ENGINE

CONTENTS

E11AA--

SPECIFICATIONS

GENERAL SPECIFICATIONS

E11CA--

Engine for Europe

Items		4G32	4G63 – 8 valve	G63B	4G63 – 16 valve
Total displacement	cc (cu.in.)	1,597 (97.5)		1,997 (121.9)	
Bore x Stroke	mm (in.)	76.9 x 86 (3.03 x 3.39)		85 x 88 (3.35 x 3.46)	
Compression ratio			8.5		9.5
Firing order			1-3-4-2		
Combustion chamber			Semi-spherical		Pentroof
Valve mechanism			OHV		
Camshaft arrangement			SOHC		
Camshaft driven by			Cogged belt		
Rocker arm			Slipper type		Roller type
Valve timing					
Intake	Open	BTDC 20°		BTDC 19°	BTDC 11°
	Close	ABDC 48°		ABDC 57°	ABDC 53°
Exhaust	Open	BBDC 51°		BBDC 57°	BBDC 63°
	Close	ATDC 17°		ATDC 19°	ATDC 21°
Spark plug					
NGK		BPR5ES	BPR6ES	BUR6EA-11	BKR5E-11
				BPR6ES-11	BK5E*
NIPPON DENSO		W16EPR	W20EPR	W20EPR-S11	K16PR-U11
				W20EPR11	K16P-U*
Auto-lash adjuster		Not equipped		Equipped	
Jet valve		Not equipped		Equipped	Not equipped

NOTE
* : Vehicles without catalytic converter

Items		4G64 – 8 valve	G64B	4D56
Total displacement	cc (cu.in.)	2,351 (143.5)		2,477 (151.1)
Bore x Stroke	mm (in.)	86.5 x 100 (3.41 x 3.94)		91.1 x 95 (3.59 x 3.74)
Compression ratio			8.5	21
Firing order			1-3-4-2	–
Injection order			–	1-3-4-2
Combustion chamber			Semi-spherical	Swirl chamber
Valve mechanism			OHV	
Camshaft arrangement			SOHC	
Camshaft driven by			Cogged belt	
Rocker arm			Slipper type	Roller type
Valve timing				
Intake	Open		BTDC 20°	BTDC 20°
	Close		ABDC 64°	ABDC 49°
Exhaust	Open		BBDC 64°	BBDC 55°
	Close		ATDC 20°	ATDC 22°

Items	4G64 – 8 valve	G64B	4D56
Spark plug			
NGK	PGR6A-11 BPR6ES-11	PGR6B	–
NIPPON DENSO	P20PR-11 W20PR-S11	P20PR-S11	–
Auto-lash adjuster	Equipped		Not equipped
Jet valve	Not equipped	Equipped	Not equipped

Engine for General Export

Items		4G32	4G33	4G92
Total displacement	cc (cu.in.)	1,597 (97.5)	1,439 (87.8)	1,597 (97.5)
Bore x Stroke	mm (in.)	76.9 x 86 (3.03 x 3.39)	73 x 86 (2.87 x 3.39)	81 x 77.5 (3.19 x 3.05)
Compression ratio		8.5	9.0, 9.1*1	9.5
Firing order			1-3-4-2	
Injection order			–	
Combustion chamber			Semi-spherical	Pentroof
Valve mechanism			OHV	
Camshaft arrangement			SOHC	
Camshaft driven by			Cogged belt	
Rocker arm			Slipper type	Roller type
Valve timing				
Intake	Open		BTDC 20°	BTDC 19°
	Close		ABDC 48°	ABDC 37°
Exhaust	Open		BBDC 51°	BBDC 37°
	Close		ATDC 17°	ATDC 3°
Spark plug				
NGK			BP6ES	BK5E BKR5E-11*2
NIPPON DENSO			W20EP	K16P-U K16PR-U11*2
Auto-lash adjuster			Not equipped	
Jet valve			Not equipped	

NOTE
*1 : Vehicles for Hong Kong built from May 1991
*2 : Vehicles for Hong Kong

Items		4G63 – 8 valve	4G63 – 16 valve	4G64 – 8 valve	4D56
Total displacement	cc (cu.in.)	1,997 (121.9)		2,351 (143.5)	2,477 (151.1)
Bore x Stroke	mm (in.)	85 x 88 (3.35 x 3.46)		86.5 x 100 (3.41 x 3.94)	91.1 x 95 (3.59 x 3.47)
Compression ratio		8.5	9.5	8.6	21
Firing order			1-3-4-2		–
Injection order			–		1-3-4-2
Combustion chamber		Semi-spherical	Pentroof	Semi-spherical	Swirl chamber

Items		4G63 – 8 valve	4G63 – 16 valve	4G64 – 8 valve	4D56
Valve mechanism		OHV			
Camshaft arrangement		SOHC			
Camshaft driven by		Cogged belt			
Rocker arm		Slipper type	Roller type	Slipper type	Roller type
Valve timing					
Intake	Open	BTDC 19°	BTDC 11°	BTDC 20°	BTDC 20°
	Close	ABDC 57°	ABDC 53°	ABDC 64°	ABDC 49°
Exhaust	Open	BBDC 57°	BBDC 63°	BBDC 64°	BBDC 55°
	Close	ATDC 19°	ATDC 21°	ATDC 20°	ATDC 22°
Spark plug					
NGK		BP6ES	BK5E	BP6ES-11	–
NIPPON DENSO		W16EP	K16P-U	W20EP11	–
Auto-lash adjuster		Not equipped		Equipped	Not equipped
Jet valve		Not equipped			

Engine for Australia

Items		4G63 – 8 valve	4G63 – 16 valve	4G64 – 8 valve	4G64 – 16 valve	4D56
Total displacement	cc (cu.in.)	1,997 (121.9)		2351 (143.5)		2,477 (151.1)
Bore x Stroke	mm (in.)	85 x 88 (3.35 x 3.46)		86.5 x 100 (3.41 x 3.94)		91.1 x 95 (3.59 x 3.47)
Compression ratio		8.5	9.5	8.6	9.5	21
Filing order		1-3-4-2				–
Injection order		–				1-3-4-2
Combustion chamber		Semi-spherical	Pentroof	Semi-spherical	Pentroof	Swirl chamber
Valve mechanism		OHV				
Camshaft arrangement		SOHC				
Camshaft driven by		Cogged belt				
Rocker arm		Slipper type	Roller type	Slipper type		Roller type
Valve timing						
Intake	Open	BTDC 19°	BTDC 11°	BTDC 20°	BTDC 18°	BTDC 20°
	Close	ABDC 57°	ABDC 53°	ABDC 64°	ABDC 58°	ABDC 49°
Exhaust	Open	BBDC 57°	BBDC 63°	BBDC 64°	BBDC 58°	BBDC 50°
	Close	ATDC 19°	ATDC 21°	ATDC 20°	ATDC 18°	ATDC 22°
Spark plug						
NGK		BP6ES	BK5E-11	BP6ES	BK5E-11	–
NIPPON DENSO		W20EP	K16P-U11	W20EP	K16P-U11	–
Auto-lash adjuster		Not equipped	Equipped	Not equipped	Equipped	Not equipped
Jet valve		Not equipped				

NOTES

SERVICE SPECIFICATIONS

E11CB--

Vehicles for Europe

Items	4G32	4G63 – 8 valve		4G64	4D56
		Conventional carburettor	FBC		
Standard value					
Opening pressure of radiator cap kPa (kg/cm², psi)	75–105 (0.75–1.05, 11–15)	75–105 (0.75–1.05, 11–15)	75–105 (0.75–1.05, 11–15)	75–105 (0.75–1.05, 11–15)	75–105 (0.75–1.05, 11–15)
Drive belt deflection mm (in.)					
Alternator	7–10 (0.28–0.39)	7–10 (0.28–0.39)	7–10 (0.28–0.39)	7–10 (0.28–0.39)	11–14 (0.43–0.55)*1 9–12 (0.35–0.47)*2 13–16 (0.51–0.63)*3
Power steering oil pump	6–9 (0.24–0.35)	6–9 (0.24–0.35)	6–9 (0.24–0.35)	6–9 (0.24–0.35)	8–11 (0.31–0.43)
Air-conditioner compressor	7–10 (0.28–0.39)	7–10 (0.28–0.39)	7–10 (0.28–0.39)	7–10 (0.28–0.39)	6–9 (0.24–0.35)
Spark plug gap mm (in.)	0.7–0.8 (0.028–0.031)	0.7–0.8 (0.028–0.031)	0.7–0.8 (0.028–0.031)	1.0–1.1 (0.039–0.043)	–
Ignition timing	5° ± 2° BTDC	5° ± 2° BTDC	5° ± 2° BTDC	5° ± 2° BTDC	–
Injection timing	–	–	–	–	7° ATDC, 9° ATDC*4
Engine idle speed r/min.	750 + 50	800 ± 50	First 500 km (300 miles) 750 +150 −100 After 500 km (300 miles) 800 + 100	750 ± 100	750 ± 30
CO concentration	1.0 ± 0.5% (at the secondary air cut stage)	1.0 ± 0.5% (at the secondary air cut stage)	0.5%	–	–
Engine idle-up speed r/min.	1,000 ± 50	–	–	1,000 ± 50	1,000 ± 50
Dash pot operation engine speed r/min.	1,600 ± 200	1,600 ± 200	1,800 ± 200	–	–
Valve clearance mm (in.)					
Intake	0.15 (0.0059)	–	–	–	0.25 (0.0098)
Exhaust	0.25 (0.0098)	–	–	–	0.25 (0.0098)
Timing belt tension mm (in.)	6 (0.24)	14 (0.55)	14 (0.55)	14 (0.55)	4–5 (0.16–0.20)
Timing belt "B" tension mm (in.)	–	5–7 (0.20–0.28)	5–7 (0.20–0.28)	5–7 (0.20–0.28)	4–5 (0.16–0.20)
Engine compression pressure kPa (kg/cm², psi)	1,300 (13.0, 185)	1,200 (12.0, 171)	1,200 (12.0, 171)	1,200 (12.0, 171)	2,700 (27.0, 384) 3,100 (31.0, 441)*4
Limit					
Opening pressure of radiator cap kPa (kg/cm², psi)	65 (0.65, 9.2)	(65 (0.65, 9.2)	65 (0.65, 9.2)	65 (0.65, 9.2)	65 (0.65, 9.2)
Intake manifold vacuum – at idle mm Hg (in. Hg)	min. 450 (17.7)	min. 450 (17.7)	min. 450 (17.7)	min. 450 (17.7)	–
Engine compression pressure kPa (kg/cm², psi)	920 (9.2, 131)	890 (8.9, 127)	890 (8.9, 127)	890 (8.9, 127)	1,920 (19.2, 273) 2,240 (22.4, 319)*4
Engine compression pressure difference between each cylinder kPa (kg/cm², psi)	100 (1.0, 14)	100 (1.0, 14)	100 (1.0, 14)	100 (1.0, 14)	300 (3.0, 43)

NOTE
*1: When the used belt is installed
*2: When a new belt is installed
*3: When a double belt is installed (Value per bolt)
*4: indicates vehicles with EGR built from July, 1993 and vehicles built from June, 1994.

Items	G63B	G64B
Standard value		
Opening pressure of radiator cap kPa (kg/cm^2, psi)	75–105 (0.75–1.05, 11–15)	75–105 (0.75–1.05, 11–15)
V-belt deflection mm (in.)		
Alternator	7–10 (0.28–0.39)	7–10 (0.28–0.39)
Power steering oil pump	6–9 (0.24–0.35)	6–9 (0.24–0.35)
Air-conditioner compressor	7–10 (0.28–0.39)	7–10 (0.28–0.39)
Spark plug gap mm (in.)	1.0–1.1 (0.039–0.043)	1.0–1.1 (0.039–0.043)
Ignition timing	8±2°BTDC	5±2°BTDC
Engine idle speed r/min.	First 500 km (300 miles) 700^{+150}_{-100} After 500 km (300 miles) 750±100	750±100
CO concentration	0.5%	–
Dashpot operating engine speed r/min.	1,800±200	–
Valve Clearance		
Intake	–	–
Exhaust	–	–
Jet	0.25 (0.0098)	0.25 (0.0098)
Timing belt tension mm (in.)	14 (0.55)	14 (0.55)
Timing belt "B" tension mm (in.)	5–7 (0.20–0.28)	5–7 (0.20–0.28)
Engine compression pressure kPa (kg/cm^2, psi)	1,200 (12.0, 171)	1,200 (12.0, 171)
Limit		
Opening pressure of radiator cap kPa (kg/cm^2, psi)	65 (0.65, 9.2)	65 (0.65, 9.2)
Intake manifold vacuum-at idle mmHg (in.Hg)	min. 450 (17.7)	min. 450 (17.7)
Engine compression pressure kPa (kg/cm^2, psi)	890 (8.9, 127)	890 (8.9, 127)
Engine compressure pressure difference between each cylinder kpa (kg/cm^2, psi)	100 (1.0, 14)	100 (1.0, 14)

Items	4G63 – 16 valve		
	Conventional carburettor	FBC	MPI
Standard value			
Opening pressure of radiator cap kPa (kg/cm², psi)	75–105 (0.75–1.05, 11–15)	75–105 (0.75–1.05, 11–15)	75–105 (0.75–1.05, 11–15)
Drive belt deflection mm (in.)			
Alternator			
When checked	7–9 (0.28–0.35)	7–9 (0.28–0.35)	7–9 (0.28–0.35)
When the used belt is installed	7.5–8.5 (0.30–0.33)	7.5–8.5 (0.30–0.33)	7.5–8.5 (0.30–0.33)
When a new belt is installed	5.5–7.5 (0.22–0.30)	5.5–7.5 (0.22–0.30)	5.5–7.5 (0.22–0.30)
Power steering oil pump			
When checked	5.5–7.5 (0.22–0.30)	5.5–7.5 (0.22–0.30)	5.5–7.5 (0.22–0.30)
When the used belt is installed	6–7 (0.24–0.28)	6–7 (0.24–0.28)	6–7 (0.24–0.28)
When a new belt is installed	4–6 (0.16–0.24)	4–6 (0.16–0.24)	4–6 (0.16–0.24)
Air-conditioner compressor			
When checked	7–9.5 (0.28–0.37)	7–9.5 (0.28–0.37)	7–9.5 (0.28–0.37)
When the used belt is installed	8–9 (0.31–0.35)	8–9 (0.31–0.35)	8–9 (0.31–0.35)
When a new belt is installed	6–7 (0.24–0.28)	6–7 (0.24–0.28)	6–7 (0.24–0.28)
Spark plug gap mm (in.)	0.7–0.8 (0.028–0.031)	1.0–1.1 (0.039–0.043)	1.0–1.1 (0.039–0.043)
Basic ignition timing	0° ±2° BTDC	0° ±2° BTDC	0° ±2° BTDC
Engine idle speed r/min.	800 ± 50	800 ± 50	750 ± 100
CO concentration	2.5 ± 0.5	–	–
Engine idle-up speed r/min.	1,000 ± 50	1,000 ± 50	–
Timing belt "B" tension mm (in.)	5–7 (0.20–0.28)	5–7 (0.20–0.28)	5–7 (0.20–0.28)
Engine compression pressure kPa (kg/cm², psi)	1,350 (13.5, 192)	1,350 (13.5, 192)	1,350 (13.5, 192)
Auto tensioner rod protrusion amount mm (in.)	3.8–4.5 (0.15–0.18)	3.8–4.5 (0.15–0.18)	3.8–4.5 (0.15–0.18)
Contraction amount of auto tensioner rod mm (in.)	Less than 1 (0.04)	Less than 1 (0.04)	Less than 1 (0.04)
Limit			
Opening pressure of radiator cap kPa (kg/cm², psi)	65 (0.65, 9.2)	65 (0.65, 9.2)	65 (0.65, 9.2)
Intake manifold vacuum-at idle mmHg (in.Hg)	min. 450 (17.7)	min. 450 (17.7)	min. 450 (17.7)
Engine compression pressure kPa (kg/cm², psi)	1,020 (10.2, 145)	1,020 (10.2, 145)	1,020 (10.2, 145)
Engine compression pressure difference between each cylinder kPa (kg/cm², psi)	100 (1.0, 14)	100 (1.0, 14)	100 (1.0, 14)
Cylinder head bolt shank length mm (in.)	99.4 (3.91)	99.4 (3.91)	99.4 (3.91)

NOTES

Vehicles for General Export

Items	4G32	4G33	4G63 – 8 valve	4G64	4D56
Standard value					
Opening pressure of radiator cap kPa (kg/cm², psi)	75–105 (0.75–1.05, 11–15)	75–105 (0.75–1.05, 11–15)	75–105 (0.75–1.05, 11–15)	75–105 (0.75–1.05, 11–15)	75–105 (0.75–1.05, 11–15)
V-belt deflection mm (in.)					
Alternator	7–10 (0.28–0.39)	7–10 (0.28–0.39)	7–10 (0.28–0.39)	7–10 (0.28–0.39)	11–14 (0.43–0.55)*1 9–12 (0.35–0.47)*2 13–16 (0.51–0.63)*3
Power steering oil pump	–	–	6–9 (0.24–0.35)	6–9 (0.24–0.35)	8–11 (0.31–0.43)
Air-conditioner compressor	7–10 (0.28–0.39)	7–10 (0.28–0.39)	7–10 (0.28–0.39)	7–10 (0.28–0.39)	6–9 (0.24–0.35)
Spark plug gap mm (in.)	0.7–0.8 (0.028–0.031)	0.7–0.8 (0.028–0.031)	0.7–0.8 (0.028–0.031)	1.0–1.1 (0.039–0.043)	–
Distributor breaker point gap mm (in.)					
Mitsubishi type	0.45–0.55 (0.018–0.021)	0.45–0.55 (0.018–0.021)	–	–	–
Denso type	–	–	4.5–0.5 (0.016–0.020)	–	–
Dwell angle	49–55°	49–55°	49–55°	–	–
Ignition timing	5° ± 2°BTDC	5° ± 2°BTDC	5° ± 2°BTDC	5° ± 2°BTDC	–
Injection timing	–	–	–	–	7°ATDC
Engine idle speed r/min.	600 ± 50 700 ± 50*4 850 ± 50*8, *9	600 ± 50 700 ± 50*4 850 ± 50*8, *9	700 ± 50*5 750 ± 50*6 850 ± 50*7 900 ± 50*8	750 ± 100	750 ± 30
CO concentration	2.5 ± 0.5% 1.5 ± 0.5%*4	2.5 ± 0.5% 2.0 ± 0.5%*7 (at the secondary air cut stage)	2.5 ± 0.5% 1.5 ± 0.5%*4	–	–
Engine idle-up speed r/min.	1,000 ± 50	1,000 ± 50	1,000 ± 50	1,000 ± 50	1,000 ± 50
Valve clearance mm (in.)					
Intake	0.15 (0.0059)	0.15 (0.0059)	0.15 (0.0059)	–	0.25 (0.0098)
Exhaust	0.25 (0.0098)	0.25 (0.0098)	0.25 (0.0098)	–	0.25 (0.0098)
Timing belt tension mm (in.)	6 (0.24)	6 (0.24)	5–7 (0.20–0.28)	5–7 (0.20–0.28)	4–5 (0.16–0.20)
Timing belt "B" tension mm (in.)	–	–	–	–	4–5 (0.16–0.20)
Engine compression pressure kPa (kg/cm², psi)	1,300 (13.0, 185)	1,200 (12.0, 171) 1,400 (14.0, 199)*7	1,200 (12.0, 171)	1,200 (12.0, 171)	2,700 (27.0, 384)
Limit					
Opening pressure of radiator cap kPa (kg/cm², psi)	65 (0.65, 9.2)	65 (0.65, 9.2)	65 (0.65, 9.2)	65 (0.65, 9.2)	65 (0.65, 9.2)
Intake manifold vacuum – at idle mm Hg (in. Hg)	min. 450 (17.7)	min. 450 (17.7)	min. 450 (17.7)	min. 450 (17.7)	–
Engine compression pressure kPa (kg/cm², psi)	920 (9.2, 131)	840 (8.4, 119) 1,000 (10.0, 142)*7	890 (8.9, 127)	890 (8.9, 127)	1,920 (19.2, 273)
Engine compression pressure difference between each cylinder kPa (kg/cm², psi)	100 (1.0, 1.4)	100 (1.0, 1.4)	100 (1.0, 1.4)	100 (1.0, 1.4)	300 (3.0, 43)

NOTE
*1: When the used belt is installed
*2: When a new belt is installed
*3: When a double belt is installed (Value per belt)
*4: indicates vehicles for Gulf countries.
*5: indicates vehicles with a manual transmission.
*6: indicates vehicles with an automatic transmission.
*7: indicates vehicles for Hong Kong built from July 1991
*8: indicates vehicles with manual transmission and an engine which uses an 80% petrol/20% ethanol mixture.
*9: indicates vehicles with automatic transmission and an engine which uses an 80% petrol/20% ethanol mixture.

Items	4G92 Conventional carburettor	4G92 FBC	4G63 – 16 valve (Carburettor)	4G63 – 16 valve (MPI)
Standard value				
Opening pressure of radiator cap kPa (kg/cm², psi)	75–105 (0.75–1.05, 11–15)	75–105 (0.75–1.05, 11–15)	75–105 (0.75–1.05, 11–15)	75–105 (0.75–1.05, 11–15)
Drive belt deflection mm (in.)				
Alternator				
When checked	8–10 (0.31–0.39)	8–10 (0.31–0.39)	7–9 (0.28–0.35)	7–9 (0.28–0.35)
When the used belt is installed	8.5–9.5 (0.33–0.37)	8.5–9.5 (0.33–0.37)	7.5–8.5 (0.30–0.33)	7.5–8.5 (0.30–0.33)
When a new belt is installed	6–8 (0.24–0.31)	6–8 (0.24–0.31)	5.5–7.5 (0.22–0.30)	5.5–7.5 (0.22–0.30)
Power steering oil pump				
When checked	4.5–6.5 (0.17–0.26)	4.5–6.5 (0.17–0.26)	5.5–7.5 (0.22–0.30)	5.5–7.5 (0.22–0.30)
When the used belt is installed	5–6 (0.20–0.24)	5–6 (0.20–0.24)	6–7 (0.24–0.28)	6–7 (0.24–0.28)
When a new belt is installed	3–5 (0.12–0.20)	3–5 (0.12–0.20)	4–6 (0.16–0.24)	4–6 (0.16–0.24)
Air-conditioner compressor				
When checked	9–12 (0.35–0.47)	9–12 (0.35–0.47)	7–9.5 (0.28–0.37)	7–9.5 (0.28–0.37)
When the used belt is installed	9.5–11 (0.37–0.43)	9.5–11 (0.37–0.43)	8–9 (0.31–0.35)	8–9 (0.31–0.35)
When a new belt is installed	8–9 (0.31–0.35)	8–9 (0.31–0.35)	6–7 (0.24–0.28)	6–7 (0.24–0.28)
Spark plug gap mm (in.)	0.7–0.8 (0.028–0.031)	1.0–1.1 (0.039–0.043)	0.7–0.8 (0.028–0.031)	0.7–0.8 (0.028–0.031)
Basic ignition timing	5° ± 2° ATDC	5° ± 2° ATDC	0° ± 2° BTDC	5° ± 2° BTDC
Engine idle speed r/min.	800 ± 50	800 ± 50	800 ± 50	750 ± 100
CO concentration	2.5 ± 0.5%	Less than 0.5%	2.5 ± 0.5%	–
Engine idle-up speed (for air-conditioner) r/min.	1,000 ± 50	1,000 ± 50	1,000 ± 50	–
Engine idle-up speed (for power steering) r/min.	950 ± 50	950 ± 50	–	–
Valve clearance				
Intake	0.20 (0.0079)	0.20 (0.0079)	–	–
Exhaust	0.30 (0.0118)	0.30 (0.0118)	–	–
Timing belt tension mm (in.)	30 (1.18)	30 (1.18)	–	–
Timing belt "B" tension mm (in.)	–	–	5–7 (0.20–0.28)	5–7 (0.20–0.28)
Engine compression pressure kPa (kg/cm², psi)	1,400 (14.0, 199)	1,400 (14.0, 199)	1,350 (13.5, 192)	1,350 (13.5, 192)
Auto tensioner rod protrusion amount mm (in.)	–		3.8–4.5 (0.15–0.18)	3.8–4.5 (0.15–0.18)
Contraction amount of auto tension rod mm (in.)	–	–	Less than 1 (0.04)	Less than 1 (0.04)

Items	4G92		4G63 – 16 valve (Carburettor)	4G63 – 16 valve (MPI)
	Conventional carburettor	FBC		
Limit				
Opening pressure of radiator cap kPa (kg/cm^2, psi)	65 (0.65, 9.2)	65 (0.65, 9.2)	65 (0.65, 9.2)	65 (0.65, 9.2)
Intake manifold vacuum-at idle mmHg (in.Hg)	min. 450 (17.7)	min. 450 (17.7)	min. 450 (17.7)	min. 450 (17.7)
Engine compression pressure kPa (kg/cm^2, psi)	1,060 (10.6, 151)	1,060 (10.6, 151)	1,020 (10.2, 145)	1,020 (10.2, 145)
Engine compression pressure difference between each cylinder kPa (kg/cm^2, psi)	100 (1.0, 14)	100 (1.0, 14)	100 (1.0, 14)	100 (1.0, 14)
Cylinder head bolt shank length mm (in.)	96.4 (3.80)	96.4 (3.80)	99.4 (3.91)	99.4 (3.91)

Vehicles for Australia

Items	4G63 – 8 valve	4G64 – 8 valve	4D56
Standard value			
Opening pressure of radiator cap kPa (kg/cm^2, psi)	75–105 (0.75–1.05, 11–15)	75–105 (0.75–1.05, 11–15)	75–105 (0.75–1.05, 11–15)
V-belt deflection mm (in.)			
Alternator	7–10 (0.28–0.39)	7–10 (0.28–0.39)	11–14 (0.43–0.55)*1 9–12 (0.35–0.47)*2 13–16 (0.51–0.63)*3
Power steering oil pump	6–9 (0.24–0.35)	6–9 (0.24–0.35)	8–11 (0.31–0.43)
Air-conditioner compressor	7–10 (0.28–0.39)	7–10 (0.28–0.39)	6–9 (0.24–0.35)
Spark plug gap mm (in.)	0.7–0.8 (0.028–0.031)	0.7–0.8 (0.028–0.031)	–
Ignition timing	5° ± 2°BTDC	5° ± 2°BTDC	–
Injection timing	–	–	7°ATDC
Engine idle speed r/min.			
Manual transmission	750 ± 50	800 ± 100	750 ± 30
Automatic transmission	800 ± 50	800 ± 100	750 ± 30
CO concentration	2.0 ± 0.5% (At the secondary air cut stage)	–	–
Engine idle-up speed r/min.	1,000 ± 50	–	1,000 ± 50
Dashpot operating engine speed r/min.	1,600 ± 200	–	–
Intake manifold vacuum-at idle mmHg (in.Hg)	500 (19.7)	500 (19.7)	–
Valve clearance			
Intake	–	–	0.25 (0.0098)
Exhaust	–	–	0.25 (0.0098)
Timing belt tension mm (in.)	14 (0.55)	14 (0.55)	4–5 (0.16–0.20)
Timing belt "B" tension mm (in.)	5–7 (0.20–0.28)	5–7 (0.20–0.28)	4–5 (0.16–0.20)
Battery electrolyte specific gravity [at 20° (68°F)]	1.220–1.290	1.220–1.290	1.220–1.290
Engine compression pressure kPa (kg/cm^2, psi)	1,200 (12.0, 171)	1,200 (12.0, 171)	2,700 (27.0, 384)
Limit			
Opening pressure of radiator cap kPa (kg/cm^2, psi)	65 (0.65, 9.2)	65 (0.65, 9.2)	65 (0.65, 9.2)
Engine compression pressure kPa (kg/cm^2, psi)	890 (8.9, 127)	890 (8.9, 127)	1,920 (19.2, 273)
Engine compression pressure difference between each cylinder kPa (kg/cm^2, psi)	100 (1.0, 14)	100 (1.0, 14)	300 (3.0, 43)

NOTE
*1: When the used belt is installed
*2: When a new belt is installed
*3: When a double belt is installed (Value per belt)

Items		4G63 – 16 valve	4G64 – 16 valve
Standard value			
Opening pressure of radiator cap	kPa (kg/cm^2, psi)	75–105 (0.75–1.05, 11–15)	75–105 (0.75–1.05, 11–15)
V-belt deflection	mm (in.)		
Alternator			
When checked		7–9 (0.28–0.35)	7–9 (0.28–0.35)
When the used belt is installed		7.5–8.5 (0.30–0.33)	7.5–8.5 (0.30–0.33)
When a new belt is installed		5.5–7.5 (0.22–0.30)	5.5–7.5 (0.22–0.30)
Power steering oil pump			
When checked		5.5–7.5 (0.22–0.30)	5.5–7.5 (0.22–0.30)
When the used belt is installed		6–7 (0.24–0.28)	6–7 (0.24–0.28)
When a new belt is installed		4–6 (0.16–0.24)	4–6 (0.16–0.24)
Air-conditioner compressor			
When checked		7–9.5 (0.28–0.37)	7–9.5 (0.28–0.37)
When the used belt is installed		8–9 (0.31–0.35)	8–9 (0.31–0.35)
When a new belt is installed		6–7 (0.24–0.28)	6–7 (0.24–0.28)
Spark plug gap	mm (in.)	1.0–1.1 (0.040–0.043)	1.0–1.1 (0.040–0.043)
Ignition timing		0° ± 2° BTDC	0° ± 2° BTDC
Engine idle-up speed	r/min.		
Manual transmission		800 ± 50	750 ± 100
Automatic transmission		850 ± 50	750 ± 100
CO concentration		1.5 ± 0.5% (at the secondary air cut stage)	1.5 ± 5% –
Engine idle-up speed	r/min	1,000 ± 50	–
Dashpot operating engine speed	r/min.	1,500 ± 50	–
Timing belt "B" tension	mm (in.)	5–7 (0.20–0.28)	–
Engine compression pressure	kPa (kg/cm^2, psi)	1,350 (13.5, 192)	1,350 (13.5, 192)
Auto tensioner rod protrusion amount	mm (in.)	3.8–4.5 (0.15–0.18)	3.8–4.5 (0.15–0.18)
Contraction amount of auto tensioner rod	mm (in.)	Less than 1 (0.04)	Less than 1 (0.04)
Limit			
Opening pressure of radiator cap	kPa (kg/cm^2, psi)	65 (0.65, 9.2)	65 (0.65, 9.2)
Intake manifold vacuum-at idle	mmHg (in.Hg)	min. 450 (17.7)	min. 450 (17.7)
Engine compression pressure	kPa (kg/cm^2, psi)	1,020 (10.2, 145)	1,020 (10.2, 145)
Engine compressure pressure difference between each cylinder	kPa (kg/cm^2, psi)	100 (1.0, 14)	100 (1.0, 14)
Cylinder head bolt shank length	mm (in.)	99.4 (3.91)	99.4 (3.91)

NOTES

TORQUE SPECIFICATIONS

Items	Nm	kgm	ft.lbs.
Spark plug	20–30	2.0–3.0	14–22
Glow plug	15–20	1.5–2.0	11–15
Glow plug to glow plug valve	1.0–1.5	0.10–0.15	0.7–1.0
Adjusting screw locking nut	12–18	1.2–1.8	8.5–13
Timing belt cover			
4G92 engine	8–12	0.8–1.2	6–9
Except 4G92 engine	10–12	1.0–1.2	7–8.5
Timing belt tension			
4G32, 4G33, 4D56 engines	22–30	2.2–3.0	16–22
4G63 – 8 valve, G63B, 4G64 – 8 valve, G64B engines	43–55	4.3–5.5	31–40
4G92 engine	20–27	2.0–2.7	14–20
Crankshaft pulley			
4G32, 4G33 engines	15–18	1.5–1.8	11–13
4G63, G63B, 4G64, G64B engines	20–23	2.0–2.3	15–22
4G92 engine	180–190	18–19	130–137
4D56 engine	170–190	17–19	123–137
Fan clutch	10–12	1.0–1.2	7–8.5
Rocker cover			
4G92, 4G63 – 16 valve, 4G64 – 16 valve engines	3–4	0.3–0.4	2–3
Except 4G92, 4G63 – 16 valve, 4G64 – 16 valve engines	5–7	0.5–0.7	3.6–5.0
Cylinder headbolt			
4G32, 4G33 engines			
Cold engines	70–75	7.0–7.5	51–54
4G63 – 8 valve, G63B, 4G64 – 8 valve, G64B engines			
Cold engines	90–100	9.0–10	65–72
4D56 engine			
Cold engines	105–115	10.5–11.5	76–83
4G92 engine			
Cold engines	75 →0 →20 →+90° →+90°	7.5 →0 →2.0 →+90° →+90°	54 →0 →14 →+90° →+90°
4G63 – 16 valve, 4G64 – 16 valve engines			
Cold engines	80 →0 →20 →+90° →+90°	8.0 →0 →2.0 →+90° →+90°	58 →0 →14 →+90° →+90°
Crankshaft sprocket mounting bolt			
4G32, 4G33, 4G63 – 8 valve, G63B, 4G64 – 8 valve, G64B engines	80–100	8.0–10	58–72
4G63 – 16 valve, 4G64 – 16 valve engines	110–130	11–13	80–94
4D56 engine	65–75	6.5–7.5	47–54
Fuel injection pipe clamp	4–6	0.4–0.6	2.9–4.3
Fuel injection pipe flare nut	23–37	2.3–3.7	17–27
Front exhaust pipe to exhaust manifold			
Single exhaust pipe (Petrol-powered vehicles)	15–25	1.5–2.5	11–18
Single exhaust pipe (Diesel-powered vehicles)	30–40	3.0–4.0	22–29
Dual exhaust pipe	20–30	2.0–3.0	14–22
Front exhaust pipe bracket	20–30	2.0–3.0	14–22
Front exhaust pipe to under catalytic converter	50–70	5.0–7.0	36–50
Front exhaust pipe to main muffler	20–30	2.0–3.0	14–22

Items	Nm	kgm	ft.lbs.
Power steering oil pump			
Upper bolt	25–33	2.5–3.3	18–24
Lower bolt			
Petrol-powered vehicles	20–27	2.0–2.7	14–20
Diesel-powered vehicles	14–21	1.4–2.1	10–15
Power steering oil pump bracket	20–27	2.0–2.7	14–20
Propeller shaft	50–60	5.0–6.0	36–43
Rear engine insulator to rear engine mounting bracket (2WD)	70–95	7.0–9.5	51–69
Engine mounting crossmember to body (2WD)	90–110	9.0–11	65–80
Engine mounting crossmember to strut bar (2WD)			
Vehicles built up to May, 1994	90–125	9.0–12.5	65–90
Vehicles built from June, 1994	140–190	14–19	101–137
Strut bar to lower arm (2WD)	85–110	8.5–11	61–80
Transfer mounting crossmember to bracket (4WD)	35–55	3.5–5.5	25–40
Transfer mounting crossmember to engine rear insulator (4WD)	70–95	7.0–9.5	51–69
Transfer mounting crossmember bracket (L.H.) to transmission (4WD)	19–28	1.9–2.8	14–20
Differential mounting bracket to differential carrier (or housing tube) (4WD)	80–100	8.0–10	58–72
Differential mounting bracket to bracket assembly(4WD)	60–80	6.0–8.0	43–58
Stopper bracket assembly to front suspension crossmember (4WD)	35–55	3.5–5.5	25–40
Stopper plate to body (4WD)	35–55	3.5–5.5	25–40
Engine mounting crossmember to body (4WD)	35–55	3.5–5.5	25–40
Air horn	9–14	0.9–1.4	7–10
Air intake hose	10–15	1.0–1.5	7–11
Camshaft sprocket spacer	8–12	0.8–1.2	6–9
Camshaft sprocket	80–100	8–10	58–72
Intake manifold stay			
4G92 engine	27–34	2.7–3.4	20–25
4G63 – 16 valve, 4G64 – 16 valve engine	12–15	1.2–1.5	9–11
Distributor bracket	19–28	1.9–2.8	14–20
Cooling fan bracket	30–40	3.0–4.0	22–29
Oil level gauge guide	12–15	1.2–1.5	9–11
Reed valve assembly	10–13	1.0–1.3	7–9
Water by-pass fitting	19–28	1.9–2.8	14–20
Resonance tank	9–14	0.9–1.4	7–10
Fuel high pressure pipe	4–6	0.4–0.6	3–4
Distributor	10–15	1.0–1.5	7–11
Clutch release cylinder	20–25	2.0–2.5	15–18
Auto tensioner	20–27	2.0–2.7	14–20

LUBRICANTS

E11CD--

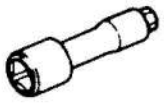
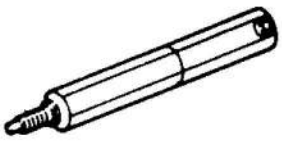
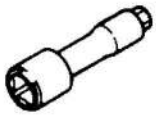
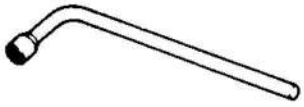
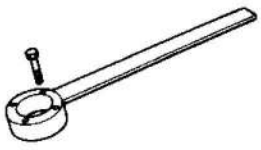
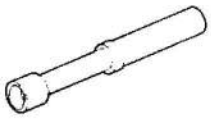
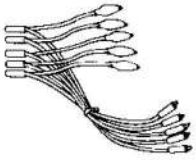
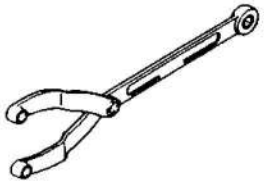
Item	Recommended lubricant	Quantity lit. (U.S. qts., Imp.qts.)
Engine oil (API classification)		
Petrol-powered vehicles		
Vehicles for Europe and Australia	SE or higher*1, SG or higher*2	
4G32 engine		3.8 (4.0, 3.3)*8
4G63, G63B, 4G64, G64B engine		
Vehicles built up to April 1992		
2WD		3.8 (4.0, 3.3)*8
4WD		4.8 (5.1, 4.2)*8
Vehicles built from May 1992		4.3 (4.5, 3.8)
Vehicles for General Export	SC or higher*3, SD or higher*4,	
4G32, 4G33, 4G92 engine	SE or higher*5	3.8 (4.0, 3,3)*8
4G63, 4G64 engine		
Vehicles built up to April 1992		
2WD		3.8 (4.0, 3.3)*8
4WD		4.8 (5.1, 4.2)*8
Vehicles built from May 1992		4.3 (4.5, 3.8)
Diesel-powered vehicles		
Vehicles without a turbocharger	CC or higher*6, CD or higher*7,	6.8 (7.2, 6.0)
Vehicles with a turbocharger	CD or higher	6.9 (7.3, 6.1)

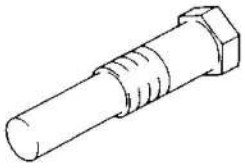
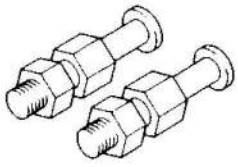
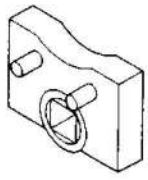
NOTE
*1 indicates vehicles for Australia and vehicles for Europe built up to October 1990.
*2 indicates vehicles for Europe built from November 1990.
*3 indicates built up to June 1991.
*4 indicates built from July 1991 up to June 1992.
*5 indicates built from July 1992. If it is difficult to obtain the engine oil of SE or higher grade, use API classification SD oil.
*6 indicates vehicles for General Export.
*7 indicates vehicles for Europe.
*8 If a MD031805 oil filter is being used, the oil capacity is increased by 0.1 lit (0.11 U.S. qt., 0.09 Imp. qt.).

