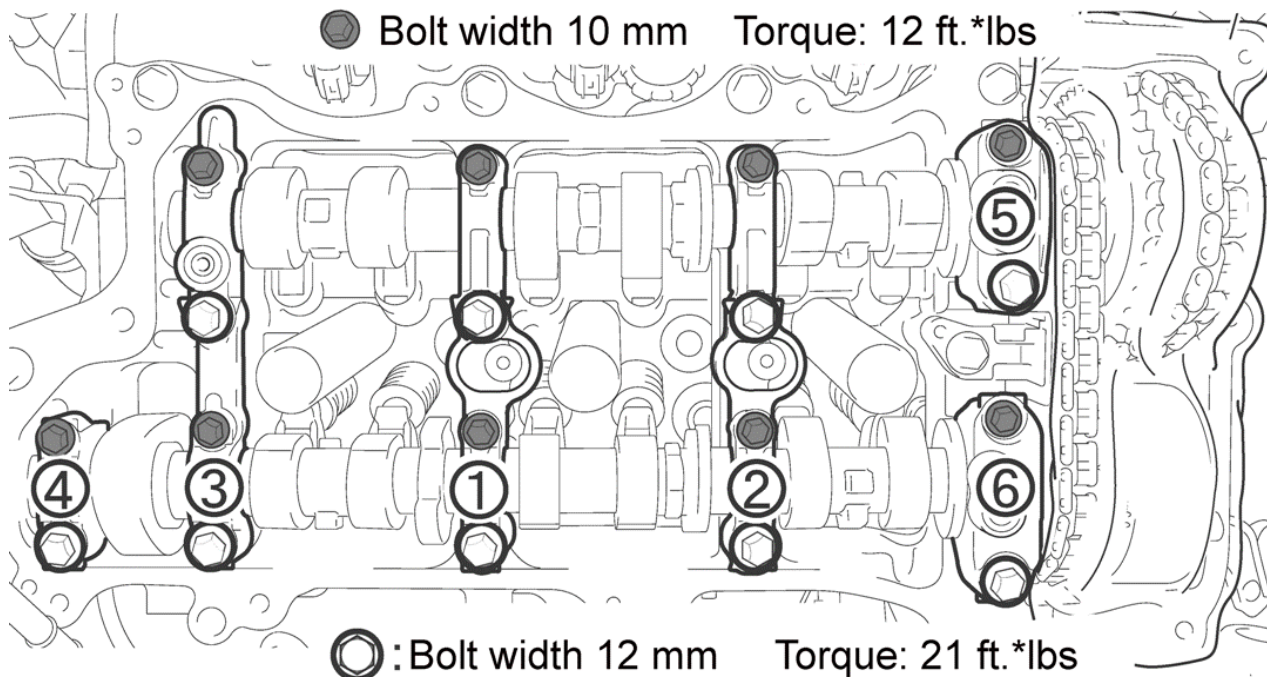
RH BANK TIMING MARKS

- Align the yellow chain link with the hole on the intake VVT gear.
- Align the other yellow chain link with the groove on the exhaust VVT gear.

(RH BANK SHOWN)

Reinstall the bearing caps in the sequence shown below (RH bank)

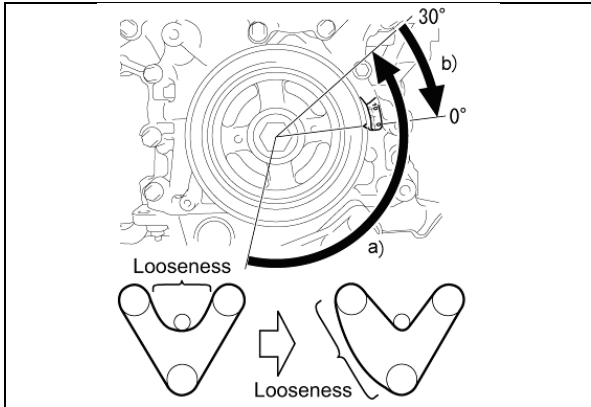
● Bolt width 10 mm Torque: 12 ft.*lbs



○ Bolt width 12 mm Torque: 21 ft.*lbs

XI. TIMING CHAIN TENSIONER AND VALVE COVER REINSTALLATION

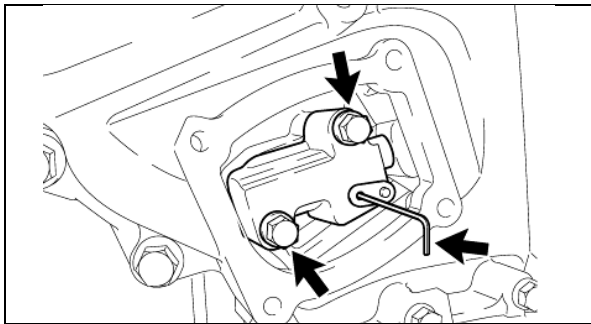
If the chain becomes trapped or skips, see the appendix for service hints



