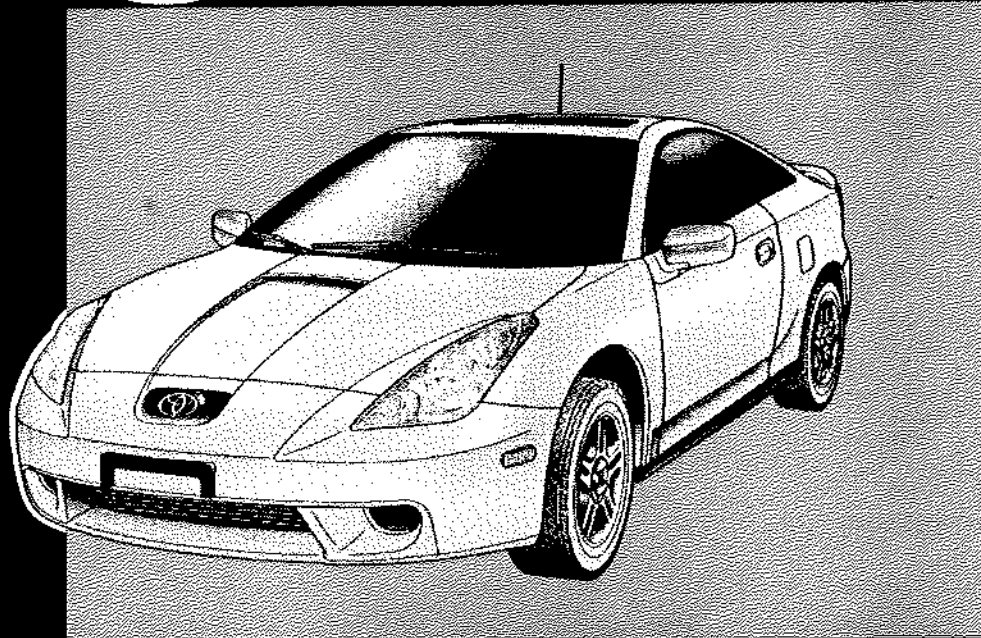


# 2000

 **TOYOTA**



# REPAIR MANUAL

- ENGINE
- CHASSIS
- BODY
- ELECTRICAL

**CELICA**

# FOREWORD

This manual (Volume 2) contains repair procedures for the engine, chassis and body, and electrical service procedures for the 2000 CELICA.

Applicable models: ZTZ230, 231 series

For maintenance, preparation, specifications and diagnostics service procedures, refer to VOLUME 1 (Pub. No. RM744U1).

The manual is divided into 21 sections with a thumb index for each section at the edge of the pages.

Please note that the publications below have also been prepared as relevant service manuals for the components and systems in this vehicles.

Manual Name	Pub. No.
• U240E Automatic Transaxle Repair Manual (Aug., 1999)	RM740U
• U340E, U341E Automatic Transaxle Repair Manual (Aug., 1999)	RM735U
• 2000 CELICA Electrical Wiring Diagram	EWD399U
• 2000 CELICA New Car Features	NCF169U

All information in this manual is based on the latest product information at the time of publication. However, specifications and procedures are subject to change without notice.

**TOYOTA MOTOR CORPORATION**

**©2000 TOYOTA MOTOR CORPORATION**

All rights reserved. This book may not be reproduced or copied, in whole or in part, without the written permission of Toyota Motor Corporation.

First Printing: Jul. 14, 1999 01-990714-00

Fourth Printing: Mar. 14, 2000 04-000314-01

## CAUTION

This manual does not include all the necessary items about repair and service. This manual is made for the purpose of the use for the persons who have special techniques and certifications. In the cases that non-specialized or uncertified technicians perform repair or service only using this manual or without proper equipment or tool, that may cause severe injury to you or other people around and also cause damage to your customer's vehicle.

In order to prevent dangerous operation and damages to your customer's vehicle, be sure to follow the instruction shown below.

- Must read this manual thoroughly. It is especially important to have good understanding all the contents written in the PRECAUTION of "IN" section.
- The service method written in this manual is very effective to perform repair and service. When performing the operations following the procedures using this manual, be sure to use tools specified and recommended. If using non-specified or recommended tools and service method, be sure to confirm safety of the technicians and any possibility of causing personal injury or damage to the customer's vehicle before starting the operation.
- If part replacement is necessary, must replace the part with the same part number or equivalent part. Do not replace it with inferior quality.
- It is important to note that this manual contains various "Cautions" and "Notices" that must be carefully observed in order to reduce the risk of personal injury during service or repair, or the possibility that improper service or repair may damage the vehicle or render it unsafe. It is also important to understand that these "Cautions" and "Notices" are not exhaustive, because it is important to warn of all the possible hazardous consequences that might result from failure to follow these instructions.

NOTE: The screen toned sections below are in VOLUME 1  
(Pub. No. RM744U1).