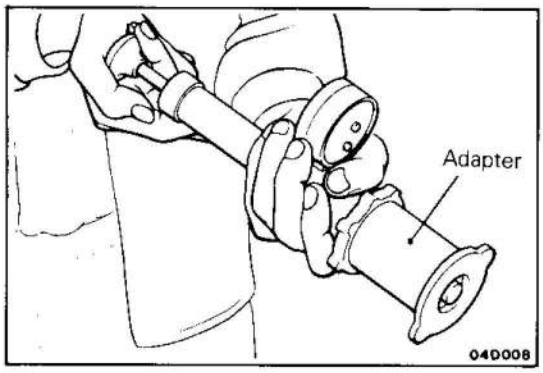
SEALANT AND ADHESIVES

Items	Specified sealant	Remarks
Rocker cover and semi-circular packing	3M ATD Part No. 8660 or equivalent	Semi-drying sealant

SPECIAL TOOLS

Tool (Number and name)	Use	Tool (Number and name)	Use
MD998051 (4G63, G63B, 4G64, G64B, 4D56 engines) Cylinder head bolt wrench 	Removal and installation of the cylinder head bolt	MD998384 (4D56 engine) Prestroke measuring adapter 	Adjusting injection timing
MD998360 (4G32, 4G33 engines Cylinder head bolt wrench 		MD998160 (4G32, 4G33 engines) Timing belt adjust wrench 	Adjusting timing belt
MD998721 (4D56 engine) Crank pulley holder 	Removal and installation of crankshaft pulley	MD998299 MAS driver 	Adjustment of MAS (vehicles for Europe and Gulf Countries)
MB991348 (4G92, 4G63 – 16 valve engine) Test harness set. 	Inspection of idle speed	MB990767 End yoke holder 	Holding of camshaft sprocket and crankshaft sprocket

Tool (Number and name)	Use	Tool (Number and name)	Use
MD998754 Holder pin 	Holding of camshaft sprocket and crankshaft sprocket	MD998738 Adjust bolt 	Fixing of auto tensioner when removing and installing the timing belt
MD998719 Holder pin 		MD998767 Tension pulley wrench 	Adjustment of timing belt tension



ENGINE (4G32 and 4G33 engines)

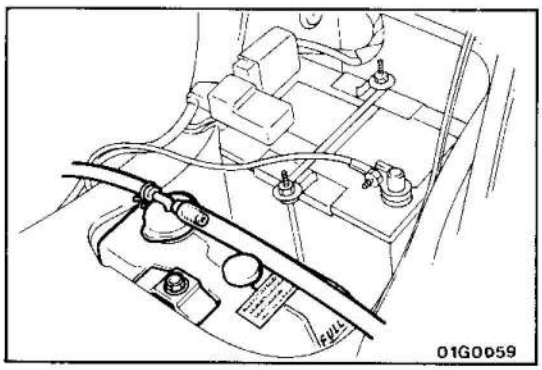
ENGINE ADJUSTMENT

CHECKING RADIATOR CAP E11FIAB

1. Attach an adapter (which fits the cap) to the tester. Increase the pressure until the indicator of the gauge stops moving.
2. Check that the pressure level is maintained at or above the limit.

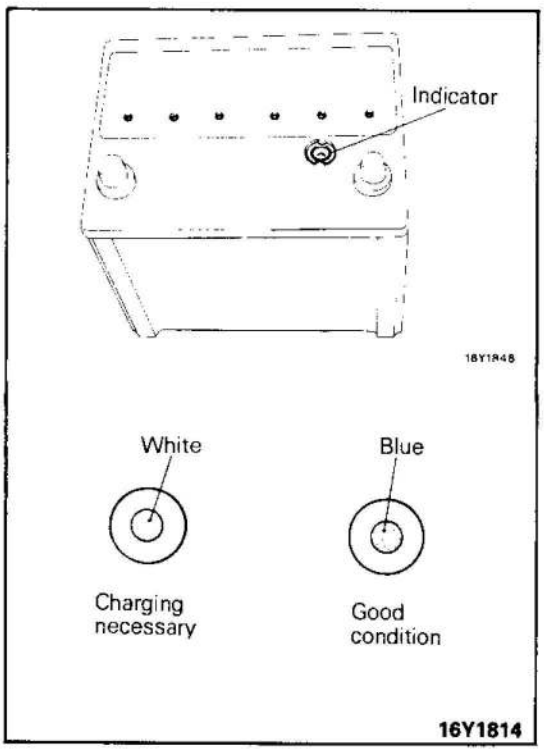
   Standard value: 75-105 kPa (0.75–1.05 kg/cm², 11–15 psi.)
   Limit: 65 kPa (0.65 kg/cm², 9.2 psi.)
3. Replace the radiator cap if the reading does not remain at or above the limit.

   NOTE
   Be sure that the cap is clean before testing, because rust or other foreign material adhered to the cap will cause the measurement to be incorrect.



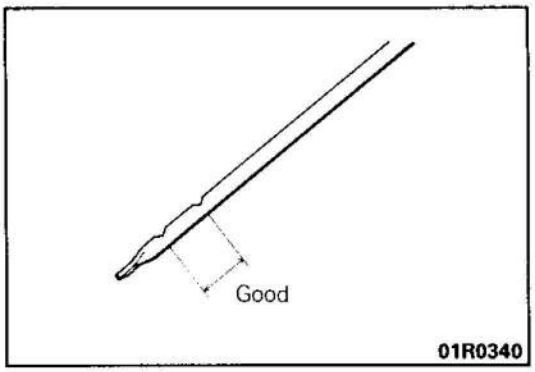
CHECKING ENGINE COOLANT E11FJAB

1. Check engine coolant in reserve tank is between "FULL" and "LOW".
2. Check oil etc. is not mixed with coolant.



INSPECTION OF BATTERY (Maintenance free battery) E11FLAB

Check color of indicator at top of battery.
Blue: Sufficient battery fluid amount and charged state.
White: Insufficient fluid. Requires charging.



INSPECTION OF ENGINE OIL LEVEL E11FNAA0

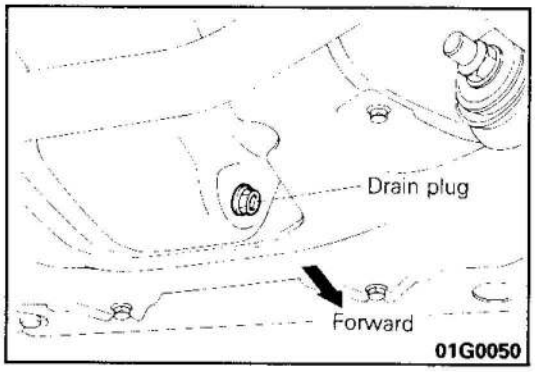
1. Pull out the oil level gauge and remove oil adhered to the level gauge, wiping with clean cloth.
2. Insert the level gauge into the oil level gauge guide.
3. Pull out the level gauge slowly and check that the oil level is in the illustrated range.

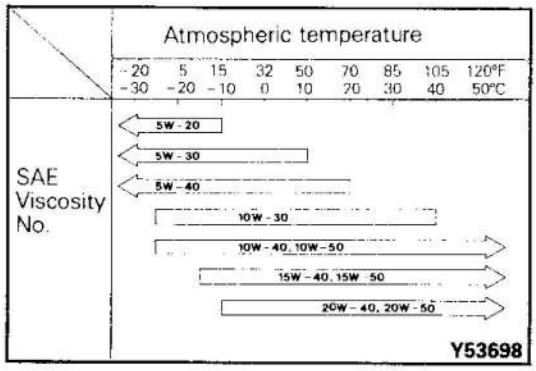
   NOTE
   1. For this inspection, place the vehicle on a level surface.
   2. Check while the engine is stationary. If the engine has been started, stop it and allow for some time before inspection
4. If below the minimum level, refill with specified oil.

   Specified oil: (API classification)
   Vehicles for Europe
   Built up to October 1990 — SE or higher
   Built from November 1990 — SG or higher
   Vehicles for General Export
   Built up to June 1991 — SC or higher
   Built from July 1991 up to June 1992 — SD or higher
   Built from July 1992 — SE or higher*

   Caution
   Refilling beyond the maximum level has adverse effect on engine performance.

   NOTE
   If it is difficult to obtain the engine oil of SE or higher* grade, use API classification SD oil.
5. Run the engine at idle and stop. Then allow some time and check oil level again to make sure it is within the specified range.





ENGINE OIL REPLACEMENT

E11F0AAD

1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 90°C (176°F to 194°F).
2. Remove the engine oil filler cap.
3. Remove the drain plug to drain oil.

Caution
Use care as oil is hot.

4. Fit the drain plug after oil has been drained completely.
5. Refill with specified quantity of oil.

Specified oil: (API classification)

Vehicles for Europe	
Built up to October 1990	**SE or higher**
Built from November 1990	**SG or higher**
Vehicles for General Export	
Built up to June 1991	**SC or higher**
Built from July 1991 up to June 1992	**SD or higher**
Built from July 1992	**SE or higher***

SAE viscosity number
Refer to left table.

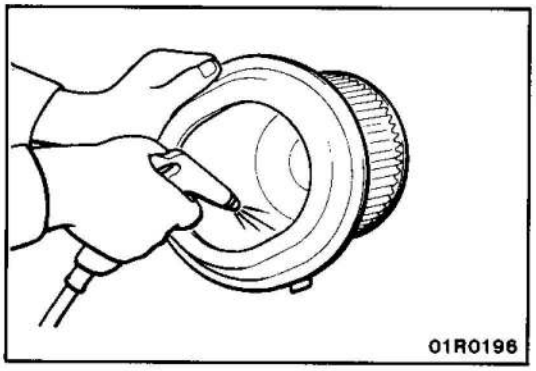
Quantity: 3.8 lit. (4.0 U.S. qts., 3.3 Imp.qts.)*1
[including 0.3 lit. (0.32 U.S. qts., 0.26 Imp. qts.) in oil filter]*1

*1: If a MD031805 oil filter is being used, the oil capacity is increased by 0.1 lit. (0.11 U.S. qt., 0.09 Imp. qt.).

NOTE
If it is difficult to obtain the engine oil of SE or higher* grade, use API classification SD oil.

6. Mount the engine oil filler cap.
7. Check oil level

NOTES



INSPECTION AND CLEANING OF AIR CLEANER ELEMENT

E11FPAB

1. Check air cleaner element for excessive dirt or clogging.
2. Blow compressed air through element from inside to clean.
3. Clean air cleaner case with rag etc.
4. Replace if heavily soiled or clogged.

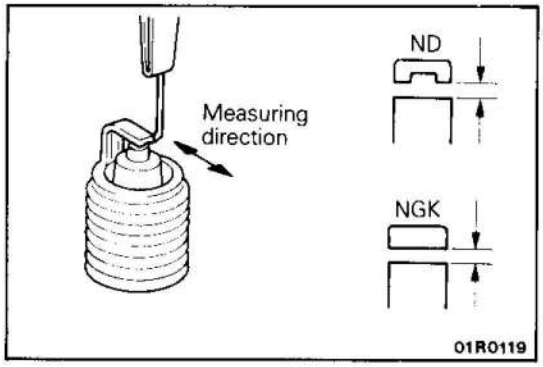
INSPECTION AND CLEANING OF SPARK PLUGS

E11FRAB0

1. Remove the high tension cables.

   Caution
   When pulling off the high tension cable from the plug, be sure to hold the cable cap.

2. Remove the spark plugs.



3. Check for burned out electrode or damaged insulator. Check for even burning.
4. Remove adhered carbon with wire brush or plug cleaner. Remove sand from plug screw with compressed air.
5. Use a plug gap gauge to check that the plug gap is within the standard value range.

   Standard value: 0.7–0.8 mm (0.028–0.031 in.)

   If the plug gap is not within the standard value range, adjust by bending the ground electrode.

6. Clean the engine plug holes.

   Caution
   Use care not to allow foreign matter in the engine.

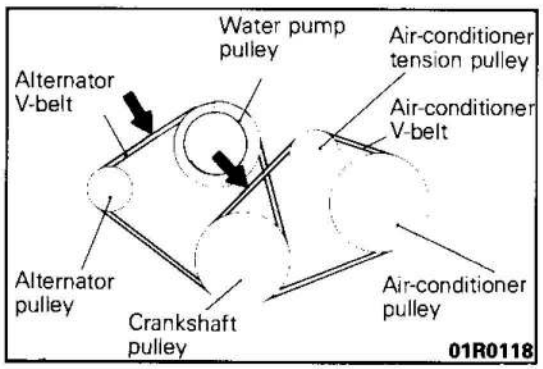
7. Mount the spark plugs.

INSPECTION AND ADJUSTMENT OF V BELT FLEX

E11FQAC

1. Check belt for damage or wear. Confirm that belt is set correctly in pulley groove.

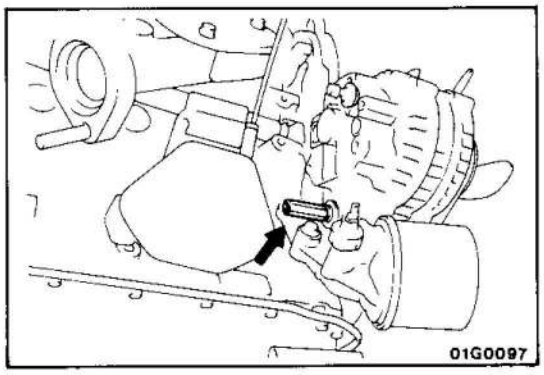
   NOTE
   If the belt "squeals" or slips, check belt for friction, damage or breaks and check pulley contact surface for damage.



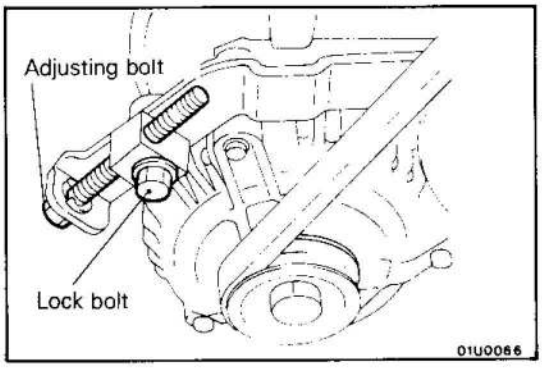
2. Press at 100N (10 kg, 22 lbs.) centre of belt between pulleys as indicated in the diagram. Measure V-belt flex.

   Standard value:
   Alternator: 7–10 mm (0.28–0.39 in.)
   Air-conditioner compressor: 7–10 mm (0.28–0.39 in.)

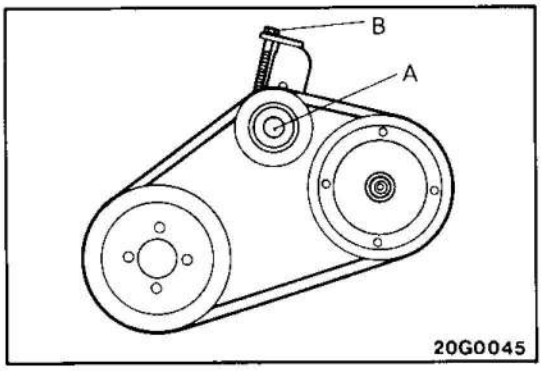
   Caution
   Measure belt flex between specified pulleys (⬅).



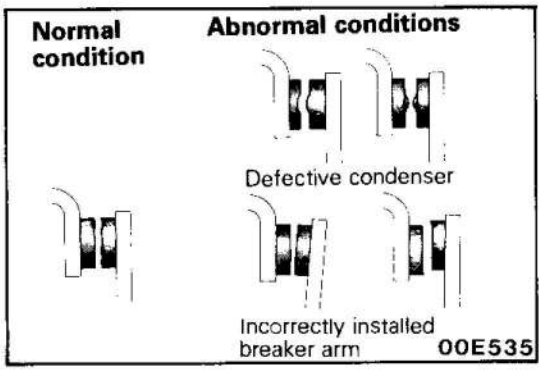
3. Adjust alternator V-belt flex by the following procedures.
   (1) Loosen alternator support bolt nut.



   (2) Loosen belt tension adjuster lock bolt.
   (3) Adjust belt flex by turning adjuster bolt.
   Standard value: 7–10 mm (0.28–0.39 in.)
   (4) Tighten lock bolt.
   (5) Tighten alternator support bolt nut.
   (6) Check belt flex and adjust if necessary.

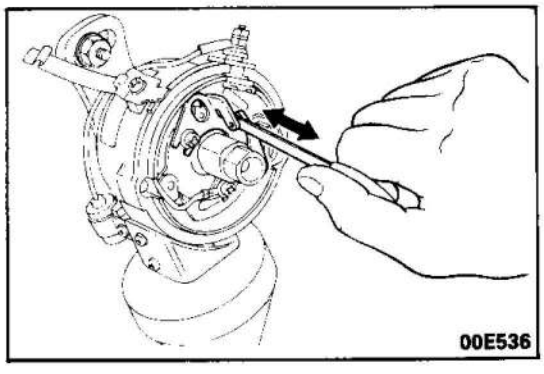


4. Adjust air-conditioner compressor V-belt flex by the following procedures.
   (1) Loosen tension pulley fixing bolt A.
   (2) Adjust belt flex with adjusting bolt B.
   Standard value: 7–10 mm (0.28–0.39 In.)
   (3) Tighten fixing bolt A.
   (4) Check belt flex and adjust if necessary.

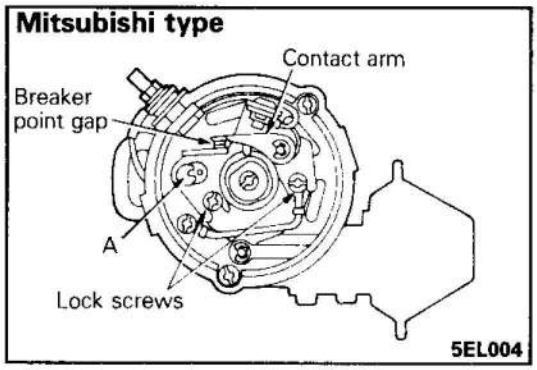


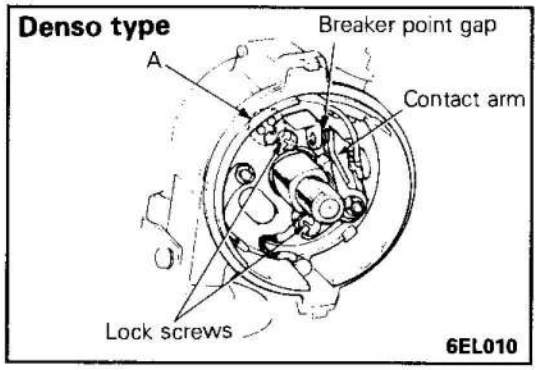
INSPECTION AND ADJUSTMENT OF BREAKER POINT GAP (Breaker point type distributor) E11FSAB

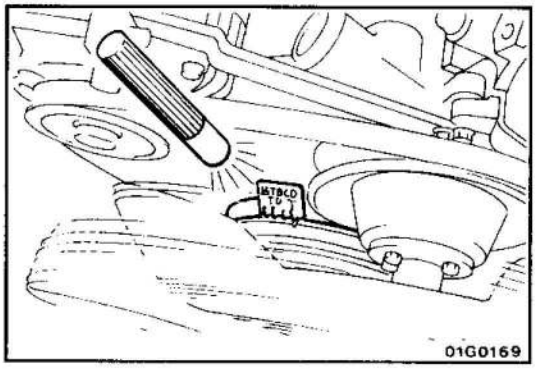
1. Remove distributor cap and rotor.
2. Check condition of contact point surfaces. Repair contact points or replace breaker assembly as necessary.

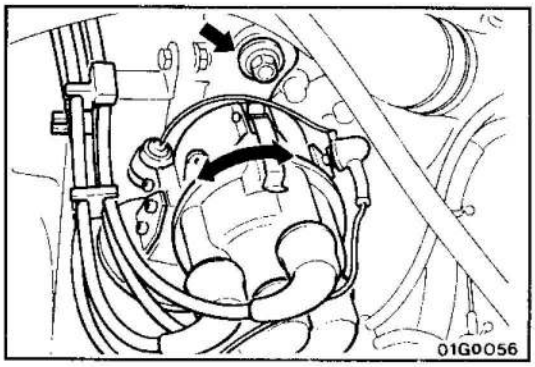


3. If correction of contact point surfaces is necessary, use a point file or sandpaper.
4. Clean point surfaces.









5. Turn crankshaft until points are wide-open.
6. Check breaker point gap with a thickness gauge.

Standard value
Point gap:
Mitsubishi type 0.45 – 0.55 mm (0.018 – 0.021 in.)
Denso type 0.4 – 0.5 mm (0.016 – 0.020 in.)
Dwell angle: 49 – 55°

7. If it is out of specification, loosen two lock screws.
8. Insert a cross-recessed head screwdriver (in the case of Mitsubishi type) or a plain screwdriver (in the case of Denso type) into adjuster (portion "A") and turn screwdriver clockwise or counterclockwise to adjust the gap.
9. After adjustment, securely tighten two lock screws.
10. Wipe points with a clean cloth or paper to remove oil and grease.
11. After adjustment, check the dwell angle and ignition timing.

INSPECTION AND ADJUSTMENT OF IGNITION TIMING

E11FVAC0

1. Before inspection and adjustment set vehicle in the following condition.
   (1) Coolant temperature: 80 – 90°C (176 – 194°F)
   (2) Lamps and all accessories: OFF
   (3) Transmission: Neutral
2. Adjust breaker point gap or dwell angle (breaker point type distributor).
3. Connect tachometer and timing light.
4. Check that engine idle speed is within the standard value.

Standard value:

Vehicles for Europe	**750±50 r/min.**
Vehicles for General Export	**600±50 r/min.**
Vehicles for Malawi*	**850±50 r/min.**
Vehicles for Gulf Countries and vehicles for Hong Kong built from July 1991	**700±50 r/min.**

* Engine in vehicles for Malawi use an 80% petrol/20% ethanol mixture.

5. Check that basic ignition timing is within the standard value.

Standard value: 5°±2° BTDC

6. If not within the standard value, loosen distributor fixing nut and adjust by rotating distributor body.

NOTE
Turning distributor body to the right delays ignition timing. Turning distributor body to the left advances ignition timing.

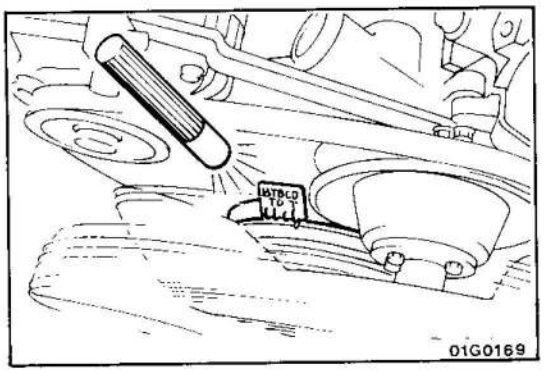
Caution – Vehicles for General Export
If the problem of knocking occurs when gasoline with an octane rating of 87 – 89 RON is used, it can be handled by retarding the standard ignition timing by about 2 degrees.

7. Tighten fixing nut after adjusting.

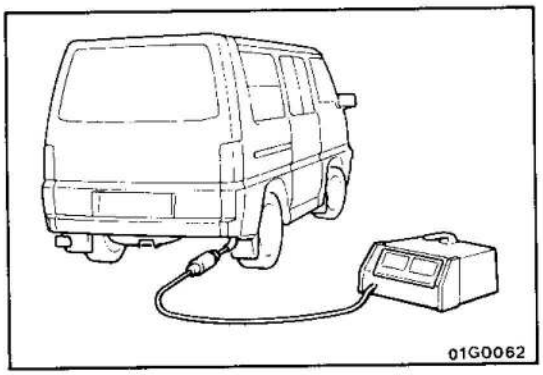
INSPECTION AND ADJUSTMENT OF ENGINE IDLING SPEED AND CO CONCENTRATION E11FXCJ

1. Before inspection and adjustment set vehicle in the following condition.
   (1) Coolant temperature: 80–90°C (176–194°F)
   (2) Lights and all accessories: OFF
   (3) Transmission: Neutral
2. Set timing light and tachometer.
3. Start engine and run at idle.
4. Check ignition timing.
   Adjust ignition timing if required. (Refer to P.11–15.)

   Standard value: 5°±2° BTDC



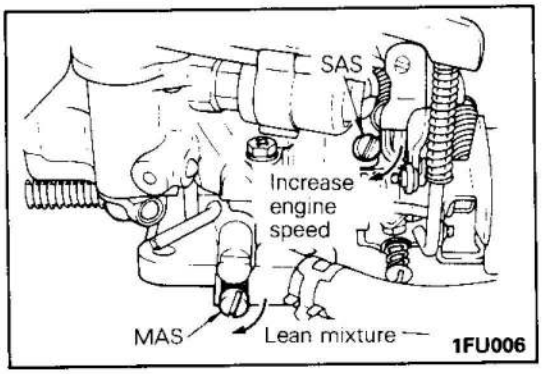
5. Disconnect the white striped vacuum hose from the secondary air control valve and plug the vacuum hose end (vehicles for Europe and vehicles for Hong Kong built from July 1991).
6. Set CO tester.
7. Run engine at 2,000–3,000 r/min. and race 2–3 times.
8. Check that engine idle speed and CO concentration are within the standard values.



Standard value:

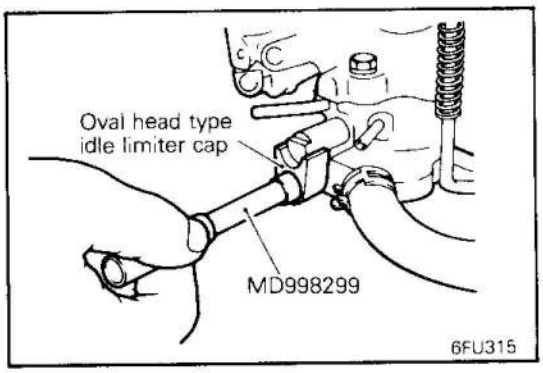
Engine idle speed	
Vehicles for Europe	**750±50 r/min.**
Vehicles for General Export	**600±50 r/min.**
Vehicles for Malawi*	**850±50 r/min.**
Vehicles for Gulf Countries	**700±50 r/min.**
Vehicles for Hong Kong built from July 1991	**700±50 r/min.**
CO concentration	
Vehicles for Europe	**1.0±0.5 %**
Vehicles for General Export	**2.5±0.5 %**
Vehicles for Gulf Countries	**1.5±0.5 %**
Vehicles for Hong Kong built from July 1991	**2.0±0.5 %**

* Engine in vehicles for Malawi use an 80% petrol/20% ethanol mixture.



9. If not within the standard values, adjust idle rpm and CO concentration to standard value with speed adjusting screw (SAS) and mixture adjusting screw (MAS).

   NOTE
   Use the special tool when adjusting mixture adjusting screws (MAS) that have over head type idle limiter cap.
   For vehicles for Hong Kong, remove the idle limiter cap when adjusting.



10. Remove plug from the disconnected white striped vacuum hose and connect hose to secondary air control valve (vehicles for Europe and vehicles for Hong Kong built from July 1991).
11. Race the engine 2–3 times at an engine speed of 2,000–3,000 r/min.
12. Check the idling carbon monoxide (vehicles for Europe and vehicles for Hong Kong built from July 1991).

Standard value

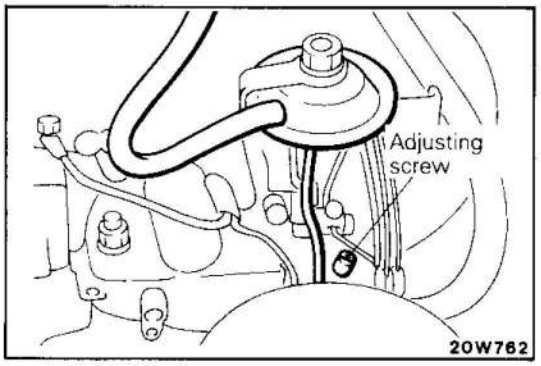
Vehicles for Europe	**1.5% or lower**
Vehicles for Honk Kong	**0.6% or lower**

INSPECTION AND ADJUSTMENT OF IDLE UP EQUIPMENT (vehicles with air-conditioner) E11FZAC0

1. Before inspection and adjustment set vehicle in the following condition.
   - Engine coolant temperature: 80–90°C (176–194°F)
   - Idle rpm and CO concentration within the standard value.
   - Lights and accessories: OFF
   - Transmission: Neutral
2. Turn air-conditioner ON.

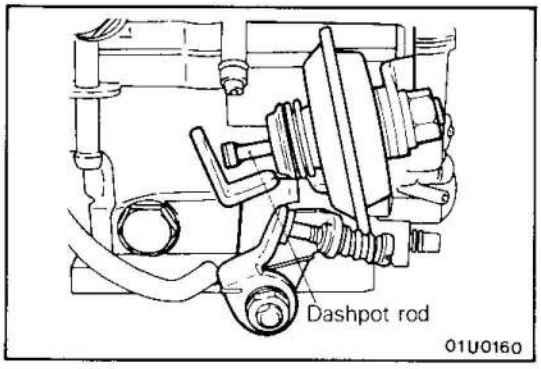
   NOTE
   Solenoid valve opens and intake manifold vacuum is applied to throttle opener and throttle opener makes full stroke.
3. Check engine rpm is within the standard value.

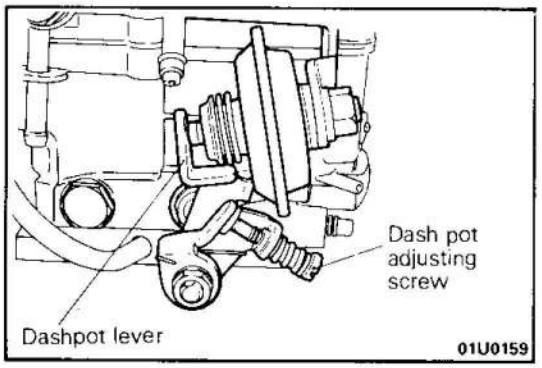
   Standard value: 1,000 ± 50 r/min.
4. If not within the standard value, adjust by turning throttle opener (air-conditioner) adjusting screw.



INSPECTION AND ADJUSTMENT OF DASHPOT (vehicles for Europe) E11FYAB

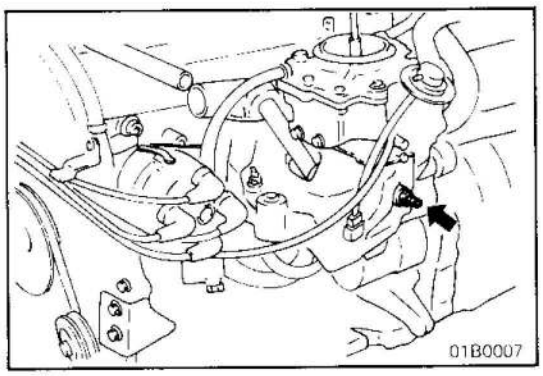
1. Before inspection and adjustment set vehicle in the following condition.
   - Engine coolant temperature: 80–90°C (176–194°F)
   - Idle rpm and CO concentration within standard value.
   - Lights and accessories: OFF
   - Transmission: Neutral
2. Start engine.
3. Set tachometer.
4. Open throttle lever until dashpot rod makes full stroke.





5. Close throttle lever until dashpot rod touches dashpot lever. Check engine rpm is within the standard value.

   Standard value: 1,600 ± 200 r/min.
6. If not within standard value, adjust by turning dashpot adjusting screw.



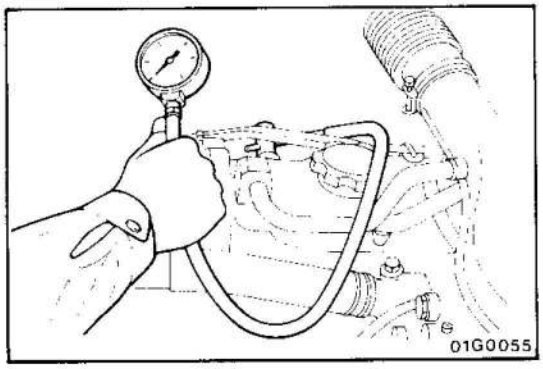
INSPECTION OF MANIFOLD VACUUM E11FWAB0

1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 90°C (176°F to 194°F).
2. Set an engine tachometer in place.
3. Set the vacuum gauge at illustrated position on the intake manifold.
4. Start the engine and check that the idle speed is within the standard value range. Then read off the vacuum gauge.

   Limit: min. 450 mmHg (17.7 in.Hg)
5. If not at standard value, refer to following chart for cause and repair.

Symptom	Probable cause	Remedy
Vacuum gauge reads under standard value but needle is stable	• Delayed ignition timing • Low valve clearance	• Adjust ignition timing • Adjust valve clearance
Vacuum gauge needle fluctuates slowly	• Air mixture concentration too high	• Adjust carburetor
Vacuum gauge reading decreases irregularly	• Air mixture concentration too low	• Adjust carburetor
Vacuum gauge needle decreases about 30–160 mmHg (1.2–6.3 in.Hg) intermittently	• Valve not installed securely	• Check, repair valve
Vacuum gauge needle suddenly decreases about 250 mmHg (9.8 in.Hg) from standard value and then returns	• Defective cylinder head gasket	• Replace cylinder head gasket.

