D - ADJUSTMENTS - 4-CYL
Article Text

1991 Toyota MR2
For Electronics & Computers El Camino Real Santa Clara CA 95051

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ARTICLE BEGINNING

1991 ENGINE PERFORMANCE
Toyota 4-Cylinder On-Vehicle Adjustments

Camry, Celica, Corolla, MR2,
Pickup, Previa, Tercel, 4Runner

ENGINE MECHANICAL

Before performing any on-vehicle adjustments to fuel or ignition systems, ensure engine mechanical condition is okay.

VALVE CLEARANCE

CAMRY, CELICA, COROLLA, MR2 & PREVIA

1) Check and adjust valves with engine cold. On Previa, remove 3 screws and right front seat scuff plate. Remove bolt and disconnect right seat belt from floor panel.
2) Remove 4 bolts and right front seat. Remove 2 bolts and right front seat leg. Remove 2 bolts and jack holder. Remove 9 bolts and right engine service hole cover.
3) On all models, remove valve covers. Rotate crankshaft so No. 1 cylinder is at TDC of compression stroke. Ensure timing mark on crankshaft pulley aligns with "0" mark on timing chain cover. Ensure valves on No. 1 cylinder are closed.
4) Measure intake valve clearance on cylinders No. 1 and 2 and exhaust valve clearance on cylinders 1 and 3. See Fig. 1. Using a feeler gauge, measure and record clearance between valve lifter and camshaft. Ensure clearance is within specification. See VALVE CLEARANCE SPECIFICATIONS table.
5) To check remaining valves, rotate crankshaft 360 degrees (one full turn) until No. 4 piston is at TDC of compression stroke. Measure intake valve clearance on cylinders No. 3 and 4 and exhaust valve clearance on cylinders 2 and 4. See Fig. 1. Record measurements. Ensure clearance is within specifications. See VALVE CLEARANCE SPECIFICATIONS Table.
6) If valves require adjustment, rotate crankshaft so camshaft lobe on valve to be adjusted is facing upward, away from valve lifter.
7) Rotate valve lifter so notch on valve lifter is toward spark plug. Press valve lifter downward using Valve Clearance Adjuster (SST 09248-55010) and SST (A). See Fig. 2. Install SST (B) between camshaft and valve lifter. Remove SST (A).
8) Using small screwdriver and magnet, remove adjusting shim. Measure thickness of shim removed. Determine correct thickness of adjusting shim to be used by subtracting appropriate valve clearance specification (See VALVE CLEARANCE SPECIFICATION Table) from measured valve clearance. Add this number to thickness of old shim. Select a new shim with a thickness as close as possible to the calculated

value. See appropriate SHIM THICKNESS TABLE.

9) Install shim and recheck valve clearance. Install valve cover.

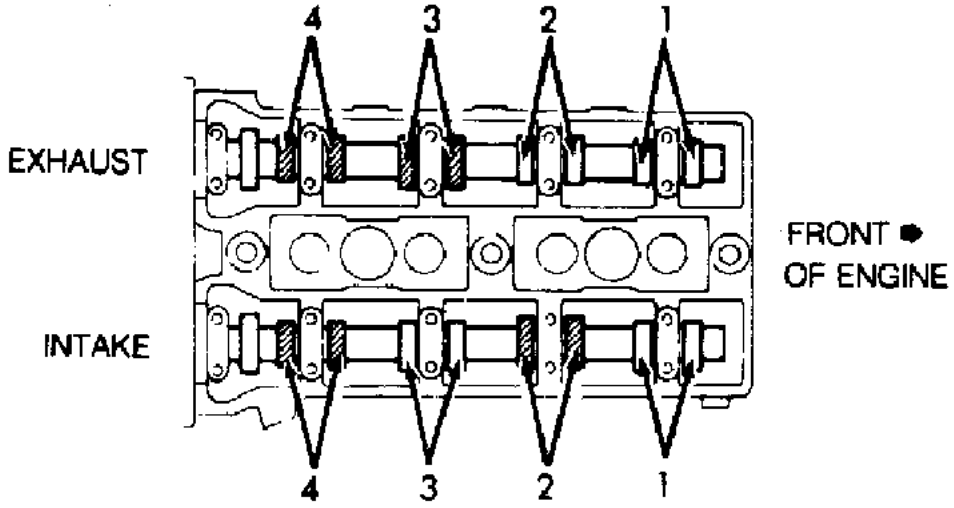


Fig. 1: Valve Arrangement (Typical)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

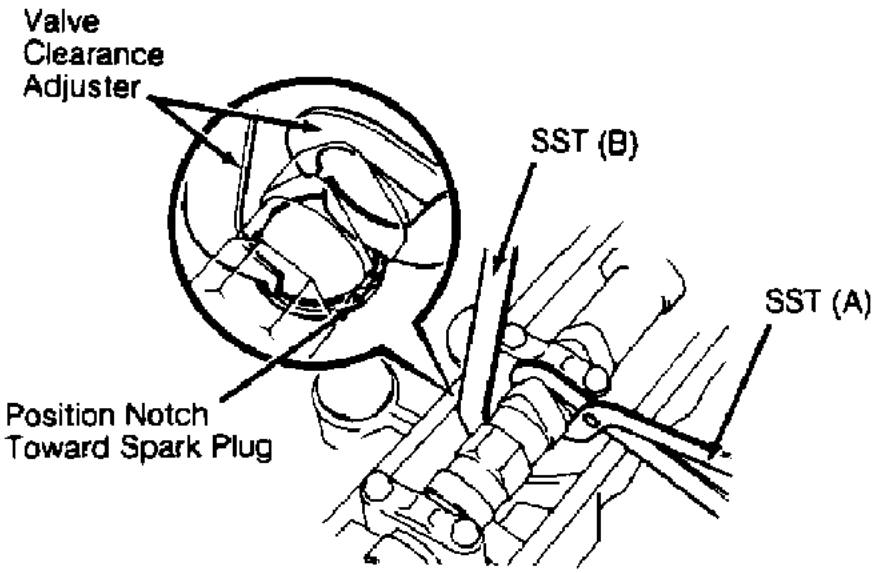


Fig. 2: Removing Valve Adjusting Shim
Courtesy of Toyota Motor Sales, U.S.A., Inc.

VALVE CLEARANCE SPECIFICATIONS TABLE

Application (1)	In. (mm)
Camry	
Exhaust	.011-.015 (.28-.38)
Intake	.007-.011 (.18-.28)
Celica	
1.6L & 2.0L Turbo	
Exhaust	.008-.012 (.20-.30)
Intake	.006-.010 (.15-.25)
2.2L	
Exhaust	.011-.015 (.28-.38)
Intake	.007-.011 (.18-.28)
Corolla	
Exhaust	.008-.012 (.20-.30)
Intake	.006-.010 (.15-.25)
MR2	
2.0L	
Exhaust	.008-.012 (.20-.30)
Intake	.006-.010 (.15-.25)
2.2L	
Exhaust	.011-.015 (.28-.38)
Intake	.007-.011 (.18-.28)
Previa	
Exhaust	.010-.014 (.25-.35)
Intake	.006-.010 (.15-.25)
Pickup & 4Runner	
Exhaust	.012 (.30)
Intake	.008 (.20)
Tercel	
Exhaust & Intake	.008 (.20)

(1) - On Pickup, Tercel and 4Runner, adjust valves at normal operating temperature. On all other models, adjust valves with engine cold.