GENERAL INFORMATION	GI
STANDARD EQUIPMENT	SE
PREPARATION	PR
SERVICE SPECIFICATIONS	SS
DIAGNOSIS	DI
<b>ENGINE MECHANICAL</b>	<b>EM</b>
<b>EMISSION CONTROL</b>	<b>EC</b>
<b>SFI</b>	<b>SF</b>
<b>COOLING</b>	<b>CO</b>
<b>LUBRICATION</b>	<b>LU</b>
<b>IGNITION</b>	<b>IG</b>
<b>STARTING</b>	<b>ST</b>
<b>CHARGING</b>	<b>CH</b>
<b>CLUTCH</b>	<b>CL</b>
<b>C56 MANUAL TRANSAXLE</b>	<b>MX</b>
<b>C60 MANUAL TRANSAXLE</b>	<b>MX</b>
<b>U240E AUTOMATIC TRANSAXLE</b>	<b>AX</b>
<b>U341E AUTOMATIC TRANSAXLE</b>	<b>AX</b>
<b>SUSPENSION AND AXLE</b>	<b>SA</b>
<b>BRAKE</b>	<b>BR</b>
<b>STEERING</b>	<b>SR</b>
<b>SUPPLEMENTAL RESTRAINT SYSTEM</b>	<b>RS</b>
<b>BODY ELECTRICAL</b>	<b>BE</b>
<b>BODY</b>	<b>BO</b>
<b>AIR CONDITIONING</b>	<b>AC</b>
<b>ALPHABETICAL INDEX</b>	<b>ID</b>

---

# ENGINE MECHANICAL

CO/HC .....	EM-1
COMPRESSION .....	EM-3
VALVE CLEARANCE .....	EM-4
IGNITION TIMING .....	EM-13
IDLE SPEED .....	EM-14
TIMING CHAIN .....	EM-15
CYLINDER HEAD .....	EM-36
ENGINE UNIT .....	EM-70
CYLINDER BLOCK .....	EM-85
EXHAUST SYSTEM .....	EM-115

**EM**

## CO/HC INSPECTION

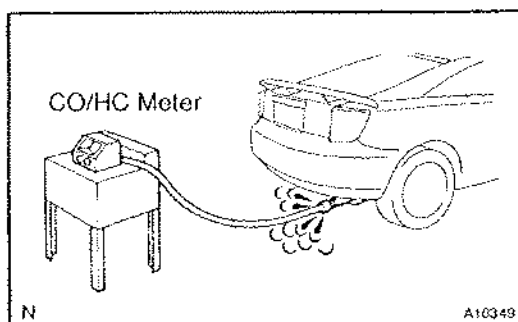
EM-1-1

### HINT:

This check is used only to determine whether or not the idle CO/HC complies with regulations.

1. **INSTALL CONDITIONS**
  - (a) Engine at normal operating temperature
  - (b) Air cleaner installed
  - (c) Air pipes and hoses of air induction system connected
  - (d) All accessories switched OFF
  - (e) All vacuum lines properly connected
  - (f) SFI system wiring connectors fully plugged
  - (g) Ignition timing check correctly
  - (h) Transmission in neutral position
  - (i) Tachometer and CO/HC meter calibrated by hand
2. **START ENGINE**
3. **RACE ENGINE AT 2,500 RPM FOR APPROX. 180 SECONDS**

EM



4. **INSERT CO/HC METER TESTING PROBE AT LEAST 40 cm (1.3 ft) INTO TAILPIPE DURING IDLING**
5. **IMMEDIATELY CHECK CO/HC CONCENTRATION AT IDLE AND/OR 2,500 RPM**

Complete the measuring with 3 minutes.

### HINT:

When doing the 2 mode (idle and 2,500 rpm) test, these measurement order prescribed by the applicable local regulations.

If the CO/HC concentration does not comply with regulations, troubleshoot in the order given below.

- Check heated oxygen sensor operation (See page DI-49).
- See the table below for possible causes, and then inspect and correct the applicable causes if necessary.

CO	HC	Problems	Causes
Normal	High	Rough idle	1. Faulty ignitions: <ul style="list-style-type: none"> <li>• Incorrect timing</li> <li>• Fouled, shorted or improperly gapped plugs</li> <li>• Open or crossed high-tension cords</li> </ul> 2. Incorrect valve clearance 3. Leaky intake and exhaust valves 4. Leaky cylinders
Low	High	Rough idle (Fluctuating HC reading)	1. Vacuum leaks: <ul style="list-style-type: none"> <li>• PCV hoses</li> <li>• Intake manifold</li> <li>• Throttle body</li> <li>• IAC valve</li> <li>• Brake booster line</li> </ul> 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2. Plugged PCV valve 3. Faulty SFI systems: <ul style="list-style-type: none"> <li>• Faulty pressure regulator</li> <li>• Defective ECT sensor</li> <li>• Defective IAT sensor</li> <li>• Faulty ECM</li> <li>• Faulty injectors</li> <li>• Faulty throttle position sensor</li> </ul>

## COMPRESSION INSPECTION

EM3A-00

### HINT:

If there is lack of power, excessive oil consumption or poor fuel economy, measure the compression pressure.