INSPECTION OF COMPRESSED PRESSURE E11FGBB0



1. Check to be sure that the engine oil, starting motor and battery are in the normal condition.
2. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 90°C (176°F to 194°F).
3. Disconnect the high-tension cable.
4. Remove all 4 spark plugs.
5. Crank engine to discharge foreign material from cylinder.

Caution
Cover spark plug hole with rag etc., to prevent foreign material scattering when discharged. Keep people away from spark plug hole side. If compression is measured with water, oil, fuel etc., inside cylinder from cracks, hot water, oil, fuel etc., will gush out from spark plug hole, which is very dangerous.

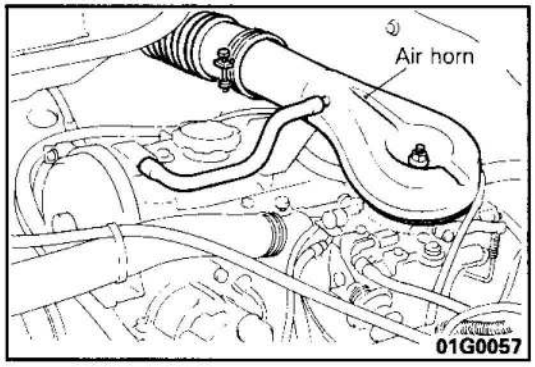
6. Set an engine tachometer in place.
7. Place a compression gauge adaptor and compression gauge in one of the spark plug holes.
8. Crank the engine with the throttle valve fully open, and measure the compression at the place where the compression gauge indicator shows a stabilized reading.

Standard value (at engine speed of 250–400 r/min)
4G32 1,300 kpa (13.0 kg/cm², 185 psi)
4G33 (except vehicles for Hong Kong built from July, 1991) 1,200 kPa (12.0 kg/cm², 171 psi)
4G33 (vehicles for Hong Kong built from July, 1991) 1,400 kpa (14.0 kg/cm², 199 psi)
Limit (at engine speed of 250–400 r/min)
4G32 920 kpa (9.2 kg/cm², 131 psi)
4G33 (except vehicles for Hong Kong built from July, 1991) 840 kpa (8.4 kg/cm², 119 psi)
4G33 (vehicles for Hong Kong built from July, 1991) 1,000 kpa (10.0 kg/cm², 142 psi)

9. Conduct steps 7, 8 with all cylinders and confirm pressure differences of all cylinders is within the limit.

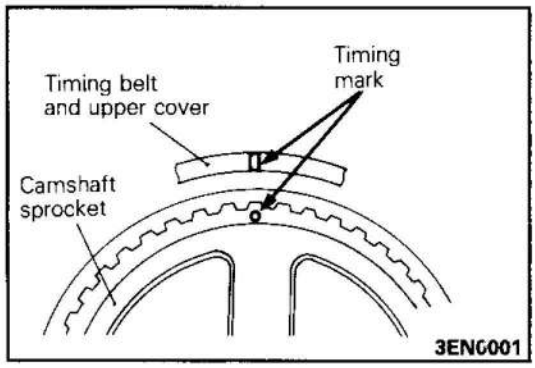
Limit: 100 kPa (1.0 kg/cm², 14 psi.) or less

10. If, after the measurement, the compression is below the limit, put a small amount of engine oil through the spark plug hole into the cylinder; then measure the compression once again and determine the cause of the malfunction.
11. If, after oil is added, the compression rises, the cause of the malfunction is a worn or damaged piston ring and/or cylinder inner surface.
    If, however, the compression does not rise, the cause is a bad valve or a bad gasket.
    For information regarding the servicing procedures for these causes of malfunction, refer to the ENGINE AND TRANSMISSION MANUAL.

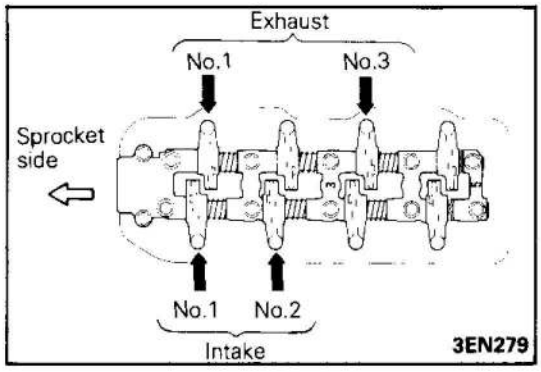


INSPECTION AND ADJUSTMENT OF VALVE CLEARANCE E11FDBD

1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 90°C (176°F to 194°F).
2. Check the ignition timing and idling speed, and adjust if necessary (Refer to P.11–15, 16.)
3. Remove air horn.
4. Remove rocker cover.
5. Remove timing belt front upper cover.



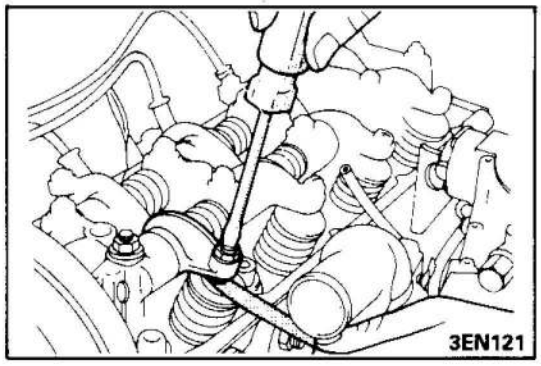
6. Turn crankshaft clockwise and align with camshaft sprocket timing mark.



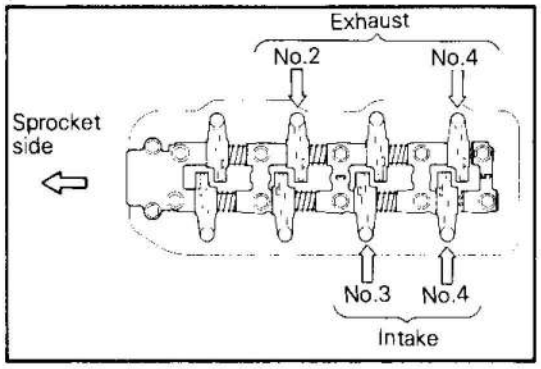
7. Check that valve clearance indicated in the diagram is at the standard value.

Standard value (hot engine):

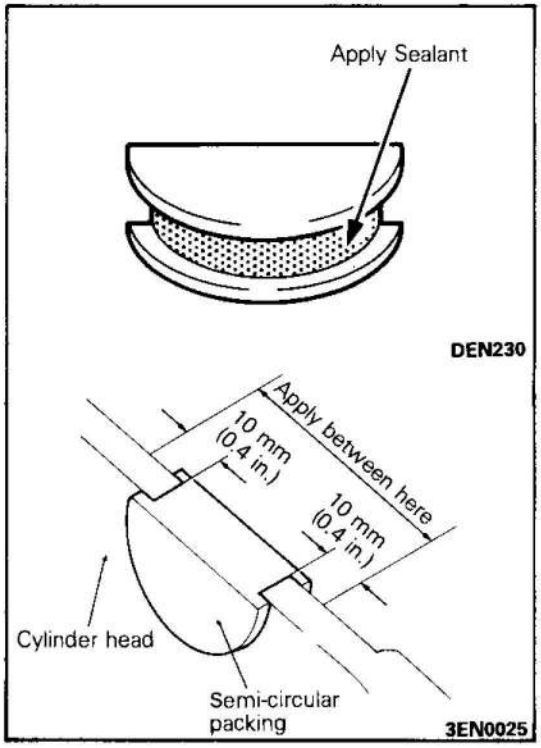
Intake	**0.15 mm (0.0059 in.)**
Exhaust	**0.25 mm (0.0098 in.)**



8. If valve clearance is off the standard value, loosen rocker arm adjusting screw locking nut. Use feeler gauge and adjust valve clearance by turning adjusting screw.
9. Secure rocker arm adjusting screw with screwdriver so that it will not rotate and tighten locking nut.



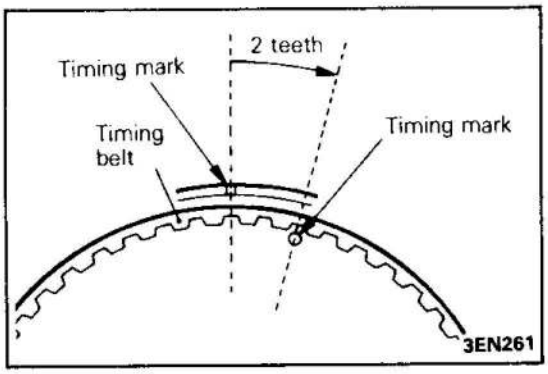
10. Rotate clockwise the crankshaft one complete turn (360° degree).
11. Check that valve clearance indicated in the diagram is at the standard value.
12. Repeat steps 7. and 8. to adjust the valve clearance of remaining valves.



13. When installing the rocker cover assembly to the cylinder head, apply a coating of the specified sealant to the semi-circular packing and the cylinder head top surfaces, and then tighten at the specified torque.

Specified sealant: 3M ATD Part No. 8660 or equivalent

Caution
If they are overtorqued, a deformed rocker cover or oil leakage could result.

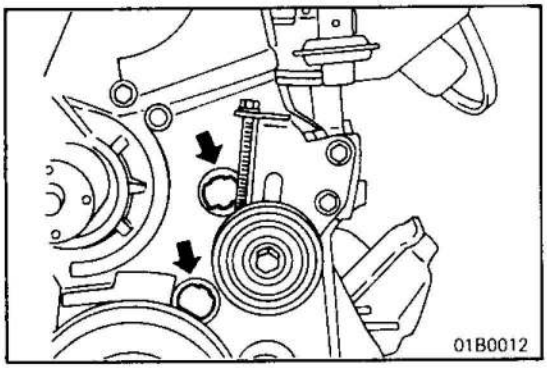


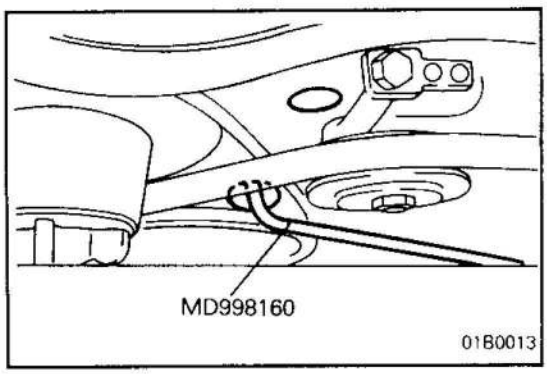
ADJUSTMENT OF TIMING BELT TENSION E11FFAD

1. Remove air-conditioner compressor V-belt. Remove alternator V-belt.
2. Remove timing belt front upper cover.
3. Position the piston in No.1 cylinder at the top dead center on compression stroke and turn the crankshaft to align the timing mark on the cover with the position two teeth past the timing mark on the camshaft sprocket.

Caution
Turn the crankshaft always in normal (clockwise) direction.

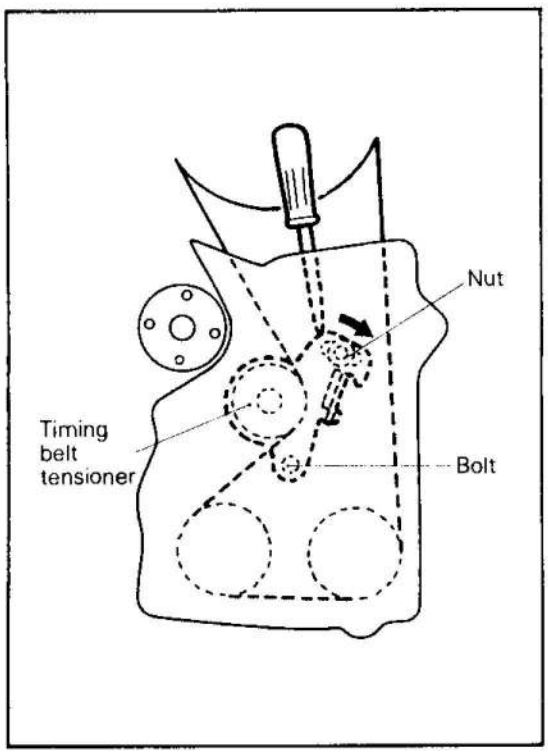
4. Remove the access covers.





5. With special tool, loosen the timing belt tensioner mounting nut and bolt.

Caution
Do not loosen the nut and bolt more than necessary. They could drop in the lower cover.

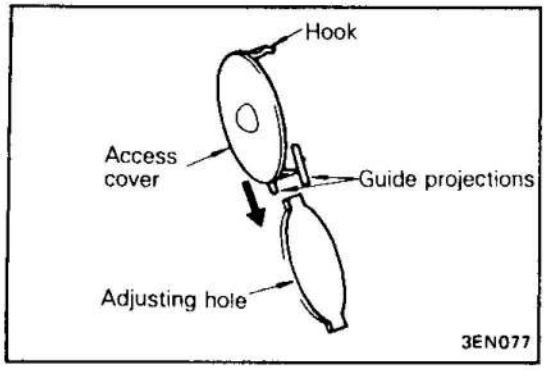


6. Insert a screwdriver from the top of the timing belt lower cover and push the tensioner in the belt tensioning direction and then release.

Caution
When inserting a screwdriver, use care not to damage the belt.

7. With spescial tool, tighten the timing belt tensioner mounting nut and bolt.

Caution
Tighten the tensioner nut (upper) first and then bolt (lower).



8. Install access cover.
   Access cover is easily installed by sliding hook between guide projections.
9. Install timing belt front upper cover.
10. Install air-conditioner compressor belt. Install alternator belt. Refer to P.11–13 for V-belt tension adjustment.

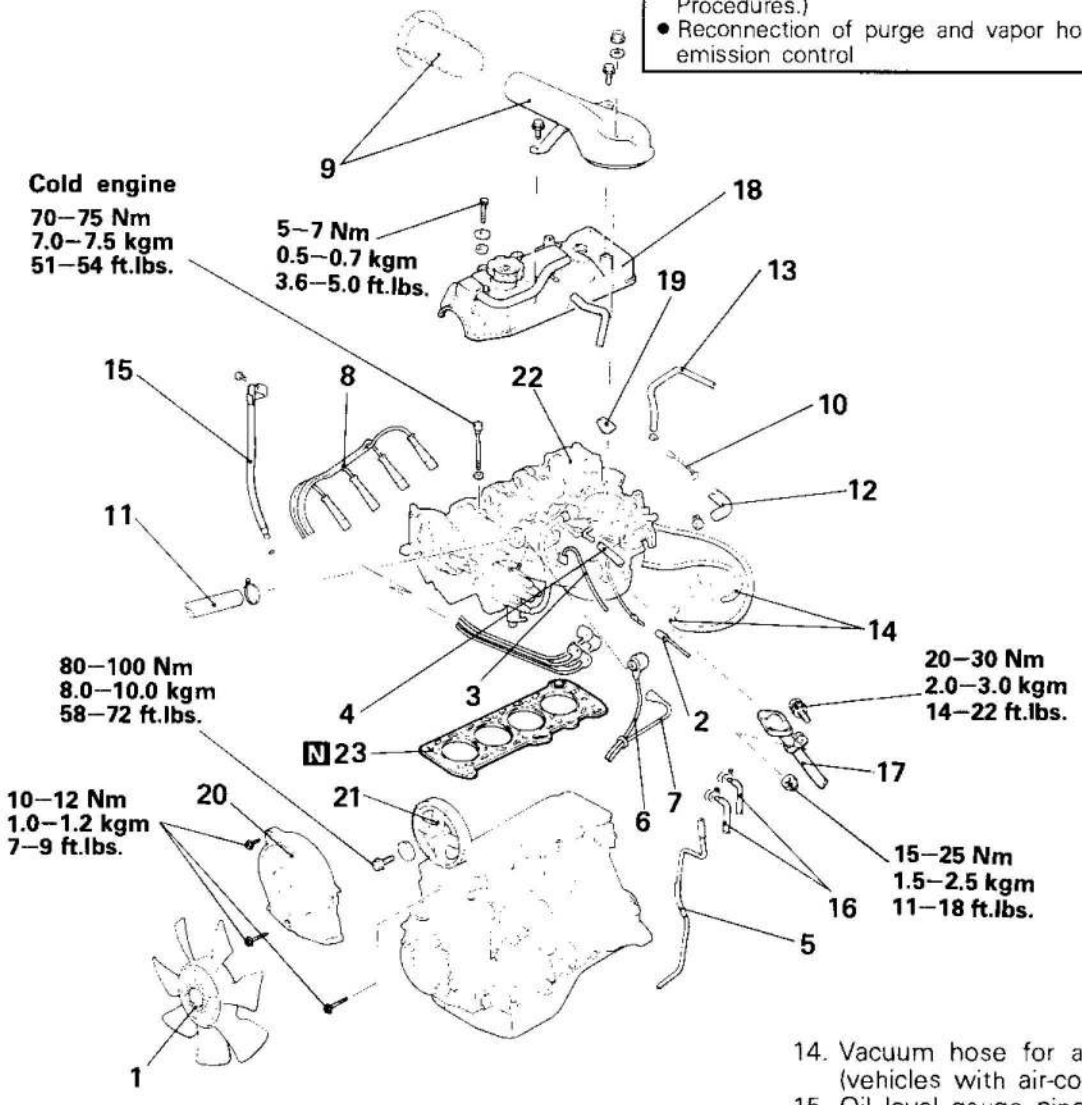
CYLINDER HEAD GASKET

REMOVAL AND INSTALLATION

E11JA--0

Pre-removal Operation
- Removal of seat underframe
- Drainage of engine coolant
- Disconnection of purge and vapor hoses for emission control

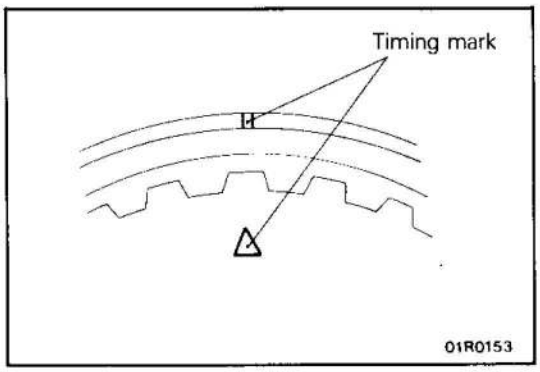
Post-installation Operation
- Installation of seat underframe
- Filling of engine coolant (Refer to GROUP 14 – Service Adjustment Procejures.)
- Checking of engine oil (Refer to P. 11-12.)
- Adjustment of accelerator cable (Refer to GROUP 13 – Service Adjustment Procedures.)
- Reconnection of purge and vapor hoses for emission control



Removal steps

1. Cooling fan
2. Control harness connector
3. Coolant temperature sensor connector
4. Vapor hose
5. Fuel pump breather hose
6. Distributor harness
7. High tension code
8. Spark plug code
9. Air horn and air duct
10. Accelerator cable
11. Radiator upper hose
12. Water hose (vehicles for Europe)
13. Brake vacuum hose
14. Vacuum hose for air-conditioner idle-up (vehicles with air-conditioner)
15. Oil level gauge pipe
16. Fuel hose
17. Exhaust pipe
- ◆◆ 18. Rocker cover
- ◆◆ 19. Semi-circular packing
20. Timing belt upper cover
- ◆◆ 21. Camshaft sprocket
- ◆◆ ◆◆ 22. Cylinder head assembly
- ◆◆ 23. Cylinder head gasket

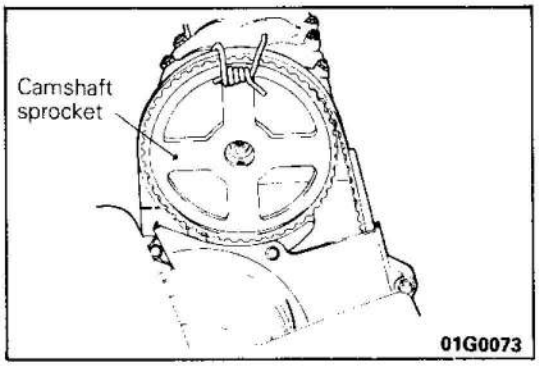
NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".
(4) N : Non-reusable parts



SERVICE POINTS OF REMOVAL E11JBAF

21. REMOVAL OF CAMSHAFT SPROCKET

(1) Rotate crankshaft and align timing marks.



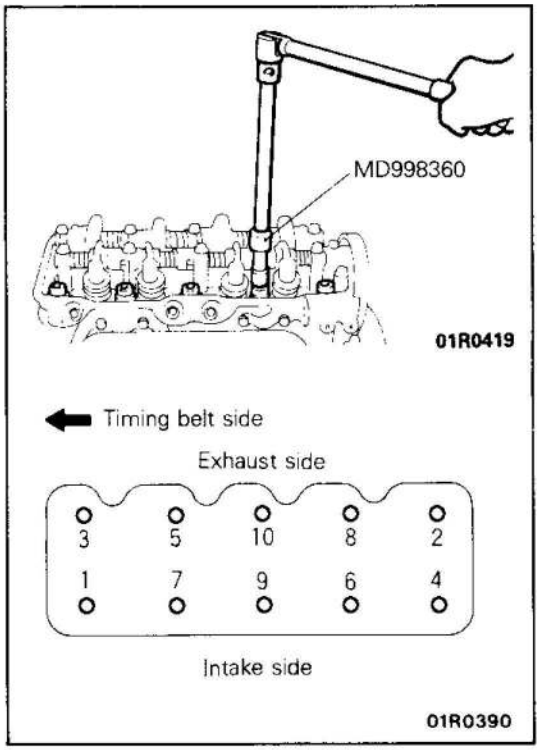
(2) Remove camshaft sprocket with timing belt and place it on timing belt front lower cover.

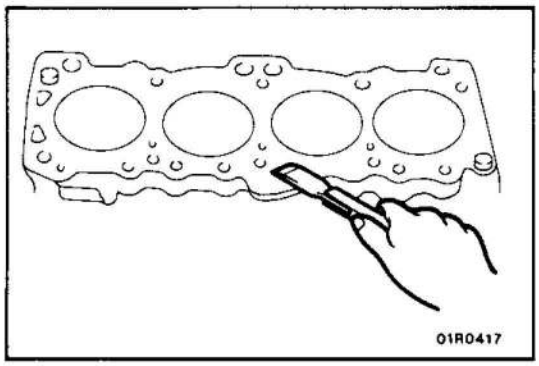
Caution
Do not rotate crankshaft after removing camshaft sprocket.

NOTE
Secure camshaft sprocket and timing belt with wire etc., to prevent them from slipping out of place.

22. REMOVAL OF CYLINDER HEAD ASSEMBLY

Loosen bolt in the numerical order indicated in the diagram with special tool and remove.



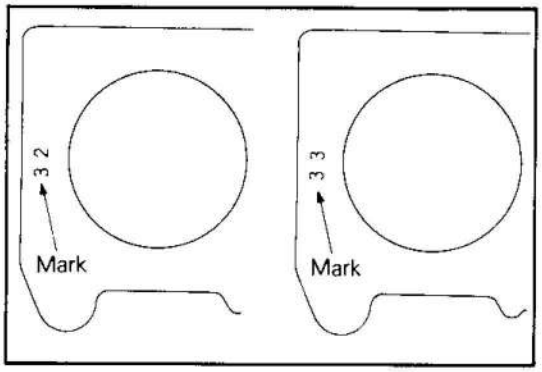


SERVICE POINTS OF INSTALLATION E11JDAT

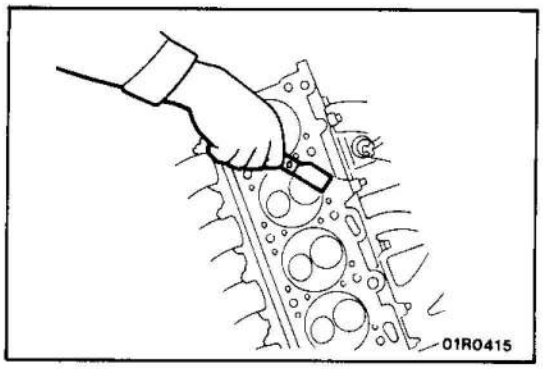
23. INSTALLATION OF CYLINDER HEAD GASKET

(1) Scrape off gasket adhered to cylinder block.

Caution
Be careful that foreign material does not fall into cylinder, or into coolant and oil passage ways.



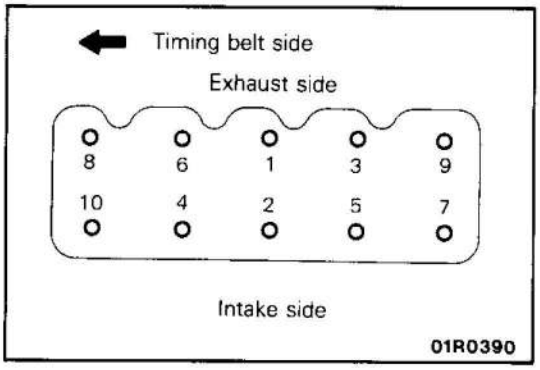
(2) Identification mark is provided on cylinder head gasket to ensure correct installation.
(3) Mount on cylinder block with mark at top.



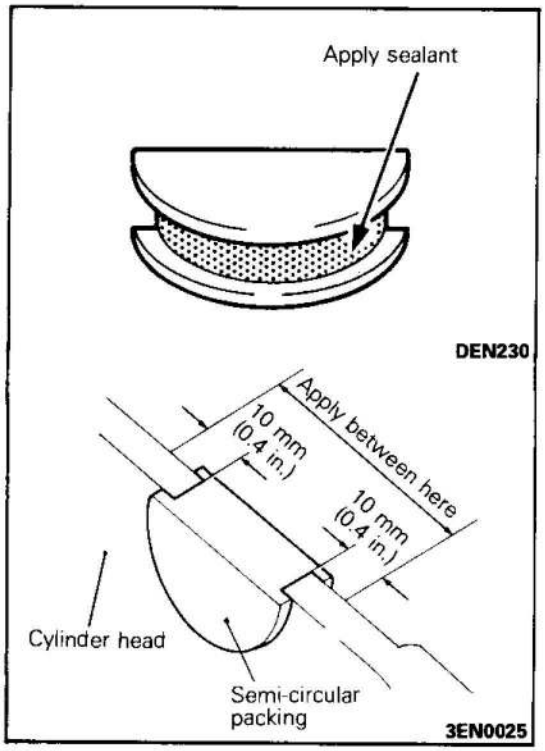
22. INSTALLATION OF CYLINDER HEAD ASSEMBLY

(1) Scrape off gasket adhered to cylinder head assembly.

Caution
Be careful that foreign material does not fall into coolant and oil passage ways.



(2) Tighten in the numerical order indicated in the diagram in two or three groups with special tool (MD998360).



19. INSTALLATION OF SEMI-SIRCULAR PACKING

Apply specified sealant to semi-circular packing and cylinder head to locations indicated in the diagram.

Specified sealant: 3M ATD Part No.8660 or equivalent

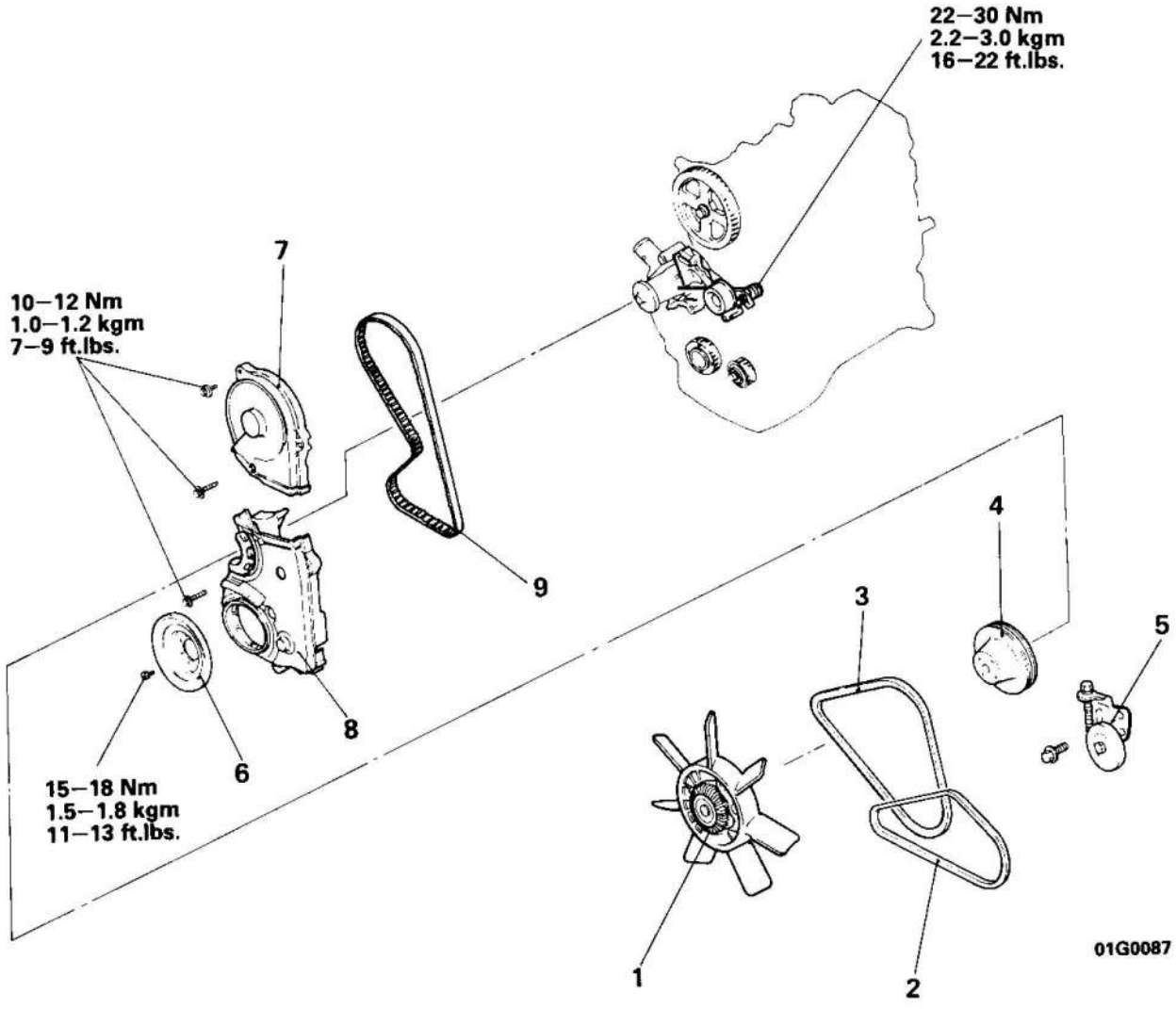
18. INSTALLATION OF ROCKER COVER

(1) Replace rocker cover gasket if cracked or deteriorated.
(2) Apply engine oil to gasket surface.
(3) Install rocker cover.

TIMING BELT

E11GA--0

REMOVAL AND INSTALLATION



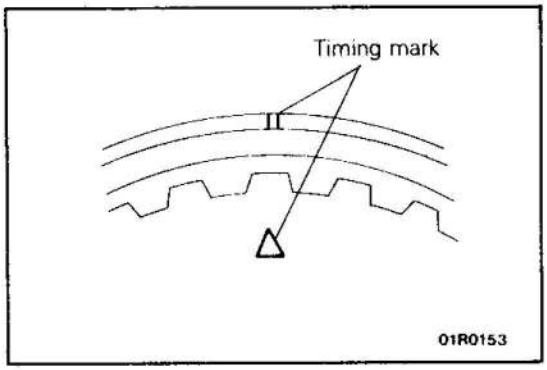
Post-installation Operation
- Adjustment of alternator V-belt tension (Refer to P.11–13.)
- Adjustment of air-conditioner compressor V-belt tension (Refer to P.11–13.)

Removal steps

1. Cooling fan
2. Air-conditioner compressor V-belt (vehicles with air-conditioner)
3. Alternator V-belt
4. Water pump pulley
5. Tension pulley bracket (vehicles with air-conditioner)
6. Crankshaft pulley
7. Timing belt upper cover
8. Timing belt lower cover

◆◆ ▶◆ 9. Timing belt

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ▶◆ : Refer to "Service Points of Installation".

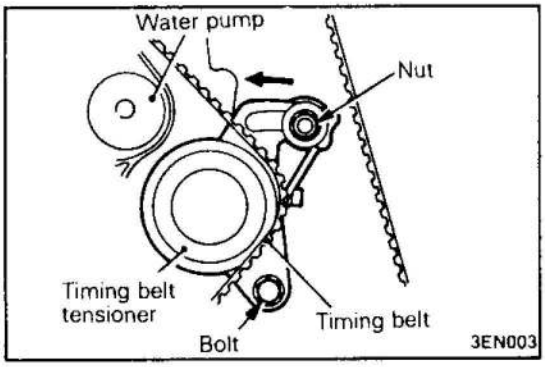


SERVICE POINTS OF REMOVAL E11GBCC

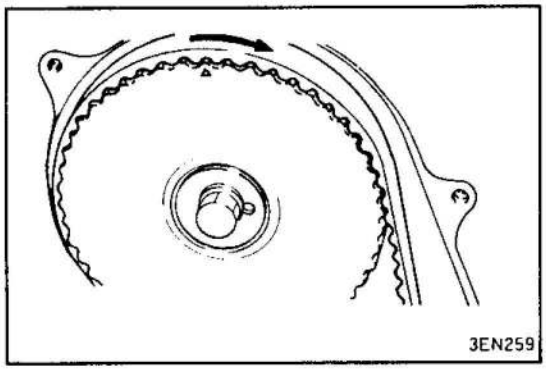
9. REMOVAL OF TIMING BELT

(1) Rotate crankshaft clockwise (to the right) and align timing marks.

Caution
Always rotate crankshaft clockwise.

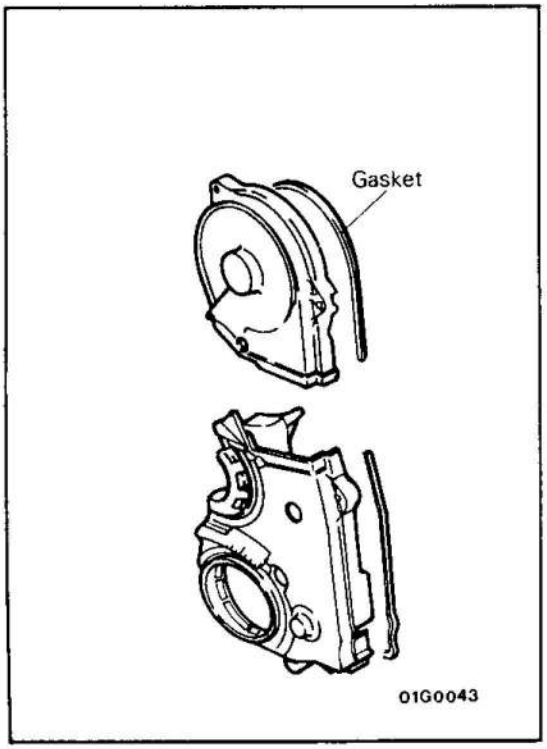


(2) Loosen timing belt tensioner bolt and nut.
(3) Push timing belt tensioner to water pump side and tighten nut. Secure so that tensioner will not move back.



(4) Remove timing belt.

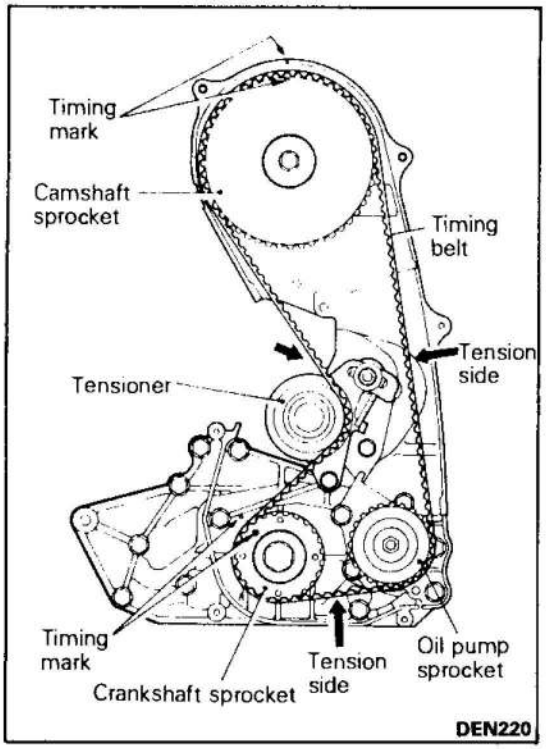
Caution
When reinstalling timing belt, mark an arrow at the back of belt with chalk to show rotation direction (rotate to right).



