VALVE CLEARANCE (1MZ–FE/3MZ–FE)
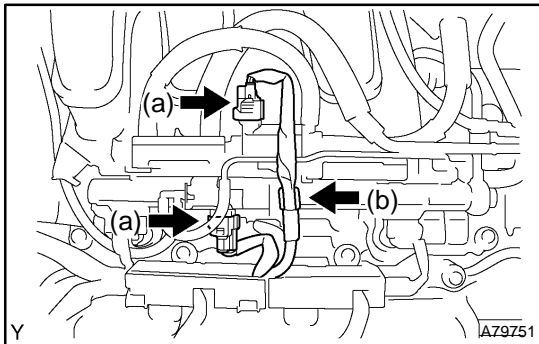## ADJUSTMENT

141IH–03

1. DRAIN ENGINE COOLANT (See page 16–27)

2. REMOVE FRONT FENDER APRON SEAL RH
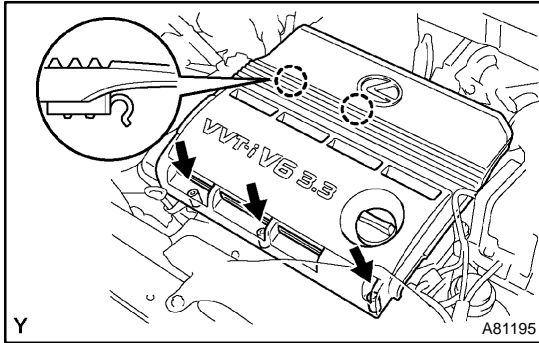
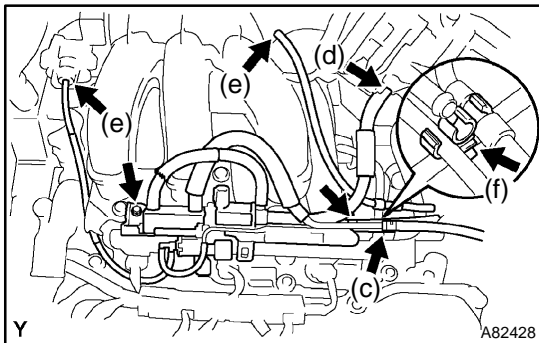**3. REMOVE V–BANK COVER SUB–ASSY**

(a) Using a socket hexagon wrench 5, remove the 3 nuts.

(b) Remove the V–bank cover.

4. REMOVE RADIATOR HOSE INLET

5. REMOVE FRONT SUSPENSION UPPER BRACE CENTER (W/ FRONT SUSPENSION BRACE UPPER CENTER)

6. REMOVE AIR CLEANER ASSEMBLY WITH HOSE

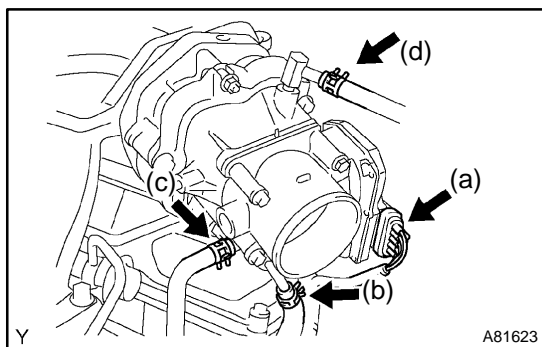**7. REMOVE EMISSION CONTROL VALVE SET**

(a) Disconnect the 2 VSV connectors.

(b) Remove the wire harness clamp.

(c) Disconnect the fuel vapor feed hose No. 1.

(d) Disconnect the fuel vapor feed hose No. 2.

(e) Disconnect the 2 vacuum hoses.

(f) Remove the clamp.

(g) Remove the 2 nuts and the emission control valve set.

8. REMOVE INTAKE AIR SURGE TANK

(a) Disconnect the throttle motor connector.

(b) Disconnect the water by–pass hose No. 3.

(c) Disconnect the water by–pass hose No. 2.