#### 1. WARM UP AND STOP ENGINE

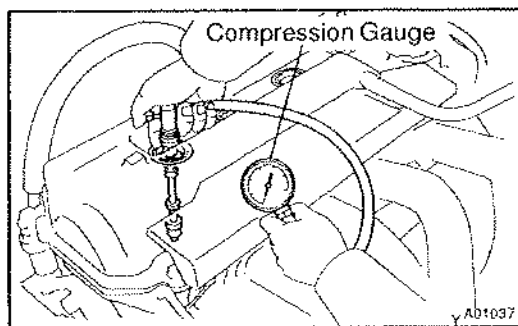
Allow the engine to warm up to normal operating temperature.

#### 2. REMOVE IGNITION COIL (See page IG-6)

#### 3. REMOVE SPARK PLUGS

#### 4. INSPECT CYLINDER COMPRESSION PRESSURE

- (a) Insert a compression gauge into the spark plug hole.
- (b) Fully open the throttle.
- (c) While cranking the engine, measure the compression pressure.



### HINT:

Always use a fully charged battery to obtain engine speed of 250 rpm or more.

- (d) Repeat steps (a) through (c) for each cylinder.

### NOTICE:

This measurement must be done in as short a time as possible.

#### Compression pressure:

1ZZ-FE 1,500 kPa (15.3 kgf/cm<sup>2</sup>, 218 psi)

2ZZ-GE 1,400 kPa (14.3 kgf/cm<sup>2</sup>, 203 psi) or more

#### Minimum pressure:

1ZZ-FE 1,000 kPa (10.2 kgf/cm<sup>2</sup>, 145 psi)

2ZZ-GE 1,000 kPa (10.2 kgf/cm<sup>2</sup>, 145 psi)

#### Difference between each cylinder:

1ZZ-FE 100 kPa (1.0 kgf/cm<sup>2</sup>, 15 psi) or less

2ZZ-GE 110 kPa (1.1 kgf/cm<sup>2</sup>, 16 psi) or less

- (e) If the cylinder compression in one more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat steps (a) through (c) for cylinders with low compression.
  - If adding oil helps the compression, it is likely that the piston rings and/or cylinder bore are worn or damaged.
  - If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket.

#### 5. REINSTALL SPARK PLUGS

#### 6. INSTALL IGNITION COIL (See page IG-7)

EM



# VALVE CLEARANCE ADJUSTMENT

EM150-C1

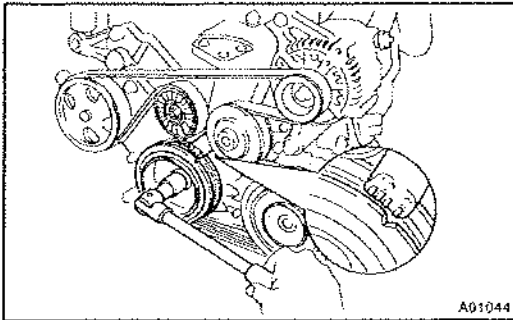
## HINT:

Inspect and adjust the valve clearance when the engine is cold.

- 1. REMOVE CYLINDER HEAD COVER**  
(See page EM-18)

- 2. SET NO. 1 CYLINDER TO TDC/COMPRESSION**

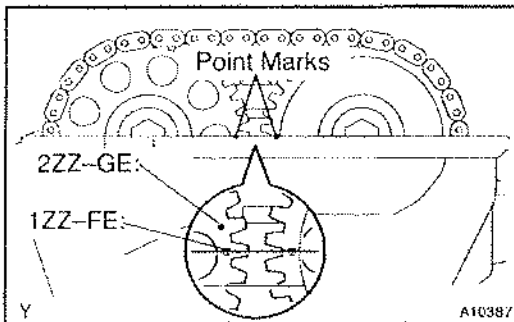
- Turn the crankshaft pulley, and align its groove with the timing mark "0" of the timing chain cover.



A01044

- Check that the point marks of the camshaft timing sprockets are in straight line on the timing chain cover surface as shown in the illustration.

If not, turn the crankshaft 1 revolution (360°) and align the marks as above.



A10387

- 3. INSPECT VALVE CLEARANCE**

- Check only the valves indicated.

- Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
- Record the out-of-specification valve clearance measurements. They will be used later to determine the required replacement adjusting shim.