1. VALVE TIMING CHECK

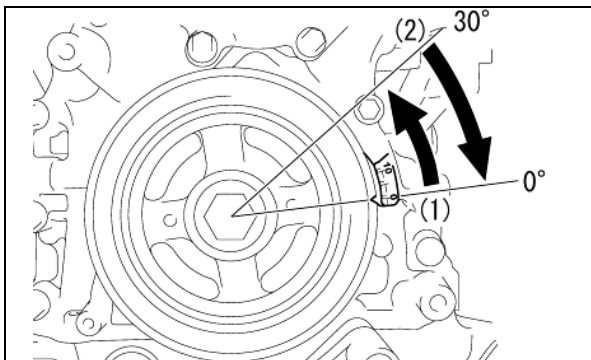
- Rotate the crankshaft back to approximately 30° before TDC.
- Rotate the crankshaft back to TDC.

NOTE: This step provides the space necessary to reinstall the tensioner.



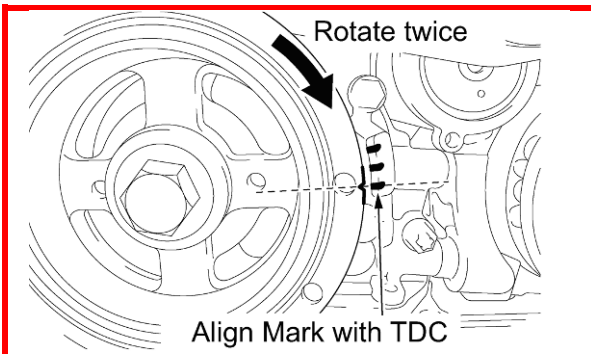
- Install the tensioner and torque to spec.
- Remove the pin.

Torque: 7 ft.lbf (10N·m)



- Rotate the crankshaft 30° counterclockwise.
- Rotate the crankshaft back to TDC.

NOTE: This step provides the proper tension to the chain.

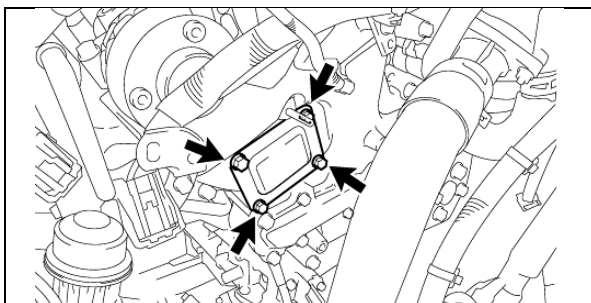


- Rotate the engine 720° and stop at the TDC mark.

NOTE: Pay close attention for any binding or abnormalities. If the engine does not rotate smoothly, diagnose and repair before completing reassembly steps.

- Reconfirm the timing marks are still perfectly aligned, realign as necessary.

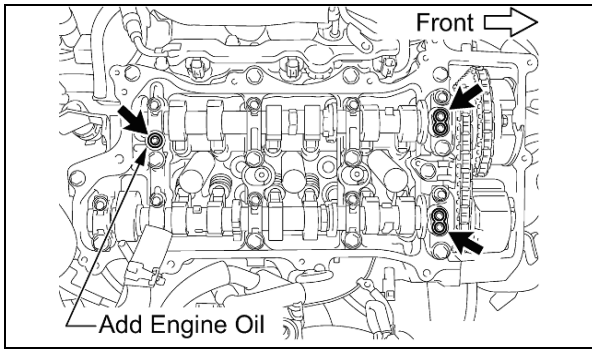
NOTE: the painted markings on the chain will not realign after the engine has been rotated.



- Install a **NEW** gasket.
- Reinstall the tensioner cover and bolts and torque to spec.