(d) Disconnect the union to check valve hose.
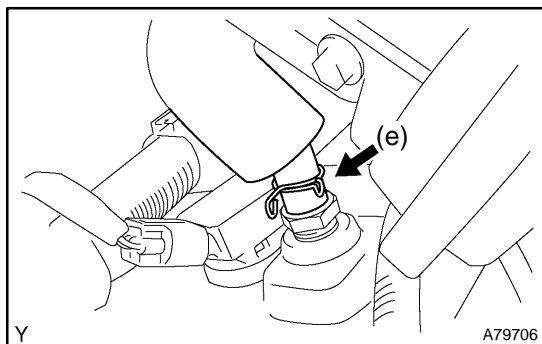
(e) Disconnect the ventilation hose.
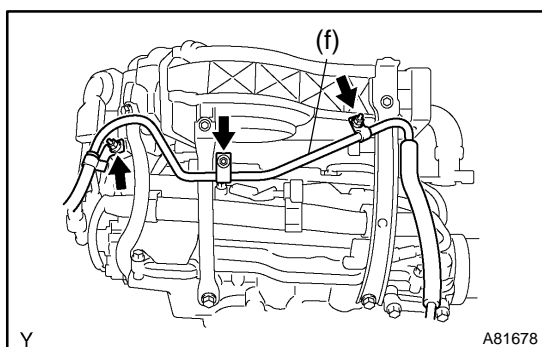
(f) Remove the 3 nuts and disconnect the pressure feed tube.
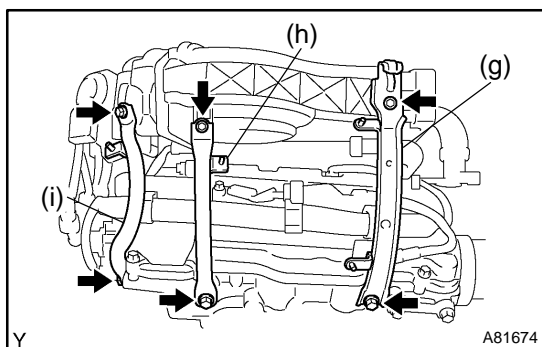
(g) Remove the 2 bolts and engine hanger No. 1.

(h) Remove the 2 bolts and surge tank stay No. 1.

(i) Remove the 2 bolts and surge tank stay No. 2.
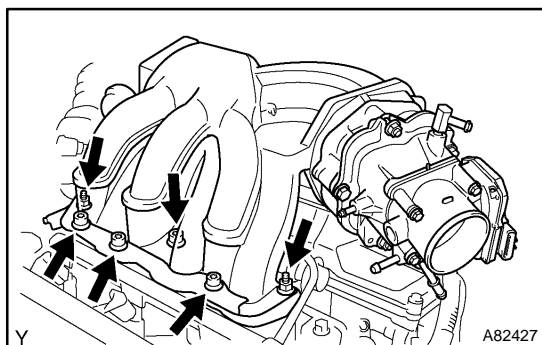
(j) Using a socket hexagon wrench 8, remove the 4 bolts.

(k) Remove the 2 nuts, emission control valve bracket and intake air surge tank.

(l) Remove the gasket from the intake air surge tank.

9. REMOVE IGNITION COIL ASSY

A78541
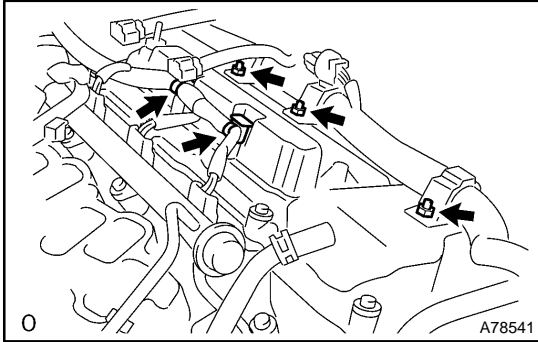
10. REMOVE CYLINDER HEAD COVER SUB–ASSY
(a) Remove the 2 engine wire harness clamps.
(b) Remove the 3 nuts and disconnect the engine wire harness.
(c) Remove the 9 bolts and cylinder head cover.

A36719
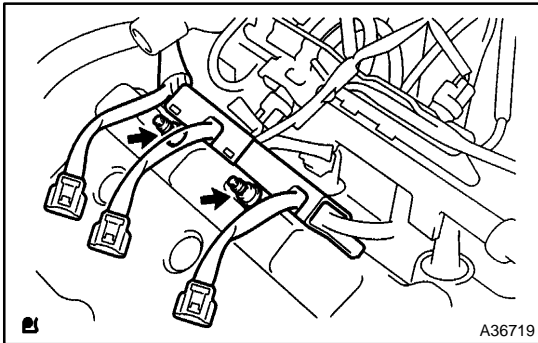
11. REMOVE CYLINDER HEAD COVER SUB–ASSY LH
(a) Using an E6 torx socket wrench, remove the 2 bolts and disconnect the engine wire harness protector.
(b) Remove the 9 bolts and cylinder head cover.