SHIM THICKNESS TABLE (1.6L & 2.0L NON-TURBO)

Thickness mm (in.)	Shim No.
2.50 (0.0984)	02
2.55 (0.1004)	04
2.60 (0.1024)	06
2.65 (0.1043)	08
2.70 (0.1063)	10
2.75 (0.1083)	12
2.80 (0.1102)	14
2.85 (0.1122)	16
2.90 (0.1142)	18
2.95 (0.1161)	20
3.00 (0.1181)	22
3.05 (0.1201)	24
3.10 (0.1220)	26

Thickness mm (in.)	Shim No.
3.15 (0.1240)	28
3.20 (0.1260)	30
3.25 (0.1280)	32
3.30 (0.1299)	34

SHIM THICKNESS TABLE (2.0L TURBO)

Thickness mm (in.)	Shim No.
2.00 (0.0787)	02
2.05 (0.0807)	04
2.10 (0.0827)	06
2.15 (0.0846)	08
2.20 (0.0866)	10
2.25 (0.0886)	12
2.30 (0.0906)	14
2.35 (0.0925)	16
2.40 (0.0945)	18
2.45 (0.0965)	20
2.50 (0.0984)	22
2.55 (0.1004)	24
2.60 (0.1024)	26
2.65 (0.1043)	28
2.70 (0.1063)	30
2.75 (0.1083)	32
2.80 (0.1102)	34
2.85 (0.1122)	36
2.90 (0.1142)	38
2.95 (0.1161)	40
3.00 (0.1181)	42
3.05 (0.1201)	44
3.10 (0.1220)	46
3.15 (0.1240)	48
3.20 (0.1260)	50
3.25 (0.1280)	52
3.30 (0.1299)	54

SHIM THICKNESS TABLE (PREVIA 2.4L)

Thickness mm (in.)	Shim No.
2.50 (0.0984)	1
2.55 (0.1004)	3
2.60 (0.1024)	5
2.65 (0.1043)	7
2.70 (0.1063)	9
2.75 (0.1083)	11
2.80 (0.1102)	13
2.85 (0.1122)	15
2.90 (0.1142)	17
2.95 (0.1161)	19

3.00 (0.1181)	21
3.05 (0.1201)	23
3.10 (0.1220)	25
3.15 (0.1240)	27
3.20 (0.1260)	29
3.25 (0.1280)	31
3.30 (0.1299)	33

PICKUP & 4RUNNER

1) Check and adjust valve clearance with engine at normal operating temperature. Remove valve cover. Rotate crankshaft pulley and align pulley groove with "0" mark on timing belt cover to set No. 1 cylinder at TDC of compression stroke.

2) Ensure rocker arms on cylinder No. 1 are loose, and rocker arms on cylinder No. 4 are tight. This indicates TDC compression for cylinder No. 1. If rocker arms are not as described, rotate crankshaft 360 degrees and realign timing marks. Check intake valve clearance on cylinders No. 1 and 2, and exhaust valve clearance on cylinders No. 1 and 3; adjust clearance to specification if necessary. See VALVE CLEARANCE SPECIFICATIONS table.

3) Rotate crankshaft 360 degrees and realign timing marks. Adjust intake valve clearance on cylinders No. 3 and 4, and exhaust valve clearance on cylinders No. 2 and 4.

TERCEL

1) Check and adjust valve clearance with engine at normal operating temperature. Remove valve cover. Rotate crankshaft pulley and align pulley groove with "0" mark on timing belt cover to set No. 1 cylinder at TDC of compression stroke.

2) Ensure rocker arms on cylinder No. 1 are loose, and rocker arms on cylinder No. 4 are tight. This indicates TDC compression for No. 1 cylinder. If rocker arms are not as described, rotate crankshaft 360 degrees and realign timing marks.

3) With cylinder No. 1 at TDC compression, measure valve clearance between camshaft lobe and rocker arm using proper thickness feeler gauge. See Fig. 3. See VALVE CLEARANCE SPECIFICATIONS table.

4) Rotate crankshaft 360 degrees and check clearance on remaining camshaft lobes. See Fig. 3. To adjust valve clearance, loosen lock nut and turn adjusting screw. After proper clearance has been obtained, hold adjusting screw stationary and tighten lock nut. Recheck valve clearance. Install valve cover.

