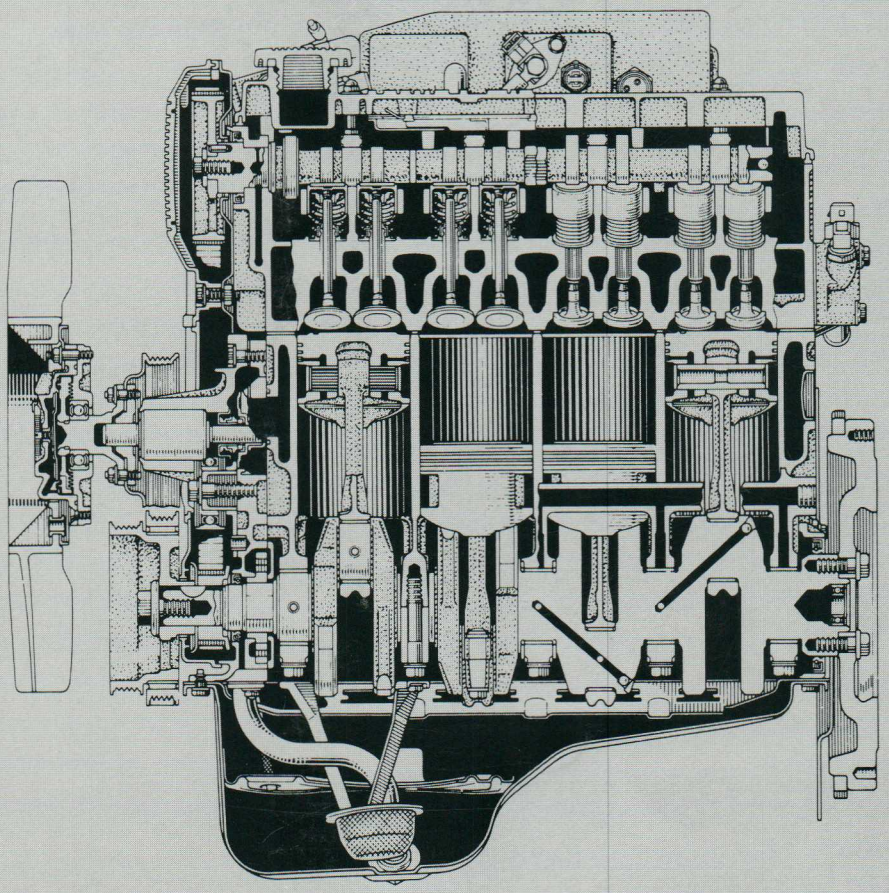
TOYOTA
SERVICE NEWS

Winter 1987 The Independents' Guide to Professional Service and Repair Bulletin 26

THE TOYOTA 4A-GE ENGINE



IN THIS ISSUE

November 6, 1987

Dear Independent Toyota Repair Specialist:

1987 marks the 30th anniversary of Toyota Motor Sales in the United States. As we celebrate this special occasion, we'd like to pay tribute to those who have helped make our continuing success possible. The Toyota family remains committed to recognizing and supporting your efforts in serving Toyota's growing number of customers. You've helped us keep millions of Toyotas in peak repair.

This extra attention to customer satisfaction has helped Toyota and its dealers set an import sales record of more than 10 million vehicles in the first 30 years of U.S. sales. But this is only the beginning. Our U.I.O. is growing rapidly and as our volume increases, so will the demand for quality service.

Toyota is proud of its dealers throughout the country, including the local dealer bringing you this issue of Toyota Service News. As a participant in Toyota's STAR program, this dealership offers you a quick access to quality Toyota Genuine Parts at competitive prices. Our STAR dealers will continue to take the extra steps to ensure that Genuine Toyota Parts are available to you. They'll also continue to support your information needs by distributing Toyota Service News and hosting training clinics in your area.

Thanks for your support. We look forward to working and growing with you in the years to come.

Sincerely,

R. J. Gallio
R.J. Gallio
Corporate Parts Manager

P. Broman
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Corporate Service Manager

TOYOTA SERVICE NEWS

Winter 1987 Bulletin 26

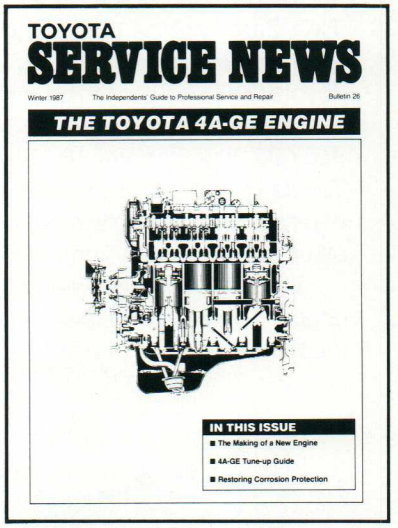
PAGE DESCRIPTION ARTICLE NO.

THIS ISSUE: 4A-GE ENGINE

SERVICE TIPS

BODY LANGUAGE

On the Cover



Toyota's 4A-GE engine is a high-performance engine that's as easy to drive as any ordinary engine — maybe even easier. It currently is used in the MR2, FX-16 and Corolla GT-S.

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Article No. 234

THE MAKING OF A NEW ENGINE

The 4A-GE high-performance engine was developed for the 1985 introduction of Toyota's fifth-generation Corolla line. Today, it is used in the MR-2, FX-16 and the Corolla GT-S (Figures 234-1 and 234-2)

The 4A-GE engine is the ninth in a long line of Toyota Twin-Cam engines that began with the 6-cylinder, 2-liter engine powerplant originally mounted in the famous Toyota 2000 GT.

Between 1966 and 1983, Toyota produced some 850,000 high-performance twin cam engines. Today, Toyota is recognized for having produced more twin-cam engines and more twin-cam 4-valve engines than all other manufacturers combined.

The 4A-GE, which was designed to be a light-weight engine with higher output and better fuel efficiency, also incorporates the latest technology in improved combustion efficiency, reduced noise and vibration, lower maintenance requirements and enhanced serviceability.

In order to provide the ideal combination of high-end power with low and mid-range torque, the 4A-GE was fitted with the T-VIS (Toyota Variable Induction System). The T-VIS utilizes a valve in the intake manifold to provide maximum breathing for high-rpm performance while creating a swirl effect at low and mid-ranges for more complete combustion and a resultant torque increase.

TCCS (Toyota Computer Controlled System) is governed by an 8-bit microcomputer that controls the EFI (Electronic Fuel Injection), ESA (Electronic Spark Advance) and T-VIS. It serves to enhance both the driveability of the car and its fuel efficiency. In addition, TCCS includes self-diagnostic capabilities.

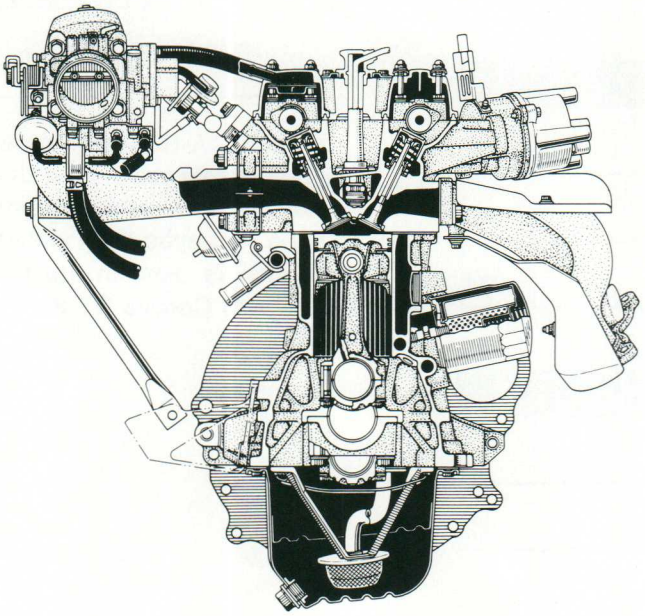


Figure 234-1

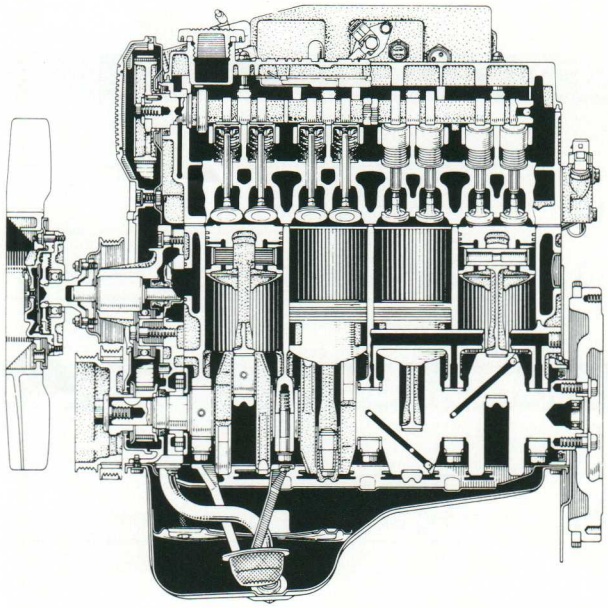


Figure 234-2

THE MAKING OF A NEW ENGINE (Continued)

Major Specifications

Engine	4A-GE 1987 Corolla GTS
Piston Displacement (cc)	96.8 cu. in (1587/CC)
Bore x Stroke (mm)	3.2 x 3.0 in. (81.0 x 77.0 mm)
Compression Ratio	9.4 to 1
Fuel Supply System	EFI
Valve System	DOHC, 16 valves, belt driven
Combustion Pressure	STD. 179 PSI @250 rpm, Limit 128 PSI
HP (SAE Net)	112 HP @6600 rpm
Torque (SAE Net)	97 ft-lb @4800 rpm

Note: Specifications will change depending on year and model application. Refer to the appropriate repair manual for specific instructions.

Summary Of Major Features

1. Improved engine performance and fuel economy.
   - Each cylinder is provided with four valves to improve intake and exhaust efficiency in the high-speed range.
   - The spark plug is located in the center of a pentroof combustion chamber for improved combustion stability.
   - The inertia of the valve train is decreased by allowing the cams to operate the valves directly. This enables the valves to operate efficiently at high speeds.
   - T-VIS is utilized on this engine.
   - The 4A-GE engine is equipped with the latest TCCS (Toyota Computer Controlled System) and L-type EFI.
2. Decreased size and weight
   - The flywheel, pistons and connecting rods are of a light-weight construction.
   - The throttle body is combined into one unit with the air valve.
   - A compact, high-output alternator is used.
3. Reduction in vibration and noise through:
   - A high-strength cylinder block.
   - An 8-balance weight crankshaft.
   - A crankshaft pulley with a built-in rubber damper.
   - A rubber timing belt with rounded teeth.
   - An in-tank electric fuel pump.
4. Upgraded serviceability through:
   - Adoption of a V-ribbed belt which reduces slippage, noise and increases life.
   - Self-diagnostic functions.
   - Increased valve adjustment intervals.