P18805
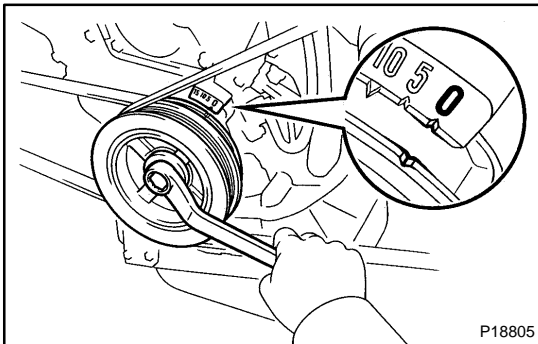
12. INSPECT VALVE CLEARANCE
(a) Turn the crankshaft pulley, and align the timing notch with timing mark 0 of the No. 1 timing belt cover.
(b) Check that the valve lifters on the No. 1 timing belt cover (IN and EX) are both loose.

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

RH Bank

3 3

EX

IN

1 1

LH Bank   Front ←

6 6

IN

EX

2 2

A78666

(c) Check the valves indicated in the illustration on the left.
- (1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.

Valve clearance (Cold):

Item	Specified Condition
Intake	0.15 to 0.25 mm (0.006 to 0.010 in.)
Exhaust	0.25 to 0.35 mm (0.010 to 0.014 in.)

- (2) Record valve clearance measurements that are out of the specified range. These measurements will be used later to determine the size of the adjustment shim to be installed.

RH Bank

5 5

EX

IN

3 3

LH Bank   Front ←

2 2

IN

EX

4 4

A78667

(d) Turn the crankshaft 2/3 of a revolution (240°), and check the valves indicated in the illustration on the left.
- (1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.

Valve clearance (Cold):

Item	Specified Condition
Intake	0.15 to 0.25 mm (0.006 to 0.010 in.)
Exhaust	0.25 to 0.35 mm (0.010 to 0.014 in.)

- (2) Record valve clearance measurements that are out of the specified range. These measurements will be used later to determine the size of the adjustment shim to be installed.

RH Bank

EX

IN

5 5

Front ←

LH Bank

IN

EX

6 6

A78668

(e) Turn the crankshaft 2/3 of a revolution (240°), and check the valves indicated in the illustration on the left.
  (1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.

Valve clearance (Cold):

Item	Specified Condition
Intake	0.15 to 0.25 mm (0.006 to 0.010 in.)
Exhaust	0.25 to 0.35 mm (0.010 to 0.014 in.)

  (2) Record valve clearance measurements that are out of the specified range. These measurements will be used later to determine the size of the adjustment shim to be installed.

Upward

Notch

A78669

13. ADJUST VALVE CLEARANCE

(a) Turn the camshaft so that the cam lobe faces upward.

(b) Turn the valve lifter with a screwdriver so that the notches are perpendicular to the camshaft.

Front of No. 1 and No. 2 Cylinders

SST (A)

SST (B)

7

Others

SST (A)

SST (B)

9

A78670
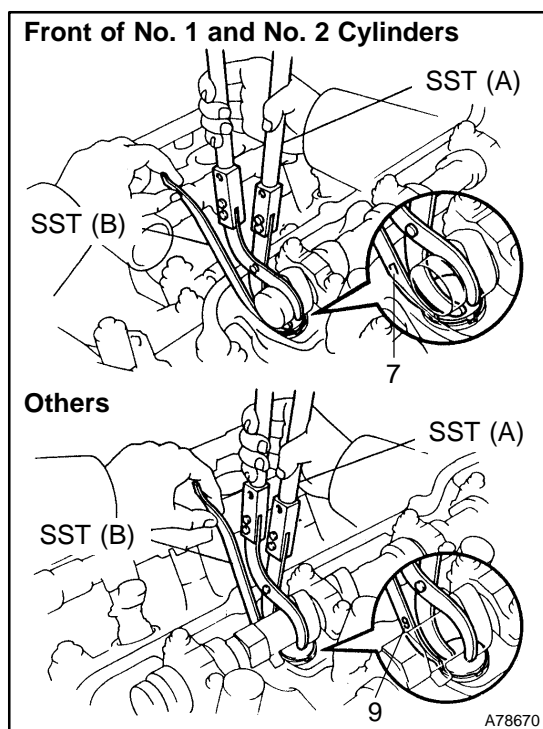
(c) Using SST (A), press down the valve lifter and place SST (B) between the camshaft and valve lifter. Remove SST (A).
  SST   09248–55040 (09248–05410, 09248–05420)
HINT:
• Apply SST (B) at a slight angle on the side marked with "9" or "7" at the position shown in the illustration.
• When SST (B) is inserted too deeply, it will get pinched by the shim. To prevent it from being stuck, insert it gently from the intake side at a slight angle.