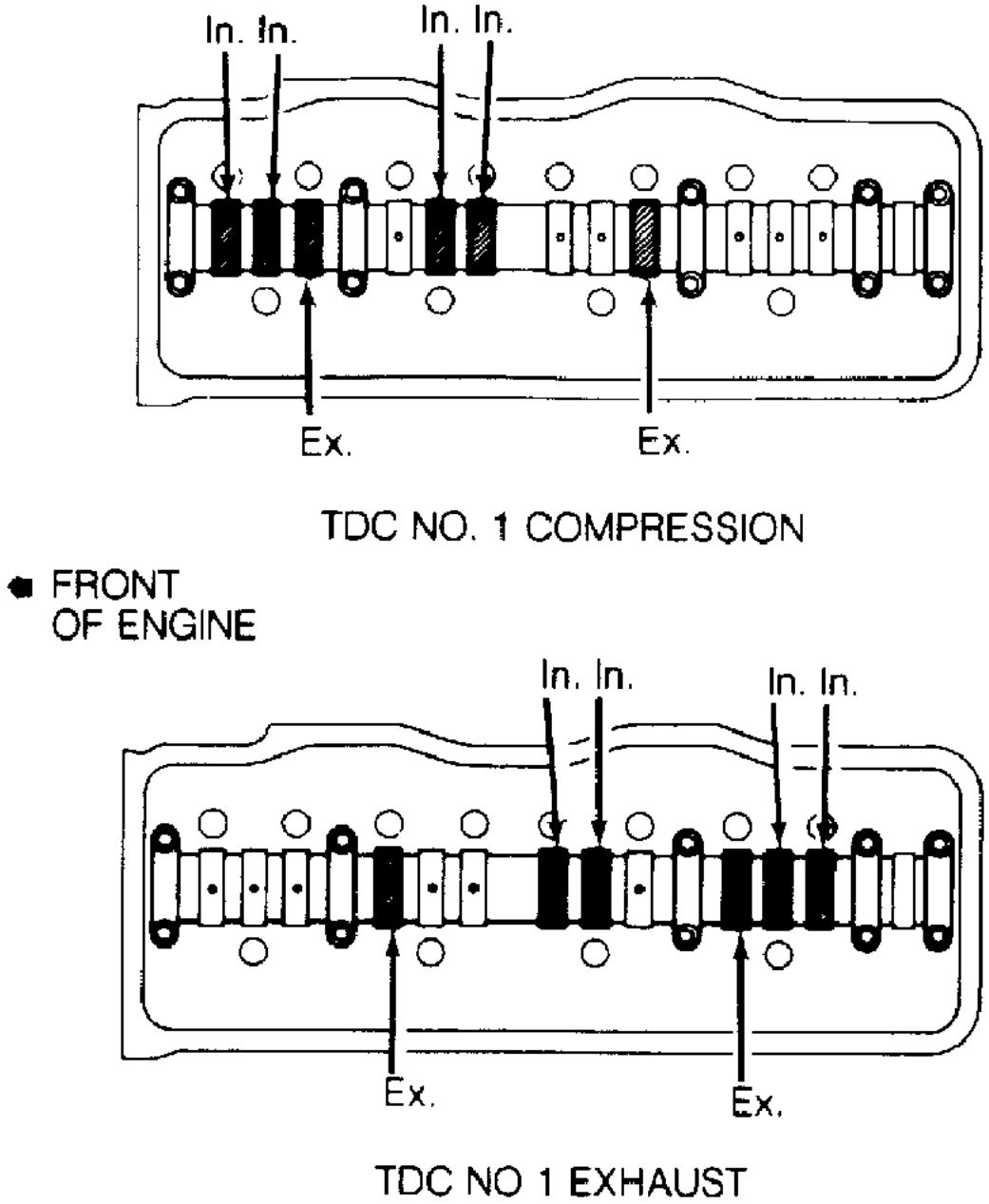


Fig. 3: Adjusting Valve Clearance (Tercel)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

IGNITION TIMING

CAUTION: Some tachometers may not be compatible with ignition system. Consult tachometer manufacturer before connecting tachometer to system. To avoid possible damage to ignitor and/or coil, DO NOT allow tachometer terminal to become grounded.

1) Ensure engine is at normal operating temperature. Connect

timing light to engine. Connect tachometer to proper location. See Figs. 4 - 11.

2) Install jumper wire between proper terminals of engine check connector. See Figs. 12 - 14. Ensure idle speed is within specification. See appropriate IDLE SPEED SPECIFICATIONS table under IDLE SPEED & MIXTURE. Ensure base timing is within specification. See IGNITION TIMING table.

3) Adjust timing by turning distributor

4) Remove jumper wire from engine check connector and ensure advance timing is within specification. See IGNITION TIMING DEGREES table. Tighten distributor hold-down bolt or cam position sensor bolt. See TORQUE SPECIFICATIONS table at end of article.

IGNITION TIMING TABLE - Degrees BTDC @ RPM

Application	(1) Base Timing	(2) Advance Timing
Camry	10 @ 650	13-22 @ 650-750
Celica		
1.6L	10 @ 800	0-20 @ 800
2.0L	10 @ 750-800	12-21 @ 750-800
2.2L	10 @ 650	13-22 @ 650-750
Corolla		
1.6L (4A-FE)	10 @ 700-800	0-20 @ 700-800
1.6L (4A-GE)	10 @ 800	9-19 @ 800
MR2		
2.0L	10 @ 750-850	12-21 @ 750-850
2.2L	10 @ 650	13-22 @ 650
Pickup & 4Runner	5 @ 750-850	10-14 @ 750-850
Previa	5 @ 750	12 @ 750
Tercel	10 @ 800	7-17 @ 800

(1) - Check ignition timing with transmission in Neutral, and jumper wire connected between proper terminals of check connector.
(2) - Check ignition timing with transmission in Neutral, and jumper wire removed from check connector terminals.
(3) - More than 12 degrees at idle.

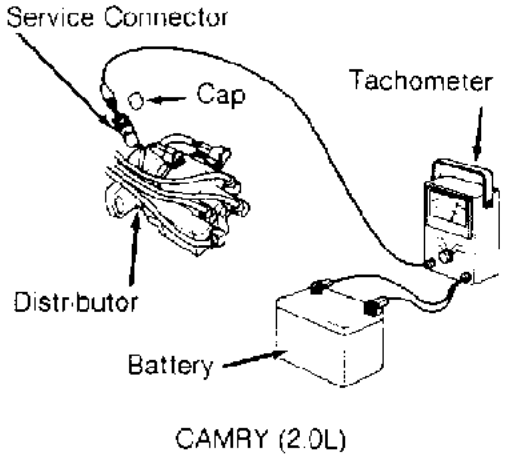


Fig. 4: Connecting Tachometer (Camry 2.0L)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

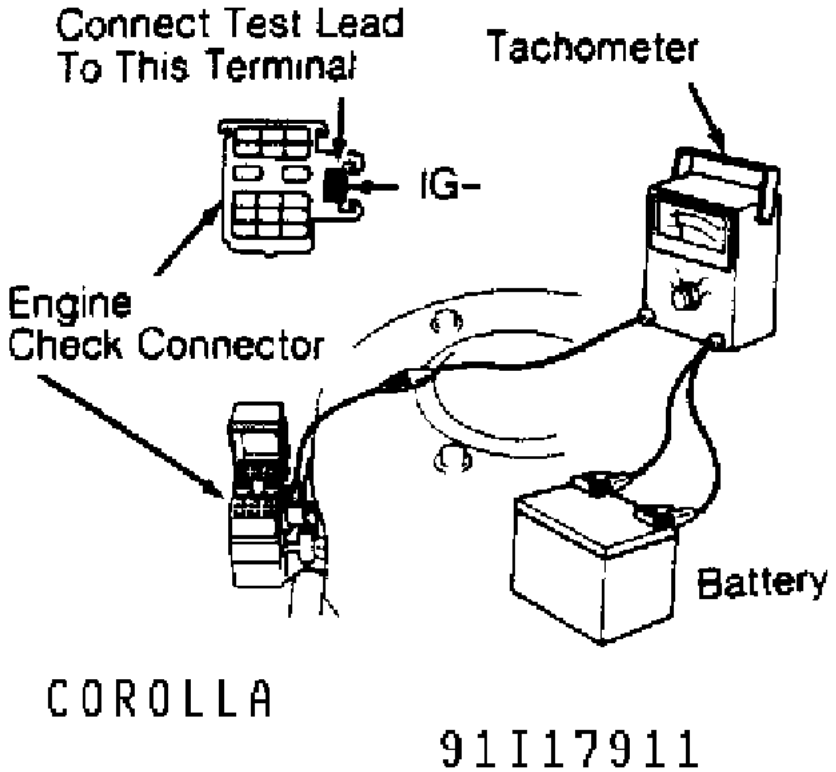
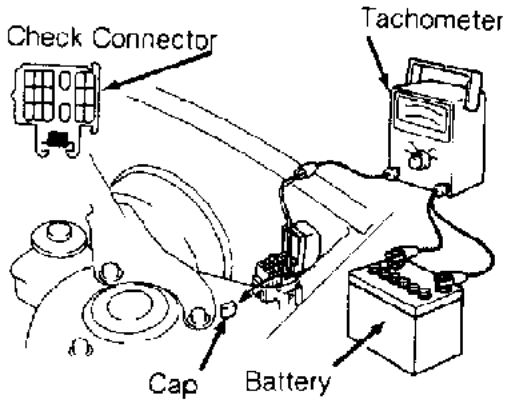
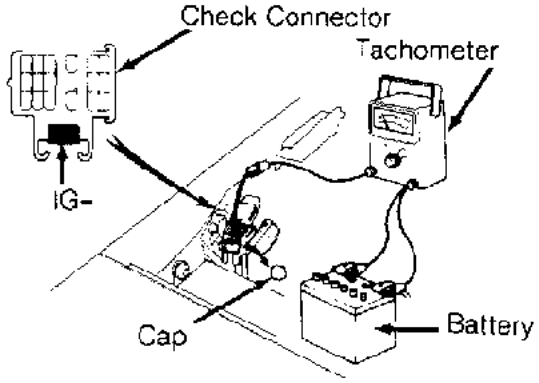