Torque: 80 in.lbf (9.0N·m)

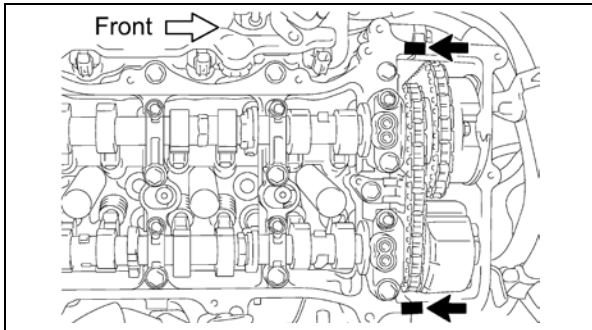
Gasket: p/n 11328-31030



2. REINSTALL THE VALVE COVER RH

- a) Install the 3 **NEW** gaskets into the bearing caps.
- b) Pour oil into the hole illustrated.

Bearing cap o-ring: (1 hole) p/n 90430-10024
Camshaft oil hole gaskets: (2 holes) p/n 11159-31010



- c) Degrease and dry the valve cover bolts and mounting surface.
- d) Install the **NEW** gasket into the valve cover.
- e) Apply FIPG to the points illustrated and within 3 minutes attach and bolt down the valve cover.

Valve cover gasket RH: p/n 11213-31040

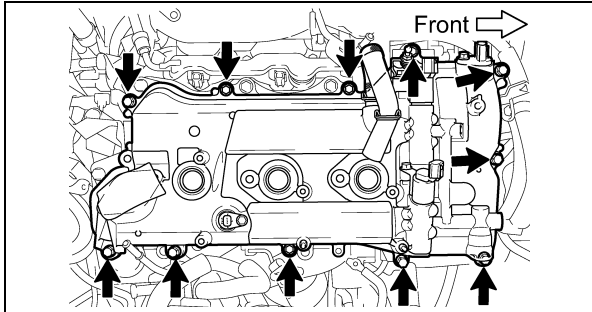
Valve cover gasket LH: p/n 11214-31020



Wait 2 hours before starting the engine after applying FIPG.

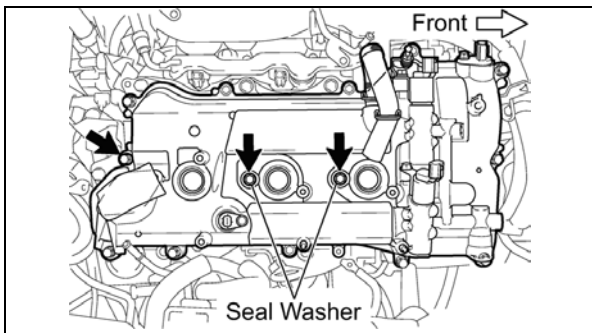
- f) Apply adhesive 1324 to the threads and install the valve cover bolts. Do not torque yet.

Adhesive 1324 p/n: 08833-00070 (thread-locker)



- g) Install the **NEW** seal washers
- h) Install the 3 bolts.

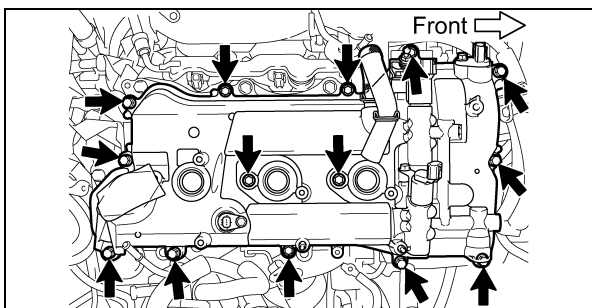
Seal washer p/n: 90210-06013



- i) Torque the bolts in several increments.

Torque:

- Bolt width 10 mm: 7 ft. lbf (10N·m)
- Bolt width 12 mm: 15ft. lbf (21N·m)