SST (B)

Magnetic Finger

A78671
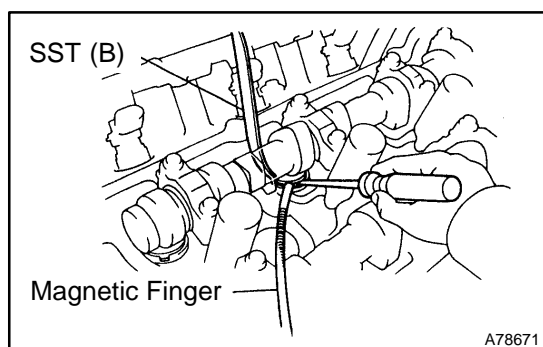
(d) Using a small screwdriver and magnetic finger, remove the adjusting shim.

EM0494
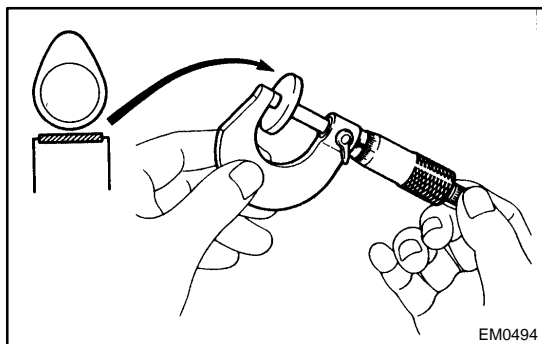
(e) Using a micrometer, measure the thickness of the removed shim.

(f) Calculate the thickness of a new shim so that the valve clearance comes within the specified value.

A	Thickness of new shim
B	Thickness of used shim
C	Measured valve clearance

Specified value (Cold):
Intake A = B + (C – 0.20 mm (0.0079 in.))
Exhaust A = B + (C – 0.30 mm (0.0118 in.))

(g) Select a new shim with a thickness as close as possible to the calculated values.

EXAMPLE (Intake):
Measured valve clearance = 0.45 mm (0.0177 in.)
0.45 mm (0.0177 in.) – 0.20 mm (0.0079 in.) = 0.25 mm (0.0098 in.)
(Measured – Specification = Excess clearance)
Used shim measurement = 2.80 mm (0.1102 in.)
0.25 mm (0.0098 in.) + 2.80 mm (0.1102 in.) = 3.05 mm (0.1201 in.)
(Excess clearance + Used shim = Ideal new shim)
Closest new shim = 3.05 mm (0.1201 in.)
Select No. 12 shim

HINT:
• Shims are available in 17 sizes in increments of 0.05 mm (0.0020 in.), from 2.50 mm (0.0984 in.) to 3.30 mm (0.1299 in.).
• Refer to adjusting shim selection chart on the following 2 pages.

Adjusting Shim Selection Chart (Intake)

Installed shim thickness mm (in.) — column headers (left to right):

2.500 (0.0984), 2.520 (0.0992), 2.540 (0.1000), 2.550 (0.1004), 2.560 (0.1008), 2.580 (0.1016), 2.600 (0.1024), 2.620 (0.1031), 2.640 (0.1039), 2.650 (0.1043), 2.660 (0.1047), 2.670 (0.1051), 2.680 (0.1055), 2.690 (0.1059), 2.700 (0.1063), 2.710 (0.1067), 2.720 (0.1071), 2.730 (0.1075), 2.740 (0.1079), 2.750 (0.1083), 2.760 (0.1087), 2.770 (0.1091), 2.780 (0.1094), 2.790 (0.1098), 2.800 (0.1102), 2.810 (0.1106), 2.820 (0.1110), 2.830 (0.1114), 2.840 (0.1118), 2.850 (0.1122), 2.860 (0.1126), 2.870 (0.1130), 2.880 (0.1134), 2.890 (0.1138), 2.900 (0.1142), 2.910 (0.1146), 2.920 (0.1150), 2.930 (0.1154), 2.940 (0.1157), 2.950 (0.1161), 2.960 (0.1165), 2.970 (0.1169), 2.980 (0.1173), 2.990 (0.1177), 3.000 (0.1181), 3.010 (0.1185), 3.020 (0.1189), 3.030 (0.1193), 3.040 (0.1197), 3.050 (0.1201), 3.060 (0.1205), 3.080 (0.1213), 3.100 (0.1220), 3.120 (0.1228), 3.140 (0.1236), 3.150 (0.1240), 3.160 (0.1244), 3.180 (0.1252), 3.200 (0.1260), 3.220 (0.1268), 3.240 (0.1276), 3.250 (0.1280), 3.260 (0.1283), 3.280 (0.1291), 3.300 (0.1299)