Fig. 5: Connecting Tachometer (Corolla)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



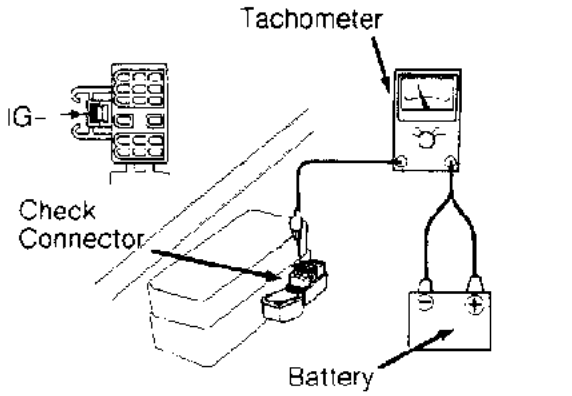
CELICA

Fig. 6: Connecting Tachometer (Celica)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



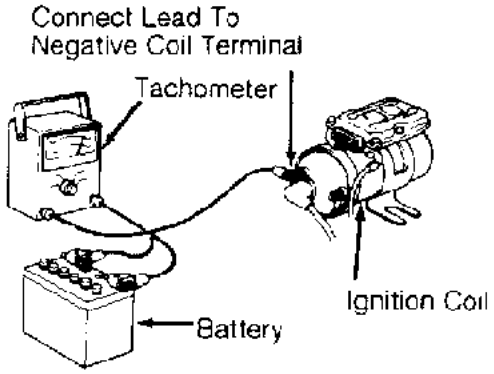
MR2

Fig. 7: Connecting Tachometer (MR2)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



PICKUP (2.4L & 3.0L) & 4RUNNER (3.0L)

Fig. 8: Connecting Tachometer (Pickup)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



4RUNNER (2.4L)

Fig. 9: Connecting Tachometer (4Runner)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

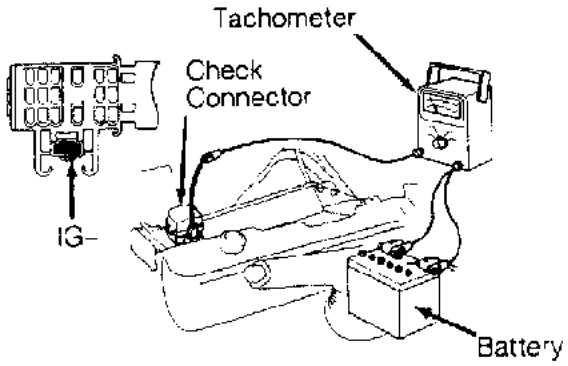


Fig. 10: Connecting Tachometer (Previa)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

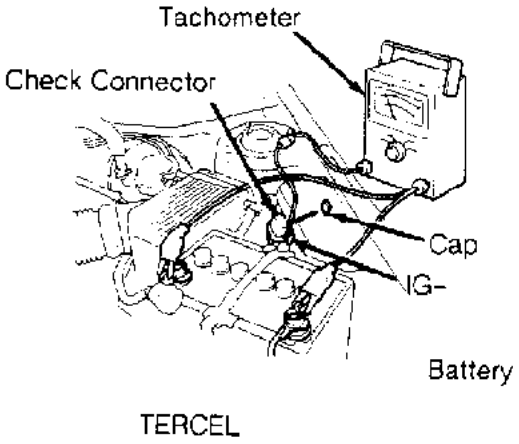


Fig. 11: Connecting Tachometer (Tercel)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

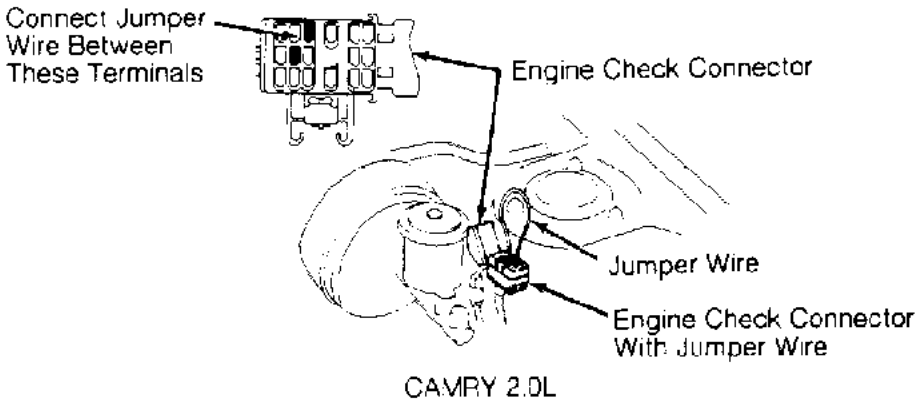


Fig. 12: Installing Jumper Wire To Eng. Check Conn. (Camry)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