### Valve clearance (Cold):

#### 1ZZ-FE:

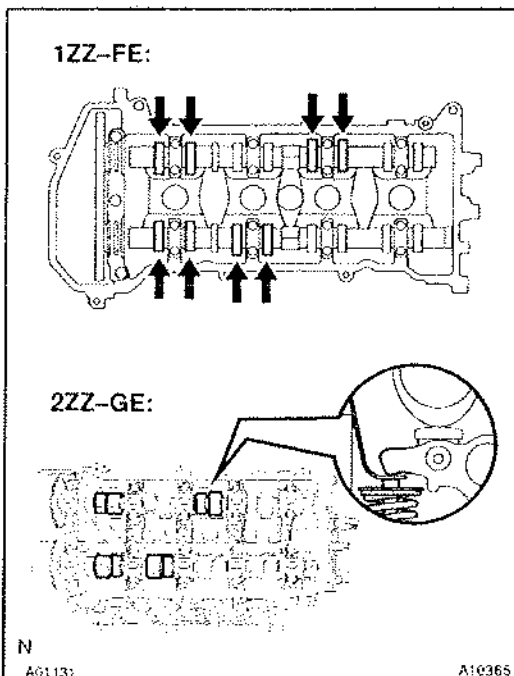
Intake 0.15 – 0.25 mm (0.006 – 0.010 in.)

Exhaust 0.25 – 0.35 mm (0.010 – 0.014 in.)

#### 2ZZ-GE:

Intake 0.15 – 0.25 mm (0.006 – 0.010 in.)

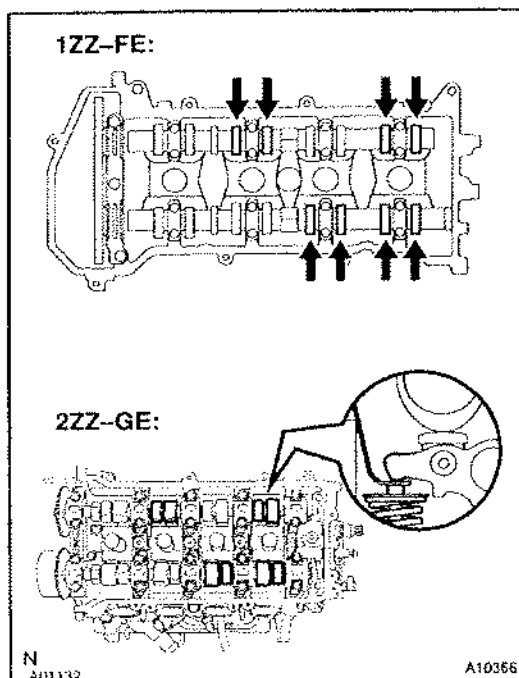
Exhaust 0.35 – 0.45 mm (0.014 – 0.018 in.)



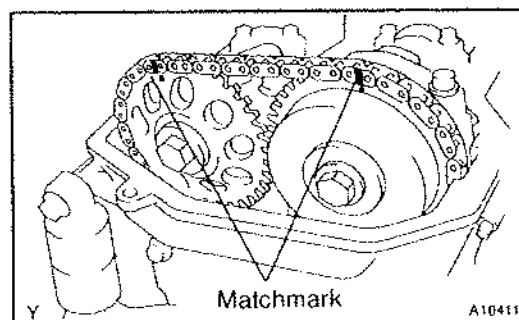
N

A01133

A10365

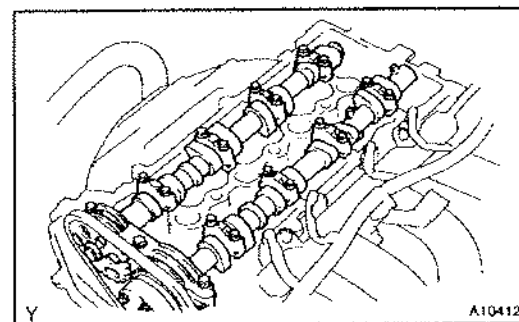


- (b) Turn the crankshaft 1 revolution ( $360^\circ$ ) and align the mark as above (See procedure in step 2).
- (c) Check only the valves indicated as shown. Measure the valve clearance (See procedure in step (a)).



#### 4. 1ZZ-FE: ADJUST VALVE CLEARANCE

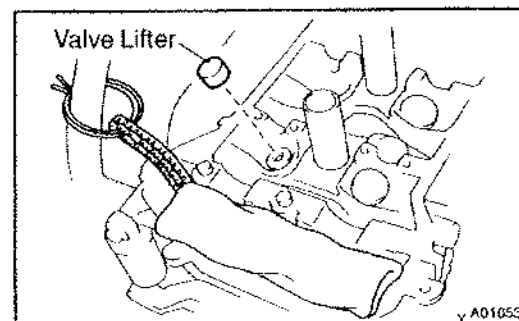
- (a) Set the No. 1 cylinder to the TDC/compression (See procedure in step 2).
- (b) Place matchmarks on the timing chain and camshaft timing sprockets.
- (c) Remove the 2 bolts and chain tensioner.