INSPECTION E11GCAB0

TIMING BELT COVER

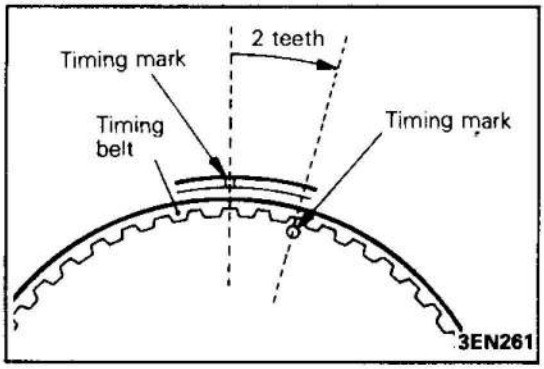
Cracking, splitting, deterioration of gasket.



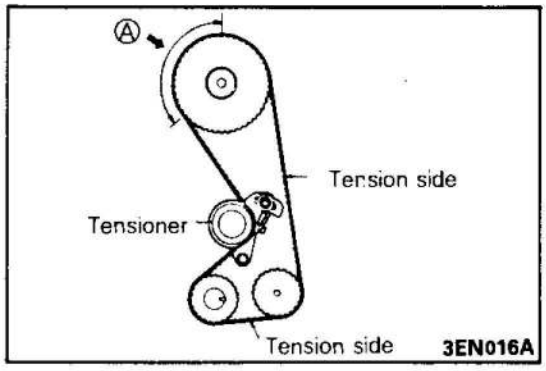
SERVICE POINTS OF INSTALLATION E11GDCC

9. INSTALLATION AND ADJUSTMENT OF TIMING BELT

(1) Align sprocket timing marks.
(2) First, put timing belt around crankshaft sprocket. Next, put timing belt around oil pump sprocket and then around camshaft sprocket. Install so that tension side has no slack.
(3) Push camshaft sprocket counter clockwise (to the left) and stretch belt tension side taut. Reconfirm correct timing mark alignments.
(4) Turn 1 – 2 times tensioner bolt and nut temporarily secured on water pump side first, and loosen. Stretch belt using tensioner spring force.

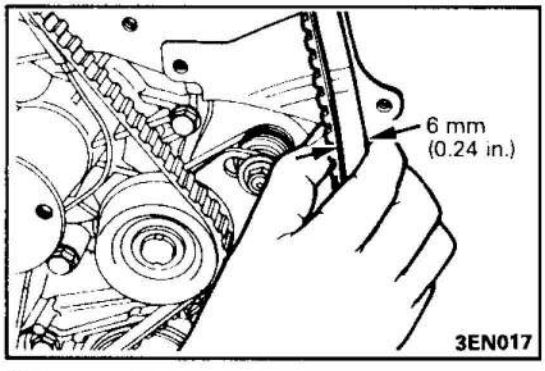


(5) Rotate crankshaft clockwise (to the right) for two teeth on the camshaft sprocket. This provides appropriate tension to timing belt, so do not rotate crankshaft counter clockwise (to the left) or check tension by pressing belt.



(6) Push tensioner in rotation direction (indicated in diagram). Adjust so that belt does not rise at point (A) and meshes completely with camshaft sprocket.
(7) Tighten tensioner installing nut (upper tensioner) to specified torque.
(8) Tighten tensioner installing bolt (lower tensioner) to specified torque.

Caution
If bolt is tightened first, tensioner will rotate and tension will be too tight.



(9) Press center of timing belt tension side (between camshaft sprocket and oil pump sprocket) with thumb and pointer from both sides and confirm that gap between belt back and cover is at the standard value.

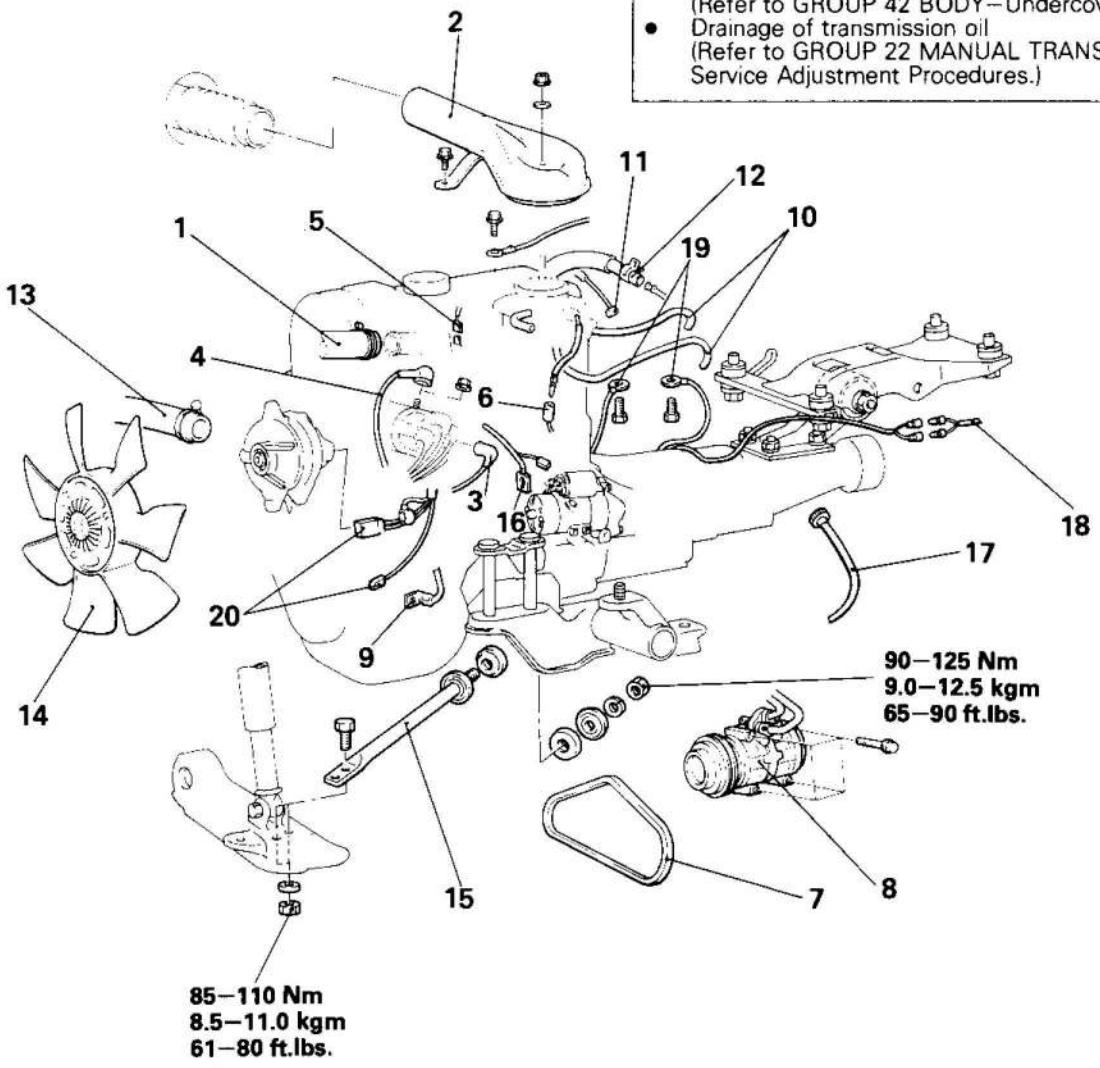
Standard value: 6 mm (0.24 in.)

ENGINE AND TRANSMISSION ASSEMBLY

E11SA--0

REMOVAL AND INSTALLATION

Pre-removal Operation
- Disconnection of purge and vapor hose for emission control
- Drainage of engine coolant
- Removal of undercover
  (Refer to GROUP 42 BODY–Undercover.)
- Drainage of transmission oil
  (Refer to GROUP 22 MANUAL TRANSMISSION–Service Adjustment Procedures.)

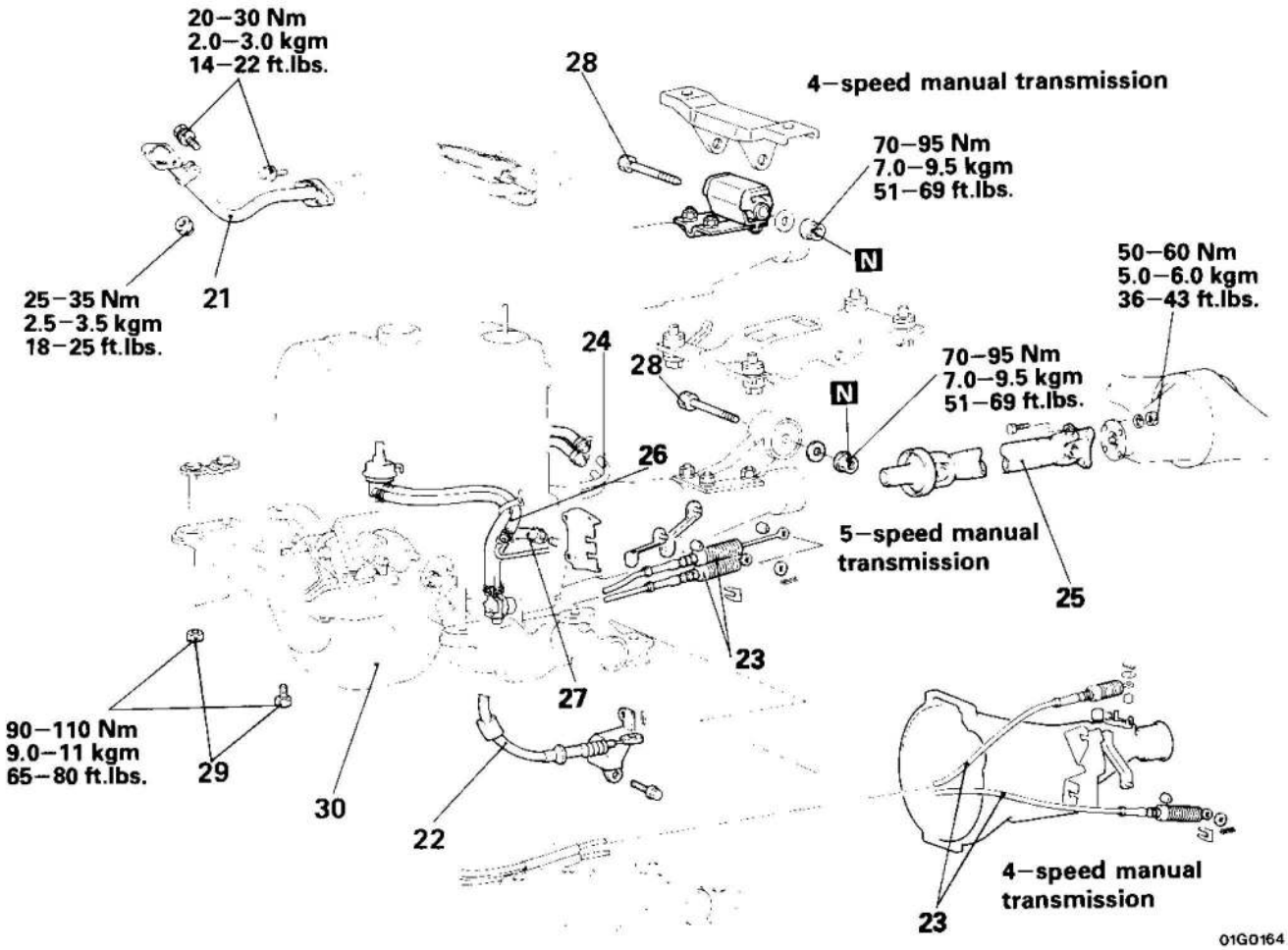


01G0023

Removal steps

1. Radiator upper hose
2. Air horn
3. High tension code
4. Distributor harness connector
5. Coolant temperature sensor harness connector
6. Control harness connector
7. Air-conditioner V-belt
8. Air-conditioner compressor
9. Engine earth
10. Vacuum hose for air-conditioner idle-up (vehicles with air-conditioner)
11. Accelerator cable
12. Brake vacuum hose
13. Radiator lower hose
14. Cooling fan
15. Strut bar
16. Starter harness connector
17. Speedometer cable
18. Back-up lamp harness connector
19. Earth cable
20. Alternator and oil pressure switch harness connector

NOTE
Reverse the removal procedures to reinstall.



Removal steps

- 21. Exhaust pipe
- 22. Clutch control cable
- ◆▶▶◀ 23. Transmission control cable
- 24. Heater hose
- 25. Propeller shaft
- 26. Fuel return hose
- 27. Fuel main hose
- ◆▶ 28. Rear engine mounting installation bolt
- 29. Engine mounting to crossmember installation bolt and nut
- 30. Engine and transmission assembly.

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆▶ : Refer to "Service Points of Removal".
(3) ▶◀ : Refer to "Service Points of Installation".
(4) N : Non-reusable parts

Post-installation Operation

- Reconnection of purge and vapor hose for emission control
- Filling of engine coolant (Refer to GROUP 14 – Service Adjustment Procedures.)
- Installation of undercover (Refer to GROUP 42 – Undercover.)
- Filling of transmission oil (Refer to GROUP 22 – Service Adjustment Procedures.)
- Filling of engine oil (Refer to P.11–12.)
- Checking of alternator V-belt tension (Refer to P.11–13.)
- Checking of air-conditioner V-belt tension (Refer to P.11–13.)
- Checking of accelerator cable play (Refer to GROUP 13 – Service Adjustment Procedures.)
- Checking of clutch operation (Refer to GROUP 21 – Service Adjustment Procedures.)

SERVICE POINTS OF REMOVAL E11S8BG

23. HANDLING OF TRANSMISSION CONTROL CABLE

Refer to GROUP 22 MANUAL TRANSMISSION – Transmission Control (2WD).

28. REMOVAL OF REAR ENGINE MOUNTING INSTALLATION BOLT

Support the engine and transmission before removing.

SERVICE POINTS OF INSTALLATION E11SDBG

23. INSTALLATION OF TRANSMISSION CONTROL CABLE

Refer to GROUP 22 MANUAL TRANSMISSION – Transmission Control (2WD).

ENGINE (4G92 engine)

ENGINE ADJUSTMENT

CHECKING RADIATOR CAP E11FIAC0

Refer to P.11 – 11 for checking procedures.

CHECKING ENGINE COOLANT E11FJAD0

Refer to P.11 – 11 for checking procedures.

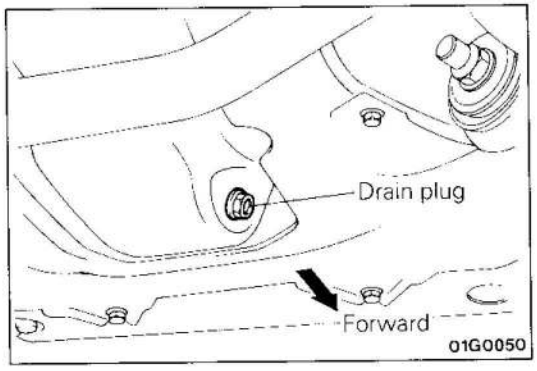
CHECKING BATTERY (Maintenance-free battery) E11FLAC0

Refer to P.11 – 11 for checking procedures.

INSPECTION OF ENGINE OIL LEVEL E11FNAC0

Refer to P.11 – 12 for checking procedures.

ENGINE OIL REPLACEMENT E11FOAA1



1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 90°C (176°F to 194°F).
2. Remove the engine oil filler cap.
3. Remove the drain plug to drain oil.

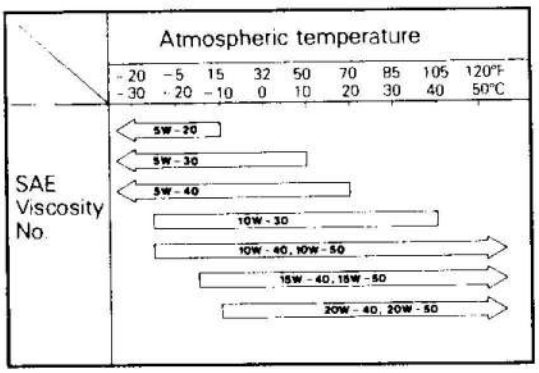
   Caution
   Use care as oil is hot.

4. Fit the drain plug after oil has been drained completely.
5. Refill with specified quantity of oil

   Specified oil (API classification): SE or higher

   Quantity: 3.8 lit (4.0 U.S. qts., 3.3 Imp. qts.) [including 0.3 lit, (0.32 U.S. qts., 0.26 Imp. qts.) in oil filter]

6. Mount the engine oil filler cap.
7. Check oil level.



CHECKING AND CLEANING OF AIR CLEANER ELEMENT E11FPAC0

Refer to P.11 – 12 for checking procedures.

CHECKING AND CLEANING OF SPARK PLUG

E11FRAB1

1. Remove the spark plug cables.

   Caution
   When pulling off the spark plug cable from the plug, be sure to hold the cable cap.

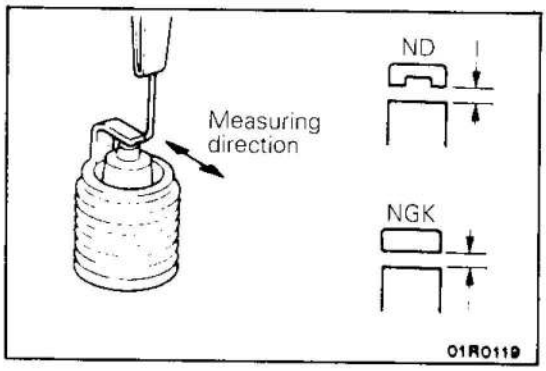
2. Remove the spark plugs.
3. Check for burned out electrode or damaged insulator. Check for even burning.
4. Remove adhered carbon with wire brush or plug cleaner. Remove sand from plug screw with compressed air.
5. Use a plug gap gauge to check that the plug gap is within the standard value range.

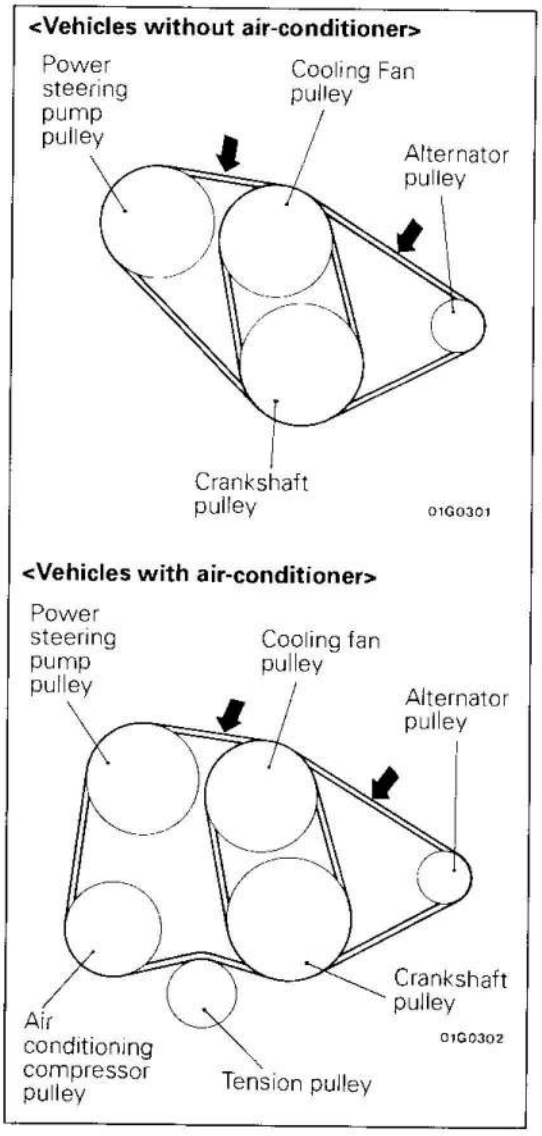
   Standard value:
   Vehicles for General Export
   0.7–0.8 mm (0.028–0.031 in.)
   Vehicles for Hong Kong
   1.0–1.1 mm (0.040–0.043 in.)

   If the plug gap is not within the standard value range, adjust by bending the ground electrode.
6. Clean the engine plug holes.

   Caution
   Use care not to allow foreign matter in the engine.

7. Mount the spark plugs.





INSPECTION AND ADJUSTMENT OF V-BELT FLEX

E11FQAD0

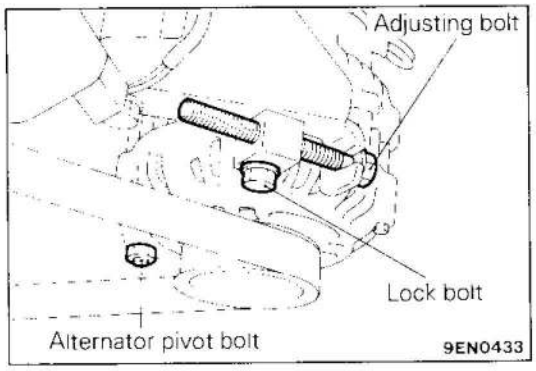
1. Check belt for damage or wear. Confirm that belt is set correctly in pulley groove.

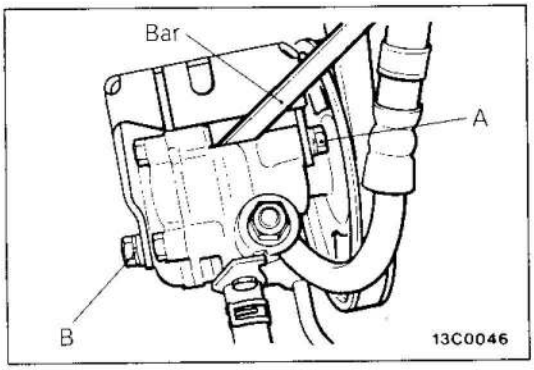
   NOTE
   If the belt "squeals" or slips, check belt for friction, damage or breaks and check pulley contact surface for damage.

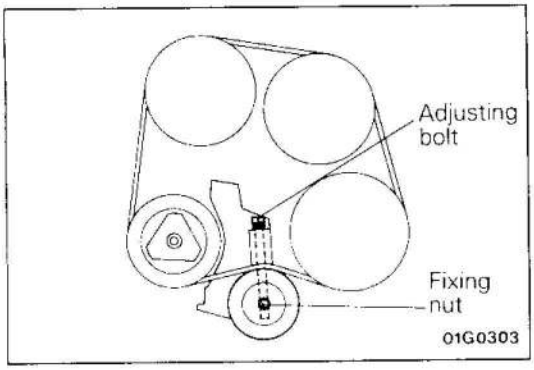
2. Press at 100N (10 kg, 22 lbs.) centre of belt between pulleys as indicated in the diagram. Measure V-belt flex.

   Standard value:

Item		Check value	Adjustment value	
			Used belt	New belt
For alternator	Deflection mm (in.)	8–10 (0.31–0.39)	8.5–9.5 (0.33–0.37)	6–8 (0.24–0.31)
For power steering	Deflection mm (in.)	4.5–6.5 (0.7–0.26)	5–6 (0.20–0.24)	3–5 (0.12–0.20)
For A/C	Deflection mm (in.)	9–12 (0.35–0.47)	9.5–11 (0.37–0.43)	8–9 (0.31–0.35)





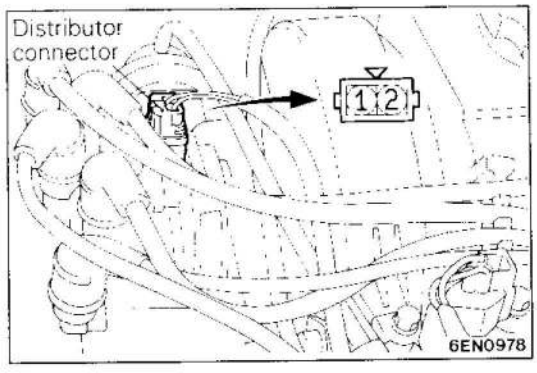


3. Adjust alternator drive belt flex by the following procedures.
   (1) Loosen the nut of the alternator pivot bolt.
   (2) Loosen the lock bolt.
   (3) Turn the adjusting bolt to adjust the amount of belt deflection to the standard value.
   (4) Tighten the lock bolt.
   (5) Tighten the nut of the alternator pivot bolt.
   (6) Turn the crankshaft one or more turns clockwise, and then check the belt deflection or belt tension.
4. Adjust the power steering oil pump drive belt flex by the following procedures.
   (Vehicles without air-conditioner)
   (1) Loosen bolts A and B (for holding the oil pump).
   (2) Place a bar or similar object against the body of the oil pump, and, while manually providing the suitable amount of tension, adjust the amount of flexion of the belt.
   (3) Tighten bolts A and B in that order.
   (4) Turn the crankshaft one or more turns clockwise, and then check the belt deflection or belt tension.
5. Adjust power steering oil pump and air-conditioner compressor drive belt flex by the following procedures.
   (Vehicles with air-conditioner)
   (1) Loosen the tension pulley fixing nut.
   (2) Adjust belt deflection with the adjusting bolt.
   (3) Tighten the tension pulley fixing nut.
   (4) Turn the crankshaft one or more turns clockwise, and then check the belt deflection or belt tension.

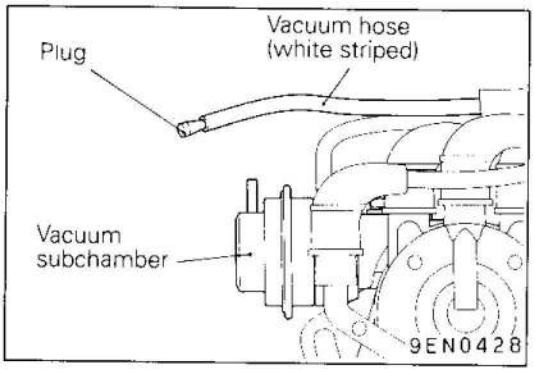
INSPECTION AND ADJUSTMENT OF IGNITION TIMING

E11FVAC1

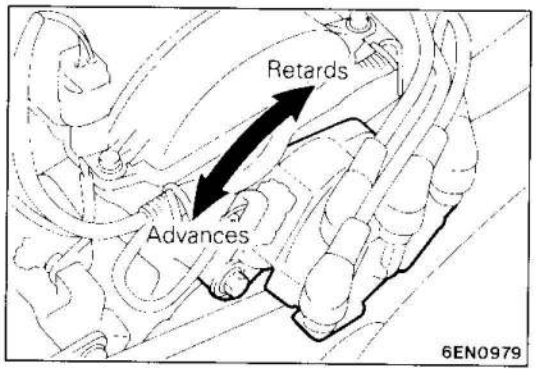
1. Before inspection and adjustment set vehicle in the following condition.
   - Engine coolant temperature: 80–95°C (176–203°F)
   - Lamps and all accessories: OFF
   - Transmission: Neutral



2. Disconnect the distributor connector, and then connect the special tool (MB991348) between the disconnected connectors. (Connect all terminals.)
3. Connect a primary-voltage-detection type tachometer to the terminal No. 2 of the distributor connector.
4. Set a timing light.
5. Start the engine and run it at idle.
6. Check that the engine speed is at 600–900 r/min.



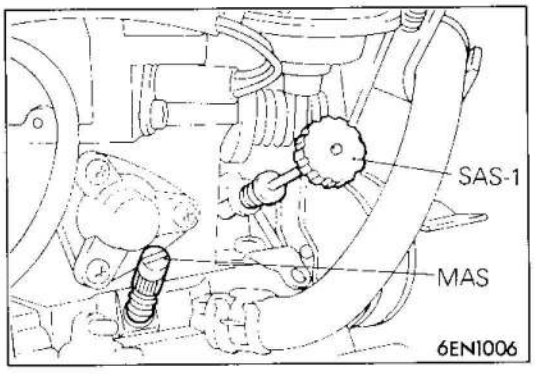
7. Disconnect the vacuum hose (white striped) from the vacuum subchamber of the distributor, and then plug the hose end.



8. Check the basic ignition timing.
   Standard value: 5° ±2° ATDC
9. If not within the standard value, loosen the distributor fixing bolt, and then rotate the distributor body to adjust.
10. Tighten the installation nut while holding the distributor to prevent it from turning.
11. Connect the vacuum hose to the original position.
12. Check that the ignition timing is at the standard value.
    Standard value: Approx. 5°BTDC

INSPECTION AND ADJUSTMENT OF ENGINE IDLING SPEED AND CO CONCENTRATION (Vehicles for General Export)

1. Before inspection and adjustment set vehicle in the following condition.
   - Engine coolant temperature: 80–95°C (176–203°F)
   - Lamps and all accessories: OFF
   - Transmission: Neutral (P range on vehicles with A/T)
2. Set up a timing light and tachometer.
   For information regarding the tachometer installation method, refer to P.11 – 31-3.
3. Start the engine and run at idle.
4. Check the ignition timing. Adjust if necessary.
   Standard value:
   Basic ignition timing 5° ±2° ATDC
   When advances at idle Approx. 5°BTDC
5. Set up a CO tester.
6. Run the engine at 2,000 to 3,000 r/min. and race it two or three times.



7. Check the curb idle speed and CO concentration.

   Curb idle speed: 800 ± 50 r/min
   CO concentration: 2.5 ± 0.5%

8. If they are not within the standard value ranges, adjust the curb idle speed and CO concentration to the standard values with the speed adjusting screw-1 (SAS-1) and mixture adjusting screw (MAS).

INSPECTION OF IDLING SPEED AND MIXTURE (Vehicles for Hong Kong)

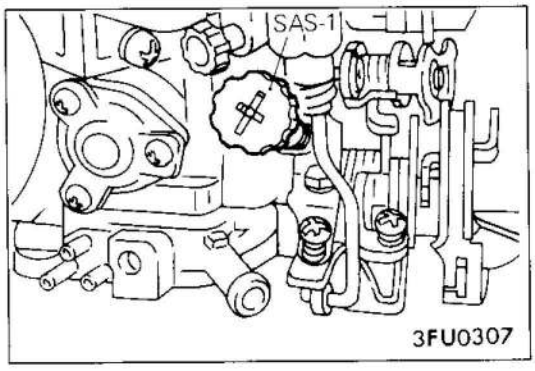
1. Perform inspection with the vehicle in the following condition.
   - Engine coolant temperature: 80–95°C (176–203°F)
   - Lamps and all accessories: OFF
   - Transmission: Neutral
2. Set up a timing light and tachometer.
   For information regarding the tachometer installation method, refer to P.11-31-3.
3. Check the ignition timing. Adjust if necessary.

   Standard value:
   Basic ignition timing 5° ± 2° ATDC
   When advances at idle Approx. 5°BTDC

4. Race the engine 2 to 3 times at an engine speed of 2,500 – 3,000 r/min.
5. Check the idle speed and the CO concentration.

   Curb idle speed: 800 ± 50 r/min.
   CO concentration: 0.5% or less

6. If the idle speed is not within the standard value, adjust by turning the speed adjusting screw 1 (SAS 1) of the carburettor.



7. If the CO concentration is not within the standard value, check the fuel control system components.
   (a) If a malfunctioning component is found, repair or replace the component, and then repeat the inspection procedures in steps 4 and 5.
   (b) If no malfunctioning component can be found, clean the carburettor jets, and then repeat the inspection procedures in steps 4 and 5.
8. If the system is not working correctly after performing the above repair or replacement or cleaning, replace the throttle body of carburettor and repeat steps 4 and 5 for rechecking.
9. If the system is not working correctly even after replacing the throttle body, replace the carburettor assembly.

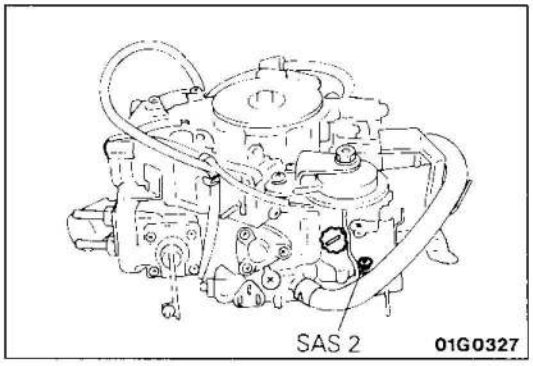
INSPECTION AND ADJUSTMENT OF IDLE UP EQUIPMENT

1. INSPECTION AND ADJUSTMENT OF IDLE UP EQUIPMENT FOR POWER STEERING

1. Inspect and adjust the idle speed.
2. Before inspection and adjustment, set vehicle in the following condition:
   - Engine coolant temperature: 80–95°C (176–203°F)
   - Lamps and all accessories: OFF
   - Transmission: Neutral
   - Steering wheel: Straight forward position
3. Disconnect the vacuum hose (red striped) from the idle up actuator.
4. Connect a hand vacuum pump to the nipple from which the vacuum hose was disconnected.
5. Set an engine tachometer.
6. Start the engine and run it at idle.
7. Apply the vacuum of 650 mmHg.
8. Open the throttle valve once (approx. 2,000 r/min.), and then close it gradually. Run the engine until engine speed stabilizes.
9. Check the engine speed.

   Standard value: 950 ± 50 r/min.

10. If the engine speed is not within the standard value, adjust by turning the speed adjusting screw 2 (SAS 2).



2. INSPECTION AND ADJUSTMENT OF IDLE UP EQUIPMENT FOR A/C

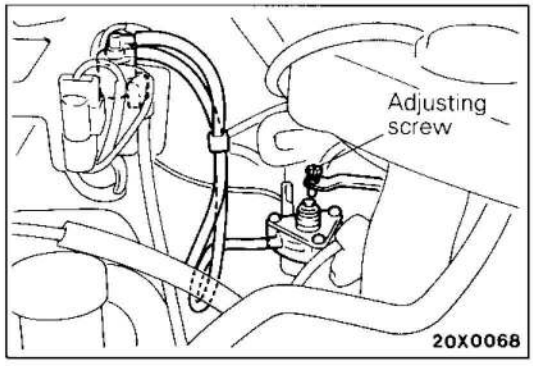
1. Inspect and adjust the idle speed.
2. Before inspection and adjustment, set vehicle in the following condition:
   - Engine coolant temperature: 80–95°C (176–203°F)
   - Lamps and all accessories: OFF
   - Transmission: Neutral
   - Steering wheel: Straight forward position
3. Start the engine and run it at idle.
4. Set an engine tachometer.
5. Turn on A/C.

   NOTE
   Intake manifold vacuum is applied to the idle up actuator.

6. Open the throttle valve once (approx. 2,000 r/min.), and then close it gradually. Run the engine until engine speed stabilizes.
7. Check the engine speed.

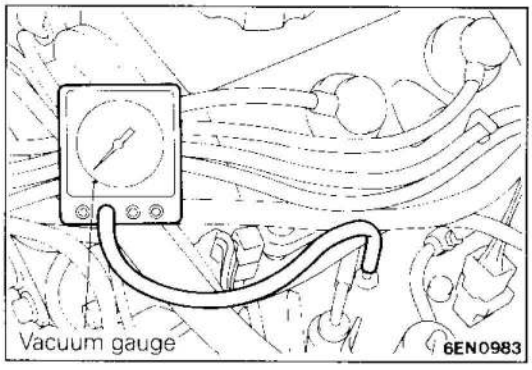
   Standard value: 1,000 ± 50 r/min.