Measured clearance mm (in.) — row headers (left to right):

- 0.000 – 0.020 (0.0000 – 0.0008)
- 0.021 – 0.040 (0.0008 – 0.0016)
- 0.041 – 0.060 (0.0016 – 0.0024)
- 0.061 – 0.080 (0.0024 – 0.0031)
- 0.081 – 0.100 (0.0032 – 0.0039)
- 0.101 – 0.120 (0.0040 – 0.0047)
- 0.121 – 0.140 (0.0048 – 0.0055)
- 0.141 – 0.149 (0.0056 – 0.0059)
- 0.150 – 0.250 (0.0059 – 0.0098)
- 0.251 – 0.260 (0.0099 – 0.0102)
- 0.261 – 0.280 (0.0103 – 0.0110)
- 0.281 – 0.300 (0.0111 – 0.0118)
- 0.301 – 0.320 (0.0119 – 0.0126)
- 0.321 – 0.340 (0.0126 – 0.0134)
- 0.341 – 0.360 (0.0134 – 0.0142)
- 0.361 – 0.380 (0.0142 – 0.0150)
- 0.381 – 0.400 (0.0150 – 0.0157)
- 0.401 – 0.420 (0.0158 – 0.0165)
- 0.421 – 0.440 (0.0166 – 0.0173)
- 0.441 – 0.460 (0.0174 – 0.0181)
- 0.461 – 0.480 (0.0181 – 0.0189)
- 0.481 – 0.500 (0.0189 – 0.0197)
- 0.501 – 0.520 (0.0197 – 0.0205)
- 0.521 – 0.540 (0.0205 – 0.0213)
- 0.541 – 0.560 (0.0213 – 0.0220)
- 0.561 – 0.580 (0.0221 – 0.0228)
- 0.581 – 0.600 (0.0229 – 0.0236)
- 0.601 – 0.620 (0.0237 – 0.0244)
- 0.621 – 0.640 (0.0244 – 0.0252)
- 0.641 – 0.660 (0.0252 – 0.0260)
- 0.661 – 0.680 (0.0260 – 0.0268)
- 0.681 – 0.700 (0.0268 – 0.0276)
- 0.701 – 0.720 (0.0276 – 0.0283)
- 0.721 – 0.740 (0.0284 – 0.0291)
- 0.741 – 0.760 (0.0292 – 0.0299)
- 0.761 – 0.780 (0.0300 – 0.0307)
- 0.781 – 0.800 (0.0307 – 0.0315)
- 0.801 – 0.820 (0.0315 – 0.0323)
- 0.821 – 0.840 (0.0323 – 0.0331)
- 0.841 – 0.860 (0.0331 – 0.0339)
- 0.861 – 0.880 (0.0339 – 0.0346)
- 0.881 – 0.900 (0.0347 – 0.0354)
- 0.901 – 0.920 (0.0355 – 0.0362)
- 0.921 – 0.940 (0.0363 – 0.0370)
- 0.941 – 0.960 (0.0370 – 0.0378)
- 0.961 – 0.980 (0.0378 – 0.0386)
- 0.981 – 1.000 (0.0386 – 0.0394)
- 1.001 – 1.020 (0.0394 – 0.0402)
- 1.021 – 1.040 (0.0402 – 0.0409)
- 1.041 – 1.050 (0.0410 – 0.0413)

(The body of the chart is a matrix of shim selection numbers (1 through 17) arranged diagonally; each cell indicates the new shim No. to install for the given measured clearance and installed shim thickness.)

Intake valve clearance (Cold):
0.15 to 0.25 mm (0.006 to 0.010 in.)

EXAMPLE:
The 2.800 mm (0.1102 in.) shim is installed, and the measured clearance is 0.450 mm (0.0177 in.). Replace the 2.800 mm (0.1102 in.) shim with a new No. 12 shim.

New shim thickness   mm (in.)

Shim No.	Thickness	Shim No.	Thickness
1	2.500 (0.0984)	10	2.950 (0.1161)
2	2.550 (0.1004)	11	3.000 (0.1181)
3	2.600 (0.1024)	12	3.050 (0.1201)
4	2.650 (0.1043)	13	3.100 (0.1220)
5	2.700 (0.1063)	14	3.150 (0.1240)
6	2.750 (0.1083)	15	3.200 (0.1260)
7	2.800 (0.1102)	16	3.250 (0.1280)
8	2.850 (0.1122)	17	3.300 (0.1299)
9	2.900 (0.1142)		

HINT:
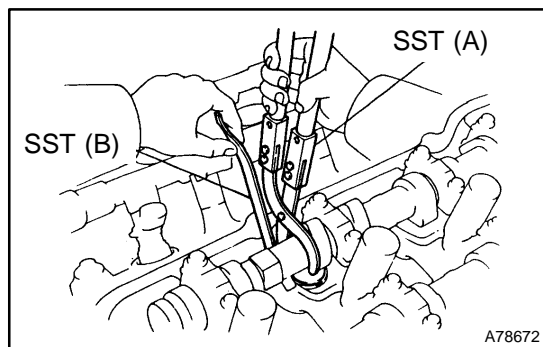A shim's thickness is written on its face in millimeters.