- (d) Remove the camshaft and timing sprocket assemblies (See page EM-42).
- (1) 19 camshaft bearing cap bolts
  - (2) 9 camshaft bearing caps (No. 1 & No. 3)
  - (3) Exhaust camshaft and timing sprocket assembly
  - (4) Intake camshaft and timing sprocket assembly

#### HINT:

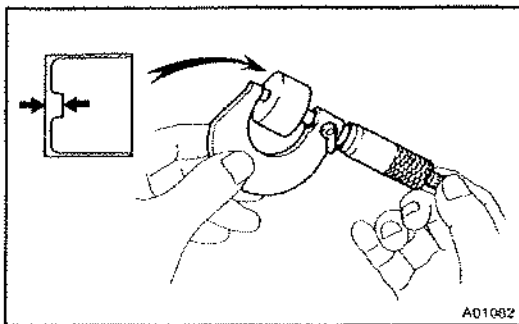
When disconnect the timing chain from the camshaft timing sprocket, holding the timing chain.



- (e) Tie the timing chain with a string as shown in the illustration.

#### NOTICE:

- Be careful not to drop anything inside the timing chain cover.
  - Do not allow the chain to come into contact with water or dust.
- (f) Remove the valve lifters.



(g) Determine the replacement valve lifter size according to these Formula or Charts:

- Using a micrometer, measure the thickness of the removed lifter.
- Calculate the thickness of a new lifter so the valve clearance comes within the specified value.

T..... Thickness of used lifter

A..... Measured valve clearance

N..... Thickness of new lifter

Intake:  $N = T + (A - 0.20 \text{ mm (0.008 in.)})$

Exhaust:  $N = T + (A - 0.30 \text{ mm (0.012 in.)})$

- Select a new lifter with a thickness as close as possible to the calculated values.

HINT:

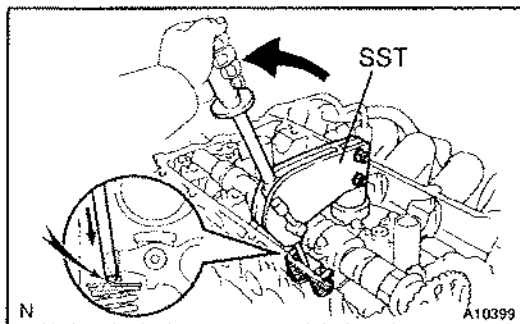
Lifter are available in 35 sizes in increments of 0.020 mm (0.0008 in.), from 5.060 mm (0.1992 in.) to 5.740 mm (0.2260 in.).

### 5. 2ZZ-GE:

#### ADJUST VALVE CLEARANCE

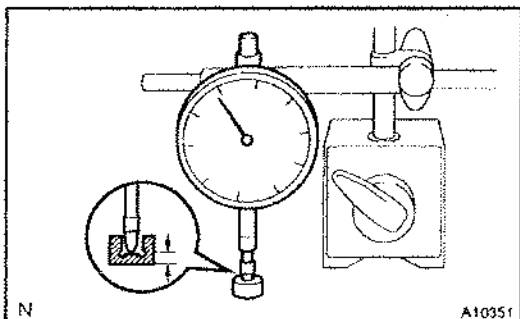
(a) Remove the adjusting shim.

- (1) Turn the crankshaft so that the cam lobe of camshaft on the adjusting valve points upward.



(2) Using SST, press down the valve.

(3) Using SST, remove the adjusting shim.



(4) Determine the replacement shim size according to these Formula or Charts:

- Using dial indicator, measure the thickness of the removed shim.
- Calculate the thickness of a new shim so the valve clearance comes within the specified value.