Article No. 235

CYLINDER HEAD AND CYLINDER HEAD BOLTS

The cylinder head is made of an aluminum alloy that has high heat conductivity. Since it is a DOHC type, the inlet and exhaust ports are laid out in a cross-flow arrangement.

Each cylinder is provided with four valves, two for inlet and two for exhaust (Figure 235-1).

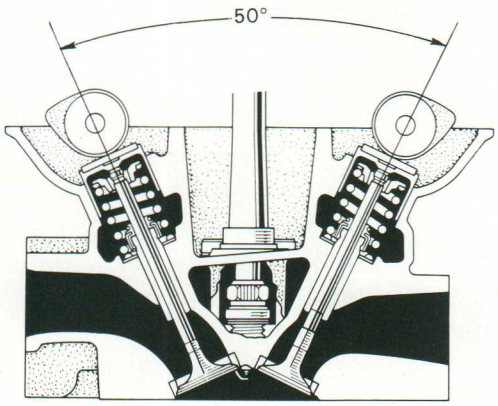


Figure 235-1

The overall cross-sectional area of the valves and ports is increased (Figure 235-2), resulting in an increase in intake efficiency when the engine is operating at high speeds.

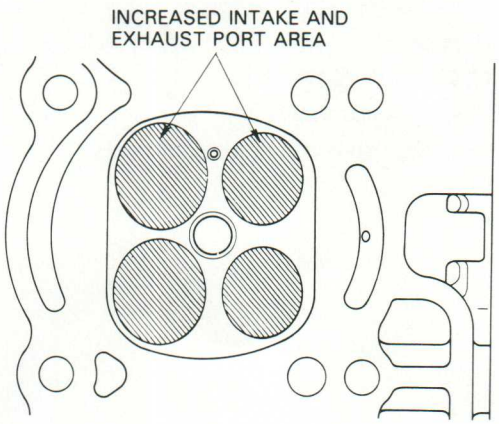


Figure 235-2

The spark plug is located at the center of each combustion chamber through the adoption of a pentroof-type design (Figure 235-3). This combustion chamber design results in a decrease in knocking, faster and more even flame propagation, with increased combustion efficiency.

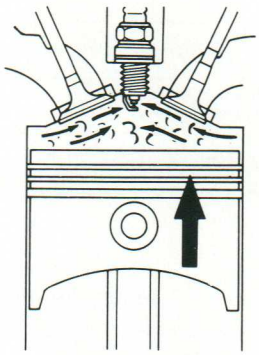


Figure 235-3

Due to close tolerances in the cylinder head area and the high bolt torque required, special head bolts with 12-sided heads (Figure 235-4) are used.

Bolt Length: Intake side -- 90mm (3.5 in.)
Exhaust side -- 108mm (4.3 in.)

Note: On 1988 models a special "angle torqueing" procedure is used. Refer to the appropriate Toyota repair manual for special instructions.

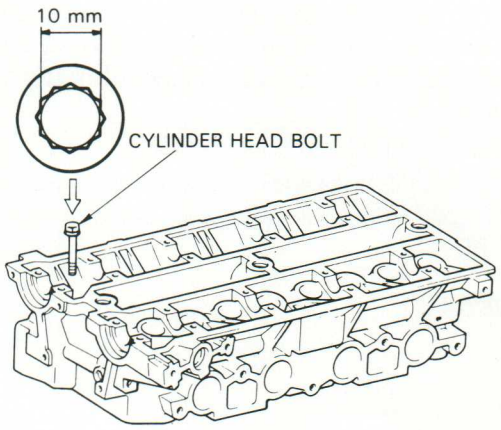


Figure 235-4

A special service tool (SST No. 09205-16010) is required to loosen and torque the cylinder head bolts.

Article No. 236

PISTONS AND PISTON RINGS

To decrease their weight, the pistons have been made of an aluminum alloy, their overall height has been reduced and the steel struts have been removed. In addition, the skirt of each piston has been furnished with curved striations for an increase in anti-seizing properties (Figure 236-1).

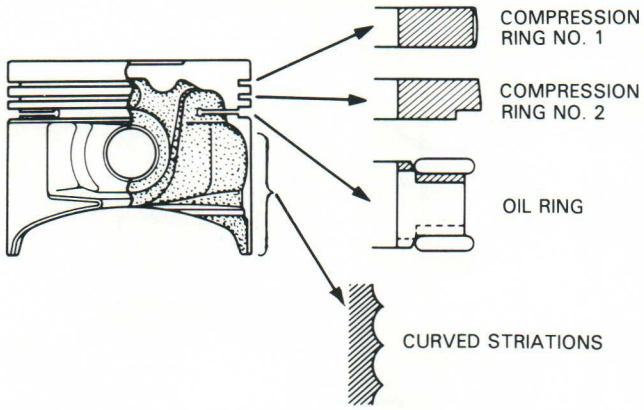


Figure 236-1

Each piston head is provided with four cut-outs to prevent the valves from interfering with the piston (Figure 236-2). Important: Incorrect piston orientation/installation may cause piston/valve contact.

Piston Markings

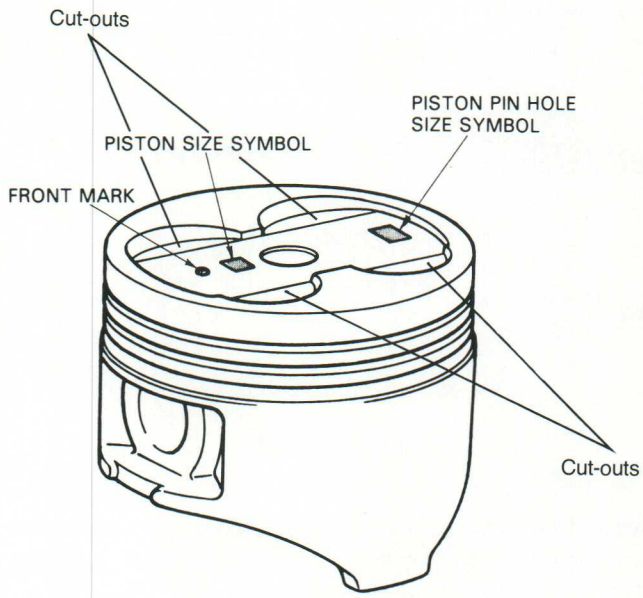


Figure 236-2

Note: Recently, 0.05mm oversize pistons were made available to allow for minor refinishing of cylinder surfaces.

The No. 2 compression ring has not been undercut at the ring end gap (Figure 236-3). This is to reduce oil loss when the engine is operating at high speeds.

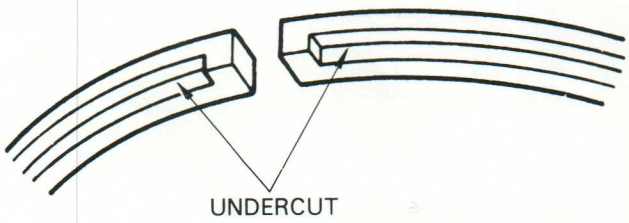


Figure 236-3

Article No. 237

CRANKSHAFT, CRANKSHAFT BEARINGS, CONNECTING ROD BEARINGS

Crankshaft

A crankshaft with five main bearings and eight balance weights has been adopted to provide rigidity, ensure proper balance between each cylinder and reduce vibration and noise (Figure 237-1).

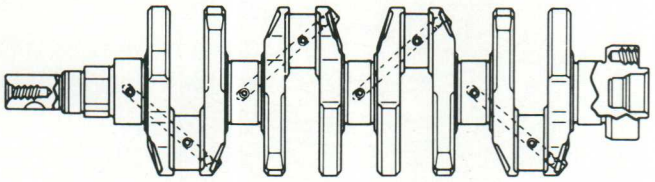


Figure 237-1

Note: Recently, 0.25mm undersize bearings were made available to allow polishing of the crankshaft journals. This crankshaft should **not** be machined.

Crankshaft Bearings

The crankshaft bearings are made of an aluminum alloy. The upper half of the bearing has an oil groove around the inside circumference but the lower half does not (Figure 237-2). A thrust washer to control crankshaft end play is installed at the No. 3 (center) journal.

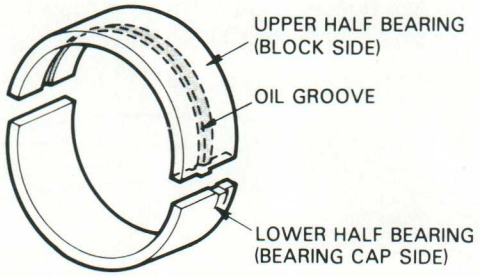


Figure 237-2

Note: If the bearing oil clearance exceeds the service limit, the bearing must be replaced with one that has the same number as that marked on the cylinder block. There are three sizes of standard bearings, marked 1, 2 or 3 (Figure 237-3).

Note: Bearing selection procedures vary between models. Refer to the appropriate repair manual for specific selection instructions.

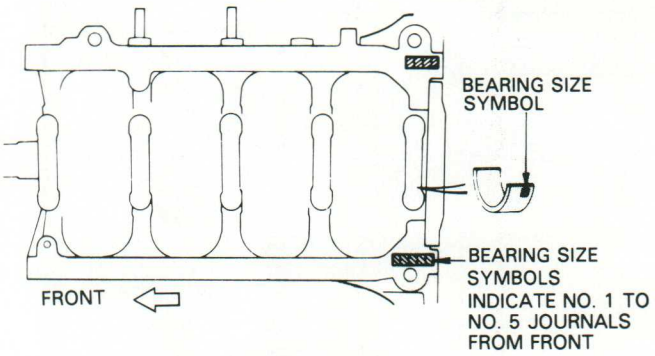


Figure 237-3

Connecting Rod Bearings

When replacing a rod bearing, replace it with one having the same number as that marked on the bearing cap. There are three sizes of standard bearings marked 1, 2 or 3 (Figure 237-4).

Note: Bearing selection procedures vary between models. Refer to the appropriate repair manual for specific selection instructions.