Adjusting Shim Selection Chart (Exhaust)

Installed shim thickness mm (in.) — column headers:

2.500 (0.0984), 2.520 (0.0992), 2.540 (0.1000), 2.550 (0.1004), 2.560 (0.1008), 2.580 (0.1016), 2.600 (0.1024), 2.620 (0.1031), 2.640 (0.1039), 2.650 (0.1043), 2.660 (0.1047), 2.670 (0.1051), 2.680 (0.1055), 2.690 (0.1059), 2.700 (0.1063), 2.710 (0.1067), 2.720 (0.1071), 2.730 (0.1075), 2.740 (0.1079), 2.750 (0.1083), 2.760 (0.1087), 2.770 (0.1091), 2.780 (0.1094), 2.790 (0.1098), 2.800 (0.1102), 2.810 (0.1106), 2.820 (0.1110), 2.830 (0.1114), 2.840 (0.1118), 2.850 (0.1122), 2.860 (0.1126), 2.870 (0.1130), 2.880 (0.1134), 2.890 (0.1138), 2.900 (0.1142), 2.910 (0.1146), 2.920 (0.1150), 2.930 (0.1154), 2.940 (0.1157), 2.950 (0.1161), 2.960 (0.1165), 2.970 (0.1169), 2.980 (0.1173), 2.990 (0.1177), 3.000 (0.1181), 3.010 (0.1185), 3.020 (0.1189), 3.030 (0.1193), 3.040 (0.1197), 3.050 (0.1201), 3.060 (0.1205), 3.080 (0.1213), 3.100 (0.1220), 3.120 (0.1228), 3.140 (0.1236), 3.150 (0.1240), 3.160 (0.1244), 3.180 (0.1252), 3.200 (0.1260), 3.220 (0.1268), 3.240 (0.1276), 3.250 (0.1280), 3.260 (0.1283), 3.280 (0.1291), 3.300 (0.1299)

Measured clearance mm (in.) — row labels (intersection values select shim number):

- 0.000 – 0.020 (0.0000 – 0.0008)
- 0.021 – 0.040 (0.0008 – 0.0016)
- 0.041 – 0.060 (0.0016 – 0.0024)
- 0.061 – 0.080 (0.0024 – 0.0031)
- 0.081 – 0.100 (0.0032 – 0.0039)
- 0.101 – 0.120 (0.0040 – 0.0047)
- 0.121 – 0.140 (0.0048 – 0.0055)
- 0.141 – 0.160 (0.0056 – 0.0063)
- 0.161 – 0.180 (0.0063 – 0.0071)
- 0.181 – 0.200 (0.0071 – 0.0079)
- 0.201 – 0.220 (0.0079 – 0.0087)
- 0.221 – 0.240 (0.0087 – 0.0094)
- 0.241 – 0.249 (0.0095 – 0.0098)
- 0.250 – 0.350 (0.0098 – 0.0138)
- 0.351 – 0.360 (0.0138 – 0.0142)
- 0.361 – 0.380 (0.0142 – 0.0150)
- 0.381 – 0.400 (0.0150 – 0.0157)
- 0.401 – 0.420 (0.0158 – 0.0165)
- 0.421 – 0.440 (0.0166 – 0.0173)
- 0.441 – 0.460 (0.0174 – 0.0181)
- 0.461 – 0.480 (0.0181 – 0.0189)
- 0.481 – 0.500 (0.0189 – 0.0197)
- 0.501 – 0.520 (0.0197 – 0.0205)
- 0.521 – 0.540 (0.0205 – 0.0213)
- 0.541 – 0.560 (0.0213 – 0.0220)
- 0.561 – 0.580 (0.0221 – 0.0228)
- 0.581 – 0.600 (0.0229 – 0.0236)
- 0.601 – 0.620 (0.0237 – 0.0244)
- 0.621 – 0.640 (0.0244 – 0.0252)
- 0.641 – 0.660 (0.0252 – 0.0260)
- 0.661 – 0.680 (0.0260 – 0.0268)
- 0.681 – 0.700 (0.0268 – 0.0276)
- 0.701 – 0.720 (0.0276 – 0.0283)
- 0.721 – 0.740 (0.0284 – 0.0291)
- 0.741 – 0.760 (0.0292 – 0.0299)
- 0.761 – 0.780 (0.0300 – 0.0307)
- 0.781 – 0.800 (0.0307 – 0.0315)
- 0.801 – 0.820 (0.0315 – 0.0323)
- 0.821 – 0.840 (0.0323 – 0.0331)
- 0.841 – 0.860 (0.0331 – 0.0339)
- 0.861 – 0.880 (0.0339 – 0.0346)
- 0.881 – 0.900 (0.0347 – 0.0354)
- 0.901 – 0.920 (0.0355 – 0.0362)
- 0.921 – 0.940 (0.0363 – 0.0370)
- 0.941 – 0.960 (0.0370 – 0.0378)
- 0.961 – 0.980 (0.0378 – 0.0386)
- 0.981 – 1.000 (0.0386 – 0.0394)
- 1.001 – 1.020 (0.0394 – 0.0402)
- 1.021 – 1.040 (0.0402 – 0.0409)
- 1.041 – 1.060 (0.0410 – 0.0417)
- 1.061 – 1.080 (0.0418 – 0.0425)
- 1.081 – 1.100 (0.0426 – 0.0433)
- 1.101 – 1.120 (0.0433 – 0.0441)
- 1.121 – 1.140 (0.0441 – 0.0449)
- 1.141 – 1.150 (0.0449 – 0.0453)