**T..... Thickness of used shim**

**A..... Measured valve clearance**

**N..... Thickness of new shim**

**Intake:  $N = T + (A - 0.20 \text{ mm (0.008 in.)})$**

**Exhaust:  $N = T + (A - 0.40 \text{ mm (0.016 in.)})$**

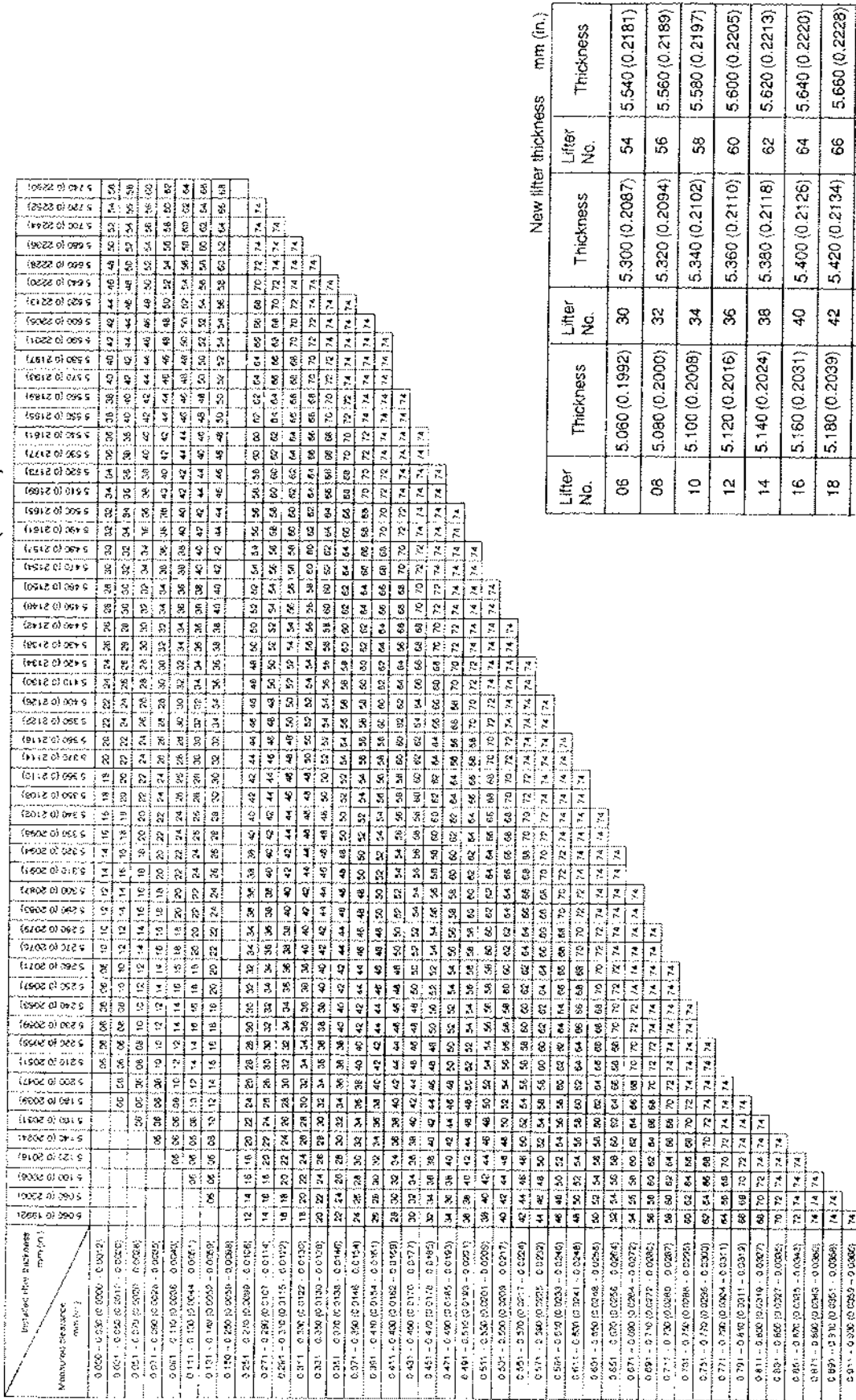
- Select a new shim with a thickness as close as possible to the calculated values.

**HINT:**

Shim are available in 41 size in increments of 0.020 mm (0.0008 in.), from 2.000 mm (0.0787 in.) to 2.800 mm (0.1102 in.).

EM

1ZZ-FE Valve Lifter Selection Chart (Intake)



**Intake valve clearance (Cold):**  
**0.15 - 0.25 mm (0.006 - 0.010 in.)**  
**EXAMPLE:** The 5.250 mm (0.207 in.) lifter is installed, and the measured clearance is 0.400 mm (0.0157 in.).  
 Replace the 5.250 mm (0.207 in.) lifter with a new No. 48 lifter.

ENGINE MECHANICAL - VALVE CLEARANCE

1ZZ-FE: Valve Lifter Selection Chart (Exhaust)

Measured valve clearance mm (in.)	Overhead lifter thickness mm (in.)	New lifter thickness mm (in.)																											
		Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness		
0.00 - 0.030 (0.000 - 0.012)		06	5.340 (0.210)	07	5.400 (0.213)	08	5.460 (0.216)	09	5.520 (0.219)	10	5.580 (0.222)	11	5.640 (0.225)	12	5.700 (0.228)	13	5.760 (0.231)	14	5.820 (0.234)	15	5.880 (0.237)	16	5.940 (0.240)	17	6.000 (0.243)	18	6.060 (0.246)	19	6.120 (0.249)

**Exhaust valve clearance (Cold):**  
 0.25 - 0.35 mm (0.010 - 0.014 in.)  
**EXAMPLE:** The 5.340 mm (0.210 in.) lifter is installed, and the measured clearance is 0.440 mm (0.0173 in.).  
 Replace the 5.340 mm (0.210 in.) lifter with a new No. 48 lifter.





ENGINE MECHANICAL VALVE CLEARANCE

2ZZ-GE: Valve Shim Selection Chart (Exhaust)

Table with columns for installed shim thickness (mm and in.), measure dimension (mm and in.), and shim thickness (mm and in.). Includes a section for Exhaust valve clearance (Cold) with a 0.35 - 0.45 mm range and an example of shim replacement.