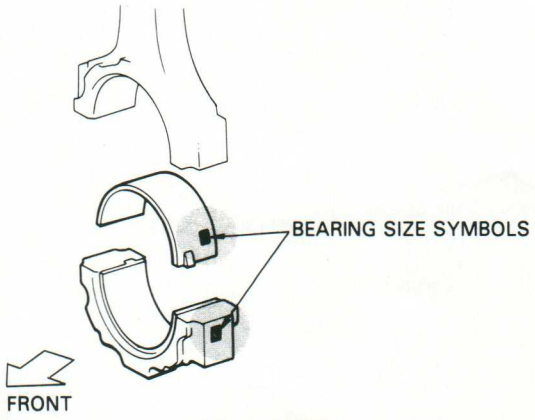


Figure 237-4

Article No. 238

VALVE MECHANISM

Description

The valves are not operated by rocker arms as on many other engines, but are directly opened and closed by the camshaft (Figure 238-1).

Each cylinder is equipped with two smaller intake and exhaust valves, thus reducing the weight of each valve. At the same time, the intake and exhaust efficiency is increased due to the enlarged port area.

A valve mechanism designed in this way reduces inertial weight and frictional losses, allowing the valves to follow the camshaft at high speeds (i.e. valve floating has been prevented). Therefore, the DOHC with four valves in each cylinder realizes higher engine speeds with higher output than more conventional engines of equal displacement.

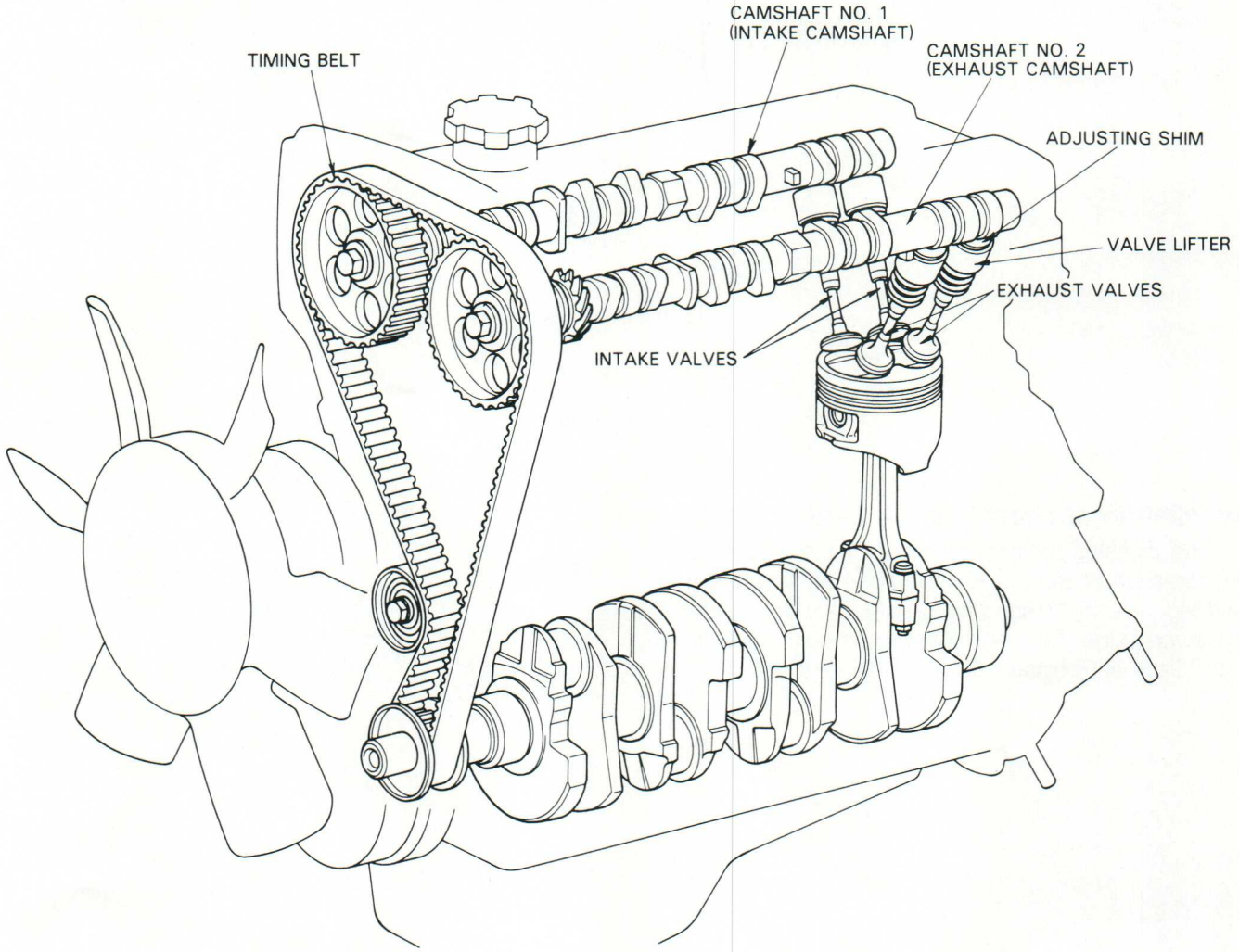


Figure 238-1

VALVE MECHANISM (Continued)

Camshaft and Oil Seals

The camshaft has five bearing journals. The end thrust is taken up by the thrust surface of the No. 1 journal.

The distributor is driven by a gear installed on the exhaust side camshaft (Figure 238-2).

The two exhaust valves of each cylinder open and close together, as do the two intake valves.

The middle of each camshaft has been provided with a hexagonal wrench head so that the camshaft can be held immobile while the camshaft timing pulley is removed or installed. It should **not** be used to rotate the engine.

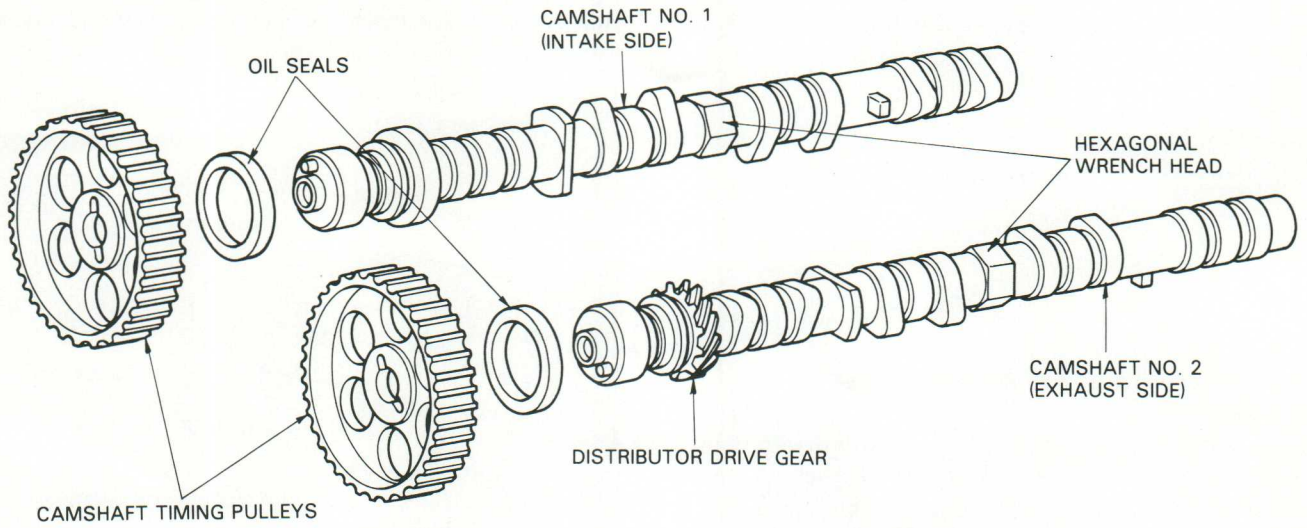


Figure 238-2

Installation of Camshaft Oil Seal

The camshaft oil seal should be installed only after the camshaft bearing caps have been tightened. If it is installed with the bearing caps still loose, the camshaft will be misaligned and premature oil seal wear may result. Front Oil Seal Replacer (SST No. 09223-50010) (Figure 238-3).

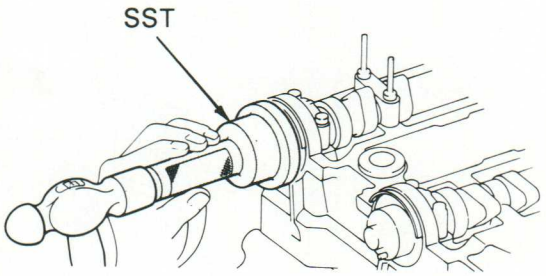


Figure 238-3

VALVE MECHANISM (Continued)

Timing Pulleys, Belt Idler and Timing Belt

Each camshaft timing pulley has two knock-through pin holes (Figure 238-4) so that the pulleys can be used interchangeably on either the exhaust or intake side.

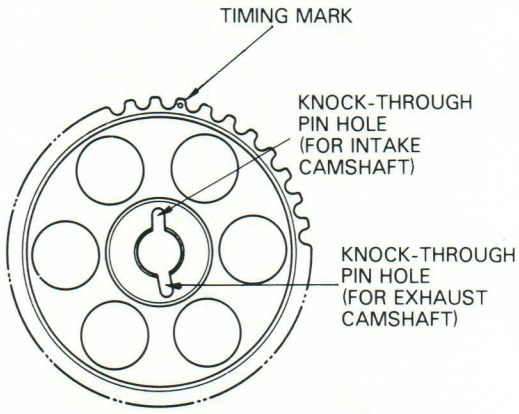


Figure 238-4

A timing belt idler is provided with a sealed-in-grease type ball bearing.

Camshaft timing is set by aligning the marks on the exhaust and intake camshafts and crankshaft as shown in Figure 238-5. Refer to the appropriate repair manual for specific adjustment procedures.

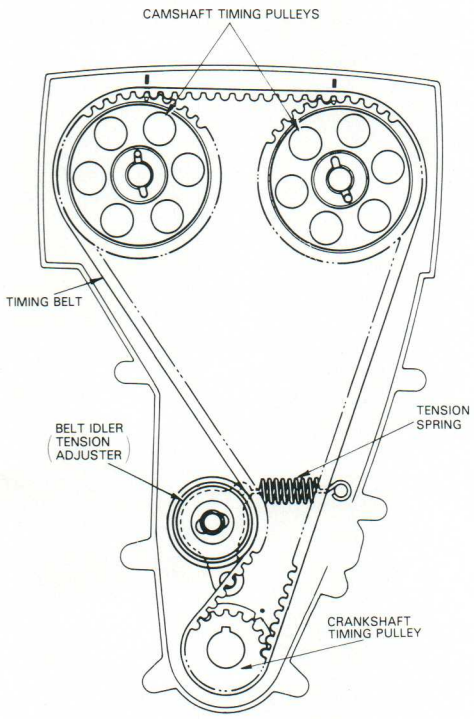


Figure 238-5

A timing belt with rounded teeth is used to reduce noise. This type of belt also engages more smoothly with the pulley than does the conventional square-tooth timing belt, resulting in improved belt durability (Figure 238-6).