8. If the engine speed is not within the standard value, adjust by turning the idle up adjusting screw.



INSPECTION OF MANIFOLD VACUUM

1. Perform the inspection with the vehicle in the following condition.
   - Engine coolant temperature: 80–95°C (176–203°F)
   - Lamps and all accessories: OFF
   - Transmission: Neutral
2. Set up a tachometer.
   For information regarding the tachometer installation method, refer to P.11–31-3.
3. Set the vacuum gauge at illustrated position on the intake manifold.
4. Check that the idle speed is within the standard value.
   Standard value: 800 ± 50 r/min.
5. Check the manifold vacuum.
   Limit: min. 450 mmHg (17.7 in.Hg)



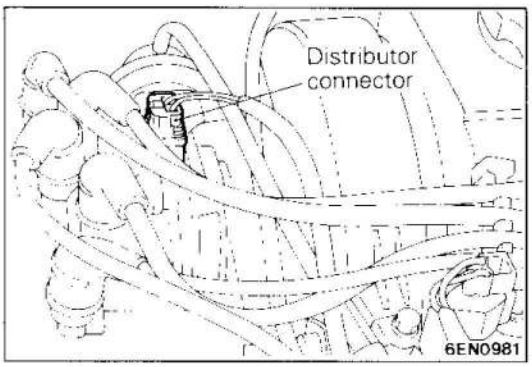
INSPECTION OF COMPRESSION PRESSURE

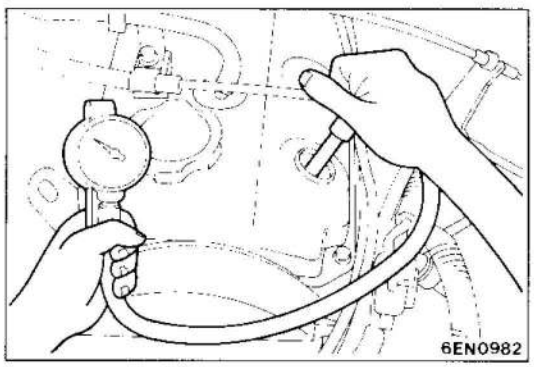
1. Before inspection, check that the engine oil, starter and battery are normal. Also, set the vehicle to the following condition:
   - Engine coolant temperature: 80–95°C (176–203°F)
   - Lamps and all accessories: OFF
   - Transmission: Neutral
2. Disconnect the spark plug cables.
3. Remove all of the spark plugs.
4. Disconnect the distributor connector.
5. Cover the spark plug hole with a rag etc., and after the engine has been cranked, check that no foreign material is adhering to the rag.

   Caution
   1. **Keep away from the spark plug hole when cranking.**
   2. **If compression is measured with water, oil, fuel, etc., that has come from cracks inside the cylinder, these materials will become heated and will gush out from the spark plug hole, which is dangerous.**
6. Set compression gauge to one of the spark plug holes.
7. Crank the engine with the throttle valve fully open and measure the compression pressure.

   Standard value (at engine speed of 250–400 r/min.):
   1,400 kPa (14.0 kg/cm^2, 199 psi)

   Limit (at engine speed of 250–400 r/min.):
   1,060 kPa (10.6 kg/cm^2, 151 psi)

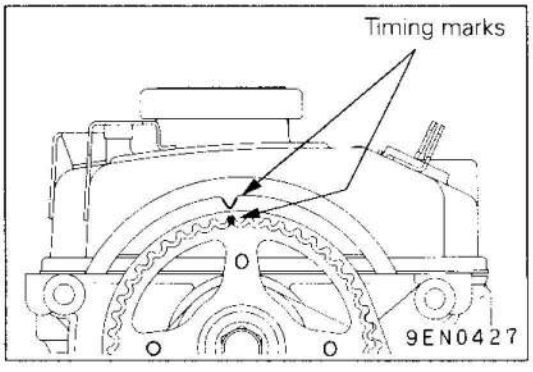




8. Measure the compression pressure for all the cylinders, and check that the pressure differences of the cylinders are below the limit.

   Limit: 100 kPa (1.0 kg/cm^2, 14 psi) or less

9. If there is a cylinder with compression or a compression difference that is outside the limit, pour a small amount of engine oil through the spark plug hole, and repeat the operations in steps 7 and 8.
   (1) If the compression increases after oil is added, the cause of the malfunction is a worn or damaged piston ring and/or cylinder inner surface.
   (2) If the compression does not rise after oil is added, the cause is a burnt or defective valve seat, or pressure is leaking from the gasket.
10. Connect the distributor connector
11. Install the spark plugs and spark plug cables.

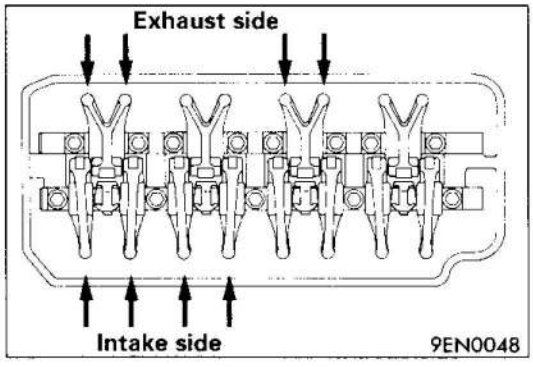


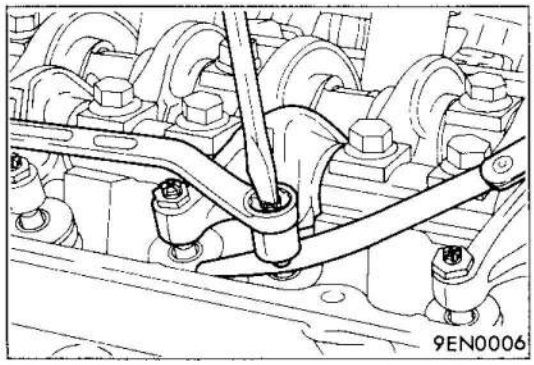
INSPECTION AND ADJUSTMENT OF VALVE CLEARANCE

1. Run the engine to warm up until the engine coolant temperature reaches 80–95°C (176–203°F).
2. Remove the timing belt upper cover.
3. Remove all spark plugs.
4. Turn the crankshaft clockwise to align timing mark of camshaft sprocket in order to set the No. 1 cylinder to compression top dead centre.
5. Remove the rocker cover.
6. Measure the valve clearances at points indicated by arrows.

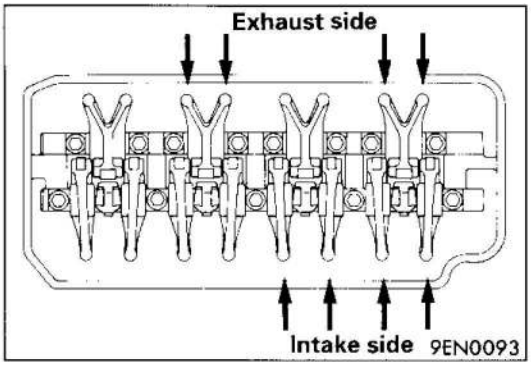
   Standard value:

Intake	**0.20 mm (0.0079 in.)**
Exhaust	**0.30 mm (0.0118 in.)**

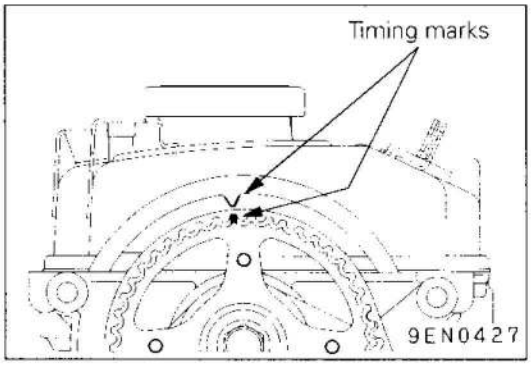




7. If out of the standard value, loosen the lock nut, and then turn the adjusting screw to adjust the clearance using a thickness gauge.
8. Tighten the lock nut while holding the adjusting screw with a screwdriver to prevent it from turning.
9. Turn the crankshaft one turn clockwise to set the No. 4 cylinder to compression top dead centre.



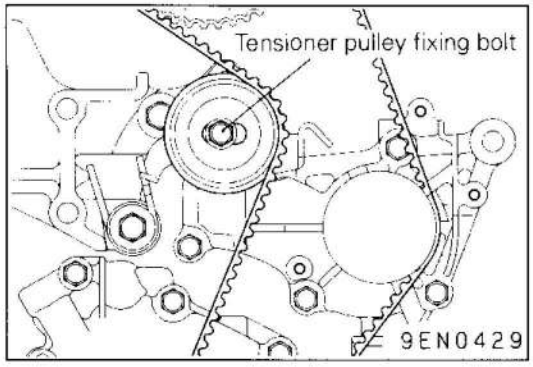
10. Measure the valve clearances at points indicated by arrows. If they are out of the standard value, adjust according to steps 7 and 8.
11. Install the rocker cover.
12. Install the spark plugs.
13. Install the timing belt upper cover.



ADJUSTMENT OF TIMING BELT TENSION

1. Remove the shroud. Refer to GROUP 14 – Radiator for removal procedures.
2. Remove the drive belt.
3. Remove the fan bracket.
4. Remove the timing belt upper cover.
5. Turn the crankshaft one or more turns clockwise, and then align timing mark of camshaft sprocket.

Caution
Never turn the crankshaft anticlockwise.



6. Loosen the tensioner pulley fixing bolt 90–180° to apply tension to the timing belt with the tensioner spring force.
7. Tighten the tensioner pulley fixing bolt.
8. Install the fan bracket and the timing belt upper cover.
9. Install the drive belt. Refer to P.11-31-2 for adjustment procedures of drive belt.
10. Install the shroud.

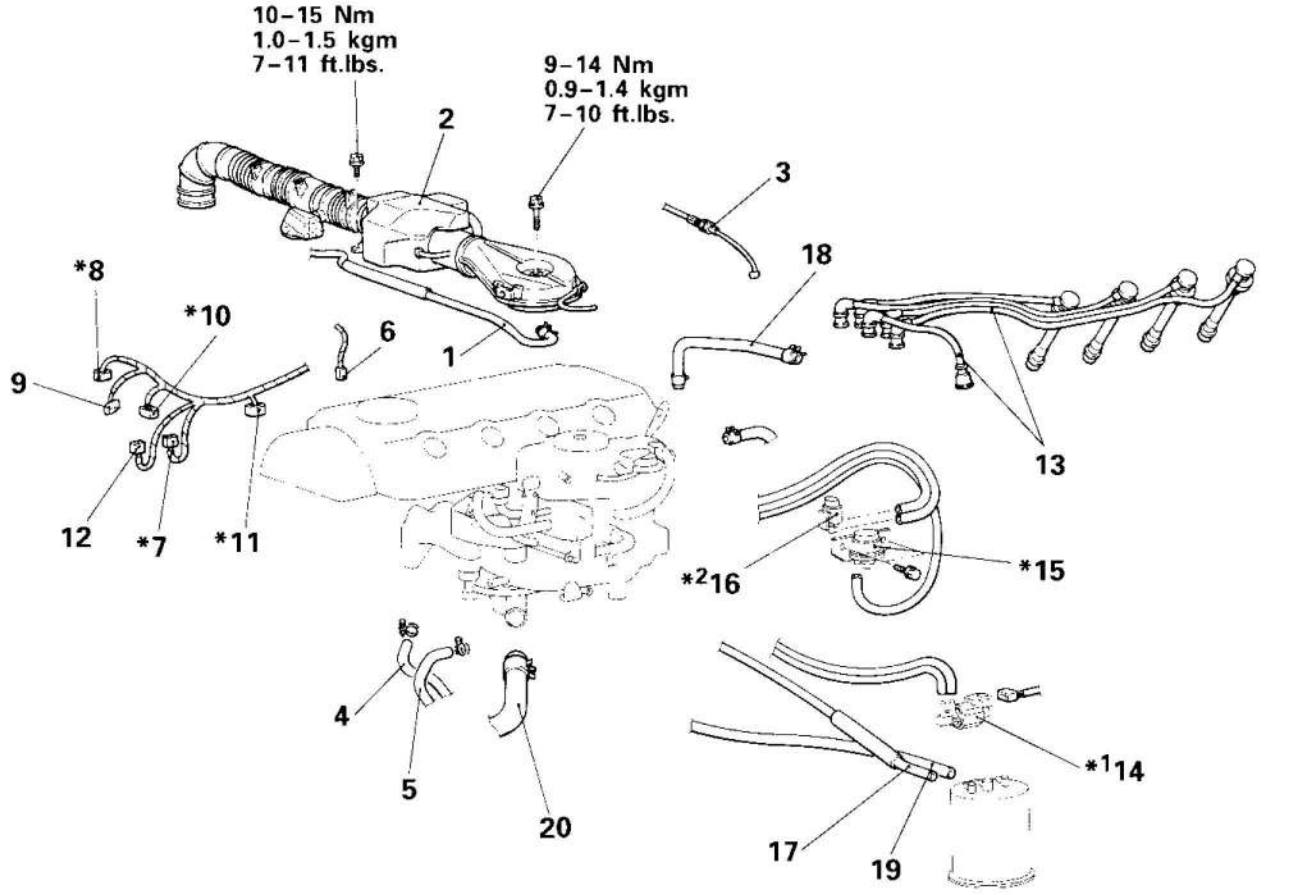
NOTES

CYLINDER HEAD GASKET

REMOVAL AND INSTALLATION

Pre-removal Operation
- Removal of seat underframe
- Removal of front exhaust pipe
  (Refer to GROUP 15 – Exhaust Pipe and Mufflers.)
- Drainage of engine coolant

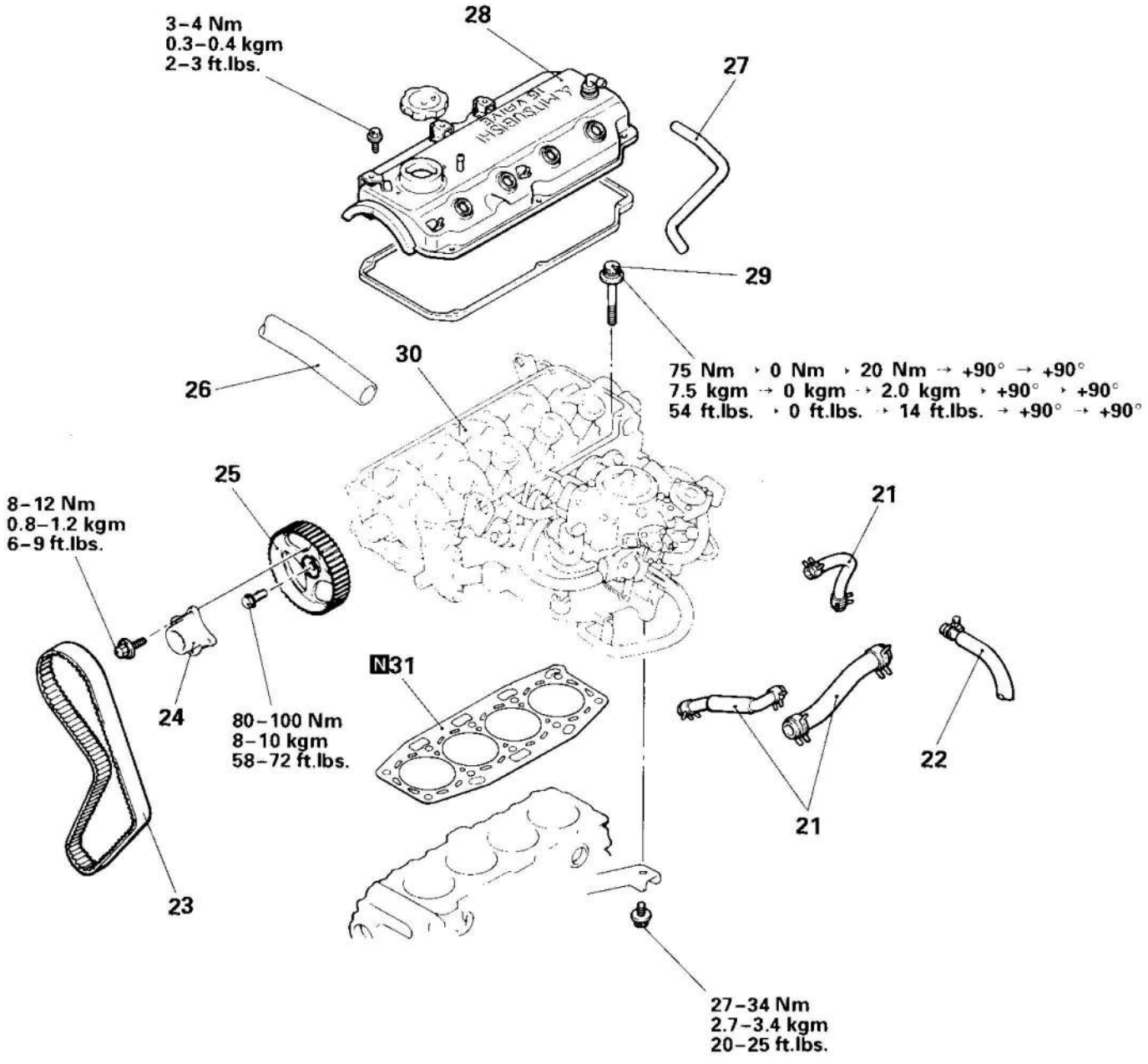
Post-installation Operation
- Filling of engine coolant
- Installation of front exhaust pipe
  (Refer to GROUP 15 – Exhaust Pipe and Mufflers.)
- Adjustment of accelerator cable
  (Refer to GROUP 13 – Service Adjustment Procedures.)
- Installation of seat underframe



Removal steps

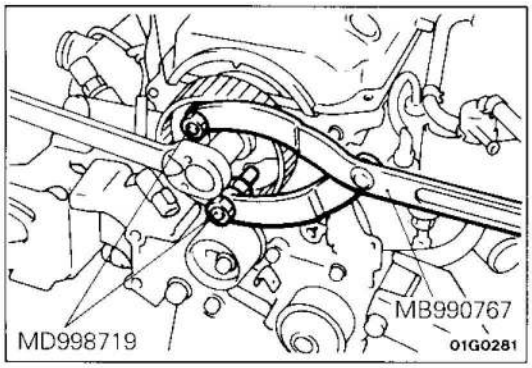
1. Innervent hose
2. Air intake hose and air horn
3. Accelerator cable
4. Fuel main hose
5. Fuel return hose
6. Engine coolant temperature gauge unit connector
7. Engine coolant temperature sensor connector
8. Oxygen sensor connector
9. Distributor connector
10. Throttle position sensor connector
11. Solenoid valve connector
12. Ignition coil connector
13. Spark plug cables and high tension cable
14. Idle up solenoid valve
15. Vacuum switch
16. Idle up solenoid valve
17. Purge hose
18. Brake booster vacuum hose
19. Vapor hose
20. Radiator lower hose
    (Refer to GROUP 14 – Radiator.)

NOTE
(1) Reverse the removal procedures to reinstall.
(2) * : Vehicles with FBC
(3) *1 : Vehicles with air-conditioner
(4) *2 : Vehicles with power steering



21. Water hose
22. Heater hose
23. Timing belt (Refer to P.11 – 31-15.)
24. Camshaft sprocket spacer (Refer to GROUP 16 – Distributor.)
◆◆ ◆◆ 25. Camshaft sprocket
26. Heat duct
27. Breather hose
28. Rocker cover
◆◆ ◆◆ 29. Cylinder head bolt
30. Cylinder head assembly
◆◆ 31. Cylinder head gasket

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".
(4) N : Non-reusable parts
(5) * : Vehicles with hot air control valve

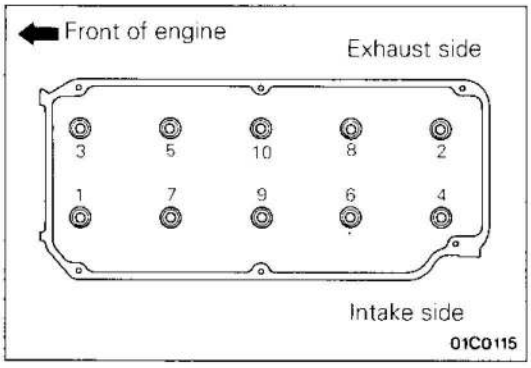


SERVICE POINTS OF REMOVAL

25. REMOVAL OF CAMSHAFT SPROCKET

Use the special tool to remove the camshaft sprocket.

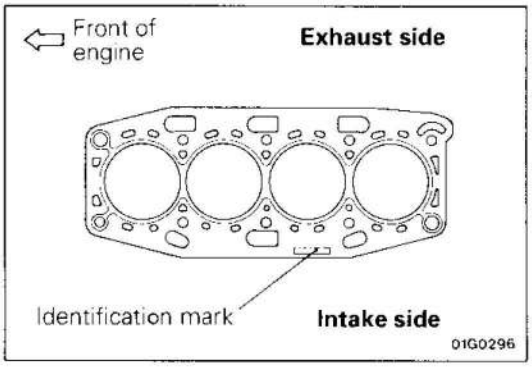
Caution
After removing the camshaft sprocket, be sure not to rotate the crankshaft.



29. REMOVAL OF CYLINDER HEAD BOLT

Loosen the bolts in 2 or 3 steps in order of the numbers shown in the illustration, and remove the cylinder head assembly.

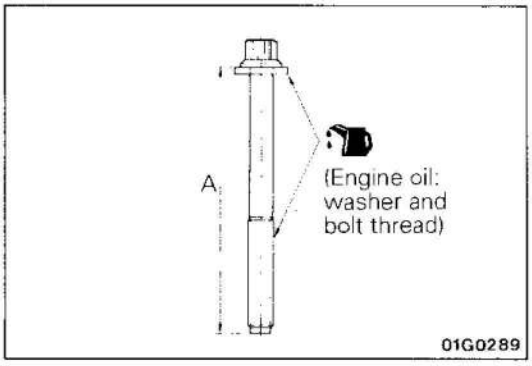
Caution
Because the plug guides cannot be replaced by themselves, be careful not to damage or deform them when removing the cylinder head bolts.



SERVICE POINTS OF INSTALLATION

31. INSTALLATION OF CYLINDER HEAD GASKET

(1) Wipe off all oil and grease from the gasket mounting surface.
(2) Install the gasket to the cylinder block with the identification mark facing upwards.



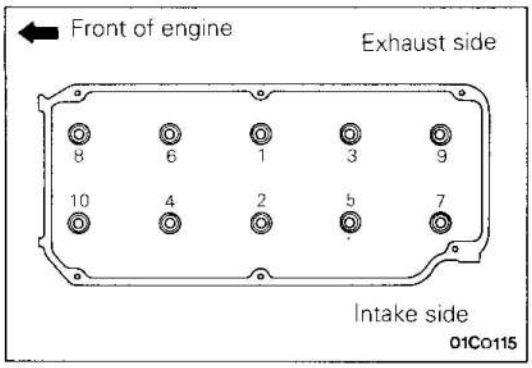
29. INSTALLATION OF CYLINDER HEAD BOLT

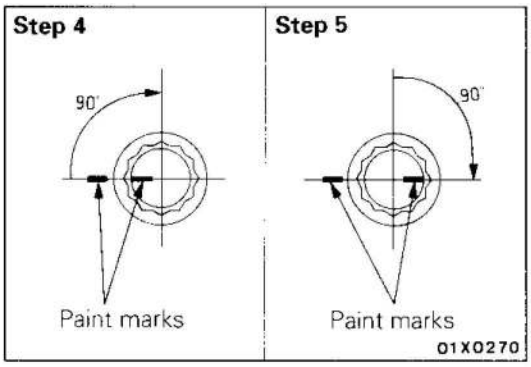
(1) When installing the cylinder head bolts, the length below the head of the bolts should be within the standard value. If it is outside the standard value, replace the bolts.

Limit (A): Within 96.4 mm (3.80 in.)

(2) Apply a small amount of engine oil to the thread section and the washer of the cylinder head bolt.

Caution
The head bolt washer should be installed with the burred side caused by tapping out facing upwards.



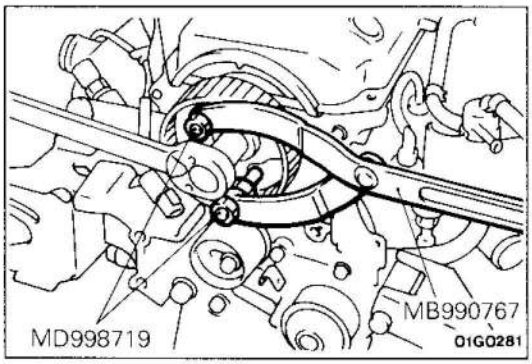


(3) Use a double hexagonal wrench of 12 mm to tighten the bolts by the following procedures.

Step	Operation	Remarks
1	Tighten to 75 Nm (7.5 kgm, 54 ft.lbs.).	In the order shown in the illustration.
2	Loosen fully.	In the reverse order of that shown in the illustration.
3	Tighten to 20 Nm (2.0 kgm, 15 ft.lbs.)	In the order shown in the illustration
4	Tighten 90° of a turn.	In the order shown in the illustration Mark the head of the cylinder head bolt and cylinder head by paint.
5	Tighten 90° of a turn.	In the order shown in the illustration. Check that the painted mark of the head bolt is lined up with that of the cylinder head

Caution

1. **If the tightening angle is less than 90°, enough tightness may not be obtained. Be careful about the tightening angle.**
2. **If the tightening angle is more than the specified, remove the bolt, and then retighten from step 1.**

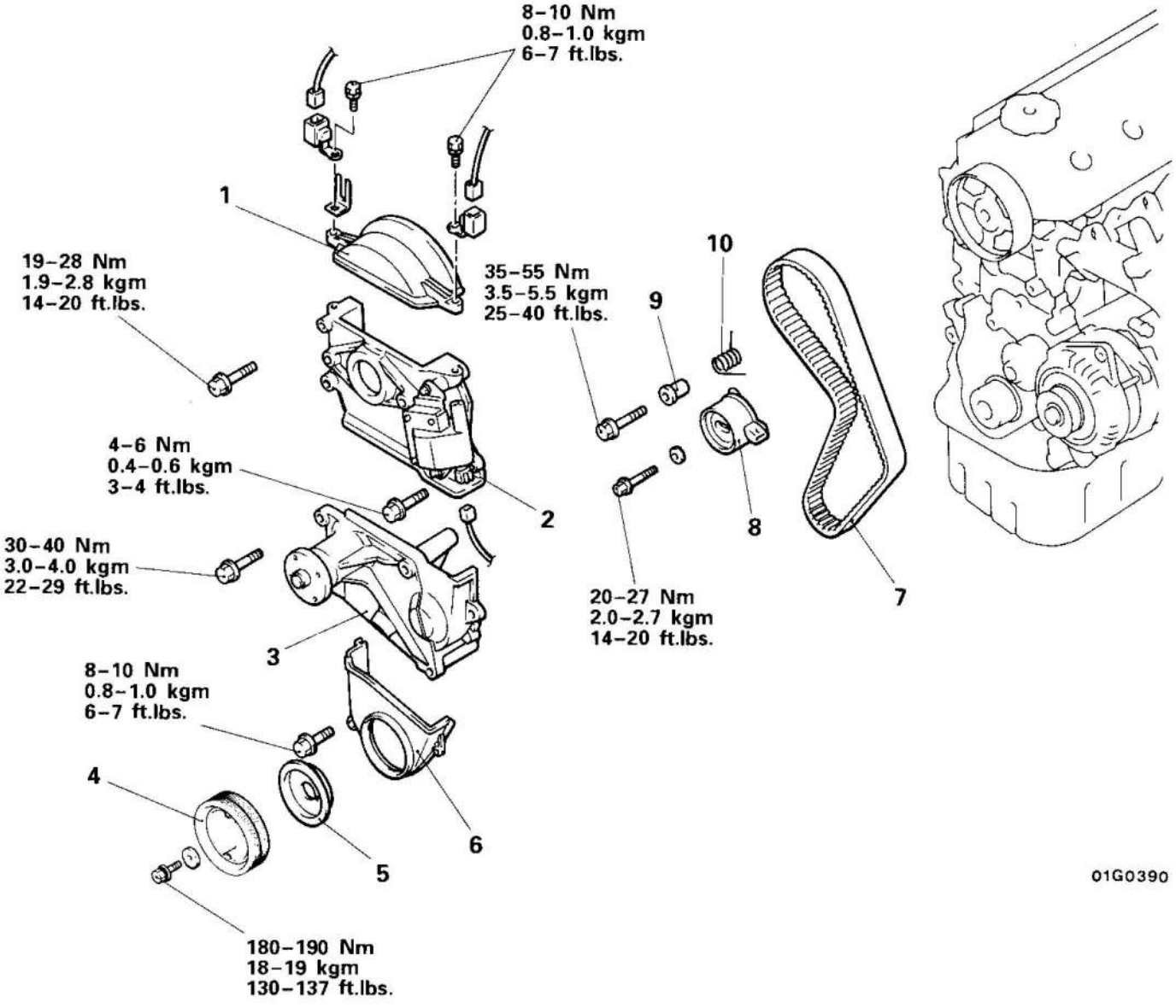


25. INSTALLATION OF CAMSHAFT SPROCKET

TIMING BELT

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and installation of cooling fan (Refer to GROUP 14 – Cooling Fan.)
- Removal and installation of distributor (Refer to GROUP 16 – Distributor.)

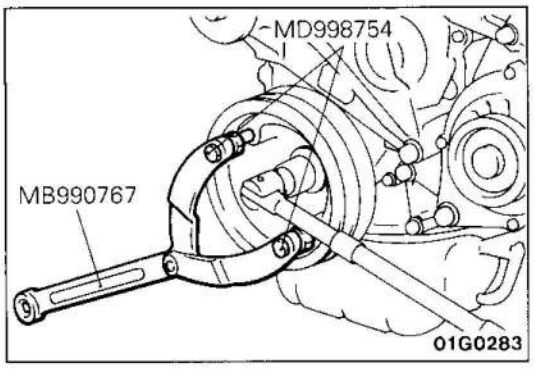


Removal steps

1. Timing belt upper cover
2. Distributor bracket and ignition coil assembly
3. Cooling fan bracket assembly
4. ◆◆ ◆◆ Crankshaft pulley
5. ◆◆ Flange
6. Timing belt lower cover
7. ◆◆ ◆◆ Timing belt
8. Timing belt tensioner
9. Tensioner spacer
10. Tensioner spring

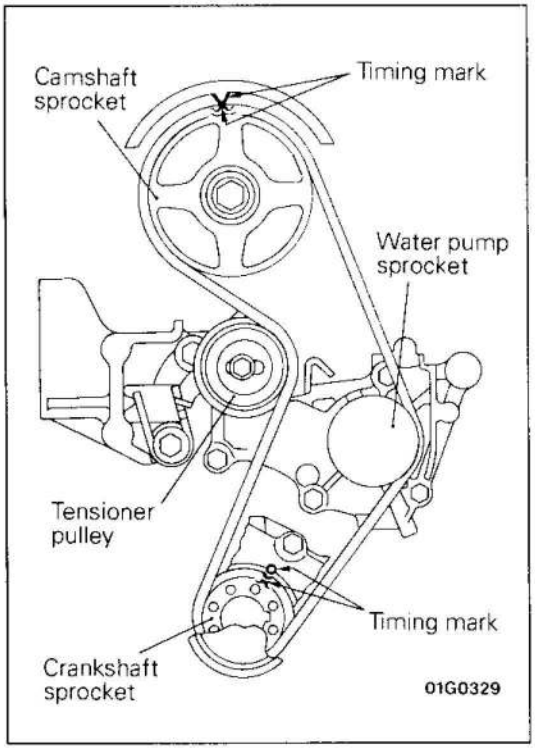
◆◆ • Adjustment of timing belt tension

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".



SERVICE POINTS OF REMOVAL

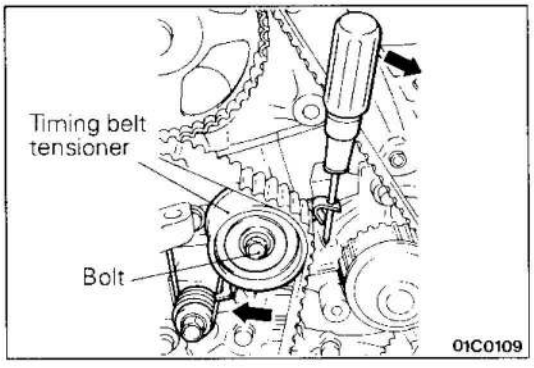
4. REMOVAL OF CRANKSHAFT PULLEY



7. REMOVAL OF TIMING BELT

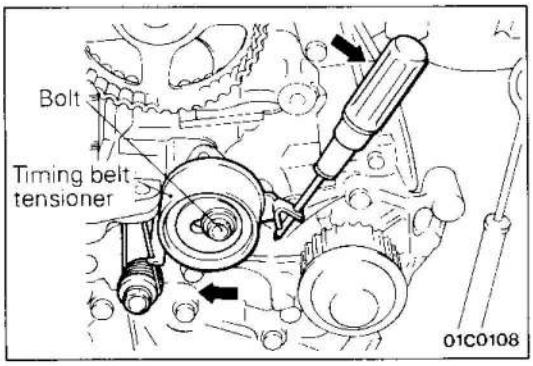
(1) Turn the crankshaft clockwise (right turn) to align each timing mark and to set the No. 1 cylinder at compression top dead centre.

Caution
The crankshaft should always be turned only clockwise.



(2) Loosen the timing belt tensioner bolt.
(3) Set a screwdriver to the timing belt tensioner and press it fully back in the direction of the arrow.
(4) Provisionally tighten the timing belt tensioner bolt.
(5) Remove the timing belt.

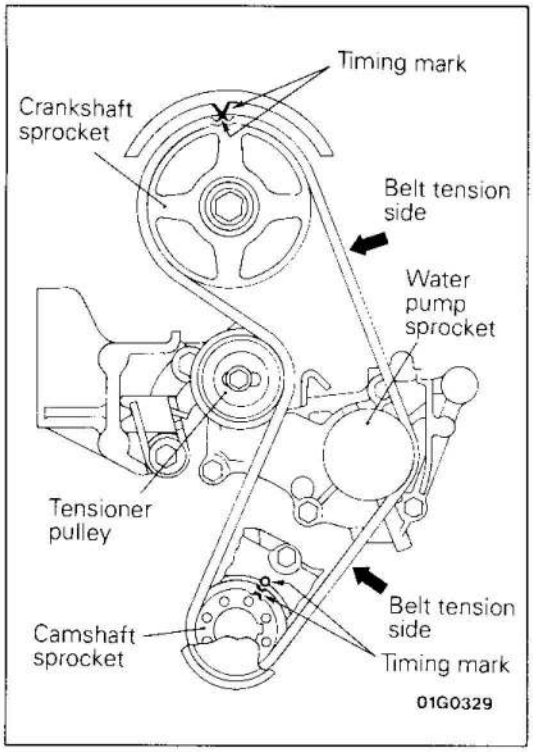
Caution
If the timing belt is to be re-used, use chalk to mark the flat side of the belt with an arrow indicating the direction of rotation (right turn).



SERVICE POINTS OF INSTALLATION

7. INSTALLATION OF TIMING BELT

(1) With the timing belt tensioner bolt loosened, use a screwdriver to fully turn the timing belt tensioner as close to the engine mount as possible, and then provisionally tighten the tensioner bolt.



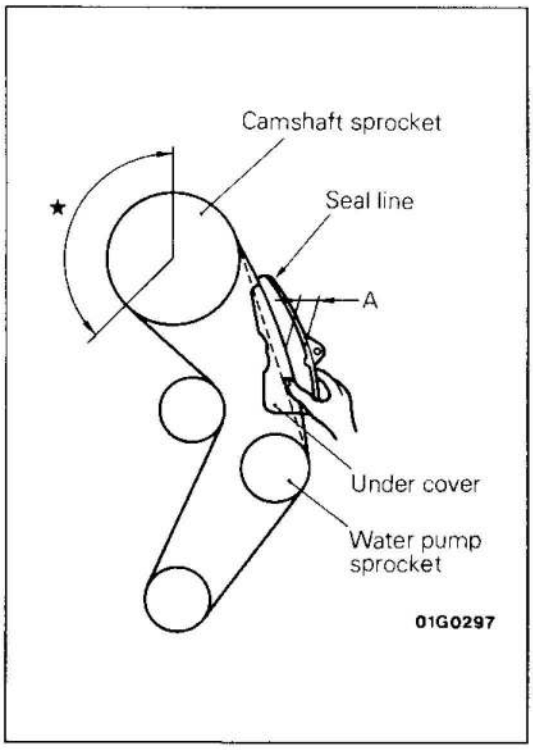
(2) Align each of the camshaft sprocket and the crankshaft sprocket timing marks.
(3) Install the timing belts in the following order, while making sure that the tension side of the belt is not slackened.
(1) Crankshaft sprocket
(2) Water pump sprocket
(3) Camshaft sprocket
(4) Tensioner pulley

Caution
After installing the timing belt, apply force to turn the camshaft sprocket in the reverse direction, and recheck to be sure that the belt is fully tensioned and that each timing mark is in the proper position.