STOP

CRITICAL INFORMATION – READ THOROUGHLY

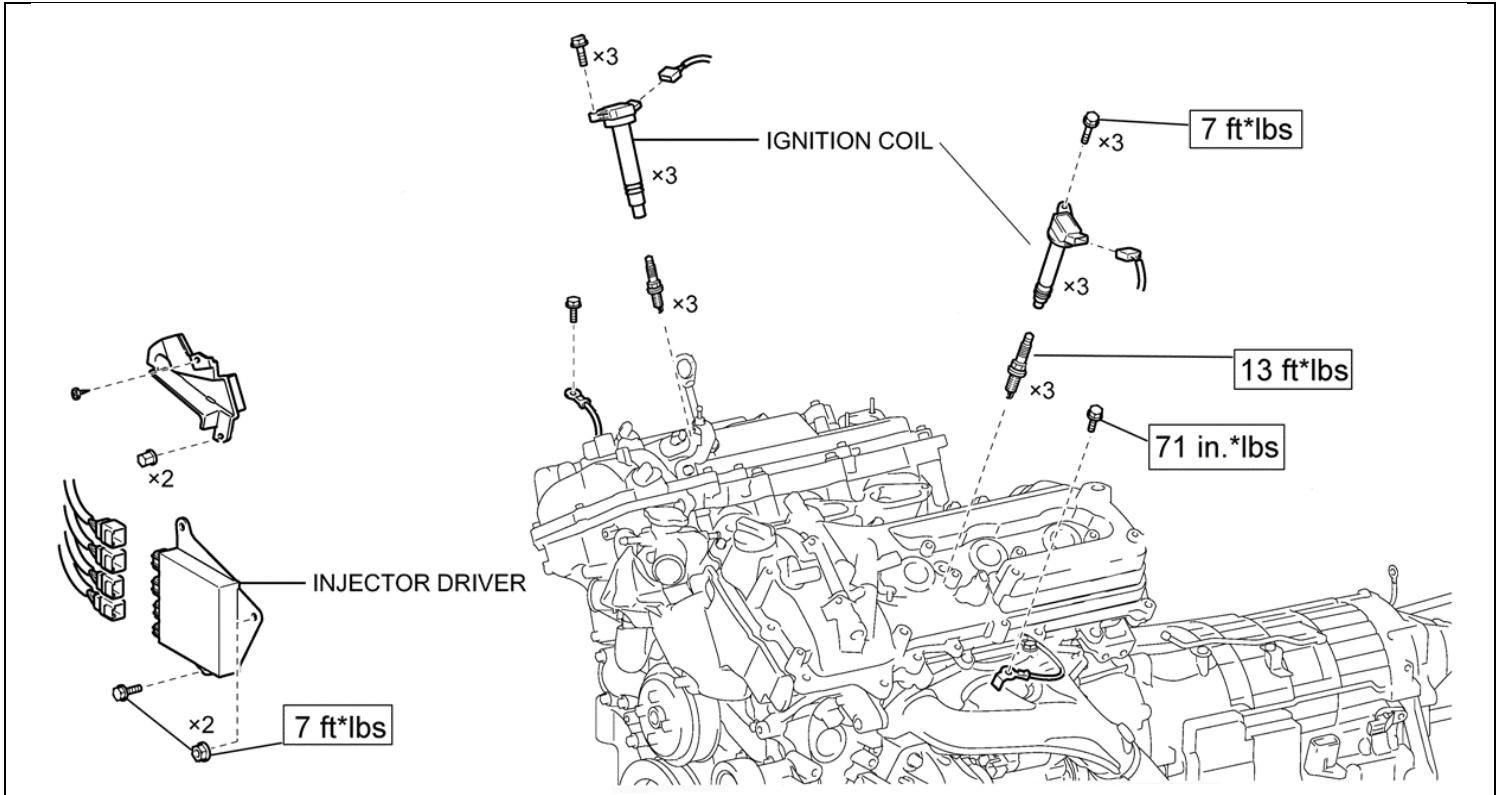
STOP

Repeat STEP 2. REINSTALL THE VALVE COVER for the LH bank

NOTE: The LH bank only has 1 seal washer

XII. AUXILIARY ENGINE COMPONENT REINSTALLATION

1. REINSTALL THE IGNITION AND OIL COMPONENTS

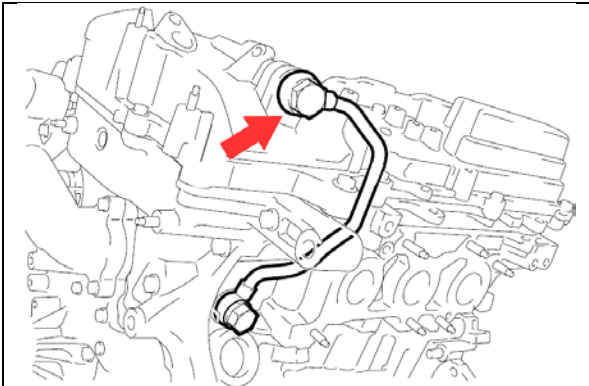


2. RECONNECT THE TOP SIDE OF THE OIL PIPES (BOTH LH & RH SIDES)

No.1 Gasket : p/n 90430-16012

Torque: 44 ft.lbf (60N·m)

NOTE: DO NOT forget to install **NEW** washer gaskets.