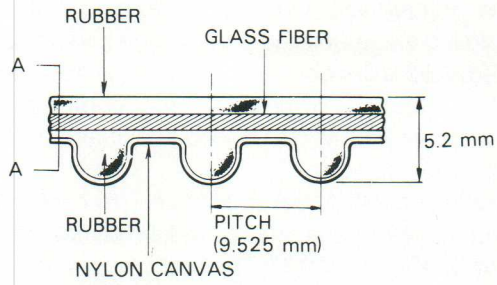


Figure 238-6

Important: An unnecessary load should never be placed on the timing belt. When removing or replacing a timing pulley, do so only after removing the timing belt. (To prevent the pulley from turning, render the camshaft immobile by holding the hexagonal wrench head, located on each camshaft, with a wrench).

Valve Lifters and Valve Adjusting Shims

The valve adjusting shims are the outer shim type, and are located on top of the valve lifters (Figure 238-7). Therefore, when adjusting the valve clearance, it is not necessary to remove the camshaft in order to replace the shim. However, a special service tool is required. Refer to article No. 240 for adjustment procedure and tool information.

Seventeen different shim sizes (increasing in size from 2.50 to 3.30 mm, in increments of .050mm) are available.

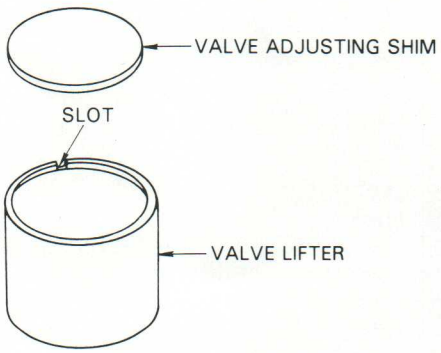


Figure 238-7

Article No. 239

T-VIS (TOYOTA VARIABLE INDUCTION SYSTEM)

Initially, the two objectives of high-end performance and low-end torque seemed imcompatible. Several different techniques, including changing valve and ignition timing and modifying port diameter combinations, were tried. After extensive testing it became apparent that the T-VIS would provide the best compromise of excellent fuel economy, high-speed power and best of all, an ideal torque curve.

The intake manifold passage leading to each cylinder is divided into two parts, one of which has an intake air control valve (Figure 239-1). This valve opens and closes in accordance with the speed of the engine, thus acting as a variable induction valve. This feature improves engine performance in the low-speed range without sacrificing high engine speed and output.

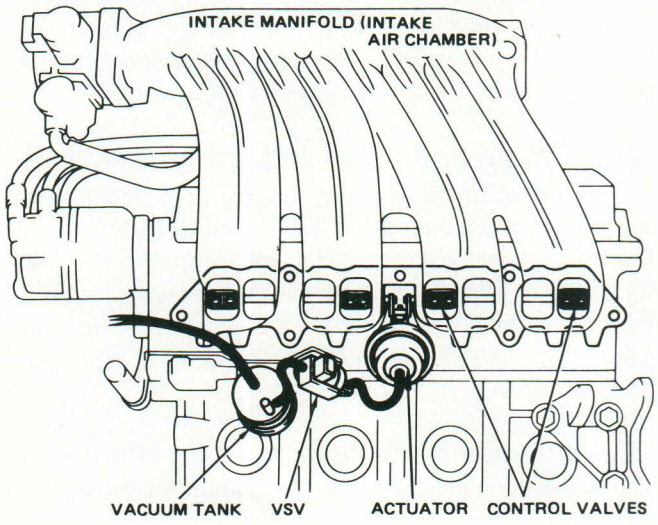


Figure 239-1

The intake air control valves for all cylinders are constructed as one unit (Figure 239-1) and open and close by means of a vacuum actuator. The improved engine performance and higher torque at lower rpm resulting from the adoption of T-VIS are illustrated in Figure 239-2.

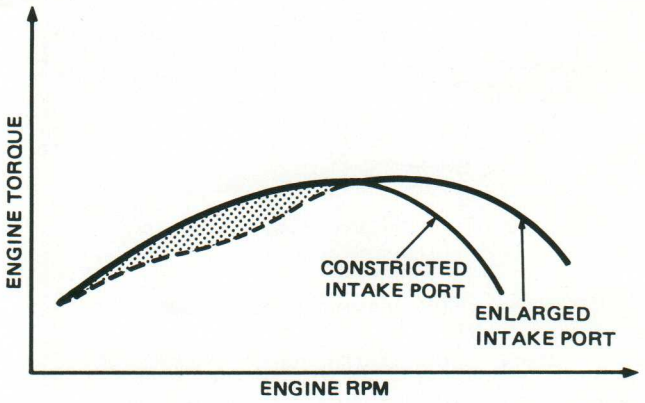


Figure 239-2

The shaded area above illustrates the improvement in performance using T-VIS over a similar engine not equipped with T-VIS.

TOYOTA VARIABLE INDUCTION SYSTEM (Continued)

Construction

1. Intake Air Control Valves. The intake air control valve assembly is installed between the cylinder head and the intake manifold. The valve either opens up or closes off one of the two ports of each intake passage (Figures 239-1 and 239-3).

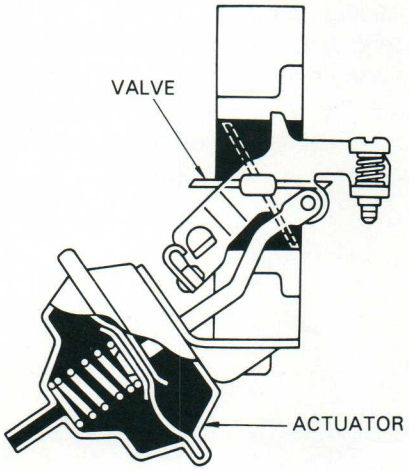
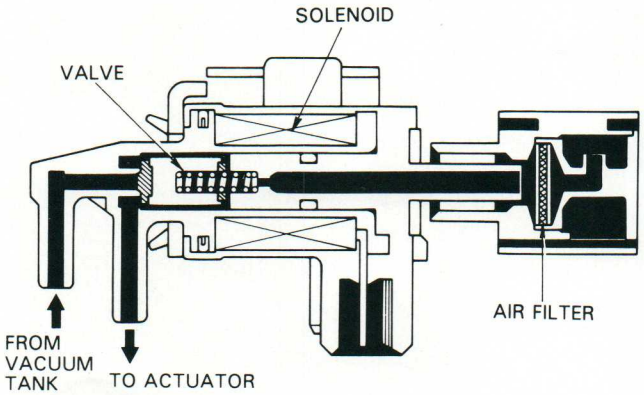


Figure 239-3

2. VSV (Vacuum Switching Valve). The VSV diverts either vacuum or atmospheric pressure to the actuator of the intake air control valve, depending on the signals from the electronic control unit (ECU) (Figure 239-4).



VSV OPERATION

VSV \ PORT	ACTUATOR	VACUUM TANK	ATMOSPHERE
ON	* ○	○	
OFF	○		○

Figure 239-4

Note: The ports marked with the circles ○—○ are connected. Ports without a circle are not connected.

3. Vacuum Tank. The vacuum tank, which is constructed with a built-in (one-way) check valve, stores the vacuum used to operate the actuator (Figure 239-5). The result is more stable actuator operation.

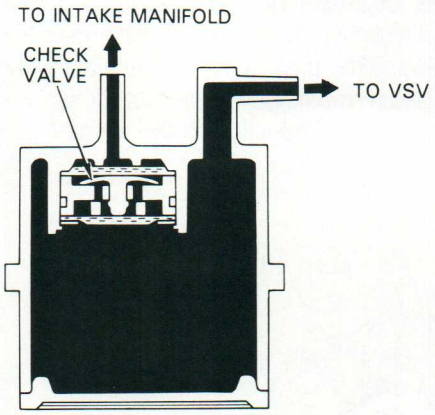


Figure 239-5

TOYOTA VARIABLE INDUCTION SYSTEM (Continued)

Operation

1. Low and Medium Speeds (Below 4300 rpm). When the engine speed is below 4300 rpm, the ECU sends no signal to the VSV, so the VSV is off. The manifold vacuum therefore passes from the vacuum tank to the VSV and then to the actuator. This completely closes the intake air control valves, located in one of the passages leading to each cylinder.

   The intake port is therefore constricted to quicken the flow of intake air-fuel mixture and improve the intake efficiency, causing the engine output to be increased. This also helps to reduce the amount of burnt gas remaining in the combustion chamber, stabilizing the combustion of the air-fuel mixture and improving combustion efficiency (Figure 239-6).

Note: When there is a heavy load on the engine the manifold vacuum becomes weak, so the vacuum is supplied from the vacuum tank, ensuring that the intake air control valve remains closed.

2. High Speeds (Above 4300 rpm). When the engine is running at high speeds, the ECU sends a signal to the VSV, causing the VSV to turn on. This allows atmospheric pressure to pass from the VSV to the actuator and results in the intake air control valve opening all the way. Since both passages open up, intake resistance decreases and higher engine output becomes possible (Figure 239-7).