- **ADJUSTMENT OF TIMING BELT TENSION**

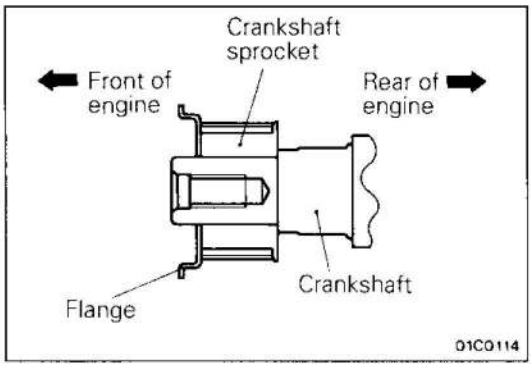
(1) Initially loosen the fixing bolt of the tensioner pulley fixed to the tensioner pulley bracket side by 1/2-1/4 turn, and use the force of the tensioner spring to apply tension to the belt.
(2) Turn the crankshaft in the proper rotation direction (right turn) for two rotations, and recheck to be sure that the timing marks on each sprocket are aligned.

Caution
As the purpose of this procedure is to apply the proper amount of tension to the tension side of the timing belt by using the cam driving torque, turn the crankshaft only by the amount given above. Be sure not to turn the crankshaft in the opposite direction (left turn).



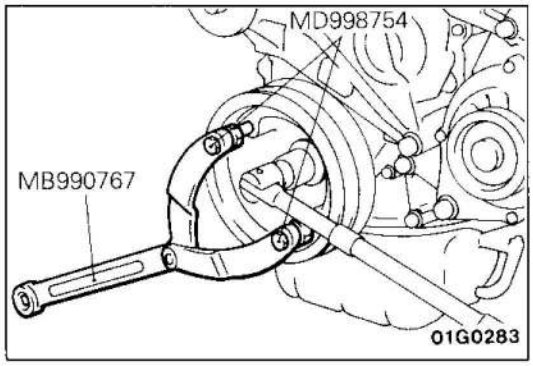
(3) After checking to be sure that no belt teeth in the section marked with ★ are lifted up and that the teeth in each sprocket are engaged, secure the tensioner pulley.
(4) Lastly, lightly clamp the centre of the span between the camshaft sprocket and the water pump sprocket on the belt tension side with your thumb and forefinger as shown in the illustration, and check to be sure that the clearance A between the reverse surface of the belt and the inside of the under cover seal line is at the standard value.

Standard value: Approx. 30 mm (1.18 in.)



5. INSTALLATION OF FLANGE

Install the flange as shown in the illustration.



6. INSTALLATION OF CRANKSHAFT PULLEY

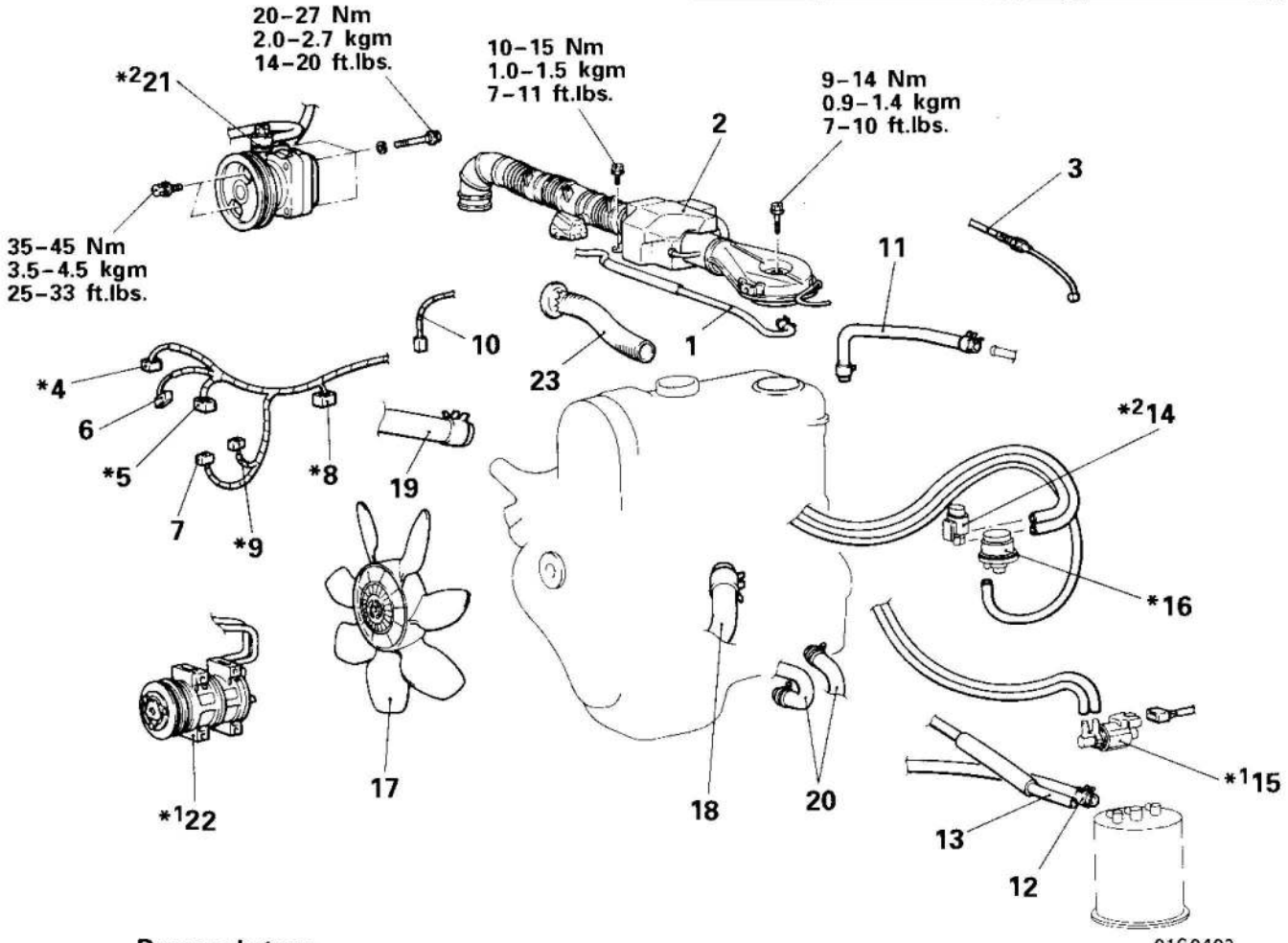
Apply the minimum amount of engine oil to the bearing surface and thread of the crankshaft bolt.

ENGINE AND TRANSMISSION ASSEMBLY

REMOVAL AND INSTALLATION

Pre-removal Operation
- Removal of front exhaust pipe (Refer to GROUP 15 – Exhaust Pipe and Mufflers.)
- Removal of seat underframe
- Drainage of engine coolant
- Drainage of transmission oil

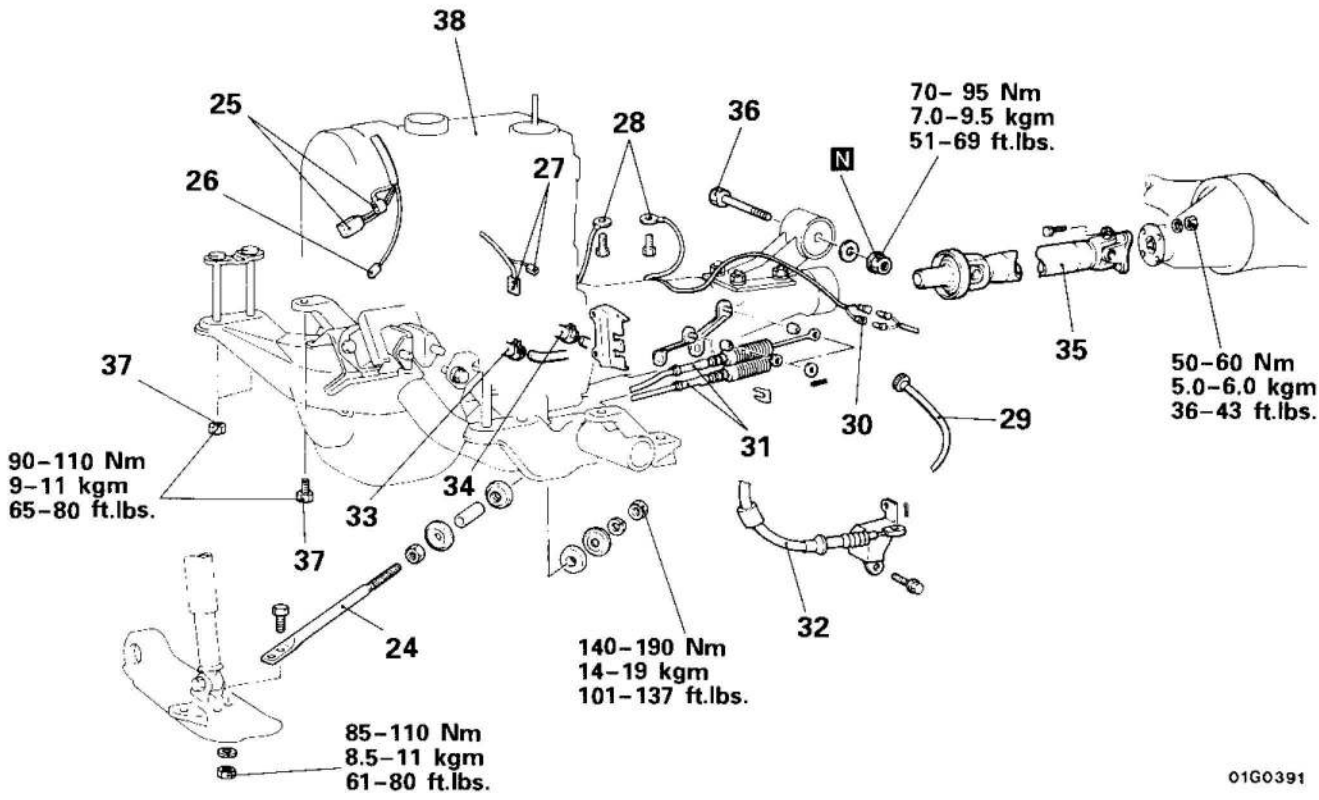
Post-installation Operation
- Installation of front exhaust pipe (Refer to GROUP 15 – Exhaust Pipe and Mufflers.)
- Installation of seat underframe
- Filling of engine coolant
- Filling of transmission oil
- Adjustment of accelerator cable (Refer to GROUP 13 – Service Adjustment Procedures.)



Removal steps

1. Innervent hose
2. Air intake hose and air horn
3. Accelerator cable
4. Oxygen sensor connector
5. Throttle position sensor connector
6. Distributor connector
7. Ignition coil connector
8. Solenoid valve connector ◆◆
9. Engine coolant temperature sensor connector ◆◆
10. Engine coolant temperature gauge unit connector
11. Brake vacuum hose
12. Vapor hose
13. Purge hose
14. Idle up solenoid valve
15. Idle up solenoid valve
16. Vacuum switch
17. Cooling fan (Refer to GROUP 14 – Cooling Fan.)
18. Radiator lower hose } (Refer to GROUP 14 – Radiator)
19. Radiator upper hose }
20. Heater hose
21. Power steering oil pump
22. Air-conditioner compressor
23. Heat duct

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) * : Vehicles with FBC
(4) *1 : Vehicles with air-conditioner
(5) *2 : Vehicles with power steering



Removal steps

24. Strut bars
(Refer to GROUP 33 – Strut Bar.)
25. Alternator connector
26. Oil pressure switch connector
27. Starter motor connector
28. Earth cable
29. Speedometer cable
30. Transmission control harness connector
31. Transmission control cable
32. Clutch cable
33. Fuel return hose
34. Fuel main hose
35. Propeller shaft
36. Rear engine mounting installation bolt
37. Engine mounting to crossmember installation bolt and nut
◆◆ ◆◆ 38. Engine and transmission assembly

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".
(4) N : Non-reusable parts

SERVICE POINTS OF REMOVAL

21. REMOVAL OF POWER STEERING OIL PUMP

Remove the power steering oil pump from the bracket with the hose attached.

NOTE
Place the removed power steering oil pump in a place where it will not be a hindrance when removing and installing the engine assembly, and tie it with a cord.

22. REMOVAL OF A/C COMPRESSOR

Disconnect the A/C compressor connector and remove the compressor from the compressor bracket with the hose still attached.

NOTE
Place the removed A/C compressor in a place where it will not be a hindrance when removing and installing the engine assembly, and tie it with a cord.

38. REMOVAL OF ENGINE AND TRANSMISSION

(1) Check that all cables, hoses, harness connectors, etc. are disconnected from the engine.
(2) Lower the engine and transmission assembly slowly.

SERVICE POINT OF INSTALLATION

38. INSTALLATION OF ENGINE AND TRANSMISSION ASSEMBLY

Install the engine and transmission assembly while checking that the cables, hoses, harness connectors, etc. are not clamped.

NOTES

ENGINE (4G63 and G63B engines)

ENGINE ADJUSTMENT

CHECKING RADIATOR CAP E11FIAC0

Refer to P.11–11 for checking procedures.

CHECKING ENGINE COOLANT E11FJAD0

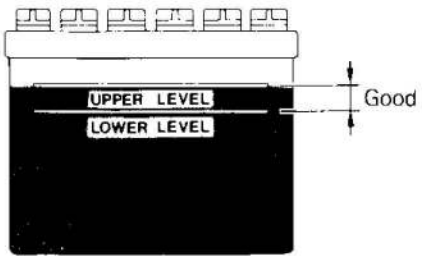
Refer to P.11–11 for checking procedures.

CHECKING BATTERY (Maintenance-free battery) E11FLAC0

Refer to P.11–11 for checking procedures.

CHECKING BATTERY (Conventional type) E11FLAD

1. Checking battery electrolyte level is between "UPPER LEVEL" and "LOWER LEVEL".



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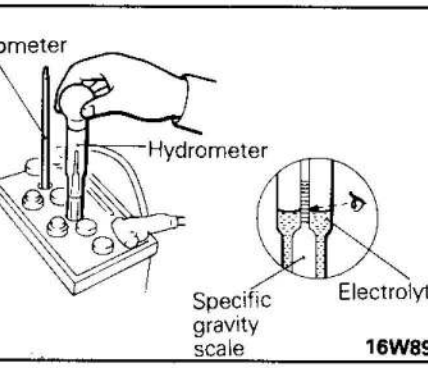
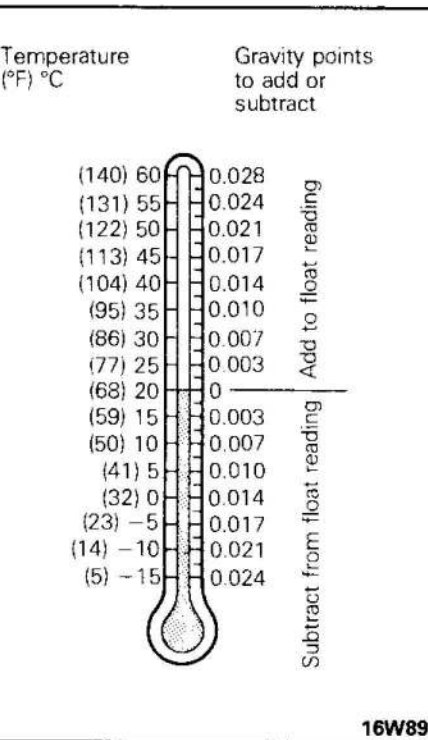


16W894

2. With a thermometer and hydrometer, read the specific gravity of electrolyte.

   Standard value: 1.220–1.290 [at 20°C (68°F)]

   NOTE
   Specific gravity variations caused by temperatures must be considered and corrected to 20°C (68°F) in the battery, otherwise specific gravity readings will not indicate the true state of charge.



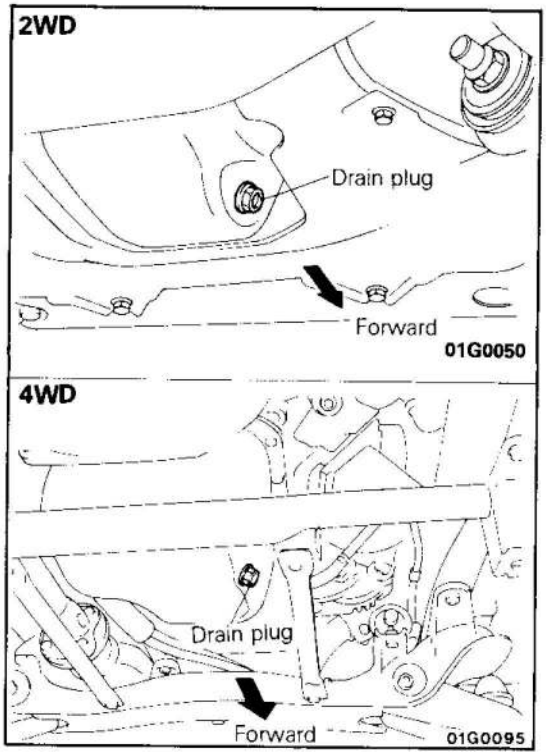
16W895

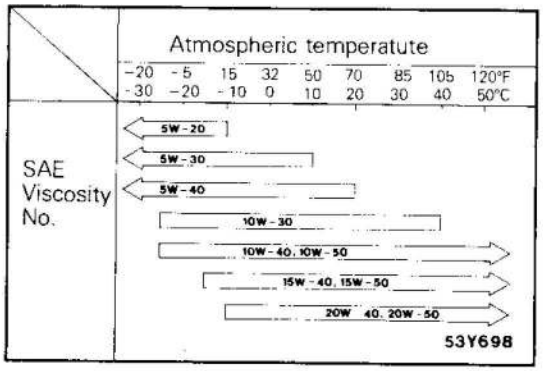
Example 1:

Hydrometer reading	1.260
Electrolyte temperature	–5°C (23°F)
Subtract specific gravity	–0.017
Corrected specific gravity	1.243

Example 2:

Hydrometer reading	1.225
Electrolyte temperature	35°C (95°F)
Add specific gravity	0.010
Corrected specific gravity	1.235





INSPECTION OF ENGINE OIL LEVEL E11FNAC0

Refer to P.11–12 for checking procedures.

ENGINE OIL REPLACEMENT E11FOAA1

1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 90°C (176°F to 194°F).
2. Remove the engine oil filler cap.
3. Remove the drain plug to drain oil.

Caution
Use care as oil is hot.

4. Fit the drain plug after oil has been drained completely.
5. Refill with specified quantity of oil.

Specified oil: (API classification)

Vehicles for Europe
Built up to October 1990 — SE or higher
Built from November 1990 — SG or higher
Vehicles for Australia — SE or higher
Vehicles for General Export
Built up to June 1991 — SC or higher
Built from July 1991 up to June 1992 — SD or higher
Built from July 1992 — SE or higher*

SAE viscosity number
Refer to left table.

Quantity:

Built up to April 1992
2WD 3.8 lit (4.0 U.S. qts., 3.3 Imp. qts.)*1 [including 0.3 lit, (0.32 U.S. qts., 0.26 Imp.qts.) in oil filter]*1
4WD 4.8 lit (5.1 U.S. qts., 4.2 Imp. qts.)*1 [including 0.3 lit, (0.32 U.S. qts., 0.26 Imp.qts.) in oil filter]*1
Built from May 1992
4.3 lit (4.5 U.S. qts., 3.8 Imp. qts.) [including 0.3 lit, (0.32 U.S. qts., 0.26 Imp.qts.) in oil filter]*1

*1: If a MD031805 oil filter is being used, the oil capacity is increased by 0.1 lit. (0.11 U.S. qt., 0.09 Imp. qt.).

NOTE
If it is difficult to obtain the engine oil of SE or higher* grade, use API classification SD oil.

6. Mount the engine oil filler cap.
7. Check oil level.

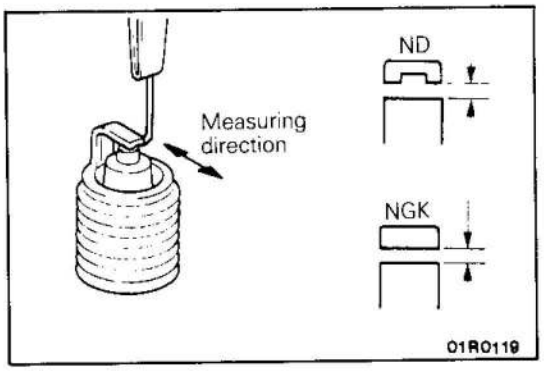
CHECKING AND CLEANING OF AIR CLEANER ELEMENT E11FPAC0

Refer to P.11–12 for checking procedures.

CHECKING AND CLEANING OF SPARK PLUG E11FRA81

1. Remove the high tension cables.

Caution
When pulling off the high tension cable from the plug, be sure to hold the cable cap.



2. Remove the spark plugs.
3. Check for burned out electrode or damaged insulator. Check for even burning.
4. Remove adhered carbon with wire brush or plug cleaner. Remove sand from plug screw with compressed air.
5. Use a plug gap gauge to check that the plug gap is within the standard value range.

Standard value:
8 valve engine 0.7–0.8 mm (0.028–0.031 in.)
16 valve engine

Vehicles with catalytic converter for Europe and vehicles for Australia
1.0–1.1 mm (0.039–0.043 in.)

Except vehicles with catalytic converter for Europe and vehicles for Australia
0.7–0.8 mm (0.028–0.031 in.)

If the plug gap is not within the standard value range, adjust by bending the ground electrode.

6. Clean the engine plug holes.

Caution
Use care not to allow foreign matter in the engine.

7. Mount the spark plugs.

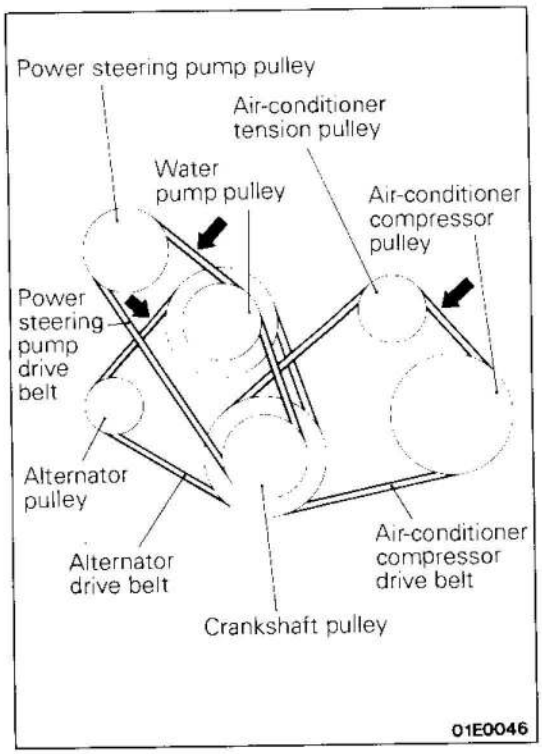
INSPECTION AND ADJUSTMENT OF DRIVE BELT FLEX

E11FQAD0

1. Check belt for damage or wear. Confirm that belt is set correctly in pulley groove.

NOTE
If the belt "squeals" or slips, check belt for friction, damage or breaks and check pulley contact surface for damage.

2. Press at 100N (10 kg, 22 lbs.) centre of belt between pulleys as indicated in the diagram. Measure drive belt flex.

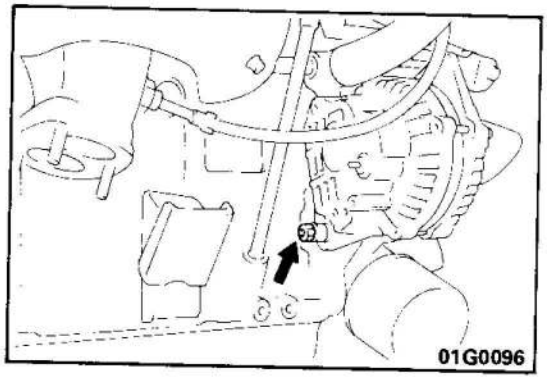


Standard value:
(8 valve engine)
Alternator: 7–10 mm (0.28–0.39 in.)
Power steering oil pump: 6–9 mm (0.24–0.35 in.)
Air-conditioner compressor: 7–10 mm (0.28–0.39 in.)

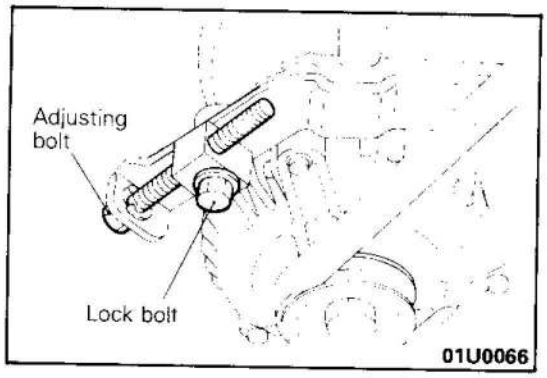
(16 valve engine)

Item		Check value	Adjustment value	
			Used belt	New belt
For alternator	Deflection mm (in.)	7–9 (0.28–0.35)	7.5–8.5 (0.30–0.33)	5.5–7.5 (0.22–0.30)
For power steering	Deflection mm (in.)	5.5–7.5 (0.22–0.30)	6–7 (0.24–0.28)	4–6 (0.16–0.24)
For A/C	Deflection mm (in.)	7–9.5 (0.28–0.37)	8–9 ((0.31–0.35)	6–7 (0.24–0.28)

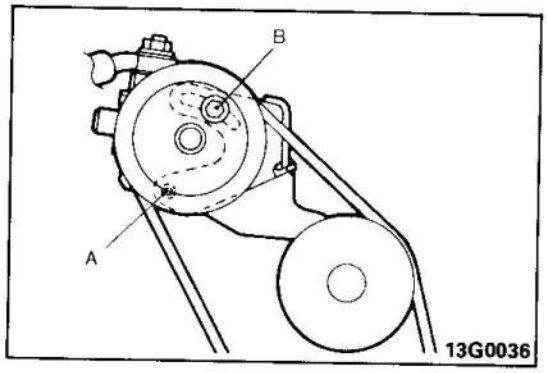
Caution
Measure belt flex between specified pulleys (⬅).



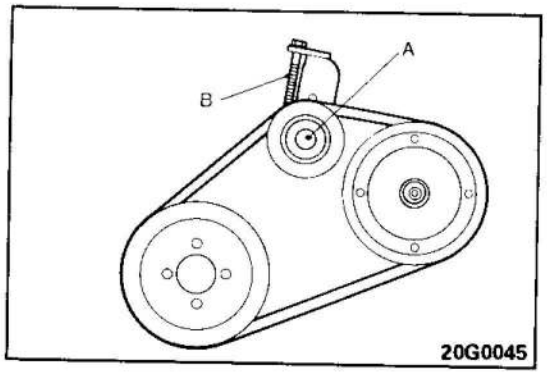
3. Adjust alternator drive belt flex by the following procedures.
   (1) Loosen alternator support bolt and nut.



   (2) Loosen belt tension adjuster lock bolt.
   (3) Adjust belt flex by turning adjuster bolt.
   (4) Tighten lock bolt.
   (5) Tighten alternator support bolt nut.
   (6) Check belt flex and adjust if necessary.



4 Adjust power steering oil pump V-belt flex by the following procedures.
   (1) Loosen power steering pump fixing bolt A and B.
   (2) Move power steering pump, tension belt moderately and adjust flex.
   (3) Tighten fixing bolt B and then A.
   (4) Check belt flex and adjust if necessary.



5. Adjust air-conditioner compressor V-belt flex by the following procedures.
   (1) Loosen tension pulley fixing bolt A.
   (2) Adjust belt flex with adjusting bolt B.
   (3) Tighten fixing bolt A.
   (4) Check belt flex and adjust if necessary.

INSPECTION AND ADJUSTMENT OF BREAKER POINT GAP (Braker point type distributor) E11FSAC

Refer to P.11–14 for inspection procedures.

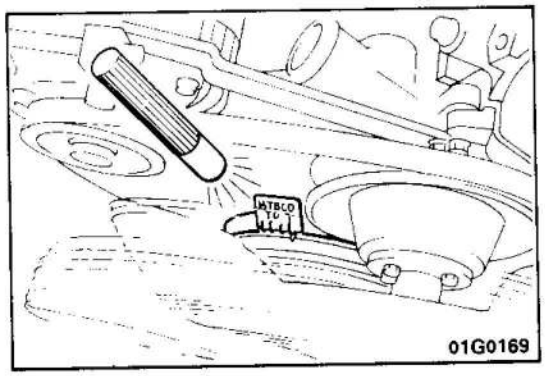
INSPECTION AND ADJUSTMENT OF IGNITION TIMING (8 Valve Engine) E11FVAC1

1. Before inspection and adjustment set vehicle in the following condition.
   - Engine coolant temperature: 80–90°C (176–194°F)
   - Lamps and all accessories: OFF
   - Transmission: Neutral (N or P range on vehicles with automatic transmission)
2. Adjust braker point gap or dwell angle (braker point type distributor).
3. Connect tachometer and timing light.
4. Check that engine idle speed is within the standard value.

Standard value:

Vehicles for Europe	
4G63 engine	
Conventional carburetor	**800±50 r/min.**
FBC	
First 500 km (300miles)	**750 $^{+150}_{-100}$ r/min.**
After 500 km (300 miles)	**800±100 r/min.**
G63B engine	
First 500 km (300 miles)	**700 $^{+150}_{-100}$ r/min.**
After 500 km (300 miles)	**750±100 r/min.**
Vehicles for General Export	**700±50 r/min.**
Vehicles for Malawi*	
Manual transmission	**850±50 r/min.**
Automatic transmission	**900±50 r/min.**
Vehicles for Australia	
Manual transmission	**750±50 r/min.**
Automatic transmission	**800±50 r/min.**

* Engine in vehicles for Malawi use an 80% petrol/20% ethanol mixture.



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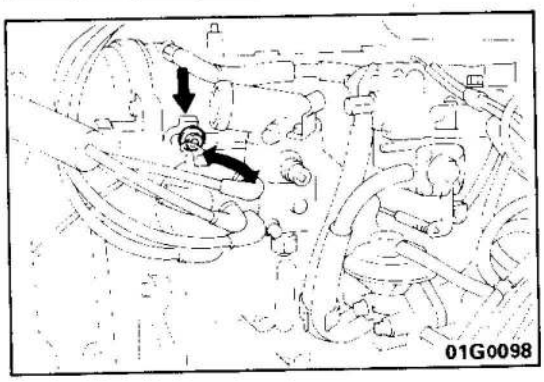
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5. Check that basic ignition timing is within the standard value.

Standard value:

4G63 engine	**5±2°BTDC**
G63B engine	**8±2°BTDC**

6. If not within the standard value, loosen distributor fixing nut and adjust by rotating distributor body.

NOTE
Turning distributor body to the right delays ignition timing. Turning distributor body to the left advances ignition timing.

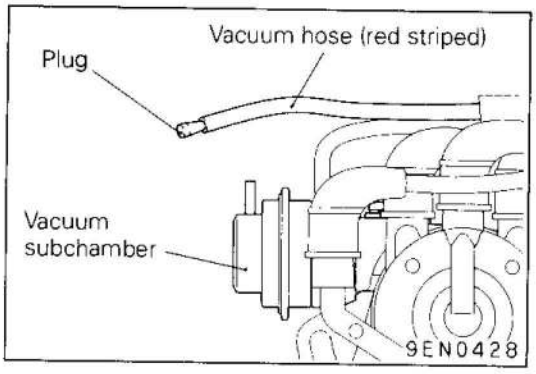
Caution – Vehicles for General Export
If the problem of knocking occurs when gasoline with an octane rating of 87 – 89 RON is used, it can be handled by retarding the standard ignition timing by about 2 degrees.

7. After adjusting, tighte nuts.
8. Attach sealing tape to the mounting nut (Vehicles for Switzerland built from December 1988).

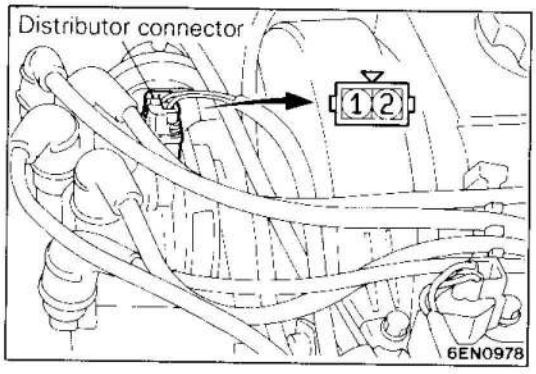
NOTE
Sealing tape is attached to the nut on all vehicles with an electronic control carburettor at the factory.

INSPECTION AND ADJUSTMENT OF IGNITION TIMING (16 Valve Engine – Carburetor) E11FVAC1

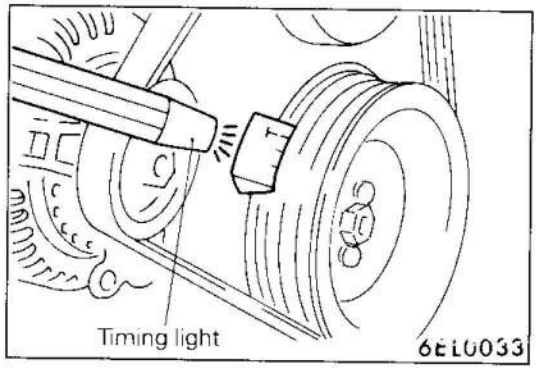
1. Before inspection and adjustment set vehicle in the following condition.
   - Engine coolant temperature: 80–95°C (176–203°F)
   - Lamps and all accessories: OFF
   - Transmission: Neutral



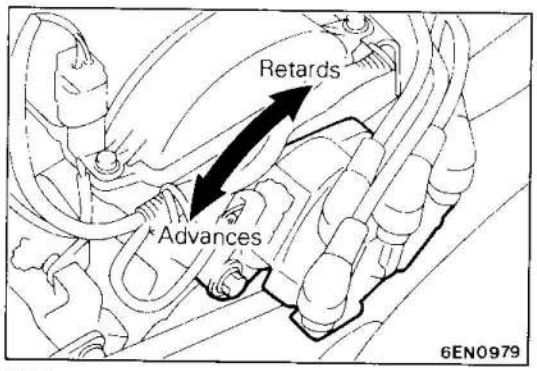
2. Disconnect the vacuum hose (red striped) from the vacuum subchamber of the distributor, and then plug the hose end. (dual diaphragm type only)



3. Disconnect the distributor connector, and then connect the special tool (MB991348) between the disconnected connectors. (Connect all terminals.)
4. Connect a primary-voltage-detection type tachometer to the terminal No. 2 of the distributor connector.
5. Set up a timing light.
6. Start the engine and run at idle.
7. Check that the engine speed is at 600–900 r/min.



8. Check that basic ignition timing is within the standard value.
   Standard value: 0°BTDC ± 2°



9. If not within the standard value, loosen distributor fixing bolts and adjust by rotating distributor body.
10. Tighten the mounting bolts after adjusting.
    Tightening torque: 12 Nm (1.2 kgm, 9 ft.lbs.)

ADDED

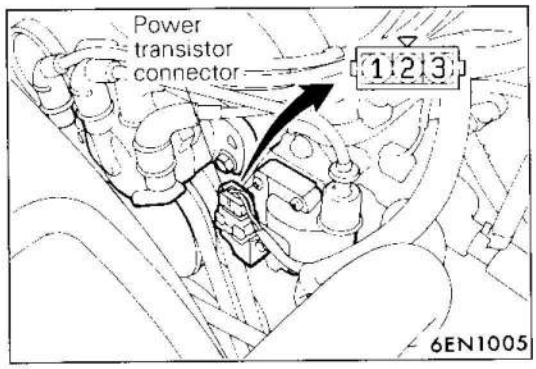
11. Connect the vacuum hose which was disconnected in step 2 to the original position. (dual diaphragm type only)
12. Check that the ignition timing is at the standard value. (dual diaphragm type only)

    Standard value:
    When altitude is less than 1,800 m
    Approx. 0°BTDC
    When altitude is more than 1,800 m
    Approx. 9°BTDC
13. Sealing tape is to be attached to the fitting bolt only for vehicles for Switzerland.

    NOTE
    Sealing tape has been attached at the factory for all other vehicles for Europe.