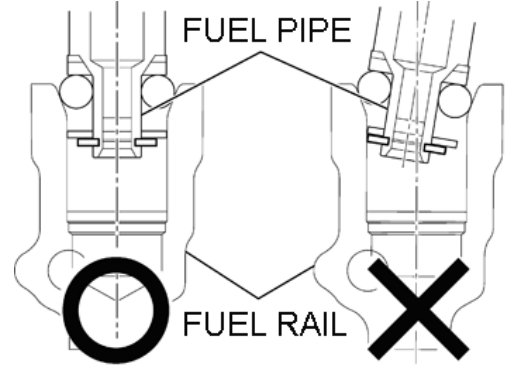
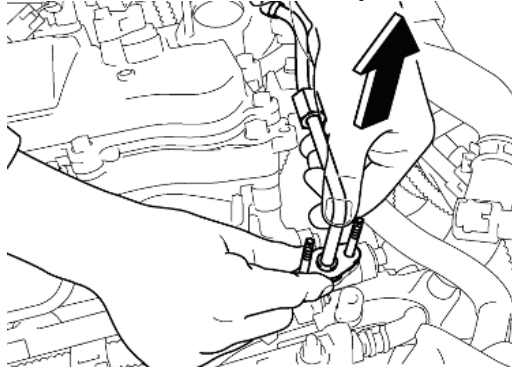


3. REINSTALL THE FUEL COMPONENTS

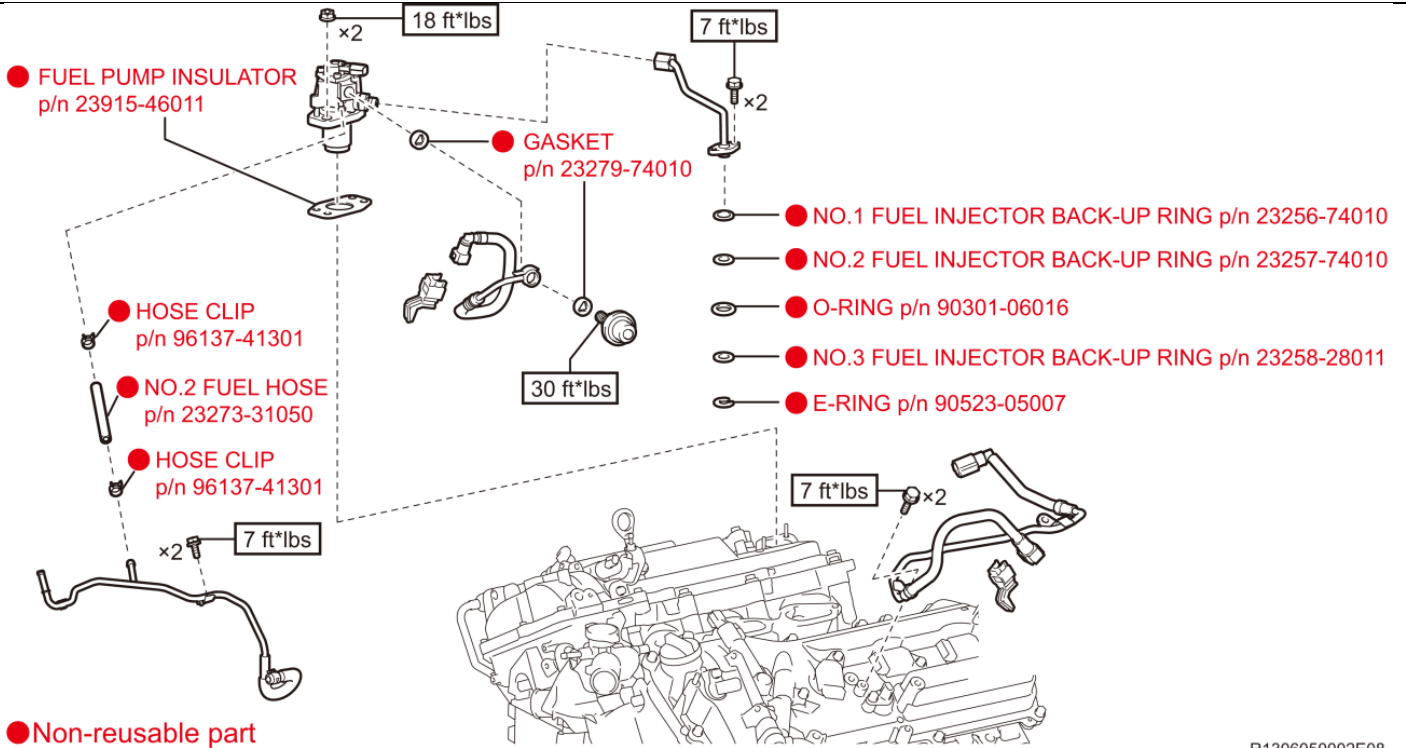


- **NEVER** have an ignition source nearby when working on the fuel system.
- **ALWAYS** wear protective eyewear when working on the fuel system.
- To prevent fuel from spraying, cover the fuel lines with towels before disconnecting.