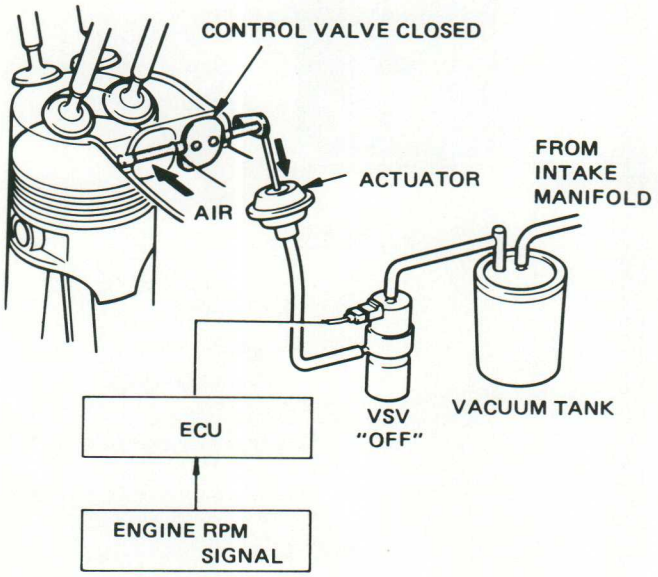


Figure 239-6

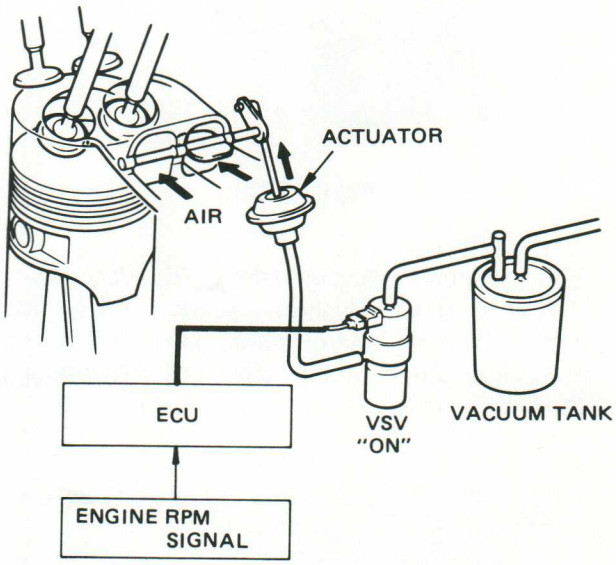


Figure 239-7

Article No. 240

4A-GE ENGINE TUNE-UP

1. Inspect engine oil level.
2. Clean or replace the air filter when necessary.
3. Inspect valve clearances.
   (a) Set cylinder No. 1 to TDC/compression. Turn the crankshaft pulley and align the groove with the "0" mark on the No. 1 timing belt cover (Figure 240-1).

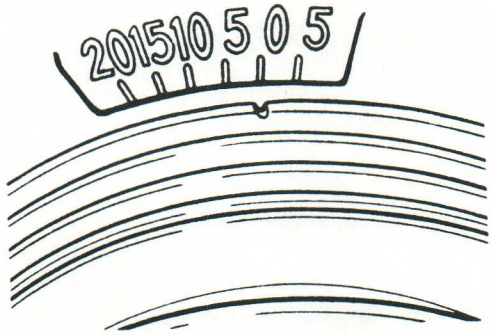


Figure 240-1

Make sure that the valve lifters on the No. 1 cylinder are loose and those on the No. 4 cylinder are tight. If not, turn the crankshaft pulley one complete revolution and recheck.

(b) Measure the clearance of the valves. Measure only those valves indicated by the numbers in Figure 240-2.

(c) Record the measurements that are out of specification. They will be used later to determnine the required replacement shims.

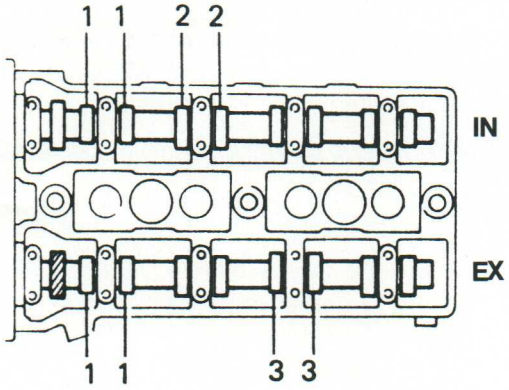


Figure 240-2

Specifications

Valve clearance (Cold)

Intake — 0.15-0.25mm (0.006-0.010 in.)

Exhaust — 0.20-0.30mm (0.008-0.012 in.)

Valve clearance (Hot) (Reference)

Intake — 0.20-0.30mm (0.008-0.012 in)

Exhaust — 0.26-0.36mm (0.010-0.014 in)

(d) Turn the crankshaft pulley one revolution and align the timing marks as indicated in (a). Measure the remaining valve clearances indicated by the numbers in Figure 240-3.

(e) Record the measurements that are out of specification. They will be used later to determine the required replacement shims.

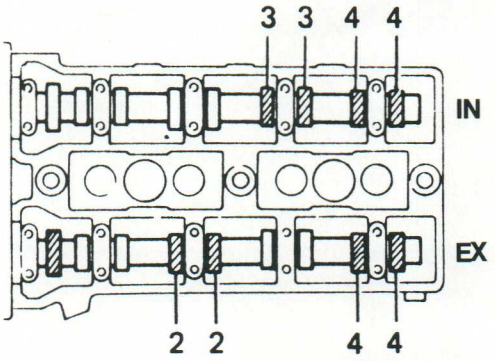


Figure 240-3

4A-GE ENGINE TUNE-UP (Continued)

4. Adjusting valve clearances

(a) Turn the crankshaft pulley to position the camshaft lobe of the valve to be adjusted upward.

(b) Using special service tools as shown in Figure 240-4, press the valve lifter down with SST A and hold down with SST B.

Note: 09248-55010-01 Set (SST A and B)
09248-05010-01 Pliers (SST A)
09248-05020-01 Gauge (SST B)

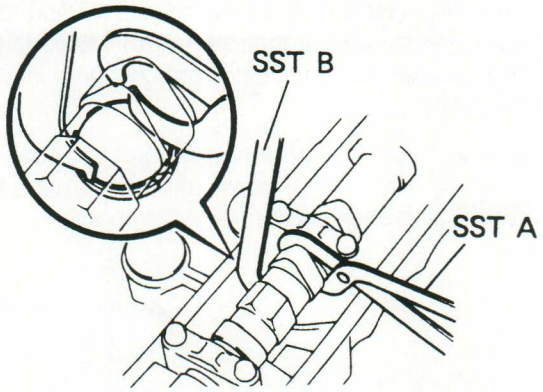


Figure 240-4

(c) Remove the adjusting shim with a small screwdriver and magnetic finger (Figure 240-5).

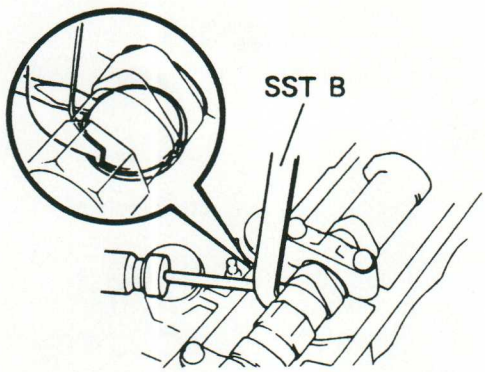


Figure 240-5

(d) Using a micrometer, measure the thickness of the used shim (Figure 240-6). Note: Inspect the shim for evidence of wear, which could affect your calculation.

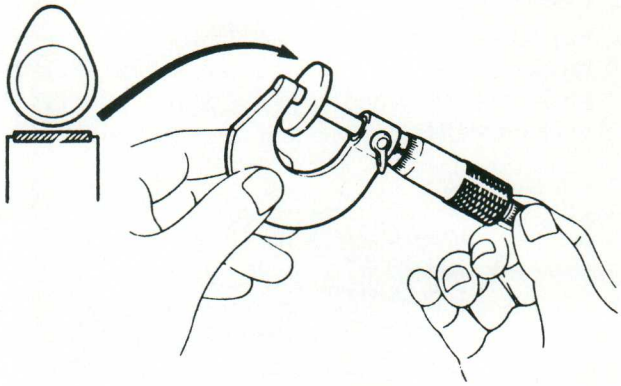


Figure 240-6

• Calculate the required thickness of the new shim using the following formula and the appropriate chart (Figure 240-7 and 240-8). The valve clearance should be within the specified value.

T = Thickness of used shim.

A = Valve clearance measured.

N = Thickness of new shim.

Intake side — N = T × [A − 0.02mm (0.008 in.)]

Exhaust side — N = T × [A − 0.25mm (0.010 in.)]

Select a shim with a thickness as close as possible to the valve clearance calculated.

Note: Shims are available in 17 sizes, in increments of 0.050mm (0.0020 in.), from 2.500mm (0.0984 in.) to 3.300mm (0.1299 in.).

(e) Using SST A, press down the valve lifter and install a new adjusting shim. Note: Make sure the shim is properly seated in the lifter cavity.

(f) Recheck valve clearance against specification.

4A-GE ENGINE TUNE-UP (Continued)