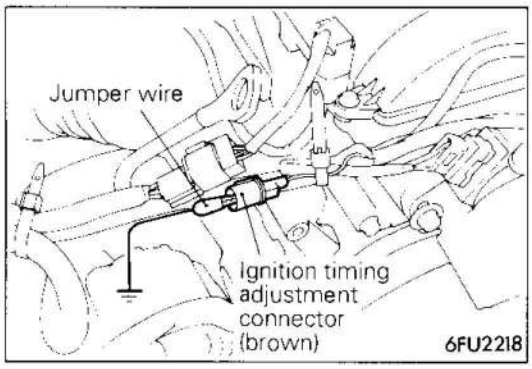
INSPECTION AND ADJUSTMENT OF IGNITION TIMING (MPI) E11F01AA

1. Before inspection and adjustment set vehicle in the following condition.
   - Engine coolant temperature: 80–95°C (176–203°F)
   - Lamps and all accessories: OFF
   - Transmission: Neutral



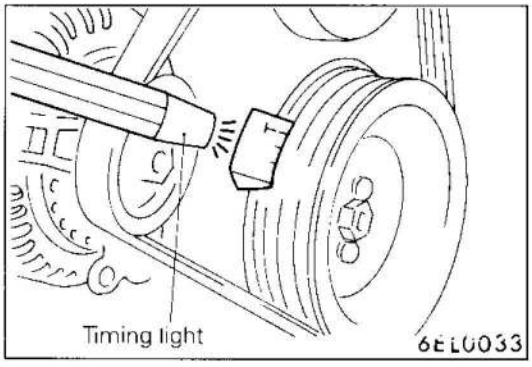
2. Disconnect the power transistor connector, and then connect the special tool (MB991348) between the disconnected connectors. (Connect all terminals.)
3. Connect a primary-voltage-detection type tachometer to the terminal No. 3 of the power transistor connector.

   NOTE
   Do not use the MUT-II.
   If tested with the MUT-II connected to the diagnosis connector, the ignition timing will not be the basic timing but be ordinary timing.
4. Set up a timing light.
5. Start the engine and run at idle.
6. Check that the idle speed is at approx. 750 r/min.
7. Turn the ignition switch to OFF.



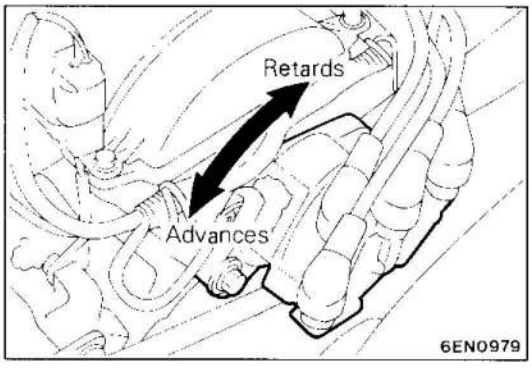
8. Remove the waterproof connector from the ignition timing adjustment connector (brown).
9. Connect the jumper wire with the clip to the ignition timing adjustment terminal, and earth this to the body.

   NOTE
   Earthing this terminal sets the engine to the basic ignition timing.
10. Start the engine and run it at idle.



11. Check that basic ignition timing is within the standard value.

    Standard value: 5 ± 2° BTDC



12. If not within the standard value, loosen distributor fixing nut and adjust by rotating distributor body.
13. Tighten mounting nut after adjusting.

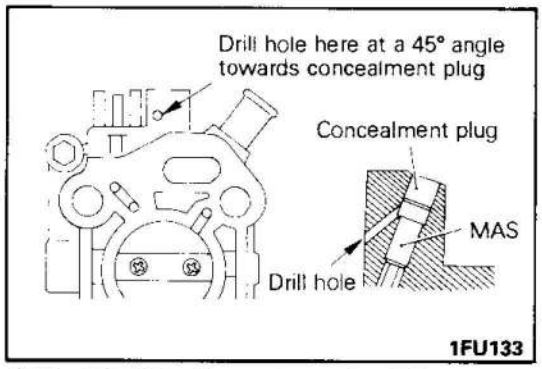
    Tightening torque: 12 Nm (1.2 kgm, 9 ft.lbs.)
14. Stop the engine, remove the jumper wire from the ignition timing adjustment connector (brown), and return the connector to its original condition.
15. Start the engine and check that ignition timing at the standard value.

    Standard value: Approx. 10°BTDC

    NOTE
    1. Ignition timing is variable within about ± 7°, even under normal operating.
    2. And it is automatically further advanced by about 5° from 10° BTDC at higher altitudes.
16. Sealing tape is to be attached to the fitting bolt only for vehicles for Switzerland.

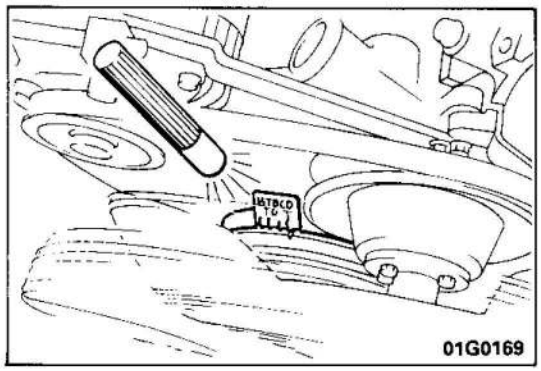
    NOTE
    Sealing tape is attached to all vehicles when new.

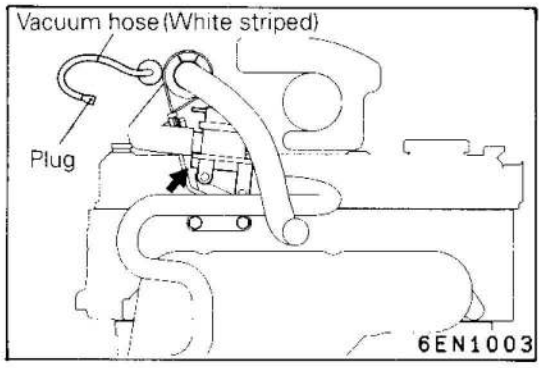
INSPECTION AND ADJUSTMENT OF ENGINE IDLING SPEED AND CO CONCENTRATION (Conventional Carburetor) E11FXCK

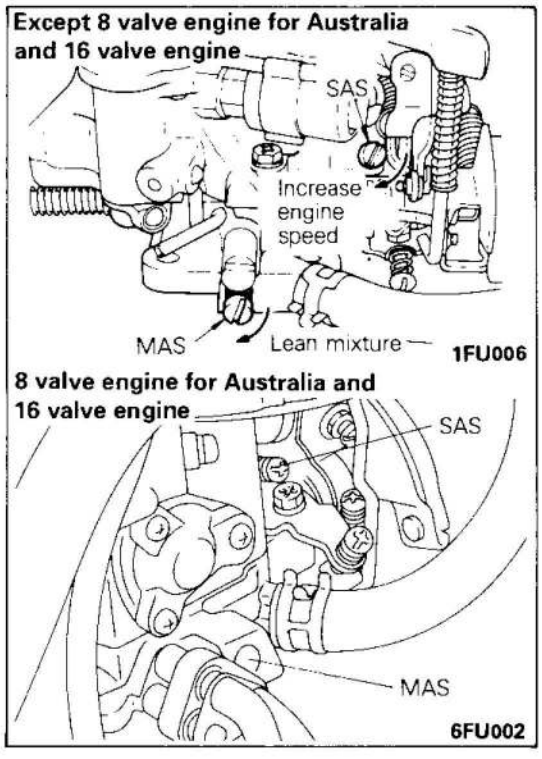


1. Remove the concealment plug in the following procedure. (Vehicles for Australia only)

   (1) Remove the carburettor from the engine.
   (2) Clamp the carburettor in a vice with the idle mixture adjusting screw (MAS) facing up (to protect the gasket surface from being damaged by the vice jaws).
   (3) Drill a 2mm (5/64in.) pilot hole in the casting surrounding the mixture adjusting screw (MAS), and then redrill the hole to 3mm (1/8in.) diameter.
   (4) Insert a blunt punch into the hole and drive out the plug.
   (5) Reinstall the carburettor on the engine.







2. Before inspection and adjustment set vehicle in the follwing condition.
   (1) Coolant temperature: 80–95°C (176–203°F)
   (2) Lamps and all accessories: OFF
   (3) Transmission: Neutral (N or P range on vehicles with automatic transmission)
3. Set timing light and tachometer.
4. Start engine and run at idle.
5. Check ignition timing. Adjust ignition timing if required. (Refer to P.11-35.)

Standard value:
8 valve engine 5 ± 2° BTDC
16 valve engine 0 ± 2° BTDC

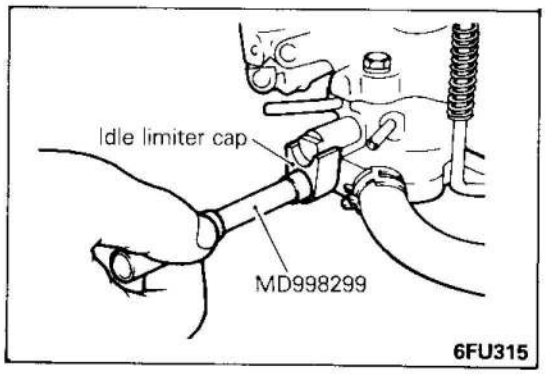
6. Set CO tester.
7. Disconnect the vacuum hose (with white stripe)from the secondary air control valve and plug the end of the hose. (Vehicles for Australia only.)
8. Run engine at 2,000–3,000r/min. and race 2–3times.
9. Check that engine idle speed and CO concetration are within the standard values.

Standard value:

Engine idle speed	
8 valve engine	
Vehicles for Europe	**800 ± 50 r/min.**
Vehicles for General Export and Gulf Countries	
Manual transmission	**700 ± 50 r/min.**
Automatic transmission	**750 ± 50 r/min.**
Vehicles for Malawi*	
Manual transmission	**850 ± 50 r/min.**
Automatic transmission	**900 ± 50 r/min.**
Vehicles for Australia	
Manual transmission	**750 ± 50 r/min.**
Automatic transmission	**800 ± 50 r/min.**
16 valve engine	
Manual transmission	**800 ± 50 r/min.**
Automatic transmission	**850 ± 50 r/min.**
CO concentration	
8 valve engine	
Vehicles for Europe	**1.0 ± 0.5 %**
Vehicles for General Export	**2.5 ± 0.5 %**
Vehicles for Gulf Countries	**1.5 ± 0.5 %**
Vehicles for Australia	**2.0 ± 0.5 %**
16 valve engine	
Vehicles for Europe and General Export	**2.5 ± 0.5%**
Vehicles for Gulf countries	**1.0 ± 0.5%**
Vehicles for Australia	**1.5 ± 0.5%**

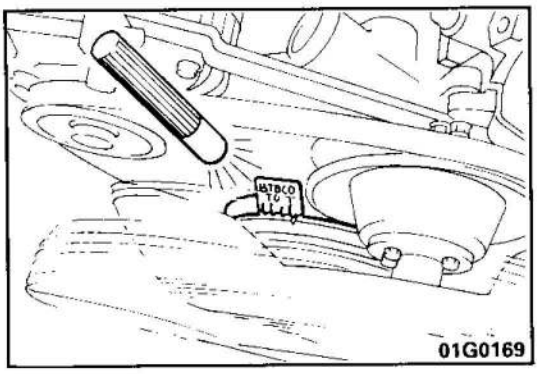
* Engine in vehicles for Malawi use an 80% petrol/20% ethanol mixture.

10. If not within the standard values, adjust idle rpm and CO concentration to standard value with speed adjusting screw (SAS) and mixture adjusting screw (MAS).



NOTE
Use the special tool when adjusting mixture adjusting screws (MAS) that have an idle limiter cap.

11. Remove plug from the disconnected white stripe vacuum hose and connect hose to the secondary air control valve (Vehicles for Australia).
12. Install the concealment plug into the hole to seal the idle mixture adjustment screw (Vehicles for Australia only).



CHECKING AND ADJUSTMENT OF ENGINE IDLING SPEED (FBC)

[Applicable through March production, 1987] E11FXCL

1. Before inspection and adjustment set vehicle in the following condition.
   (1) Engine coolant temperature: 80–90°C (176–194°F)
   (2) Lamps and all accessories: Off
   (3) Transmission: Neutral
   (4) Steering wheel: Straight forward (vehicles with a power steering)
2. Set timing light and tachometer.
3. Check ignition timing. Adjust ignition timing if required.

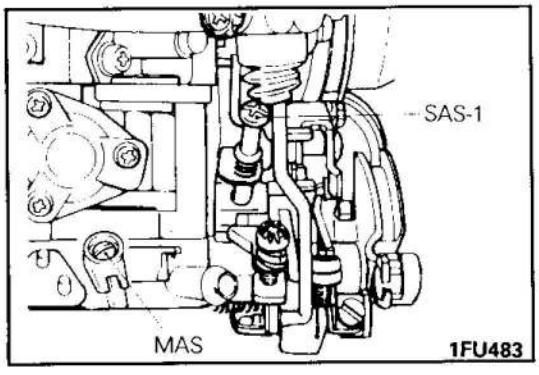
   Standard value: **4G63 engine 5±2°BTDC**
   G63B engine 8±2°BTDC

4. Run the engine for more than 5 seconds at the engine speed of 2,000 to 3,000 r/min.
5. Run the engine at idle for 2 minutes.
   Check that engine idle speed is within the standard value.

   Standard value:

4G63 engine	
First 500 km (300 miles)	**750 $^{+150}_{-100}$ r/min.**
After 500 km (300 miles)	**800±100 r/min.**
G63B engine	
Frist 500 km (300 miles)	**700 $^{+150}_{-100}$ r/min.**
After 500 km (300 miles)	**750±100 r/min.**

6. Set the engine speed to the specified value by adjusting the idle speed adjusting screw No. 1 (SAS-1) and the idle mixture adjusting screw (MAS).



CHECKING AND ADJUSTMENT OF CO CONCENTRATION (G63B engines)

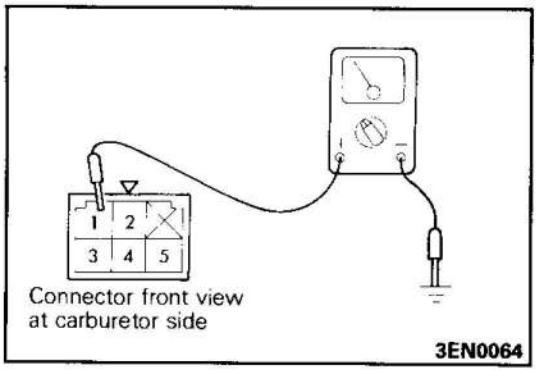
[Applicable through March production, 1987] E11FXBD

(For Unscheduled Maintenance only)

Adjustment of idle mixture is not normally required because of closed-loop control of air / fuel ratio.
In case the idle mixture adjustment is required for some reason (ex. overhauling carburetor), the following procedure should be applied.

1. Before inspection and adjustment set vehicle in the following condition.
   (1) Engine coolant temperature: 80–90°C (176–194°F)
   (2) Lamps and all accessories: Off
   (3) Transmission: Neutral
   (4) Steering wheel: Straight forward (vehicles with a power steering)
2. Set timing light and tachometer.
3. Depress accelerator pedal once to release the fast idle.
4. Check the basic ignition timing. Adjust ignition timing if required.

   Standard value: 8±2°BTDC



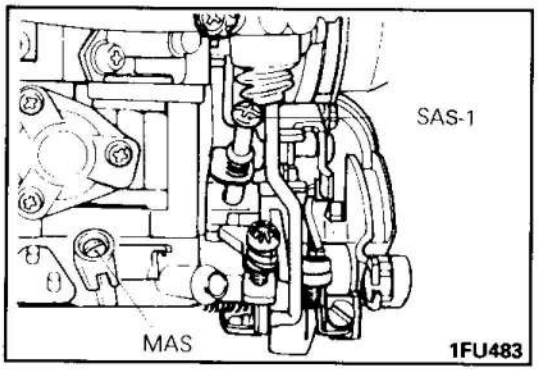
5. Turn off the ignition key.
6. Disconnect the negative cable from the terminal of the battery, wait 5 seconds or more and reconnect it.
7. Disconnect the connector of exhaust oxygen sensor.
8. Start and run the engine at least 5 minutes.
9. Connect the positive terminal of the analogue type voltmeter to the negative terminal of Feedback Solenoid Valve (FBSV) while connecting the negative terminal of the voltmeter to the vehicle body (earth).

   Caution
   Do not remove the connector.

10. Read voltage ("V-value") between FBSV and vehicle body (earth) at idle.

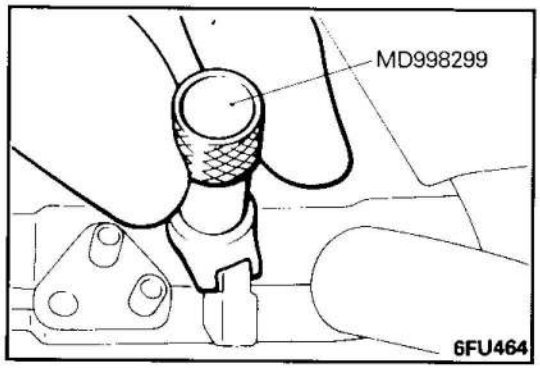
    NOTE
    Make a note of the "V-value."

11. Reconnect the connector of exhaust oxygen sensor.
12. Run the engine for about 10 seconds at engine speed of 2000 of 3000 r/min.



13. Check the needle travel of the voltmeter. When the centre of the needle travel is within the "V-value" ±0.5 volt, adjust Mixture Adjusting Screw (MAS) using the special tool so that the needle gives swinging motion with "V-value" in centre at idling.
    After adjustment, repeat above steps (12) and (13) for reconfirmation.

    NOTE
    Adjust idle rpm if neccessary.



14. While the engine is idling, suddenly race it by opening the throttle valve fully until the engine speed reaches to about 3,000 r/min, then close the throttle valve.
    Make sure that as the engine is raced, the needle of the voltmeter travels away from the idle state and that as the engine is returned to idle speed, the voltmeter needle returns to the idle state.

CHECKING AND ADJUSTMENT OF IDLE MIXTURE (8 Valve Engine – FBC)

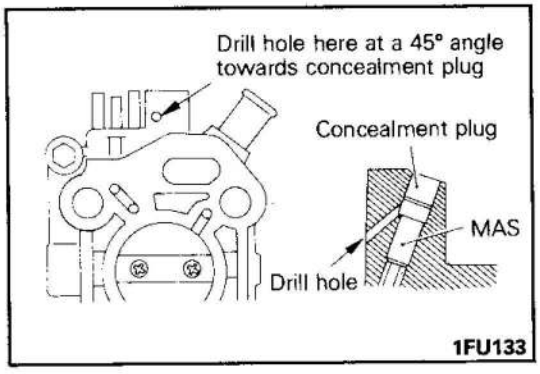
[Vehicles built from April 1987] E11FXBY

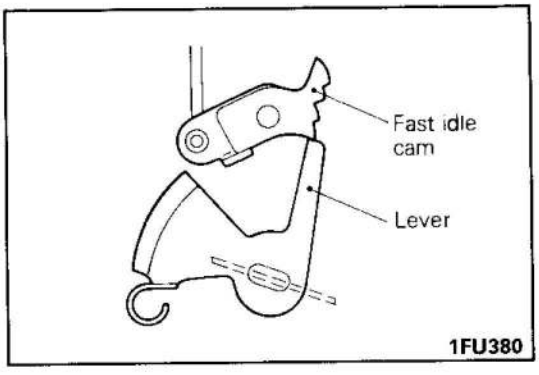
<Vehicles except for Switzerland>

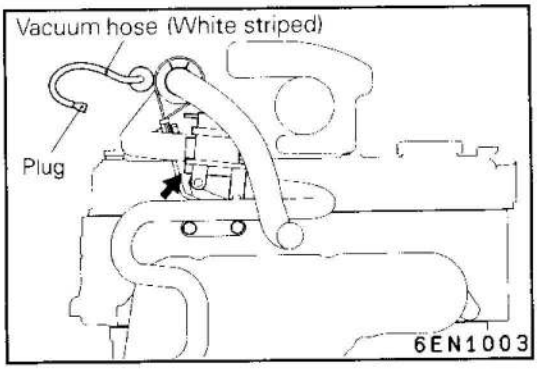
NOTE
- For vehicles for Switzerland built from December 1988, refer to the section "IDLE FEEDBACK CHECK".

(For Unscheduled Maintenance Only)
- Adjustment of idle mixture is not normally required because of closed-loop control of air/fuel ratio.
- In case the idle mixture adjustment is required for some reason (ex. overhauling carburetor), the following procedure should be applied.

1. Before inspection and adjustment set vehicle in the following condition.
   (1) Engine coolant temperature: 80 – 90°C (176 – 194°F)
   (2) Lamps and all accessories: Off
   (3) Transmission: Neutral
   (4) Steering wheel: Straight forward (vehicles with a power steering)



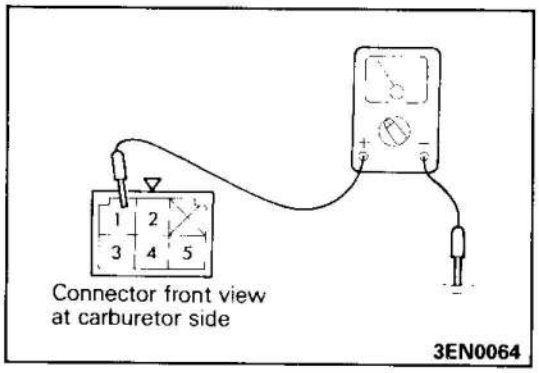


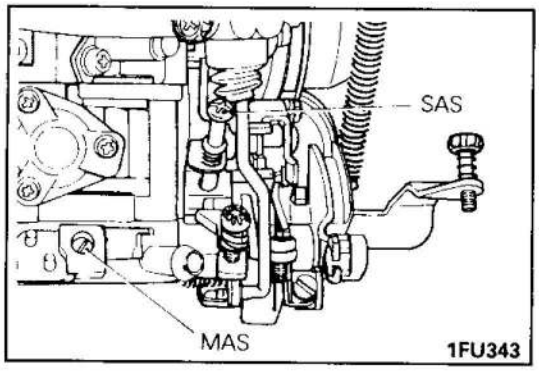


2. Remove carburetor from engine.
3. Clamp carburetor in a vice with idle mixture adjusting screw (MAS) facing up (protect gasket surface from damaging by vice jaws.)
4. Drill a 2 mm (5/64 in.) pilot hole in the casting surrounding the Mixture Adjusting Screw (MAS) then redrill the hole to 3 mm (1/8 in.).
5. Insert a blunt punch into the hole and drive out plug.
6. Reinstall carburetor on engine.
7. Run the cold engine at fast idle until the engine coolant temperature reaches 85 to 95°C (185 to 205°F).
8. Set timing light and tachometer.
9. Depress accelerator pedal once to release the fast idle.

   NOTE
   When the accelerator pedal is depressed, the lever will be released from the fast idle cam and the fast idling mode will be cancelled.
10. Check the basic ignition timing. Adjust ignition timing if required.

    Standard value: **4G63 engine 5±2°BTDC**
    G63B engine 8±2°BTDC
11. Turn off the ignition key.
12. Disconnect the negative cable from the terminal of the battery, wait 10 seconds or more and reconnect it.
13. Disconnect the connector of exhaust oxygen sensor.
14. Disconnect the vacuum hose from the secondary air control valve and plug the end of the hose.
15. Start the engine and allow it to idle for at least 5 minutes. Then check rpm to make sure the idling speed is steady.





16. Connect the positive terminal of the analogue type voltmeter to the negative terminal of Feedback Solenoid Valve (FBSV) while connecting the negative terminal of the voltmeter to the vehicle body (earth).

Caution
Do not remove the connector.

17. Read voltage ("V-value") between FBSV and vehicle body (earth) at idle.

NOTE
Make a note of the "V-value".

18. Reconnect the connector of exhaust oxygen sensor.
19. Run the engine for about 10 seconds at engine speed of 2,000 to 3,000 r/min.
20. Check the pointer travel of the voltmeter.When the centre of the needle travel is within the "V-value" ±0.5 volt, then proceed to item (21).
If the centre of the needle travel is within the "V-value"±0.5 volt, adjust Mixture Adjusting Screw (MAS) so that the needle gives swinging motion with "V-value" in centre at idling.
After adjustment, repeat above steps (19) and (20) for reconfirmation.

NOTE
Adjust idle rpm if necessary.

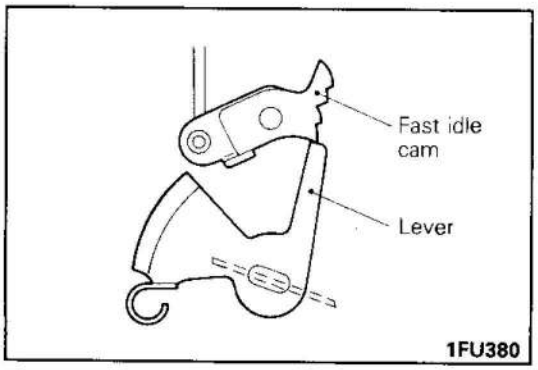
21. While the engine is idling, suddenly race it by opening the throttle valve fully until the engine speed reaches to about 3,000 r/min, then close the throttle valve.
Make sure when the engine is raced, the pointer of the voltmeter travels away from the idle state and that as the engine is returned to idle speed, the pointer returns to the idle state.
22. Remove the plug from the end of the vacuum hose. Then, reconnect the vacuum hose to the secondary air control valve.
23. Install the concealment plug into the hole to seal the Mixture Adjusting Screw (MAS).

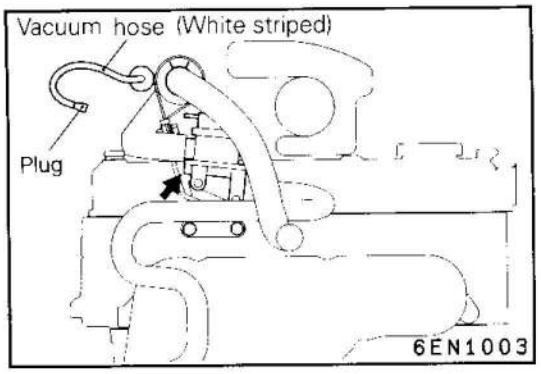
IDLE FEEDBACK CHECK (Vehicles for Switzerland built from December 1988 and 16 Valve Engine – FBC)

In case an idle condition check is required for some reason (for example when overhauling carburettor), the following procedure should be followed.

1. Perform the inspection with the vehicle in the following condition.
   - Engine coolant temperature: 80 – 90°C (176 – 194°F)
   - Lamps and all accessories: OFF
   - Transmission: Neutral
   - Steering wheel: Straight forward position (Vehicles with power steering)
2. Set the timing light and the tachometer.
3. Depress accelerator pedal once to release the fast idle.

NOTE
When the accelerator pedal is depressed, the lever will be released from the fast idle cam and the fast idling mode will be cancelled.

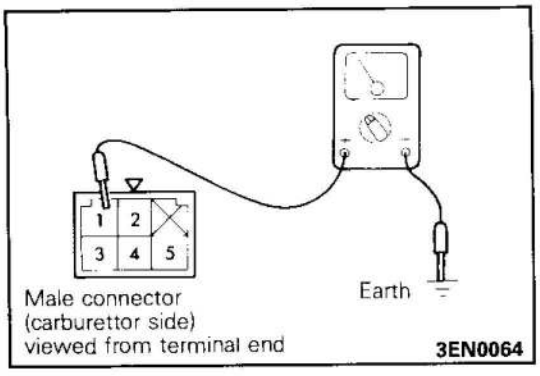




4. Start the engine and allow the engine to idle.
5. Check the ignition timing. Adjust the ignition timing if it is not within the standard value.

   Standard value: 5±2°BTDC

6. Disconnect the vacuum hose from the secondary air control valve and plug the end of the hose.



7. Connect the positive terminal of an analogue type voltmeter to the negative terminal of feedback solenoid valve while connecting the negative terminal of the voltmeter to the vehicle body as the earth.

   Caution
   The feedback solenoid valve connector must not be disconnected.

8. Run the engine for about 10 seconds at an engine speed of 2,000 to 3,000 r/min.
9. Immediately after running the engine at high speed (above step 8), check the pointer travel of the voltmeter while the engine is running at idle.
   In case the pointer of voltmeter has a swinging motion, and the centre of the pointer travel is between 2 and 12 volts. The system is in correct working condition.

   NOTE
   If necessary make an adjustment of the kerb idle speed by using the idle speed adjusting screw (SAS).

10. In case the pointer has no swinging motion or the centre of the needle travel is out of specification (2 to 12 volts), check each part of the fuel system.
    (1) If a certain part is found to be malfunctioning, repair or replace the part and repeat steps 3 and 4 for reconfirmation.
    (2) If no part is found to be malfunctioning, clean the jets of the carburettor and repeat steps 8 and 9 for reconfirmation.
11. If the system is not working correctly after performing the above repair or replacement or cleaning, replace the throttle body of carburettor and repeat steps 8 and 9 for reconfirmation.
12. If the system is not working correctly even after replacing the throttle body, replace the carburettor assembly.
13. Remove the plug from the end of the vacuum hose. Then reconnect the vacuum hose to the secondary air control valve.

INSPECTION OF ENGINE IDLING SPEED (MPI)

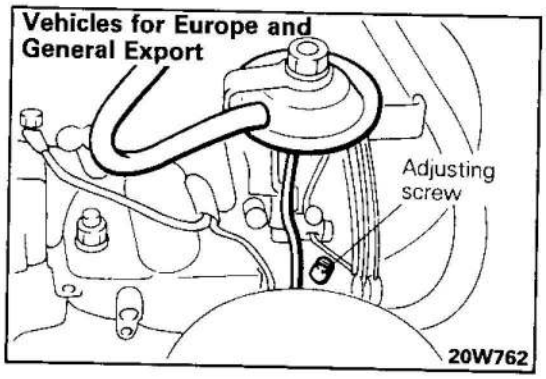
1. Before inspection and adjustment set vehicle in the following condition.
   - Engine coolant temperature: 80–95°C (176–203°F)
   - Lamps, electric cooling fan and all accessories: OFF
   - Transmission: Neutral (P range on vehicles with A/T)
2. Check the basic ignition timing. Adjust if necessary.

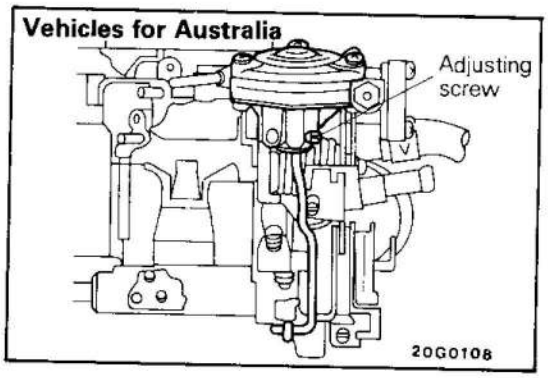
   Standard value: 5 ± 2° BTDC
3. Turn the ignition switch to OFF position, and then set the tachometer or connect the MUT-II to the diagnosis connector.

   For information regarding the tachometer installation method, refer to P.11-36-2.
4. Start the engine and run it at idle.
5. Run the engine at idle for 2 minutes.
6. Check the idle speed.

   Curb idle speed: 750 ± 100 r/min.

   NOTE
   The idle speed is controlled automatically by the idle speed control (ISC) system.
7. If the idle speed is outside the standard value, inspect the MPI components by referring to GROUP 13 – Service Adjustment Procedures.





INSPECTION AND ADJUSTMENT OF IDLE UP EQUIPMENT (vehicles with air-conditioner) E11FZAC1

1. Before inspection and adjustment set vehicle in the following condition.
   - Engine coolant temperature: 80–95°C (176–203°F)
   - Idle rpm and CO concentration within the standard value.
   - Lights and accessories: OFF
   - Transmission: Neutral
2. Turn air-conditioner ON.

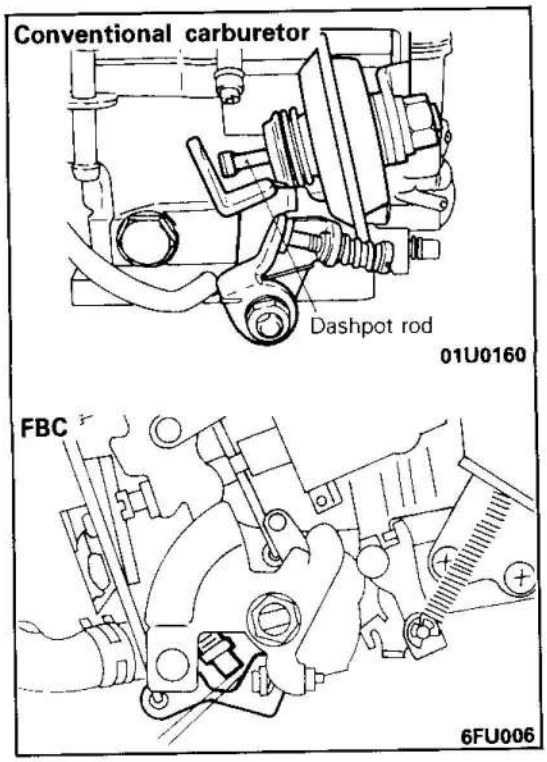
   NOTE
   Solenoid valve opens and intake manifold vacuum is applied to throttle opener and throttle opener makes full stroke.
3. Check engine rpm is within the standard value.

   Standard value: 1,000±50 rpm
4. If not within the standard value, adjust by turning throttle opener (air-conditioner) adjusting screw.

INSPECTION AND ADJUSTMENT OF DASHPOT (8 Valve Engine)

E11FYAC

1. Before inspection and adjustment set vehicle in the following condition.
   - Engine coolant temperature: 80–90°C (176–194°F)
   - Idle rpm and CO concentration within standard value.
   - Lamps and all accessories: OFF
   - Transmission: Neutral
2. Set tachometer.
3. Start engine.
4. Open throttle lever until dashpot rod makes full stroke.

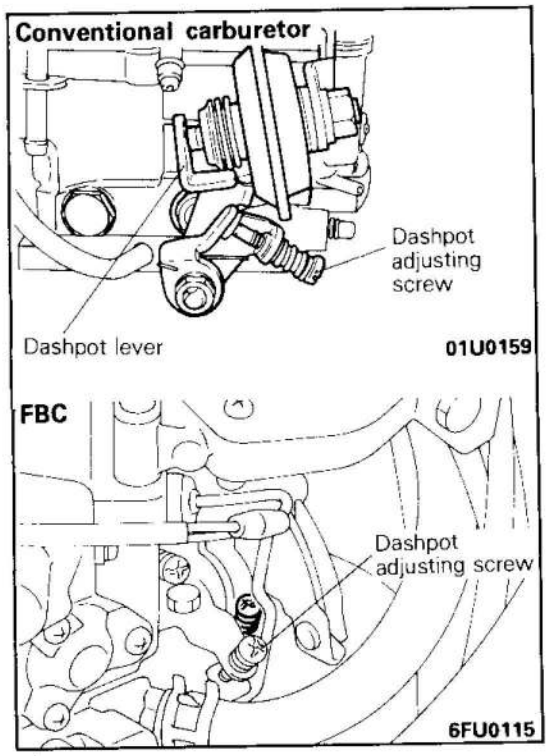


5. Close throttle lever until dashpot rod touches dashpot lever. Check engine rpm is within the standard value.

   Standard value:

Conventional carburetor	**1,600±200 r/min.**
FBC	**1,800±200 r/min.**

6. If not within standard value, adjust by turning dashpot adjusting screw.
7. If the engine speed has been adjusted, paint the dashpot adjusting screw (Vehicles for Switzerland built from December 1988).

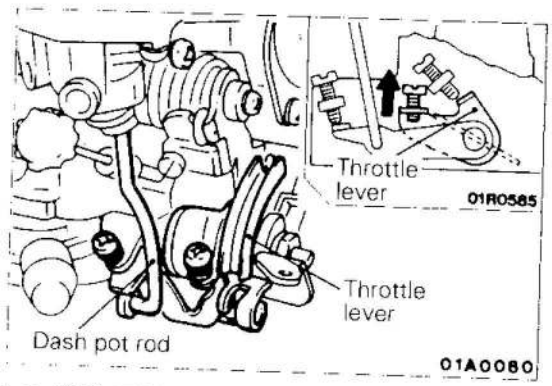


INSPECTION AND ADJUSTMENT OF DASH POT (16 Valve Engine)

<A/T only>

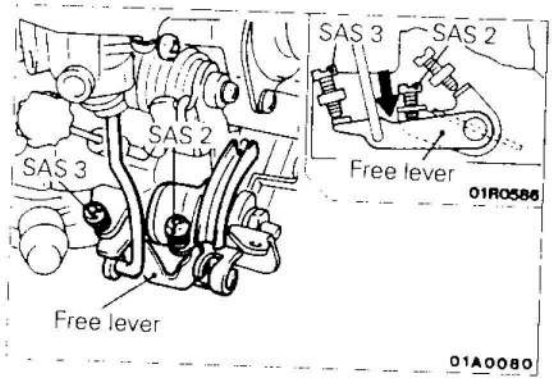
NOTE
This should be carried out after of ignition timing, idle speed and CO inspection and adjustment.