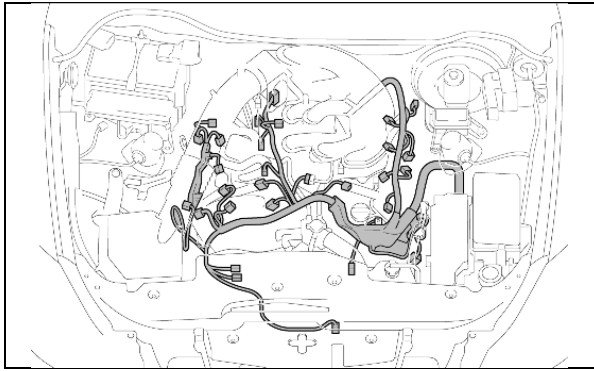
Pull the fuel pipe straight up to prevent fuel rail damage.
Use the provided campaign tool stud bolts for assistance.



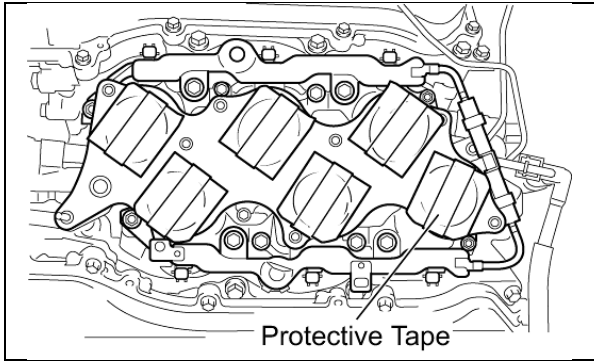
Pulling at an angle can cause scratches and nicks which will potentially cause fuel leaks.



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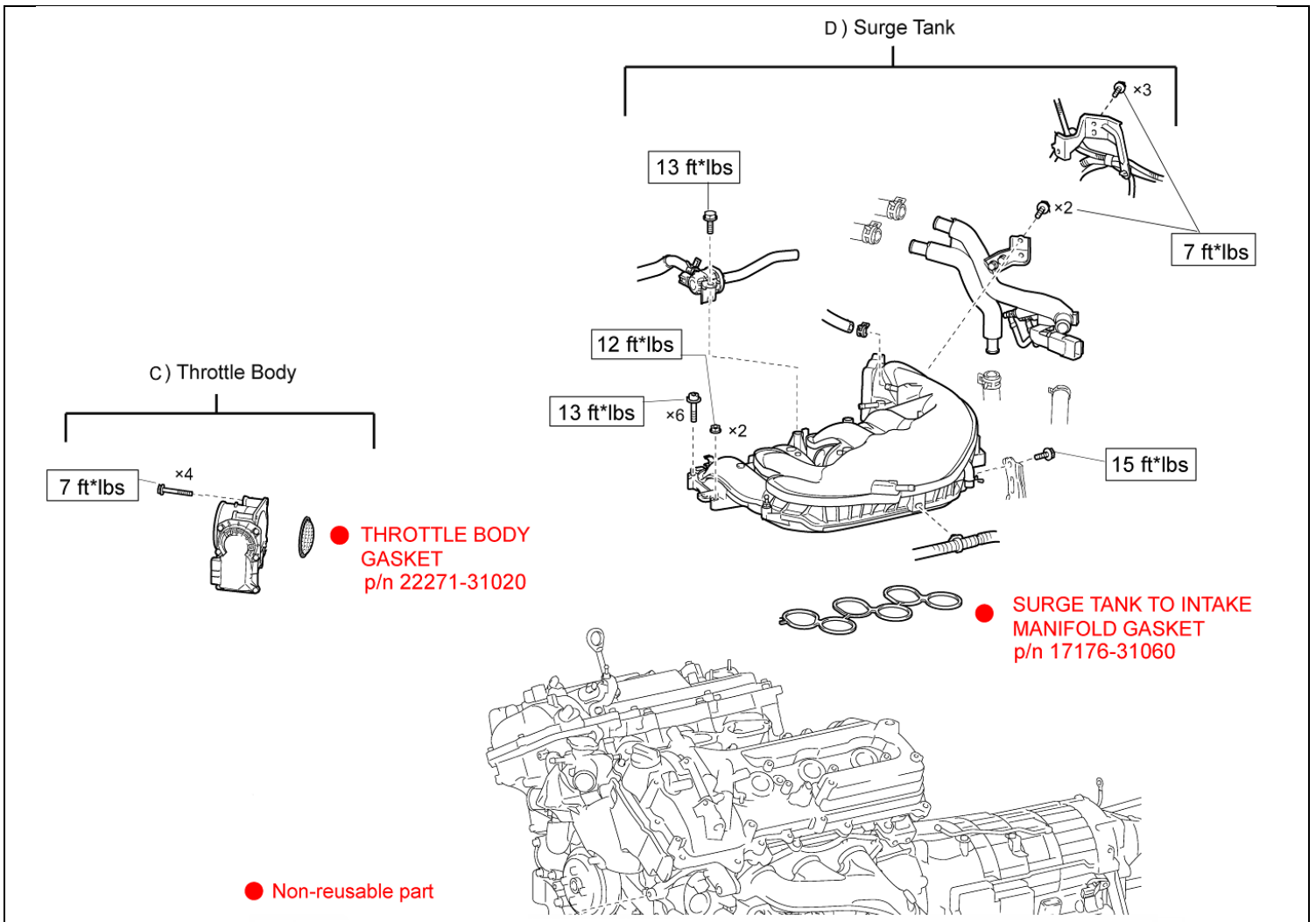