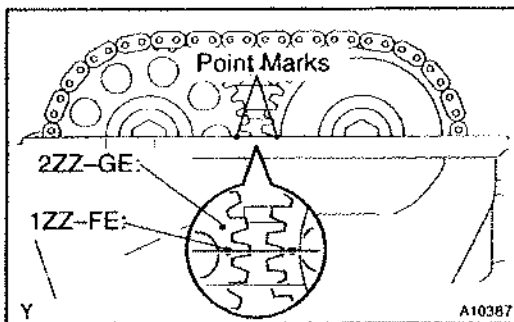
Exhaust valve clearance (Cold): 0.35 - 0.45 mm (0.014 - 0.018 in.) EXAMPLE: The 2.200 mm (0.0862 in.) shim is installed, and the measured clearance is 0.500 mm (0.0197 in.). Replace the 2.300 mm (0.0906 in.) shim with a new No. 30 shim.



## 6. 1ZZ-FE:

**REINSTALL CAMSHAFT**

- (a) Reinstall the valve lifters (See page EM-61).
- (b) Align the crankshaft pulley groove with the timing mark "0" of the timing chain cover.
- (c) Hold the timing chain, and place the intake camshaft and timing sprocket assembly.
- (d) Align the matchmarks on the timing chain and camshaft timing sprocket.
- (e) Reinstall the camshaft and timing sprocket assemblies (See page EM-65).



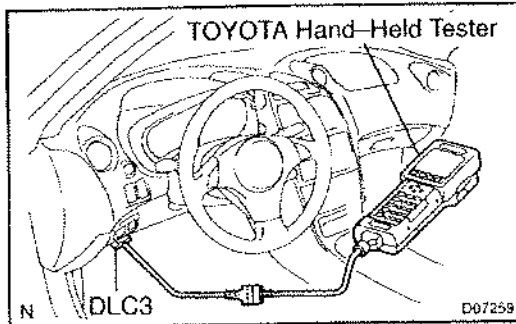
- (f) Check that the point marks of the camshaft timing sprockets are in straight line on the timing chain cover surface as shown in the illustration.
  - (g) Check that the matchmarks on the timing chain and camshaft timing sprockets.
  - (h) Install the chain tensioner (See page EM-25).
  - (i) Recheck the valve clearance (See procedure in step 3).
  - (j) Check the valve timing (See page EM-25).
7. **REINSTALL CYLINDER HEAD COVER**  
(See page EM-25)

## IGNITION TIMING INSPECTION

FM15P-01

### 1. WARM UP ENGINE

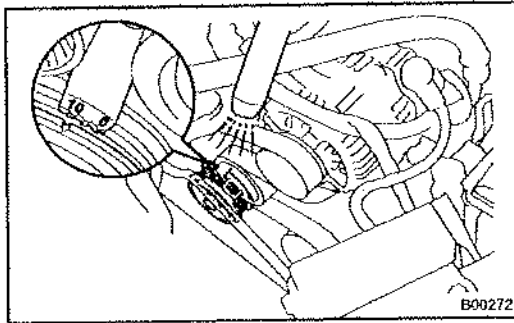
Allow the engine to warm up to normal operating temperature.



### 2. CONNECT TOYOTA HAND-HELD TESTER OR OBDII SCAN TOOL

- (a) Connect the TOYOTA hand-held tester or OBDII scan tool to the DLC3.
- (b) Please refer to the TOYOTA hand-held tester or OBDII scan tool operator's for further details.

### 3. CONNECT TIMING LIGHT TO ENGINE



### 4. INSPECT IGNITION TIMING

Using a timing light, check the ignition timing.

#### Ignition timing:

**1ZZ-FE:**

10 – 18° BTDC @ Idle

**2ZZ-GE:**

8 – 12° BTDC @ idle

(Transmission in neutral position)

#### HINT:

After engine rpm is kept at 1,000 – 1,300 rpm for 5 seconds, check that it returns to idle speed.

### 5. DISCONNECT TIMING LIGHT FROM ENGINE

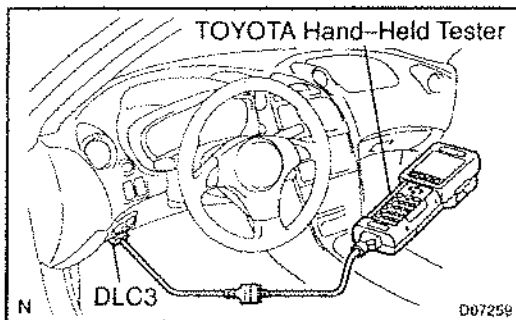
### 6. DISCONNECT TOYOTA HAND-HELD TESTER OR OBDII SCAN TOOL

## IDLE SPEED INSPECTION

EM02V-03

### 1. INSTALL CONDITIONS

- (a) Engine at normal operating temperature
- (b) Air cleaner installed
- (c) All pipes and hoses of air induction system connected
- (d) All vacuum lines properly connected
- (e) SFI system wiring connectors fully plugged
- (f) All operating accessories switched OFF
- (g) Ignition timing check correctly
- (h) Transmission in neutral position
- (i) Air conditioning switched OFF



### 2. CONNECT TOYOTA HAND-HELD TESTER OR OBDII SCAN TOOL

- (a) Connect the TOYOTA hand-held tester or OBDII scan tool to the DLC3.
- (b) Please refer to the TOYOTA hand-held tester or OBDII scan tool operator's manual for further details.