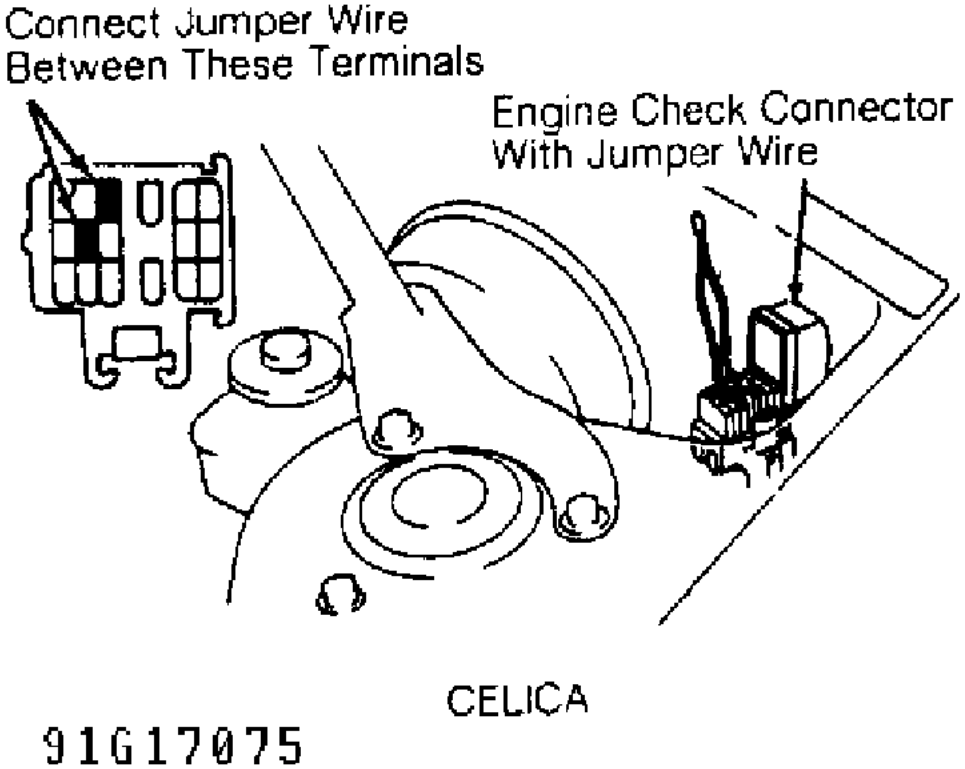


Fig. 13: Installing Jumper Wire To Eng. Check Conn. (Celica)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

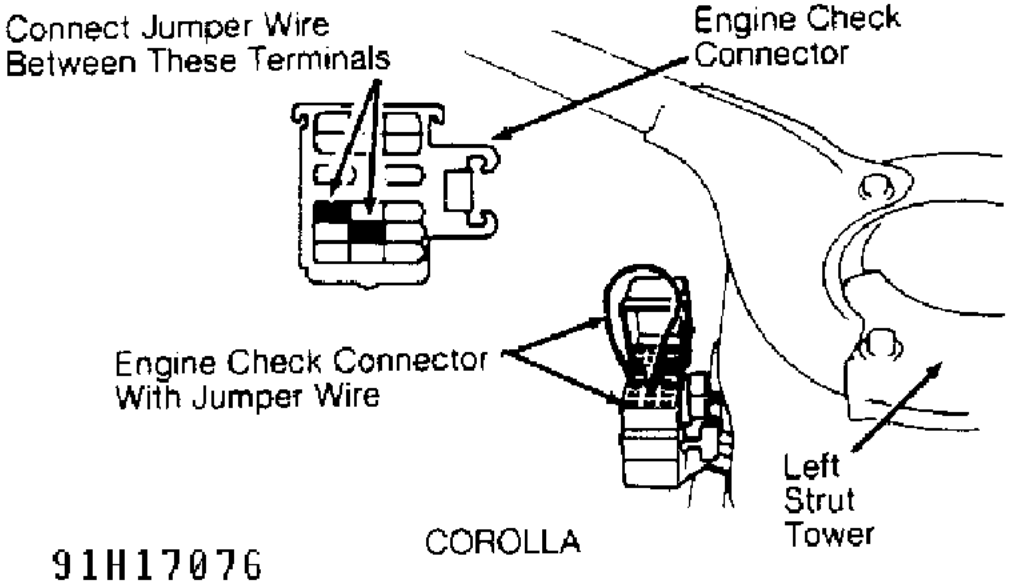


Fig. 14: Installing Jumper Wire To Eng. Check Conn. (Corolla)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

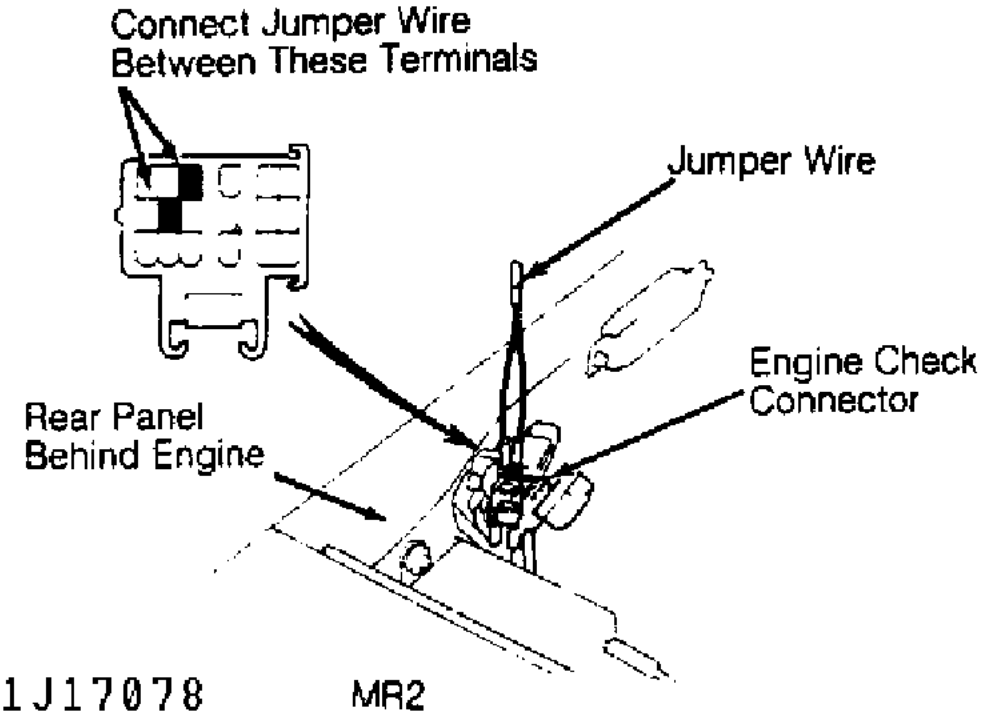


Fig. 15: Installing Jumper Wire To Eng. Check Conn. (MR2)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