Adjusting Shim Selection Chart

Intake

Measured Clearance (mm)	Installed Shim Thickness (mm)																																																							
	2.500	2.525	2.550	2.575	2.600	2.620	2.625	2.640	2.650	2.660	2.675	2.680	2.700	2.720	2.725	2.740	2.750	2.760	2.775	2.780	2.800	2.820	2.825	2.840	2.850	2.860	2.875	2.880	2.900	2.920	2.925	2.940	2.950	2.960	2.975	2.980	3.000	3.020	3.025	3.040	3.050	3.060	3.075	3.080	3.100	3.120	3.125	3.140	3.150	3.160	3.175	3.180	3.200	3.225	3.250	3.275	3.300
0.000 - 0.009											02	02	02	04	04	04	04	04	06	06	06	08	08	08	08	08	10	10	10	12	12	12	12	12	14	14	14	16	16	16	16	16	18	18	18	20	20	20	20	20	22	22	22	24	24	26	26
0.010 - 0.025										02	02	02	02	04	04	04	04	06	06	06	06	08	08	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	26	26
0.026 - 0.029									02	02	02	02	04	04	04	04	06	06	06	06	08	08	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	26	26	28
0.030 - 0.040								02	02	02	02	02	04	04	04	04	06	06	06	06	08	08	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	26	26	28
0.041 - 0.050								02	02	02	02	02	04	04	04	06	06	06	06	06	08	08	08	10	10	10	10	10	12	12	12	14	14	14	14	14	16	16	16	18	18	18	18	18	20	20	20	22	22	22	22	22	24	24	26	26	28
0.051 - 0.070						02	02	02	02	02	04	04	04	06	06	06	06	06	08	08	08	10	10	10	10	10	12	12	12	14	14	14	14	14	16	16	16	18	18	18	18	18	20	20	20	22	22	22	22	22	24	24	24	26	26	28	28
0.071 - 0.075					02	02	02	02	02	04	04	04	04	06	06	06	06	08	08	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	28	28
0.076 - 0.090					02	02	02	02	04	04	04	04	06	06	06	06	08	08	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	28	28	30
0.091 - 0.100					02	02	02	04	04	04	04	04	06	06	06	08	08	08	08	08	10	10	10	12	12	12	12	12	14	14	14	16	16	16	16	16	18	18	18	20	20	20	20	20	22	22	22	24	24	24	24	24	26	26	28	28	30
0.101 - 0.120				02	02	04	04	04	04	04	06	06	06	08	08	08	08	08	10	10	10	12	12	12	12	12	14	14	14	16	16	16	16	16	18	18	18	20	20	20	20	20	22	22	22	24	24	24	24	24	26	26	26	28	28	30	30
0.121 - 0.125			02	02	02	04	04	04	04	06	06	06	06	08	08	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	30	30
0.126 - 0.140			02	02	04	04	04	04	06	06	06	06	08	08	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	30	30	32
0.141 - 0.149			02	02	04	04	04	06	06	06	06	06	08	08	08	10	10	10	10	10	12	12	12	14	14	14	14	14	16	16	16	18	18	18	18	18	20	20	20	22	22	22	22	22	24	24	24	26	26	26	26	26	28	28	30	30	32
0.150 - 0.250																																																									
0.251 - 0.270	04	06	06	08	08	10	10	10	10	10	12	12	12	14	14	14	14	14	16	16	16	18	18	18	18	18	20	20	20	22	22	22	22	22	24	24	24	26	26	26	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34
0.271 - 0.275	04	06	06	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34
0.276 - 0.290	06	06	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34
0.291 - 0.300	06	06	08	08	10	10	10	12	12	12	12	12	14	14	14	16	16	16	16	16	18	18	18	20	20	20	20	20	22	22	22	24	24	24	24	24	26	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34
0.301 - 0.320	06	08	08	10	10	12	12	12	12	12	14	14	14	16	16	16	16	16	18	18	18	20	20	20	20	20	22	22	22	24	24	24	24	24	26	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34	34
0.321 - 0.325	06	08	08	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.326 - 0.340	08	08	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.341 - 0.350	08	08	10	10	12	12	12	14	14	14	14	14	16	16	16	18	18	18	18	18	20	20	20	22	22	22	22	22	24	24	24	26	26	26	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34	34	34
0.351 - 0.370	08	10	10	12	12	14	14	14	14	14	16	16	16	18	18	18	18	18	20	20	20	22	22	22	22	22	24	24	24	26	26	26	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34	34	34	34
0.371 - 0.375	08	10	10	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.376 - 0.390	10	10	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.391 - 0.400	10	10	12	12	14	14	14	16	16	16	16	16	18	18	18	20	20	20	20	20	22	22	22	24	24	24	24	24	26	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34	34
0.401 - 0.420	10	12	12	14	14	16	16	16	16	16	18	18	18	20	20	20	20	20	22	22	22	24	24	24	24	24	26	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34	34
0.421 - 0.425	10	12	12	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.426 - 0.440	12	12	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.441 - 0.450	12	12	14	14	16	16	16	18	18	18	18	18	20	20	20	22	22	22	22	22	24	24	24	26	26	26	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34	34	34	34
0.451 - 0.470	12	14	14	16	16	18	18	18	18	18	20	20	20	22	22	22	22	22	24	24	24	26	26	26	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34	34	34	34
0.471 - 0.475	12	14	14	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.476 - 0.490	14	14	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.491 - 0.500	14	14	16	16	18	18	18	20	20	20	20	20	22	22	22	24	24	24	24	24	26	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34	34
0.501 - 0.520	14	16	16	18	18	20	20	20	20	20	22	22	22	24	24	24	24	24	26	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34	34
0.521 - 0.525	14	16	16	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.526 - 0.540	16	16	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.541 - 0.550	16	16	18	18	20	20	20	22	22	22	22	22	24	24	24	26	26	26	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34	34	34	34
0.551 - 0.570	16	18	18	20	20	22	22	22	22	22	24	24	24	26	26	26	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34	34	34	34
0.571 - 0.575	16	18	18	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.576 - 0.590	18	18	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.591 - 0.600	18	18	20	20	22	22	22	24	24	24	24	24	26	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34	34
0.601 - 0.620	18	20	20	22	22	24	24	24	24	24	26	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34	34
0.621 - 0.625	18	20	20	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.626 - 0.640	20	20	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.641 - 0.650	20	20	22	22	24	24	24	26	26	26	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34	34	34	34
0.651 - 0.670	20	22	22	24	24	26	26	26	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34	34	34	34
0.671 - 0.675	20	22	22	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.676 - 0.690	22	22	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.691 - 0.700	22	22	24	24	26	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34	34
0.701 - 0.720	22	24	24	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34	34
0.721 - 0.725	22	24	24	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.726 - 0.740	24	24	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.741 - 0.750	24	24	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34	34	34
0.751 - 0.770	24	26	26	28	28	30	30	30	30	30	32	32	32	34	34	34	34	34
0.771 - 0.775	24	26	26	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.776 - 0.790	26	26	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.791 - 0.800	26	26	28	28	30	30	30	32	32	32	32	32	34	34	34
0.801 - 0.820	26	28	28	30	30	32	32	32	32	32	34	34	34
0.821 - 0.825	26	28	28	30	30	32	32	32	32	34	34	34	34
0.826 - 0.840	28	28	30	30	32	32	32	32	34	34	34	34
0.841 - 0.850	28	28	30	30	32	32	32	34	34	34	34	34
0.851 - 0.870	28	30	30	32	32	34	34	34	34	34
0.871 - 0.875	28	30	30	32	32	34	34	34	34
0.876 - 0.890	30	30	32	32	34	34	34	34
0.891 - 0.900	30	30	32	32	34	34	34
0.901 - 0.925	30	32	32	34	34
0.926 - 0.950	32	32	34	34
0.951 - 0.975	32	34	34
0.976 - 1.000	34	34
1.001 - 1.025	34

Intake valve clearance (cold):
0.15 – 0.25 mm (0.006 – 0.010 in.)

Example: A 2.800 mm shim is installed and the measured clearance is 0.450 mm. Replace the 2.800 mm shim with shim No. 24 (3.050 mm).

Shim thickness mm (in.)

Shim No.	Thickness	Shim No.	Thickness
02	2.500 (0.0984)	20	2.950 (0.1161)
04	2.550 (0.1004)	22	3.000 (0.1181)
06	2.600 (0.1024)	24	3.050 (0.1201)
08	2.650 (0.1043)	26	3.100 (0.1220)
10	2.700 (0.1063)	28	3.150 (0.1240)
12	2.750 (0.1083)	30	3.200 (0.1260)
14	2.800 (0.1102)	32	3.250 (0.1280)
16	2.850 (0.1122)	34	3.300 (0.1299)
18	2.900 (0.1142)		

Figure 240-7

Note: Shim numbers can be found on the face of a new shim and are used for size identification only.

4A-GE ENGINE TUNE-UP (Continued)

Adjusting Shim Selection Chart

Exhaust

Measured Clearance (mm)	Installed Shim Thickness (mm)																																																							
	2.500	2.525	2.550	2.575	2.600	2.620	2.625	2.640	2.650	2.660	2.675	2.680	2.700	2.720	2.725	2.740	2.750	2.760	2.775	2.780	2.800	2.820	2.825	2.840	2.850	2.860	2.875	2.880	2.900	2.920	2.925	2.940	2.950	2.960	2.975	2.980	3.000	3.020	3.025	3.040	3.050	3.060	3.075	3.080	3.100	3.120	3.125	3.140	3.150	3.160	3.175	3.180	3.200	3.225	3.250	3.275	3.300
0.000 - 0.009														02	02	02	02	02	04	04	04	06	06	06	06	06	08	08	08	10	10	10	10	10	12	12	12	14	14	14	14	14	16	16	16	18	18	18	18	18	20	20	20	22	22	24	24
0.010 - 0.025														02	02	02	02	04	04	04	06	06	06	06	06	08	08	08	10	10	10	10	10	12	12	12	14	14	14	14	14	16	16	16	18	18	18	18	18	20	20	20	22	22	22	24	26
0.026 - 0.040													02	02	02	02	04	04	04	04	06	06	06	06	08	08	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	24	24	26
0.041 - 0.050												02	02	02	02	04	04	04	04	06	06	06	06	08	08	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	24	24	26
0.051 - 0.070											02	02	02	04	04	04	04	04	06	06	06	08	08	08	08	08	10	10	10	12	12	12	12	12	14	14	14	16	16	16	16	16	18	18	18	20	20	20	20	20	22	22	22	24	24	26	26
0.071 - 0.090									02	02	02	02	04	04	04	04	06	06	06	06	08	08	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	26	26	28
0.091 - 0.100								02	02	02	02	04	04	04	04	06	06	06	06	08	08	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	26	26	28
0.101 - 0.120						02	02	02	02	02	04	04	04	06	06	06	06	06	08	08	08	10	10	10	10	10	12	12	12	14	14	14	14	14	16	16	16	18	18	18	18	18	20	20	20	22	22	22	22	22	24	24	24	26	26	28	28
0.121 - 0.140					02	02	02	02	04	04	04	04	06	06	06	06	08	08	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	28	28	30
0.141 - 0.150					02	02	02	04	04	04	04	06	06	06	06	08	08	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	28	28	30
0.151 - 0.170				02	02	04	04	04	04	04	06	06	06	08	08	08	08	08	10	10	10	12	12	12	12	12	14	14	14	16	16	16	16	16	18	18	18	20	20	20	20	20	22	22	22	24	24	24	24	24	26	26	26	28	28	30	30
0.171 - 0.190			02	02	04	04	04	04	06	06	06	06	08	08	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	30	30	32
0.191 - 0.199			02	02	04	04	04	06	06	06	06	08	08	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	30	30	32
0.200 - 0.300																																																									
0.301 - 0.320	04	06	06	08	08	10	10	10	10	10	12	12	12	14	14	14	14	14	16	16	16	18	18	18	18	18	20	20	20	22	22	22	22	22	24	24	24	26	26	26	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34
0.321 - 0.325	04	06	06	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34
0.326 - 0.340	06	06	08	08	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34
0.341 - 0.350	06	06	08	08	10	10	10	12	12	12	12	12	14	14	14	16	16	16	16	16	18	18	18	20	20	20	20	20	22	22	22	24	24	24	24	24	26	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34
0.351 - 0.370	06	08	08	10	10	12	12	12	12	12	14	14	14	16	16	16	16	16	18	18	18	20	20	20	20	20	22	22	22	24	24	24	24	24	26	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34	34
0.371 - 0.375	06	08	08	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.376 - 0.390	08	08	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.391 - 0.400	08	08	10	10	12	12	12	14	14	14	14	14	16	16	16	18	18	18	18	18	20	20	20	22	22	22	22	22	24	24	24	26	26	26	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34	34	34	34
0.401 - 0.420	08	10	10	12	12	14	14	14	14	14	16	16	16	18	18	18	18	18	20	20	20	22	22	22	22	22	24	24	24	26	26	26	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34	34	34	34
0.421 - 0.425	08	10	10	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.426 - 0.440	10	10	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.441 - 0.450	10	10	12	12	14	14	14	16	16	16	16	16	18	18	18	20	20	20	20	20	22	22	22	24	24	24	24	24	26	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34	34
0.451 - 0.470	10	12	12	14	14	16	16	16	16	16	18	18	18	20	20	20	20	20	22	22	22	24	24	24	24	24	26	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34	34
0.471 - 0.475	10	12	12	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.476 - 0.490	12	12	14	14	16	16	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.491 - 0.500	12	12	14	14	16	16	16	18	18	18	18	18	20	20	20	22	22	22	22	22	24	24	24	26	26	26	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34	34	34	34
0.501 - 0.520	12	14	14	16	16	18	18	18	18	18	20	20	20	22	22	22	22	22	24	24	24	26	26	26	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34	34	34	34
0.521 - 0.525	12	14	14	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.526 - 0.540	14	14	16	16	18	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.541 - 0.550	14	14	16	16	18	18	18	20	20	20	20	20	22	22	22	24	24	24	24	24	26	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34	34
0.551 - 0.570	14	16	16	18	18	20	20	20	20	20	22	22	22	24	24	24	24	24	26	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34	34
0.571 - 0.575	14	16	16	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.576 - 0.590	16	16	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.591 - 0.600	16	16	18	18	20	20	20	22	22	22	22	22	24	24	24	26	26	26	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34	34	34	34
0.601 - 0.620	16	18	18	20	20	22	22	22	22	22	24	24	24	26	26	26	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34	34	34	34
0.621 - 0.625	16	18	18	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.626 - 0.640	18	18	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.641 - 0.650	18	18	20	20	22	22	22	24	24	24	24	24	26	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34	34
0.651 - 0.670	18	20	20	22	22	24	24	24	24	24	26	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34	34
0.671 - 0.675	18	20	20	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.676 - 0.690	20	20	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.691 - 0.700	20	20	22	22	24	24	24	26	26	26	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34	34	34	34
0.701 - 0.720	20	22	22	24	24	26	26	26	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34	34	34	34
0.721 - 0.725	20	22	22	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.726 - 0.740	22	22	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.741 - 0.750	22	22	24	24	26	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34	34
0.751 - 0.770	22	24	24	26	26	28	28	28	28	28	30	30	30	32	32	32	32	32	34	34	34
0.771 - 0.775	22	24	24	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.776 - 0.790	24	24	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.791 - 0.800	24	24	26	26	28	28	28	30	30	30	30	30	32	32	32	34	34	34	34	34
0.801 - 0.820	24	26	26	28	28	30	30	30	30	30	32	32	32	34	34	34	34	34
0.821 - 0.825	24	26	26	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.826 - 0.840	26	26	28	28	30	30	30	30	32	32	32	32	34	34	34	34
0.841 - 0.850	26	26	28	28	30	30	30	32	32	32	32	32	34	34	34
0.851 - 0.870	26	28	28	30	30	32	32	32	32	32	34	34	34
0.871 - 0.875	26	28	28	30	30	32	32	32	32	34	34	34	34
0.876 - 0.890	28	28	30	30	32	32	32	32	34	34	34	34
0.891 - 0.900	28	28	30	30	32	32	32	34	34	34	34	34
0.901 - 0.925	28	30	30	32	32	34	34	34	34
0.926 - 0.950	30	30	32	32	34	34	34
0.951 - 0.975	30	32	32	34	34
0.976 - 1.000	32	32	34	34
1.001 - 1.025	32	34	34
1.026 - 1.050	34	34
1.051 - 1.075	34