### 3. INSPECT IDLE SPEED

- (a) Race the engine at 2,500 rpm for approx. 90 seconds.
- (b) Check the idle speed.

**Idle speed (w/ Cooling fan OFF):**

**1ZZ-FE**

**M/T 700 ± 50 rpm**

**A/T 750 ± 50 rpm**

**2ZZ-GE**

**M/T 800 ± 50 rpm**

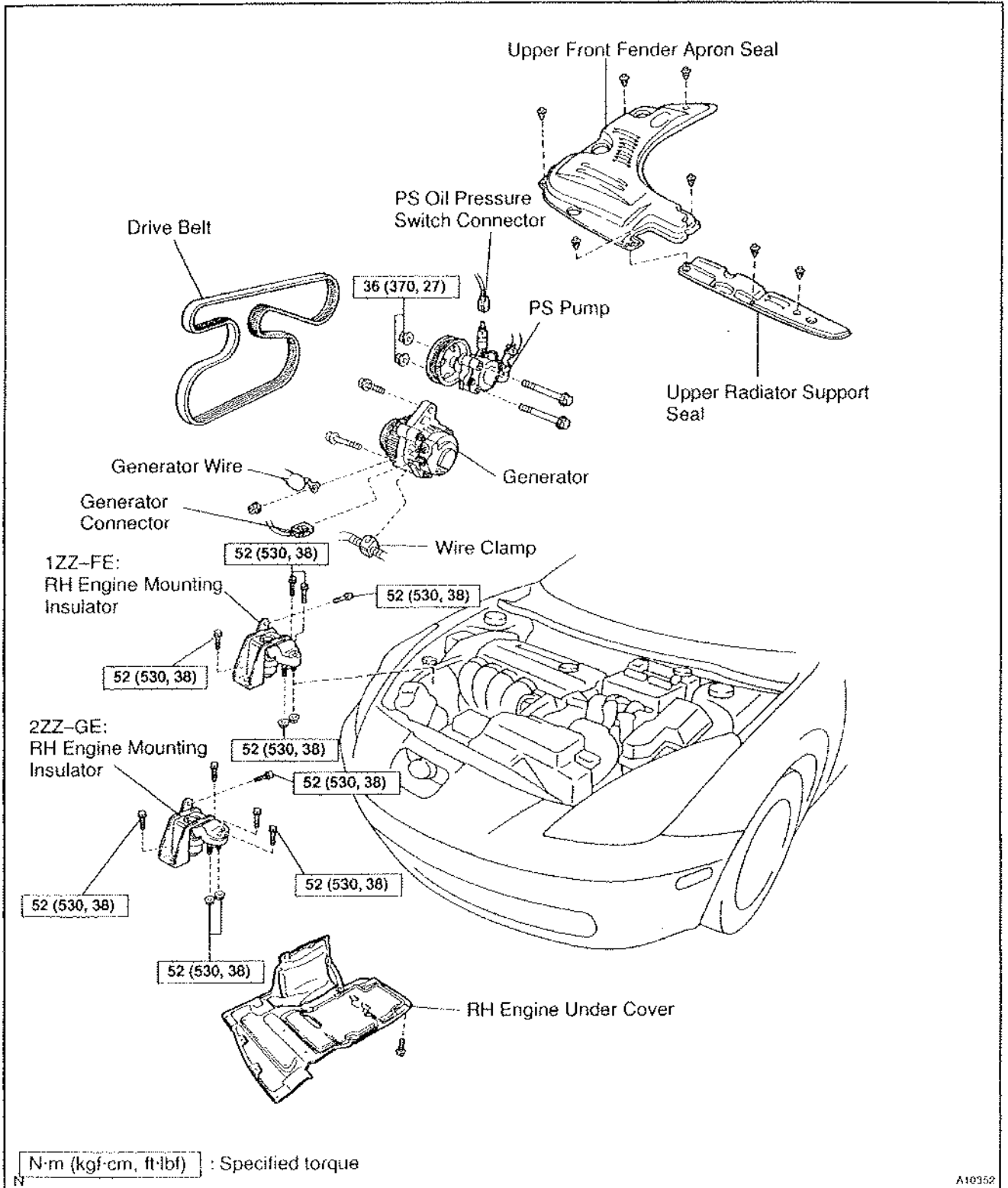
**A/T 750 ± 50 rpm**

If the idle speed is not as specified, check the IAC valve and air intake system.

### 4. DISCONNECT TOYOTA HAND-HELD TESTER OR OBDII SCAN TOOL

# TIMING CHAIN COMPONENTS

EM15E21



A10352