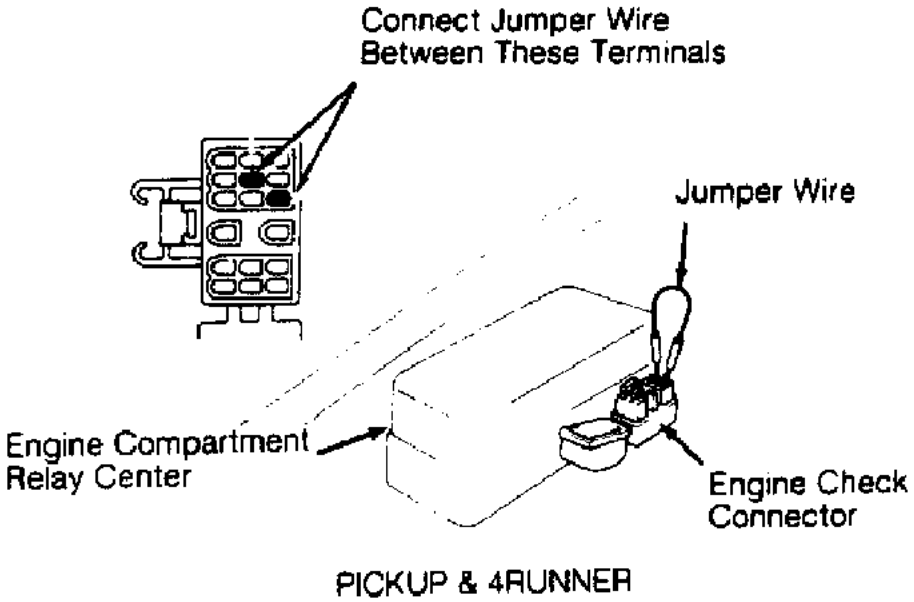


Fig. 16: Installing Jumper Wire To Eng. Check Conn. (P/U & 4Runner)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

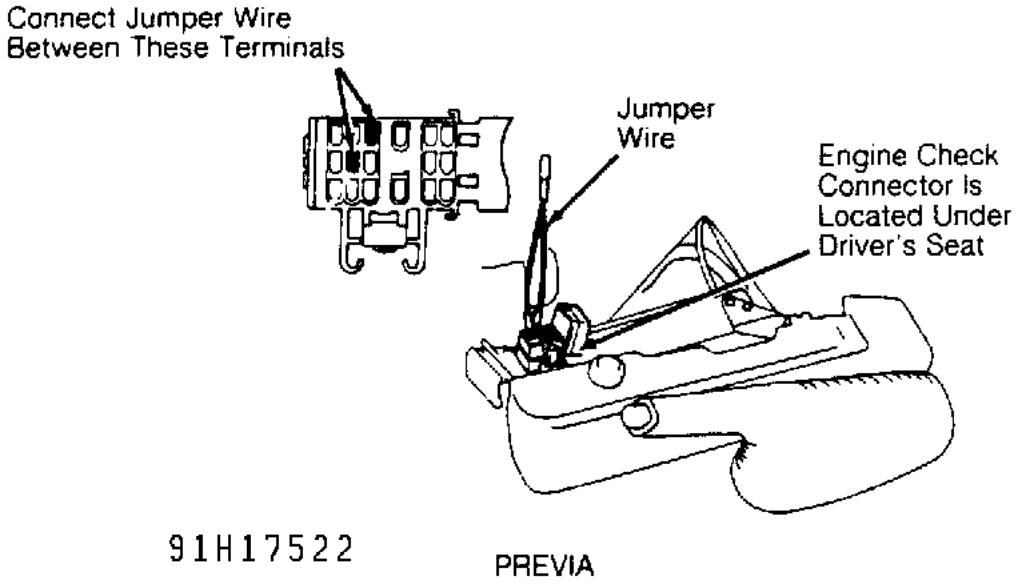


Fig. 17: Installing Jumper Wire To Eng. Check Conn. (Previa)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

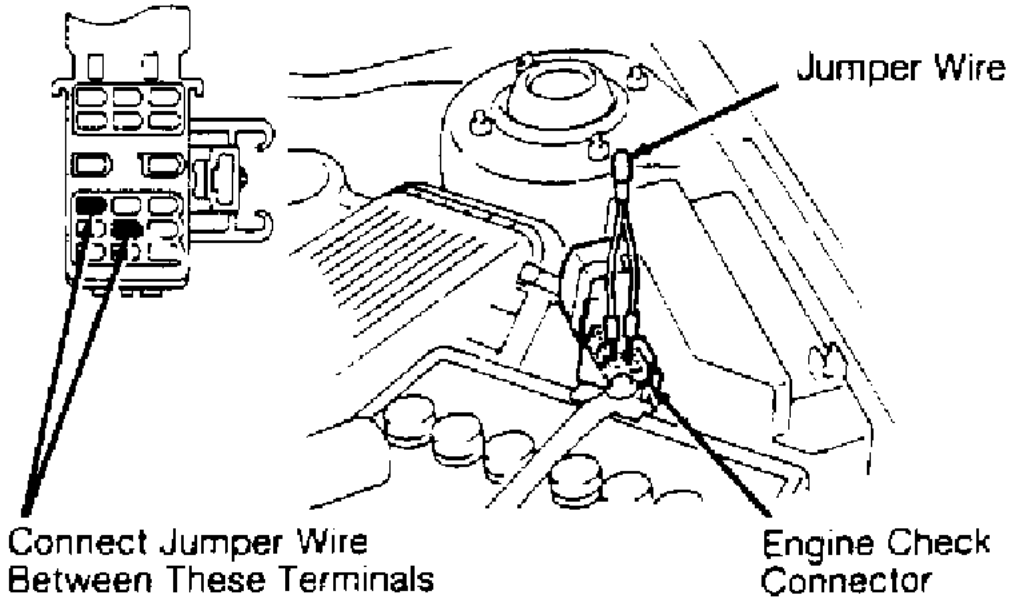


Fig. 18: Installing Jumper Wire To Eng. Check Conn. (Tercel)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

IDLE MIXTURE

NOTE: Idle mixture adjustment is not possible on any model. See G - TESTS W/ CODES article in the ENGINE PERFORMANCE Section for diagnosis of incorrect idle mixture.

IDLE SPEED

CAUTION: Some tachometers may not be compatible with ignition system. Consult tachometer manufacturer before connecting tachometer to system. To avoid possible damage to ignitor and/or coil, DO NOT allow tachometer terminal to become grounded.

NOTE: Adjust idle speed with air cleaner installed, all air intake system hoses and vacuum lines connected, electronic fuel injection system wiring connectors tight, transmission/transaxle in Neutral, all accessories and cooling fan off (if equipped) and engine at normal operating temperature.

CAMRY 2.0L

1) Install tachometer to proper terminals. See Fig. 4. Install jumper wire between proper terminals of engine check connector. See Fig. 12. Operate engine at 1000-1300 RPM for 5 seconds

then return to idle. Ensure idle speed is within specification. See IDLE SPEED SPECIFICATIONS table.

2) If idle speed requires adjustment, remove rubber boot from top of throttle body. See Fig. 19. Adjust idle speed adjusting screw to obtain correct idle speed.

3) Remove jumper wire from check connector and ensure idle speed is within specification. See IDLE SPEED SPECIFICATIONS table. If idle speed is not within specification, start engine and allow to idle for 30 seconds then shut off.

4) Repeat procedure, if necessary, until idle speed data is stored in control unit and correct idle speed is maintained. Remove tachometer.