4. REINSTALL THE WIRE HARNESS

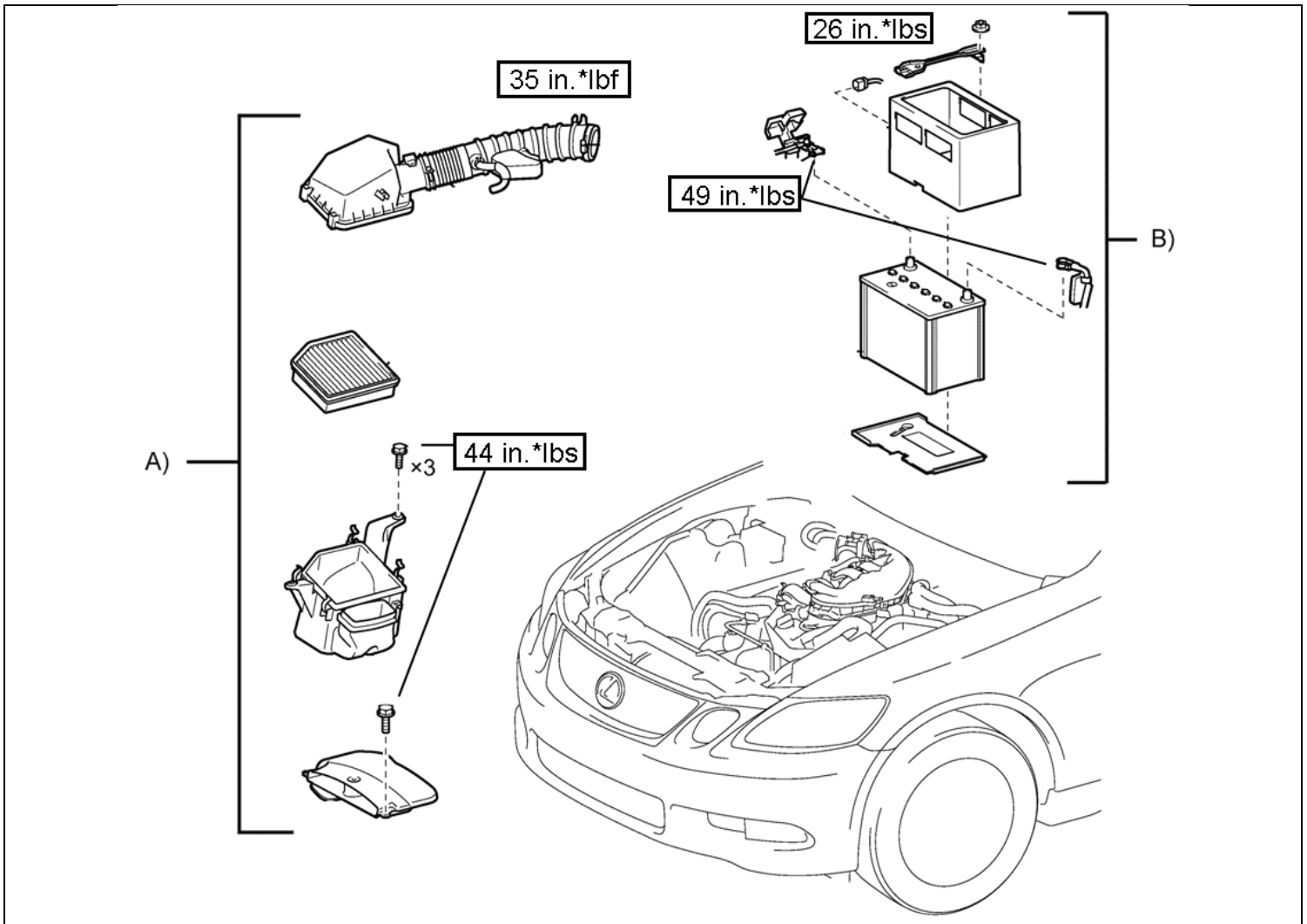


5. REMOVE THE TAPE FROM THE INTAKE MANIFOLD

6. REINSTALL COMPONENT GROUPS C-D



7. REINSTALL COMPONENT GROUPS A-B



8. REINSTALL THE GAS CAP
9. INSPECT FOR OIL LEAKS
10. INSPECT FOR FUEL LEAKS



Check that there are NO fuel leaks anywhere in the fuel system. If there is a fuel leak, repair or replace parts as necessary.

11. PERFORM SYSTEMS INITIALIZATIONS
12. CHECK FOR DTCs AND REPAIR AS NEEDED
13. TEST DRIVE THE VEHICLE



Perform a thorough test drive to confirm valve train components were installed correctly.

14. REINSTALL THE ENGINE ROOM COVERS

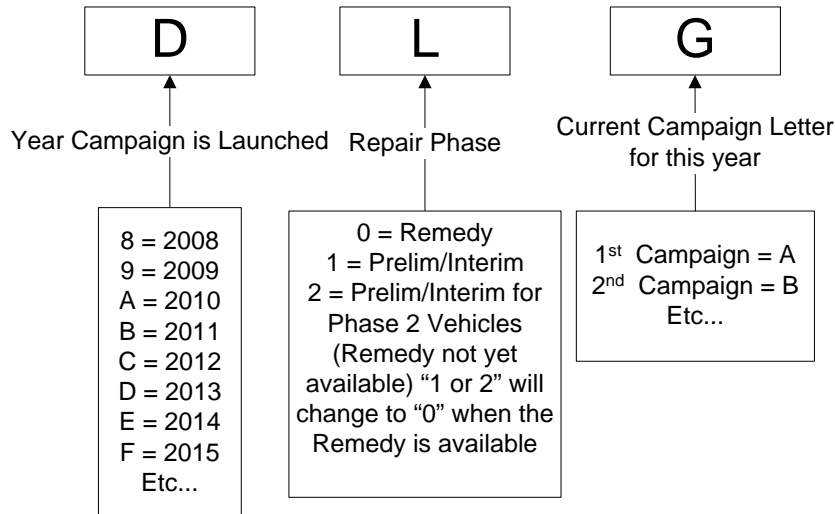
◀ VERIFY REPAIR QUALITY ▶

- Confirm the new camshaft gears are installed correctly
- Confirm the engine timing is set correctly
- Confirm all systems function correctly and that there are no leaks upon completion

If you have any questions regarding this update, please contact your area representative.

XIII. APPENDIX

A. CAMPAIGN DESIGNATION DECODER



B. CAMPAIGN PARTS DISPOSAL

As required by Federal Regulations, please make sure all campaign parts (original parts) removed from the vehicle are disposed of in a manner in which they will not be reused, ***unless requested for parts recovery return.***

C. COUNTERMEASURES IN THE EVENT OF CHAIN TRAPPING OR TOOTH SKIPPING

1. MEASURES IN THE EVENT OF TRAPPING

- Chain trapping is due to a kink in the chain and even forcefully turning the crankshaft will not release it.
- Find a point where the chain can be released (rotated) by rotating the crankshaft and camshafts of the RH and LH banks respectively clockwise or counterclockwise.
- It is helpful to have one technician pull the chain very tightly while another technician rotates the camshafts and crankshaft to unbind the chain.

2. MEASURES IN THE EVENT OF TOOTH SKIPPING

- In the event of tooth skipping, correct the tooth position one-by-one by using the free-play of the chain.
 - When the shaft is rotated, free-play of the chain gathers in the pushed portion of the chain.
- Then the chain can be shifted by one tooth using the free-play.