New shim thickness mm (in.)

Shim No.	Thickness	Shim No.	Thickness
1	2.500 (0.0984)	10	2.950 (0.1161)
2	2.550 (0.1004)	11	3.000 (0.1181)
3	2.600 (0.1024)	12	3.050 (0.1201)
4	2.650 (0.1043)	13	3.100 (0.1220)
5	2.700 (0.1063)	14	3.150 (0.1240)
6	2.750 (0.1083)	15	3.200 (0.1260)
7	2.800 (0.1102)	16	3.250 (0.1280)
8	2.850 (0.1122)	17	3.300 (0.1299)
9	2.900 (0.1142)		

Exhaust valve clearance (Cold):
0.25 to 0.35 mm (0.010 to 0.014 in.)

EXAMPLE:
The 2.800 mm (0.1102 in.) shim is installed, and the measured clearance is 0.450 mm (0.0177 in.). Replace the 2.800 mm (0.1102 in.) shim with a new No. 10 shim.

HINT:
A shim's thickness is written on its face in millimeters.

(h) Place a new adjusting shim on the valve lifter with the imprinted number facing down.

(i) Press down the valve lifter with SST (A), and remove SST (B).

SST   09248–55040 (09248–05410, 09248–05420)

(j) Recheck the valve clearance.

: Seal Packing

Front

A78673
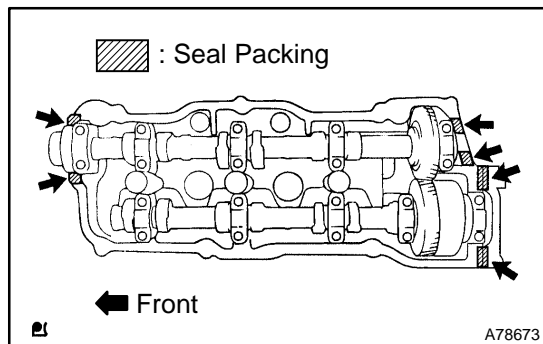
14. INSTALL CYLINDER HEAD COVER SUB–ASSY

(a) Apply seal packing to the cylinder head as shown in the illustration.

Seal packing: Part No. 08826–00080 or equivalent

NOTICE:

- **Remove any oil from the contact surface.**
- **Install the cylinder head cover within 3 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing the cylinder head cover.**

(b) Install the cylinder head cover with the 9 bolts. Tighten the bolts uniformly in several steps.

Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)

(c) Install the engine wire harness with the 3 nuts.

Torque: 8.4 N·m (85 kgf·cm, 74 in.·lbf)

15. INSTALL CYLINDER HEAD COVER SUB–ASSY LH

(a) Apply seal packing to the cylinder head as shown in the illustration.

Seal packing: Part No. 08826–00080 or equivalent

NOTICE:

- **Remove any oil from the contact surface.**
- **Install the cylinder head cover within 3 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing the cylinder head cover.**

(b) Install the cylinder head cover with the 9 bolts. Tighten the bolts uniformly in several steps.

Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)

(c) Using an E6 torx® socket wrench, install the engine wire harness protector with the 2 bolts.

: Seal Packing

Front

A78674

16. INSTALL IGNITION COIL ASSY

Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)

17. INSTALL INTAKE AIR SURGE TANK

(a) Install a new gasket to the intake air surge tank.

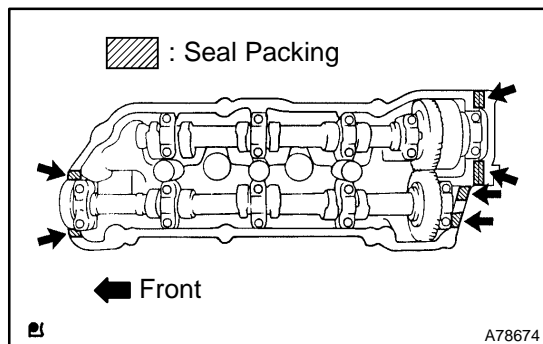(b) Install the intake air surge tank and emission control valve bracket with the 2 nuts.

Torque: 28 N·m (286 kgf·cm, 21 ft·lbf)

(c) Using a socket hexagon wrench 8, tighten the 4 bolts.

Torque: 28 N·m (286 kgf·cm, 21 ft·lbf)

(d) Install the surge tank stay No. 2 with the 2 bolts.

Torque: 20 N·m (199 kgf·cm, 15 ft·lbf)

(e) Install the surge tank stay No. 1 with the 2 bolts.
     Torque: 20 N·m (199 kgf·cm, 15 ft·lbf)
(f) Install the engine hanger No. 1 with the 2 bolts.
     Torque: 20 N·m (199 kgf·cm, 15 ft·lbf)
(g) Install the pressure feed tube with the 3 nuts.
     Torque: 7.8 N·m (80 kgf·cm, 69 in.·lbf)
(h) Connect the ventilation hose.
(i) Connect the union to check valve hose.
(j) Connect the water by–pass hose No. 2.
(k) Connect the water by–pass hose No. 3.
(l) Connect the throttle motor connector.
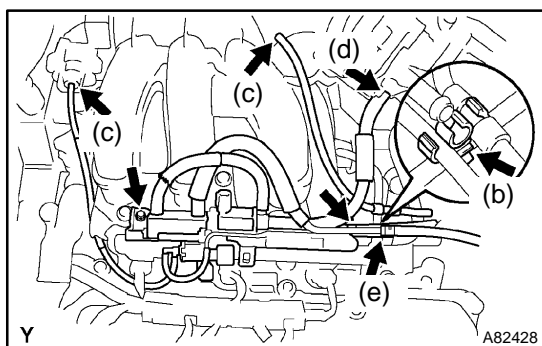
18. INSTALL EMISSION CONTROL VALVE SET
(a) Install the valve set with the 2 nuts.
(b) Install the clamp.
(c) Connect the 2 vacuum hoses.
(d) Connect the fuel vapor feed hose No. 2.
(e) Connect the fuel vapor feed hose No. 1.
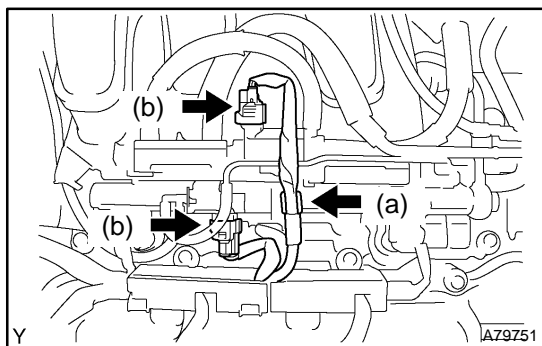
(f) Install the wire harness clamp.
(g) Connect the 2 VSV connectors.

19. INSTALL AIR CLEANER ASSEMBLY WITH HOSE
20. INSTALL FRONT SUSPENSION UPPER BRACE CENTER (W/ FRONT SUSPENSION BRACE UPPER CENTER)
     Torque: 80 N·m (816 kgf·cm, 59 ft.·lbf)
21. INSTALL RADIATOR HOSE INLET
22. INSTALL V–BANK COVER SUB–ASSY
(a) Fit the 2 retainers and install the V–bank cover.
(b) Using a socket hexagon wrench 5, tighten the 3 nuts.
     Torque: 7.9 N·m (81 kgf·cm, 70 in.·lbf)
23. INSTALL FRONT FENDER APRON SEAL RH
24. ADD ENGINE COOLANT (See page 16–27)
25. CHECK FOR ENGINE COOLANT LEAKS (See page 16–21)