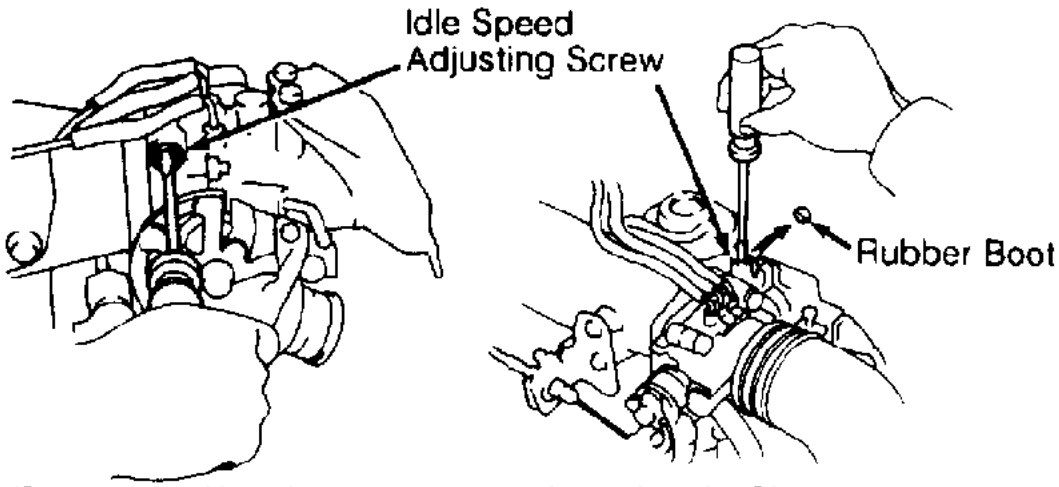


Fig. 19: Identifying Idle Speed Adjusting Screw Locations (Typical)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

CELICA 1.6L & COROLLA (4A-FE)

1) Install tachometer to proper terminals. See Fig. 5 or 6. Start engine and operate at 2500 RPM for about 2 minutes. Allow engine to idle. Install jumper wire between proper terminals of engine check connector. See Fig. 13 or 14. Ensure idle speed is within specification. See IDLE SPEED SPECIFICATIONS table.

2) If idle speed requires adjustment, remove rubber boot from top of throttle body. See Fig. 19. Adjust idle speed adjusting screw to obtain correct idle speed. Remove tachometer.

CELICA 2.0L, MR2 2.0L & PREVIA

1) Install tachometer to proper terminals. See Fig. 6, 7 or 10. Start engine and check if idle speed is within specification. See IDLE SPEED SPECIFICATIONS table.

2) If idle speed is not within specification, check Idle Speed Control (ISC) valve, wiring and ECU. See IDLE CONTROL SYSTEMS in I - SYS/COMP TESTS article in the ENGINE PERFORMANCE Section.

CELICA 2.2L & MR2 2.2L

1) Install tachometer to proper terminals. See Fig. 6 or 7. Start engine and operate at 1000-3000 RPM for about 5 seconds. Allow engine to idle. Install check connector jumper wire between proper terminals of engine check connector. See Fig. 13 or 15. Ensure idle speed is within specification. See IDLE SPEED SPECIFICATIONS table.

2) If idle speed requires adjustment, remove rubber boot from top of throttle body. See Fig. 19. Adjust idle speed adjusting screw to obtain correct idle speed. Remove check connector jumper wire and ensure idle speed is within specification. See IDLE SPEED SPECIFICATIONS table. If idle speed is not within specification, start engine and allow to idle for 30 seconds then shut off.

3) Repeat procedure, if necessary, until idle speed data is stored in control unit and correct idle speed is maintained. Remove tachometer.

COROLLA (4A-GE), PICKUP 2.4L, TERCEL & 4RUNNER 2.4L

1) Install tachometer to proper terminals. See Fig. 5, 8, 9 or 11. On Tercel, disconnect idle-up vacuum switching valve connector. On all models, start engine and operate at 2500 RPM for about 2 minutes. Ensure idle speed is within specification. See IDLE SPEED SPECIFICATIONS table.

2) If idle speed requires adjustment, adjust idle speed adjusting screw to obtain correct idle speed. See Fig. 19. Remove tachometer.

IDLE SPEED SPECIFICATIONS TABLE

Application	Idle RPM
Camry 2.0L	(1) 600-700
Celica	
1.6L	(2) 800
2.0L	(3) 750-850
2.2L	(1) 600-700
Corolla	
4A-FE Engine	
2WD Calif.	(2) 800
2WD Federal	(2) 700
4WD	(2) 800
4A-GE Engine	800
MR2	
2.0L	(3) 750-850
2.2L	(4) 650
Pickup 2.4L	
4WD & A/T	850
2WD & M/T	750
4Runner 2.4L	750
Previa	
A/T	(3) 750
M/T	(3) 700
Tercel	
A/T	800

M/T 750

(1) - Specification given is with jumper wire connected to appropriate check connector terminals. Idle speed with jumper wire removed from check connector terminals is 650-750 RPM.
(2) - Specification given is with jumper wire connected to appropriate check connector terminals.
(3) - Idle speed is not adjustable.
(4) - Specification given is with jumper wire connected to appropriate check connector terminals. Idle speed with jumper wire removed from check connector is 700-800 RPM (M/T) or 650-750 RPM (A/T).

THROTTLE POSITION SENSOR (TPS)

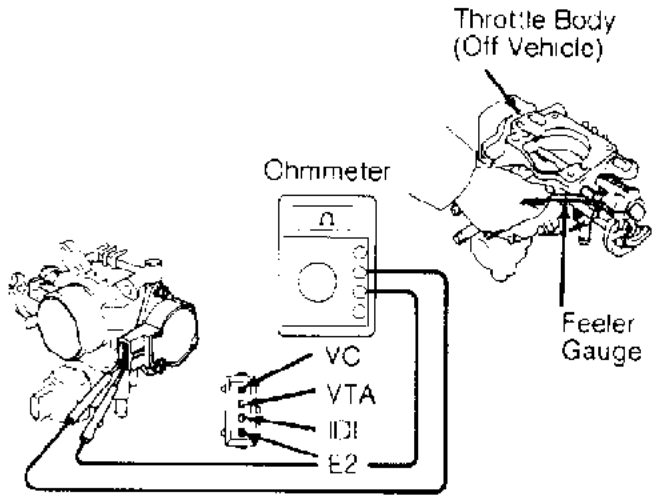
NOTE: Vehicles with Electronically Controlled Transaxle (ECT) use signals sent from TPS to Electronic Control Unit (ECU) to calculate gear shift and lock-up timing.

1) Loosen mounting screws. Unplug TPS connector. Connect ohmmeter between terminals IDL and E2 (terminals IDL and E1 on Camry 2.0L without ECT). See Figs. 20 - 23.
2) To set initial clearance, insert proper thickness feeler gauge between throttle stop screw and throttle lever. See appropriate THROTTLE POSITION SENSOR ADJUSTMENT table.
3) With ohmmeter showing infinity, rotate TPS clockwise until continuity exists. Tighten mounting screws. Using specified feeler gauge, recheck adjusted clearance. Disconnect ohmmeter and reconnect TPS after adjustment.