Shim thickness mm (in.)

Shim No.	Thickness	Shim No.	Thickness
02	2.500 (0.0984)	20	2.950 (0.1161)
04	2.550 (0.1004)	22	3.000 (0.1181)
06	2.600 (0.1024)	24	3.050 (0.1201)
08	2.650 (0.1043)	26	3.100 (0.1220)
10	2.700 (0.1063)	28	3.150 (0.1240)
12	2.750 (0.1083)	30	3.200 (0.1260)
14	2.800 (0.1102)	32	3.250 (0.1280)
16	2.850 (0.1122)	34	3.300 (0.1299)
18	2.900 (0.1142)		

Exhaust valve clearance (cold):
0.20 – 0.30 mm (0.008 – 0.012 in.)

Example: A 2.800 mm shim is installed and the measured clearance is 0.450 mm. Replace the 2.800 mm shim with shim No. 22 (3.000 mm).

Figure 240-8

Note: Shim numbers can be found on the face of a new shim and are used for size identification only.

4A-GE ENGINE TUNE-UP (Continued)

Platinum-Tipped Spark Plugs

The platinum-tipped electrode spark plug is a new generation of high-performance spark plug. It will supersede the popular conventional type.

Benefits of the Platinum-Tipped Spark Plug

- Excellent response during hard acceleration.
- Can burn leaner mixtures for improved fuel economy.
- Reduces required voltage for better starting and to resist carbon fouling.
- Lasts longer under normal operating conditions.

Precautions For Handling Platinum-Tipped Spark Plugs

- Never use a wire brush for cleaning.
- Never attempt to adjust the gap on **used** plugs.
- Spark plugs should be replaced every 60,000 miles or 72 months under normal operating conditions.
- If adjusting the gap of a **new** plug, bend only the base of the ground electrode. Do not touch the tip (Figure 240-9).

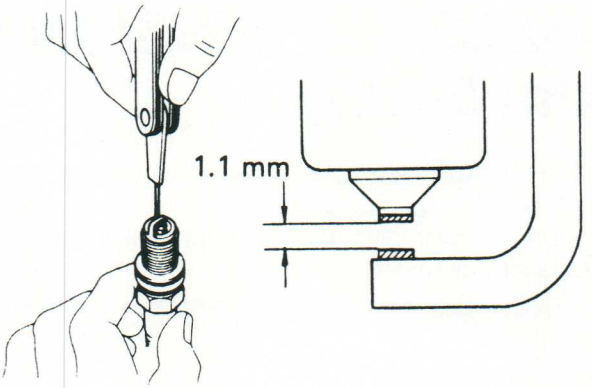


Figure 240-9

Nippondenso Platinum Tip Spark Plug Application Chart

MODELS	ENGINE	1983	1984	1985	1986	1987	1988
Corolla GTS	4A-GE			PQ16R	PQ16R	PQ16R	PQ16R
FX16	4A-GE					PQ16R	PQ16R
Celica	3S-GE				PQ16R	PQ16R	PQ16R
Celica	3S-GTE						PQ16R8
MR 2	4A-GE			PQ16R	PQ16R	PQ16R	PQ16R
MR 2	4A-GZE						PQ20RP8
Supra	5M-GE	P16R	P16R	P16R			
Supra	7M-GE				PQ16R	PQ16R	PQ16R
Supra	7M-GTE					PQ20RP8	PQ20RP8
Cressida	5M-GE	P16R	P16R	P16R	P16R	P16R	P16R
Van	3Y-E		P16R	P16R			
Van	4Y-E				P16R	P16R	P16R

Note: Platinum tip spark plugs can be identified by the letter "P" at the beginning of each plug number (i.e. P16R).

Article No. 241

CHECKING TENSION ON V-RIBBED DRIVE BELTS

The V-ribbed drive belt is regarded as the latest advancement in automotive drive belt technology. Tensioned correctly, these belts offer several advantages:

- Greater belt surface contact with less chance of slippage.
- Longer belt life.
- Quieter operation.
- Longer component bearing life.

Conventional V-Belt

V-Ribbed Belt

Figure 241-1

Important:

A V-ribbed belt that is tensioned correctly may feel loose compared to an identically tensioned conventional belt.

Inspecting Drive Belt

1. Visually check the belt for separation of adhesive rubber above and below the core. Also check for core separation from the belt side, severed core, separation of the rib from the adhesive rubber, cracking or separation of the ribs, torn or worn ribs and cracks in the inner ridges of the ribs (Figure 241-2). If necessary, replace the drive belt.

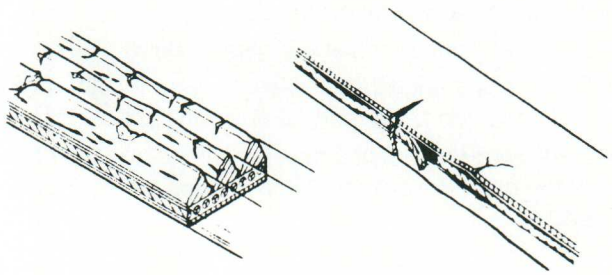


Figure 241-2

CHECKING TENSION ON V-RIBBED DRIVE BELTS (Continued)

Checking Tension

1. Using a belt tension gauge, Figure 241-3, check the drive belt tension.
   Belt tension gauge:
   Nippondenso BTG-20 00095-00010*
   Borroughs No. BT-33-73F*

   *Available through Toyota's Approved Equipment Program.

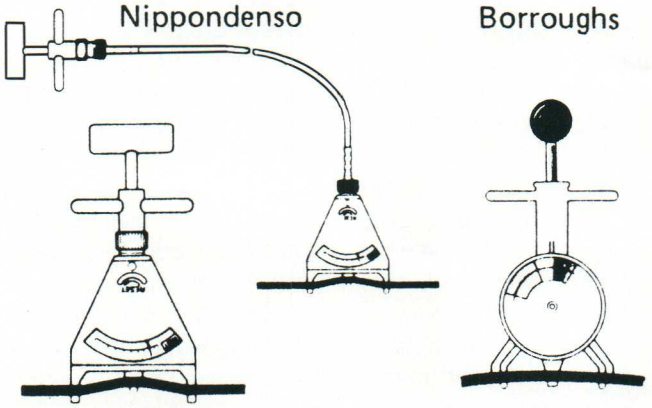


Figure 241-3

2. If necessary, adjust the drive belt tension.

Note: For correct belt tension specifications refer to the appropriate Toyota repair manual.

3. If replacing the drive belt, check to see that it fits properly in the ribbed grooves (Figure 241-4). Then, run the engine for about 5 minutes and recheck the tension.

Note: A "new belt" refers to a belt that has been in use less than 5 minutes. A "used belt" refers to a belt that has been in use on a running engine for 5 minutes or more.

V-ribbed type

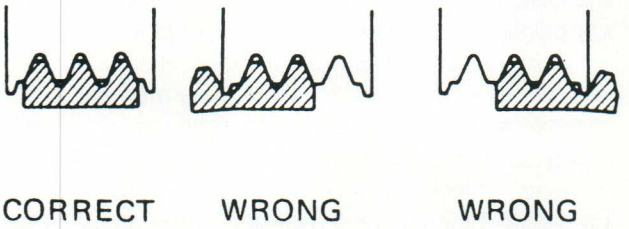


Figure 241-4

Article No. 242

RESTORING CORROSION PROTECTION DURING VEHICLE REPAIR

Introduction

Corrosion protection has become a very important step in vehicle repair due to the greater number of unitized automobiles on the road today. (These automobiles are made of high-strength steels, which are thinner than ordinary steel, to reduce the weight of structural members and exterior body panels. To protect this steel from corrosion, the factory uses state-of-the-art corrosion protective processes, coatings and sealers).