THROTTLE POSITION SENSOR ADJUSTMENT TABLE

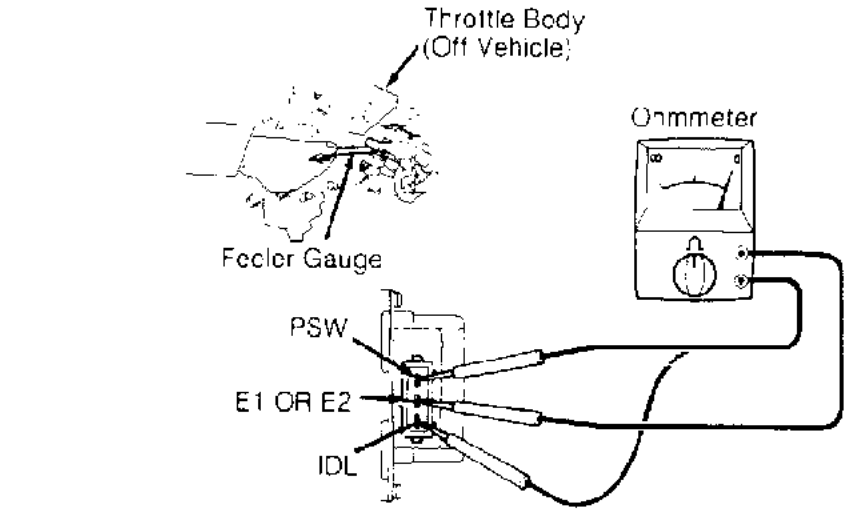
Application	Initial Clearance In. (mm)	Adjusted Clearance In. (mm)	Ohmmeter Reading
Camry 2.0L			
w/ ECT	.024 (.60)	.020 (.50)	Continuity
		.028 (.70)	Infinity
w/o ECT	.028 (.70)	.020 (.50)	Continuity
		.035 (.90)	Infinity
Celica			
1.6L	.028 (.70)	.024 (.60)	Continuity
		.031 (.79)	Infinity
2.0L	.024 (.60)	.020 (.50)	Continuity
		.028 (.70)	Infinity
2.2L			

w/ ECT	.024 (.60)	.020 (.50)	Continuity
		.028 (.70)	Infinity
w/o ECT	.028 (.70)	.020 (.50)	Continuity
		.035 (.90)	Infinity
Corolla			
4A-FE	.028 (.70)	.024 (.60)	Continuity
		.032 (.81)	Infinity
4A-GE	.019 (.48)	.014 (.36)	Continuity
		.023 (.58)	Infinity
MR2			
2.0L	.024 (.60)	.020 (.50)	Continuity
		.028 (.70)	Infinity
2.2L			
A/T	.024 (.60)	.020 (.50)	Continuity
		.028 (.70)	Infinity
M/T	.028 (.70)	.020 (.50)	Continuity
		.035 (.90)	Infinity
Pickup 2.4L &			
4Runner 2.4L .	.028 (.70)	.022 (.56)	Continuity
		.034 (.86)	Infinity
Previa	.033 (.84)	.033 (.84)	Continuity
Tercel	.024 (.60)	.020 (.50)	Continuity
		.028 (.70)	Infinity



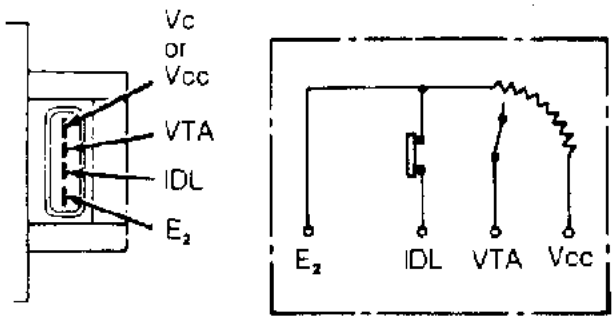
CAMRY (2.5L), CELICA (2.0L), LAND CRUISER, MR2 (2.0L) & TERCEL

Fig. 20: TPS Sensor Adjustment (Celica 2.0L, MR2 2.0L & Tercel)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



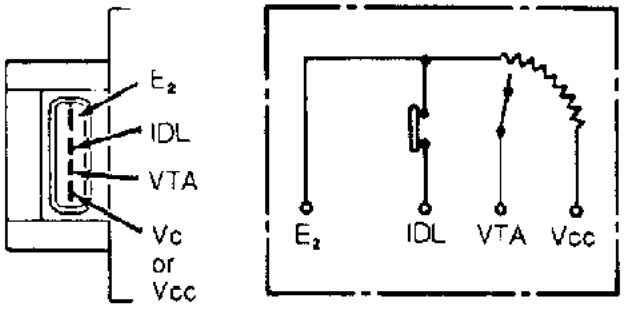
CAMRY (2.0L w/o ELECTRONIC CONTROLLED TRANSAXLE),
CELICA (1.6L & 2.2L w/o ELECTRONIC CONTROLLED TRANSAXLE),
COROLLA (1.6L 4A-FE) & MR2 (2.2L WITH M/T)

Fig. 21: TPS Sensor Adj. (Camry W/O ECT, Celica 1.6L & 2.2L W/O ECT, Corolla 1.6L 4A-FE & MR2 2.2L With M/T)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



CAMRY (2.0L w/ELECTRONIC CONTROLLED TRANSAXLE),
CELICA (2.2L w/ELECTRONIC CONTROLLED TRANSAXLE),
CRESSIDA, MR2 (2.2L WITH A/T), PICKUP,
SUPRA (TURBO) & 4RUNNER

Fig. 22: TPS Sensor Adj. (Camry W/ECT, Celica 2.2L W/ECT, MR2 2.2L With A/T, P/U & 4Runner)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



COROLLA (1.6L 4A-GE), PREVIA & SUPRA (NON-TURBO)

Fig. 23: TPS Sensor Adj. (Corolla 1.6L 4A-GE & Previa)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

DASHPOT CONTROL SYSTEM

For testing and adjustment procedures, see THROTTLE CONTROLS under EMISSION SYSTEMS & SUB-SYSTEMS in I - SYS/COMP TESTS article in the ENGINE PERFORMANCE Section.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application	Ft. lbs. (N.m)
Distributor Hold-Down Bolt	
Camry 2.0L	9 (13)
Celica	
1.6L	14 (20)
2.0L	29 (39)
2.2L	9 (13)
Corolla, Pickup & 4Runner	14 (20)
MR2	
2.0L	29 (39)
2.2L	9 (13)
Previa	(1)
Tercel	13 (18)

(1) - Information is not available from manufacturer.

END OF ARTICLE