Factory corrosion protection which is disturbed during a collision or during the repair process **must** be restored to a similar level as the undamaged portion of the vehicle being repaired, or a future corrosion problem may develop. Through the proper use of quality corrosion preventive products now available to the repair industry, the possibility of a future corrosion problem can be minimized. If quality corrosion preventive products are applied using proper repair techniques, a corrosion-resistant repair can be achieved.

General Guidelines For Corrosion Protection During Unibody Collision Repairs

Corrosion protection coatings can be damaged by cutting panels and seams either mechanically or with heat, or by minor straightening and stress relieving procedures.

Always check areas surrounding the damaged area for any cracked seams, and any damaged corrosion protective sealers or coatings. Repair as necessary.

Always use the **appropriate** respiratory and eye protection and follow any other necessary safety precautions during the collision repair process.

Do not mix product brands during a repair. Each product is designed to work with other products of the same manufacturer's paint system.

Always read and follow the product manufacturers' instructions carefully concerning product purpose, application procedures and compatibilities with other products.

Always use a quality weld-through zinc rich coating on any non-galvanized mating surfaces of joints and seams prior to welding. The amount of corrosion formation between two adjoining panels at joints or seams can be significantly reduced with the use of a quality weld-through coating.

While dressing down any cosmetic welds, also dress down welds which have pits in the weld metal surface. The first place where corrosion starts is in pitted welds.

Do not use lacquer-based primers on bare metal. Before applying any primer, always prepare the surface as directed by the paint manufacturer.

After preparing the surface, use either self-etching or epoxy primers as the first layer of primer on ALL bare metal surfaces (both internal and external) to obtain maximum paint adhesion.

Use the appropriate type of body caulking/seam sealer to seal joints where gaps are present. Also, seal all flanged and overlap joints and seams to seal out air, water and other corrosive environmental contaminants.

Use a paint sealer over primer, when it is included as part of a paint manufacturer's paint system, before applying the color coat.

Always use a waxy type anti-corrosion compound, which is light-bodied and designed to migrate between metal-to-metal surfaces, on joints and seams, inside closed sections, and on other surfaces. This type of anti-corrosion material should be used on all other areas which do not have direct environmental exposure or exposure to road abrasion. The use of conventional rubberized or tar-based undercoating should be limited to the vehicle's underbody and wheelhouse areas only. Caution: Undercoating and protective coatings should be applied to the appropriate areas only. Avoid application to areas such as:

- Components that get hot.
- Rotating and moving parts.
- Electrical loom and connectors.
- Brake components.
- Seat belt mechanisms.

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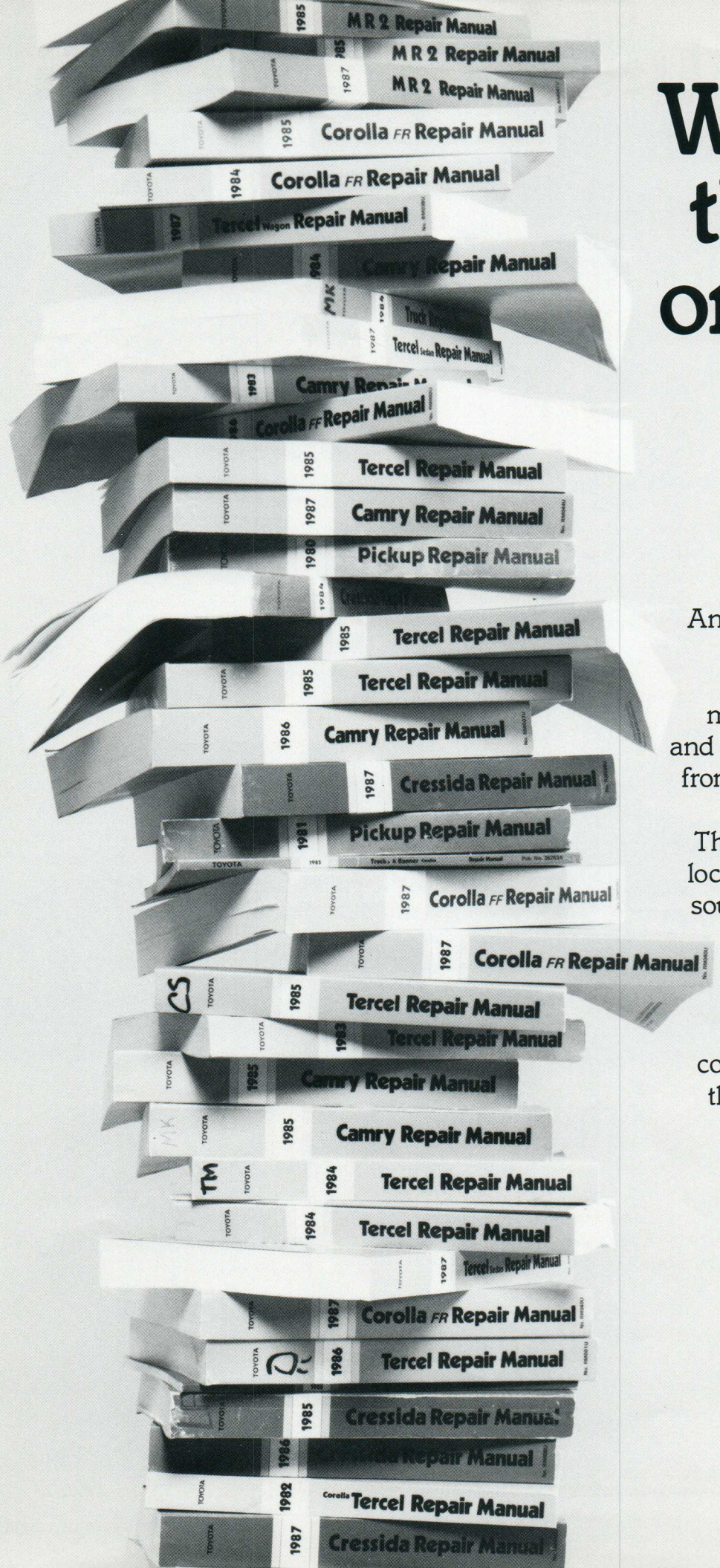

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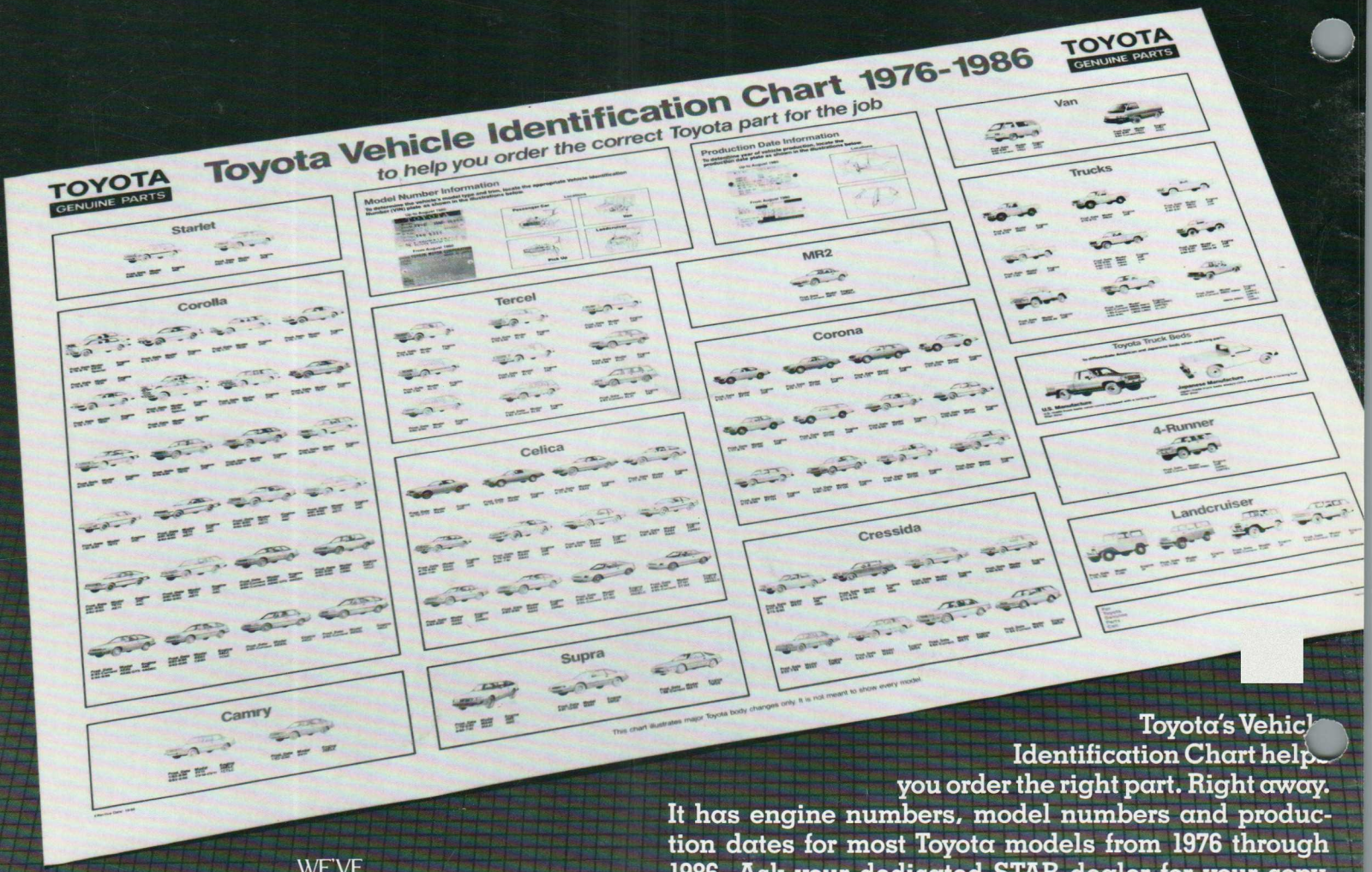
Avoid Mistaken Identity.



Toyota's Vehicle Identification Chart helps you order the right part. Right away. It has engine numbers, model numbers and production dates for most Toyota models from 1976 through 1986. Ask your dedicated STAR dealer for your copy. And ask about other items that will make life at your shop easier: the STAR parts cabinet, Toyota parts signage and Toyota Service News.

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