1. Before inspection and adjustment set vehicle in the following condition.
   - Engine coolant temperature: 80–95°C (176–203°F)
   - Lamps and all accessories: OFF
   - Transmission: P range
2. Set up a tachometer.
3. Start the engine and run at idle.
4. Open the throttle valve until the dash pot rod is at the full stroke.



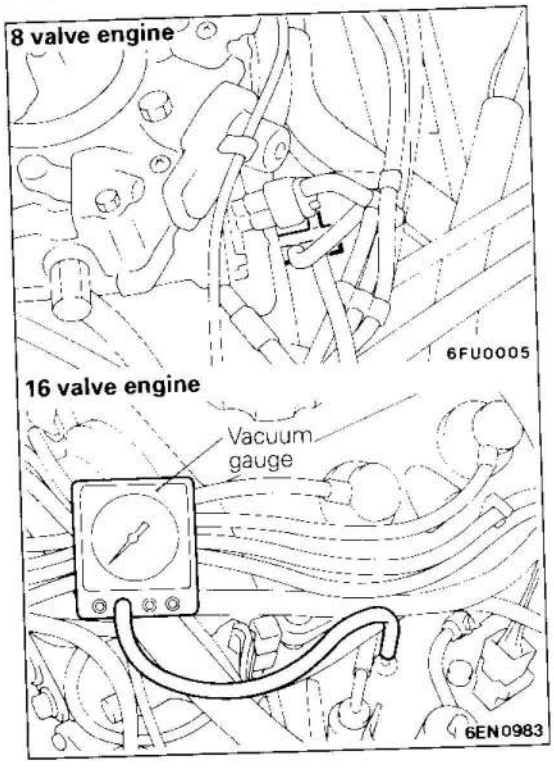
5. When the throttle valve is gradually closed, find the point where the speed adjusting screw-2 (SAS-2) touches the free lever (point where dash pot rod starts to extend). Hold the throttle valve at this point.
6. Check the engine speed (speed at which dash pot starts to operate).

   Standard value: 1,500 ± 200 r/min.



7. If the engine speed is outside the standard value, adjust by turning the speed adjusting screw-3 (SAS-3)
8. Check the time taken from when the throttle valve is released from the held position to when the engine speed reaches the check point speed (dash pot operation time).

   Standard value:
   Check point 950 r/min.
   Dashpot operation time 1.5–4.5 sec.
9. If the time is outside the standard value, adjust the dash pot operation time by increasing or decreasing the engine speed at which the dash pot starts to operate within the standard value range.



MANIFOLD VACUUM INSPECTION (Carburettor)

1. Perform the inspection with the vehicle in the following condition.
   - Engine coolant temperature: 80–95°C (176–203°F)
   - Lamps and all accessories: OFF
   - Transmission: Neutral (P range on vehicles with A/T)
2. Set up a tachometer.
   For information regarding the tachometer installation method, refer to P.11-36-1.
3. Set the vacuum gauge at illustrated position on the intake manifold.
4. Start the engine and check that idle speed is within the standard value range. Then read off the vacuum gauge.

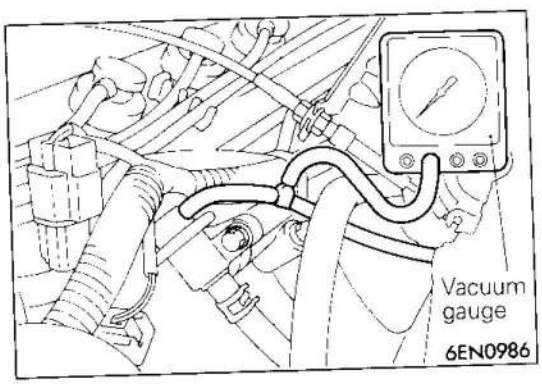
   Limit: min. 450 mmHg (17.7 in.Hg)

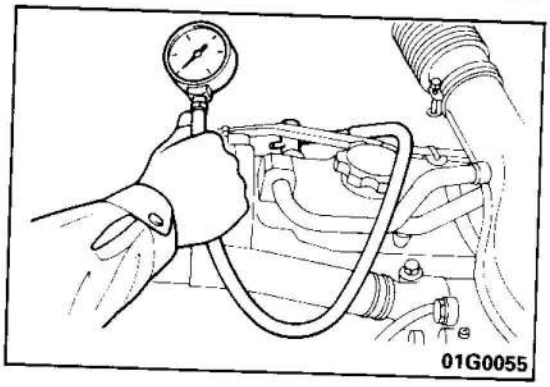
MANIFOLD VACUUM INSPECTION (MPI)

1. Before inspection, set vehicles in the following condition.
   - Engine coolant temperature: 80–95°C (176–203°F)
   - Lamps, electric cooling fan and all accessories: OFF
   - Transmission: Neutral (P range on vehicles with A/T)
2. Set the tachometer or connect the MUT-II to the diagnosis connector.
   For information regarding the tachometer installation method, refer to P.11-36-2.
3. Attach a three-way union to the vacuum hose between the fuel pressure regulator and the air intake plenum, and connect a vacuum gauge.
4. Start the engine and check that idle speed is within specification.

   Standard value: 750 ± 100 r/min.
5. Check the manifold vacuum.

   Limit: min. 450 mmHg (17.7 in.Hg)





INSPECTION OF COMPRESSED PRESSURE E11FGB81

1. Check to be sure that the engine oil, starting motor and battery are in the normal condition.
2. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 95°C (176°F to 203°F).
3. Disconnect the high-tension cable. <8 valve engine>
   Disconnect the distributor connector <16 valve engine>
4. Remove all 4 spark plugs.
5. Crank engine to discharge foreign material from cylinder.

Caution
Cover spark plug hole with rag etc., to prevent foreign material scattering when discharged. Keep people away from spark plug hole side. If compression is measured with water, oil, fuel etc., inside cylinder from cracks, hot water, oil, fuel etc., will gush out from spark plug hole, which is very dangerous.

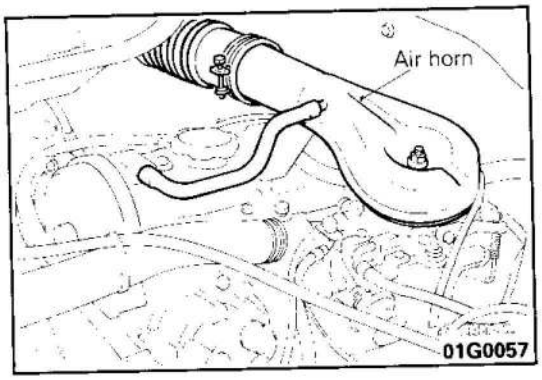
6. Set an engine tachometer in place.
7. Place a compression gauge adaptor and compression gauge in one of the spark plug holes.
8. Crank the engine with the throttle valve fully open, and measure the compression at the place where the compression gauge indicator shows a stabilized reading.

Standard value (at engine speed of 250–400 r/min.):
8 valve engine
1,200 kPa (12.0 kg/cm², 171 psi)
16 valve engine
1,350 kPa (13.5 kg/cm², 192 psi)
Limit (at engine speed of 250–400 r/min.):
8 valve engine
890 kPa (8.9 kg/cm², 127 psi)
16 valve engine
1,020 kPa (10.2 kg/cm², 145 psi)

9. Conduct steps 7, 8 with all cylinders and confirm pressure differences of all cylinders is within the limit.

   Limit: 100 kPa (1.0 kg/cm², 14 psi) or less

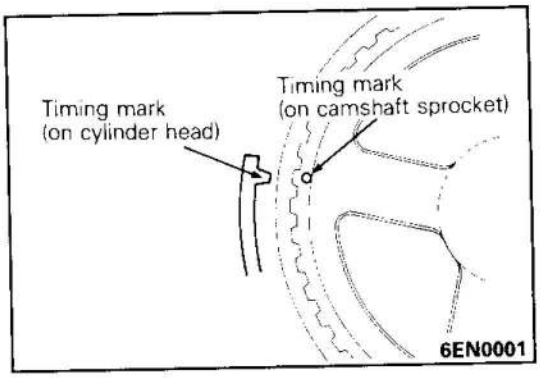
10. If after the measurement, the compression is below the limit, put a small amount of engine oil through the spark plug hole into the cylinder; then measure the compression once again and determine the cause of the malfunction.
11. If, after oil is added, the compression rises, the cause of the malfunction is a worn or damaged piston ring and/or cylinder inner surface.
    If, however, the compression does not rise, the cause is a bad valve or a bad gasket.
    For information regarding the servicing procedures for these causes of malfunction, refer to the ENGINE WORKSHOP MANUAL.



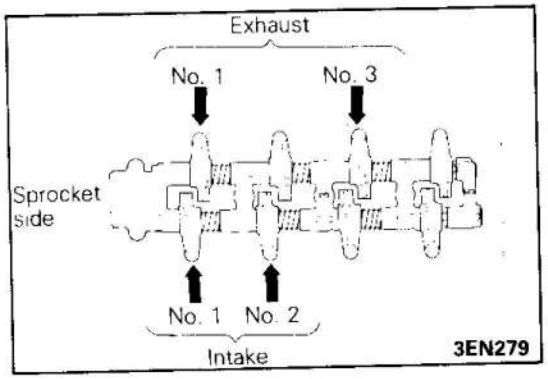
CHECKING AND ADJUSTMENT OF VALVE CLEARANCE (4G63 – 8 valve engine for General Export)

E11FDBE

1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 90°C (176°F to 194°F).
2. Check the ignition timing and idling speed, and adjust if necessary (Refer to P.11–35)
3. Remove air horn.
4. Remove rocker cover.
5. Remove timing belt front upper cover.



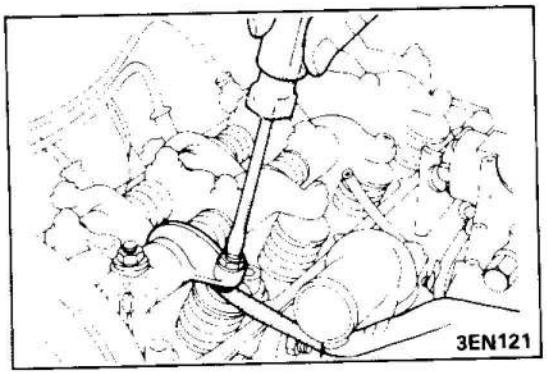
6. Turn crankshaft clockwise and align with camshaft sprocket timing mark.



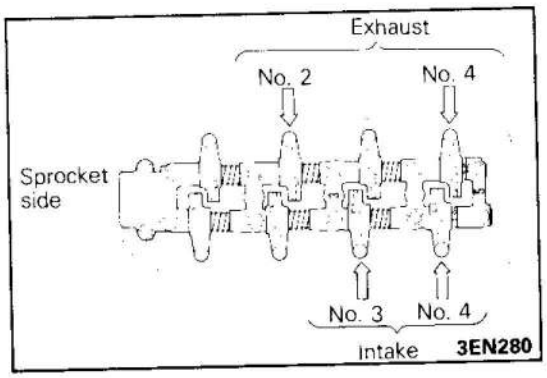
7. Check that valve clearance indicated in the diagram is at the standard value.

Standard value (hot engine):

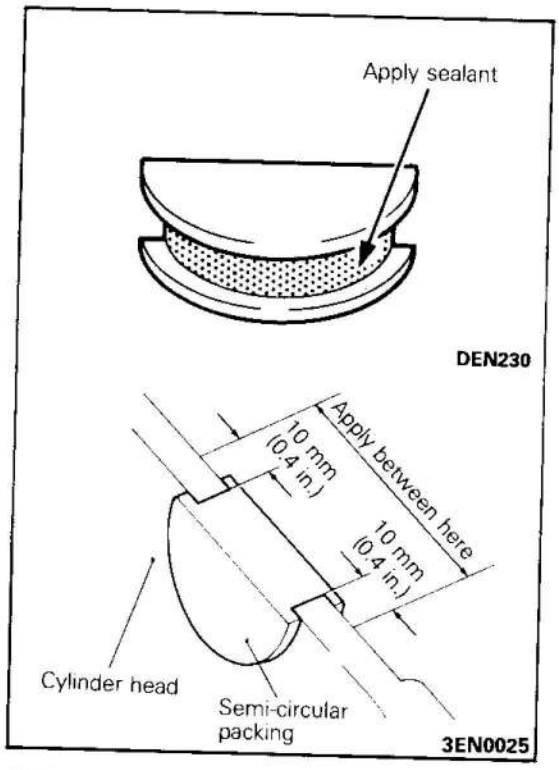
Intake	**0.15 mm (0.0059 in.)**
Exhaust	**0.25 mm (0.0098 in.)**



8. If valve clearance is off the standard value, loosen rocker arm adjusting screw locking nut. Use feeler gauge and adjust valve clearance by turning adjusting screw.
9. Secure rocker arm adjusting screw with screwdriver so that it will not rotate and tighten locking nut.



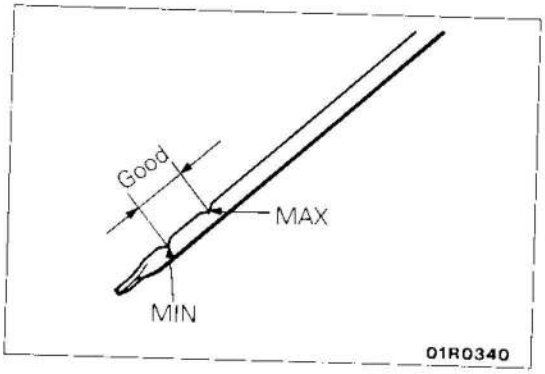
10. Rotate clockwise the crankshaft one complete turn (360° degree).
11. Check that valve clearance indicated in the diagram is at the standard value.
12. Repeat steps 8 and 9 to adjust the valve clearance of remaining valves.

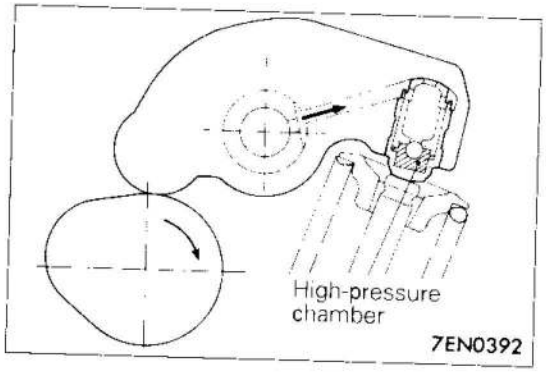


13. When installing the rocker cover assembly to the cylinder head, apply a coating of the specified sealant to the semi-circular packing and the cylinder head top surfaces, and then tighten at the specified torque.

Specified sealant: 3M ATD Part No. 8660 or equivalent

Caution
If they are overtorqued, a deformed rocker cover or oil leakage could result.





INSPECTION OF LASH ADJUSTER (4G63 – 8 Valve Engine for Europe and Australia, and 16 Valve Engine)

E11DF05AA

NOTE
If an abnormal noise (rattling noise) probably caused by the lash adjusters is heard and the noise does not stop, check as follows.

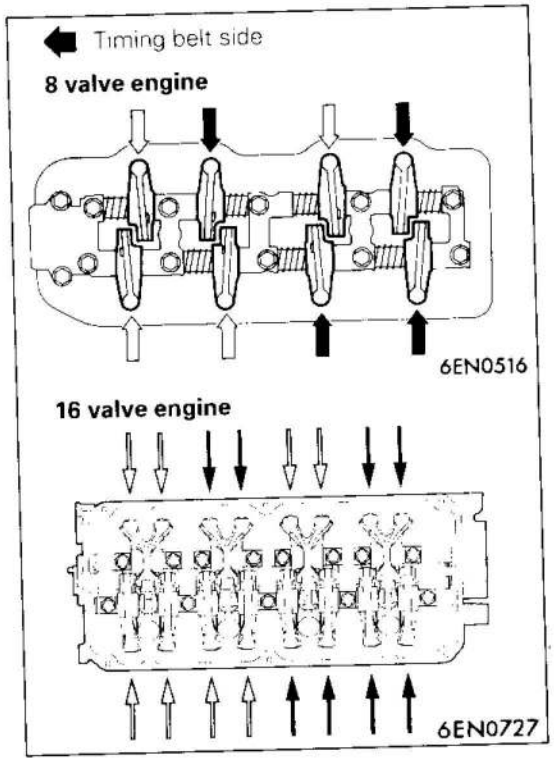
1. Check the engine oil, and if required, refuel or replace it.

   NOTE
   - If the amount of the engine oil is insufficient, air will be sucked in from the oil strainer and mix in the oil passage.
   - If the amount of the engine oil is more than the specified amount, it will be stirred by the crank to make a lot of air mix in the oil.
   - If the oil is deteriorated, it will not easily separate from air and the amount of air mixed in the oil will increase.

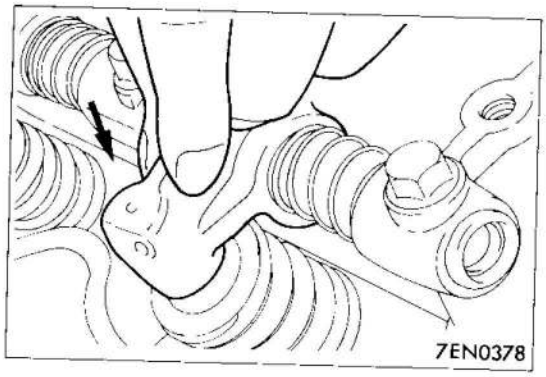
   If the air which has mixed in the oil due to the above causes enters the high pressure chamber in the lash adjusters, the air in the high pressure chamber will be pressurized during opening of the valve, which causes the lash adjusters to shrink excessively, and an abnormal noise will be generated when the valve is closed. This is the same phenomenon as the one when the valve clearance has been excessively adjusted by mistake.
   In this case, if the air which has entered the lash adjusters is bled, things will be normalized.

2. Start the engine and perform gentle racing several times (less than 10 times.)
   If the abnormal noise stops by racing, the air is bled from the high pressure chamber of the lash adjusters and the function of the lash adjusters is normalized.
   - After raising the engine speed from idling to 3000 r/min. gradually (in 30 seconds), drop the speed gradually (in 30 seconds) to idling.

   NOTE
   - If the vehicle is park on a slope for long, the oil in the lash adjusters will be decreased and air may enter the high pressure chamber when the vehicle is started.
   - After the vehicle is parked for long, air may enter the high pressure chamber because the oil in the oil passage will be gone and it will take a time before the oil is supplied to the lash adjusters.



3. If an abnormal noise does not stop by racing, check the lash adjusters according to the following procedures.
   (1) Stop the engine.
   (2) Set the No. 1 cylinder of the engine to the compression top dead center.
   (3) Push the rocker arm indicated by the arrow mark (⇐) as shown in the illustration at left and check whether or not the arm lock goes down.
   (4) Turn slowly the crank shaft 360° clockwise.
   (5) Check the rocker arm indicated by the arrow mark (⇐) as shown in the illustration at left same as above (3.)



(6) If the rocker arm can be lowered easily when the part of the rocker arm which is directly above the top of the lash adjuster is pressed, the lash adjuster is defective and should be replaced with a new part. Furthermore, when replacing the lash adjuster, bleed all of the air from the lash adjuster and then install. After this, check to be sure that there is no abnormality by carrying out the inspection in steps (1) to (5).

NOTE
- A leak-down test can be carried out to accurately determine whether the lash adjuster is defective or not.
- For the procedures for the leak-down test and air bleeding of the lash adjuster, refer to the Engine Workshop Manual.

Furthermore, if the rocker arm feels extremely stiff and cannot be lowered when it is pressed, the lash adjuster is normal, so investigate for some other cause of the abnormality.

INSPECTION AND ADJUSTMENT OF VALVE CLEARANCE (G63B engine) E11FDBG

INSPECTION OF INTAKE AND EXHAUST VALVES

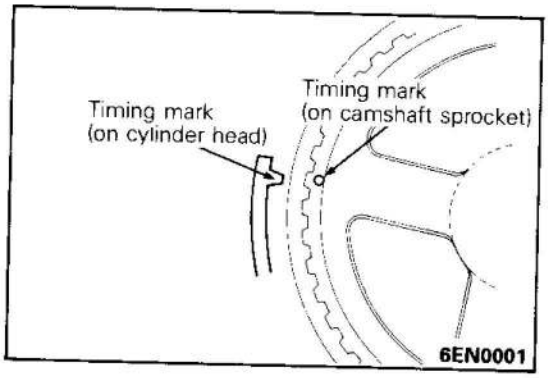
Refer to the former page.

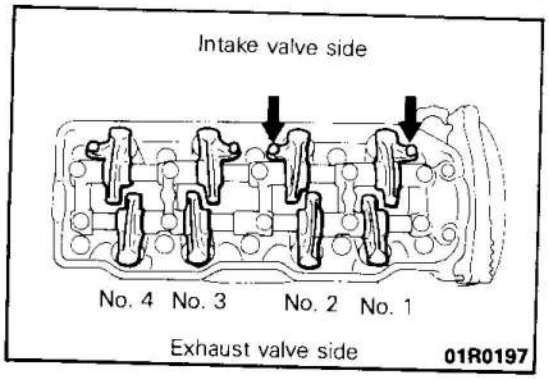
INSPECTION AND ADJUSTMENT OF JET VALVE

Caution

Jet valve clearance adjustment not only affects the exhaust gas level but also may cause engine trouble. Follow the next procedures and make precise adjustment.

1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 90°C (176°F to 194°F).
2. Check the ignition timing and idling speed, and adjust if necessary. (Refer to P.11–36, 37)
3. Remove air horn.
4. Remove rocker cover.
5. Remove timing belt front upper cover.
6. Turn crankshaft clockwise and align with camshaft sprocket timing mark.

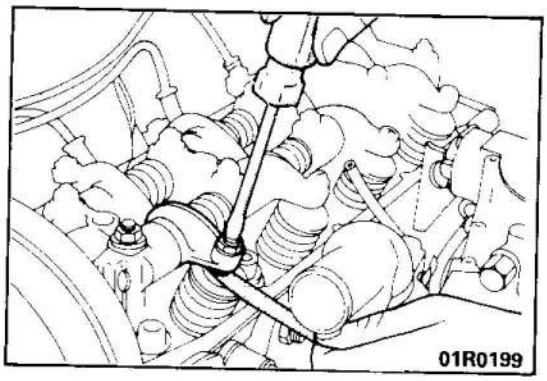




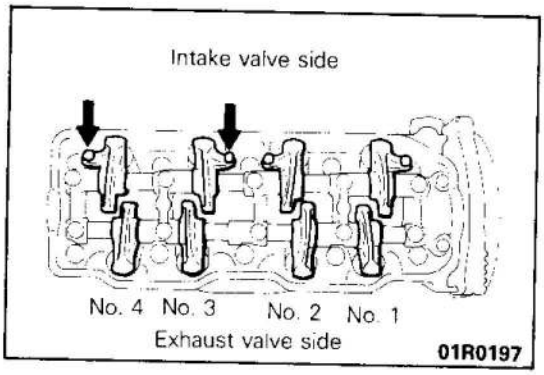
7. Check that jet valve clearance indicated in the diagram is at the standard value.

Standard value (hot engine): 0.25 mm (0.0098 in.)

NOTE

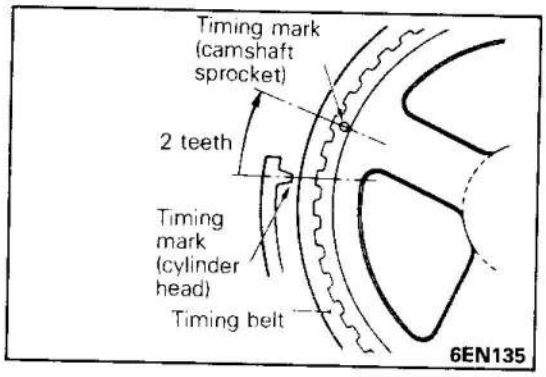


8. If jet valve clearance is off the standard value, loosen rocker arm adjusting screw locking nut. Use feeler gauge and adjust jet valve clearance by turning adjusting screw.
9. Secure rocker arm adjusting screw with screwdriver so that it will not rotate and tighten locking nut.



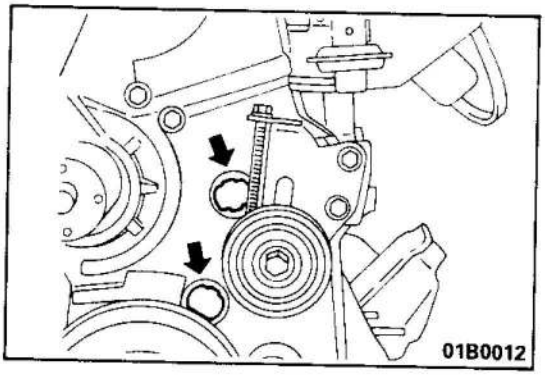
10. Rotate clockwise the crankshaft one complete turn (360° degree).
11. Check that jet valve clearance indicated in the diagram is at the standard value.
12. Repeat steps 8 and 9 to adjust the valve clearance of remaining valves.

ADJUSTMENT OF TIMING BELT TENSION (8 Valve Engine) E11FFAE



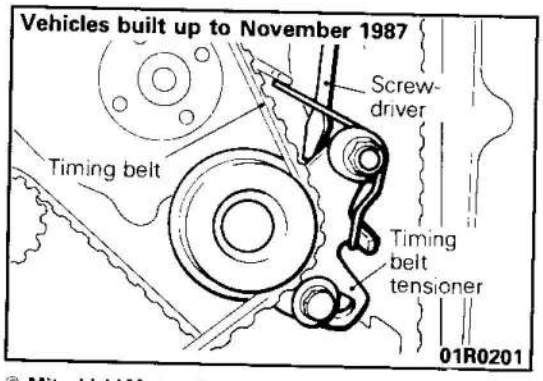
1. Remove air-conditioner compressor V-belt. Remove alternator V-belt.
2. Remove timing belt front upper cover.
3. Position the piston in No. 1 cylinder at the top dead center on compression stroke and turn the crankshaft to align the timing mark on the cover with the position two teeth past the timing mark on the camshaft sprocket.

Caution
Turn the crankshaft always in normal (clockwise) direction.



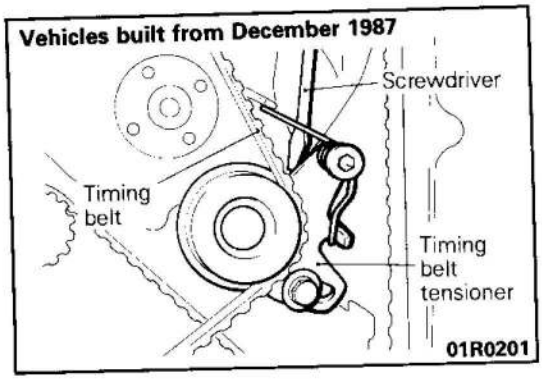
4. Remove the access covers.
5. Loosen the timing belt tensioner mounting nut and bolt.

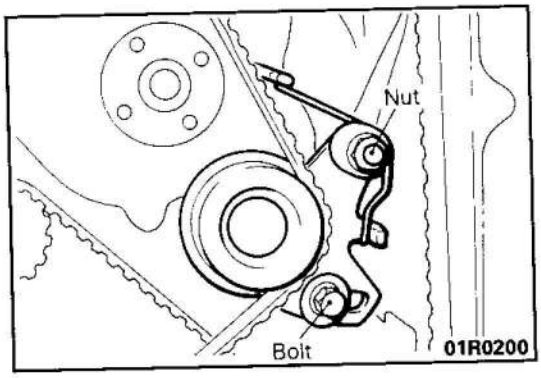
Caution
Do not loosen the nut and bolt more than necessary. They could drop in the lower cover.



6. Insert a screwdriver from the top of the timing belt lower cover and push the tensioner in the belt tensioning direction and then release.

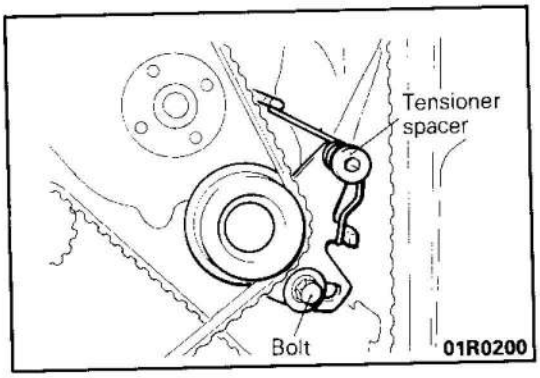
Caution
When inserting a screwdriver, use care not to damage the belt.





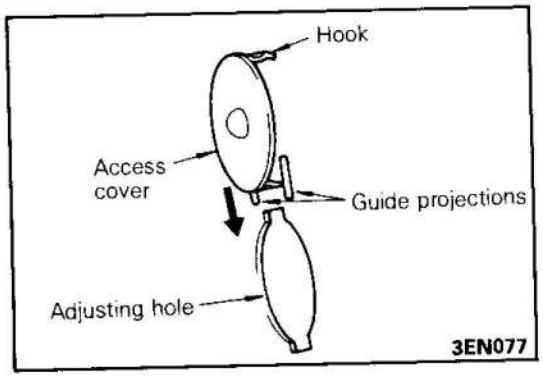
7. [Vehicles buit up to November 1987]
   Tighten the timing belt tensioner mounting nut and bolt.

   Caution
   Tighten the tensioner bolt (lower) first and then nut (upper).



[Vehicles buit from December 1987]
First tighten the tensioner slot side bolt, and then tighten the pivot side tensioner spacer.

Caution
Be sure to tighten the slot side bolt first. If the pivot side tensioner spacer is tightened first, the tensioner will rotate with it and belt tension may become loose.



8. Install access cover. Access cover is easily installed by sliding hook between guide projections.
9. Install timing belt front upper cover.
10. Install air-conditioner compressor belt. Install alternator belt. Refer to P. 11–34 for V-belt tension adjustment.

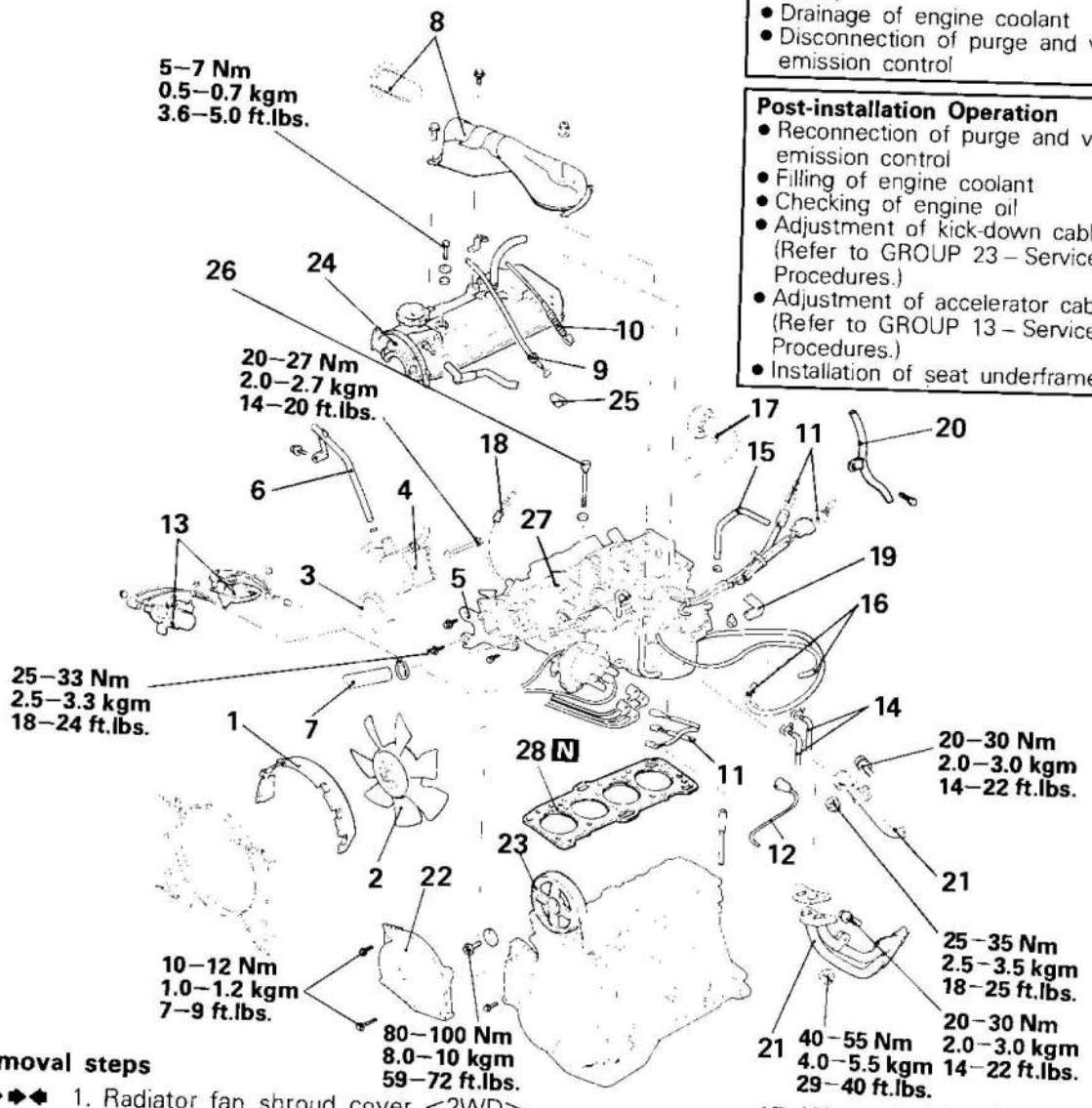
CYLINDER HEAD GASKET (8 VALVE ENGINE)

REMOVAL AND INSTALLATION

E11JA – – 1

Pre-removal Operation
- Removal of seat underframe (Refer to GROUP 01 – Engine Compartment Work)
- Drainage of engine coolant
- Disconnection of purge and vapor hoses for emission control

Post-installation Operation
- Reconnection of purge and vapor hoses for emission control
- Filling of engine coolant
- Checking of engine oil
- Adjustment of kick-down cable (Refer to GROUP 23 – Service Adjustment Procedures.)
- Adjustment of accelerator cable play (Refer to GROUP 13 – Service Adjustment Procedures.)
- Installation of seat underframe



Removal steps

◆◆▶◀◆ 1. Radiator fan shroud cover <2WD>
2. Cooling fan
3. Power steering oil pump drive belt
4. Power steering oil pump
5. Power steering oil pump bracket
(vehicles with power steering)
6. Oil level gauge pipe
7. Radiator upper hose
8. Air horn and air intake duct
9. Accelerator cable
10. Kick-down cable (vehicles with automatic transmission)
11. Control harness connector
12. High tension cable
13. Noise condensor harness
14. Fuel hose
15. Brake vacuum hose
16. Vacuum hoses for air-conditioner idle-up (vehicles with air-conditioner)
17. Warm air inlet duct
18. Oxygen sensor harness <G63B engine>
19. Heater hose
20. Automatic transmission fluid level gauge pipe (vehicles with automatic transmission)
21. Exhaust pipe
22. Timing belt upper cover
◆◆ 23. Camshaft sprocket
▶◀◆ 24. Rocker cover
▶◀◆ 25. Semi-circular packing
◆◆▶◀◆ 26. Cylinder head bolt
▶◀◆ 27. Cylinder head assembly
▶◀◆ 28. Cylinder head gasket

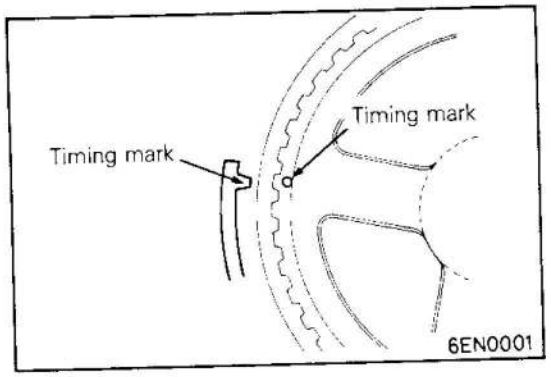
NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ▶◀◆ : Refer to "Service Points of Installation".
(4) N : Non-reusable parts

SERVICE POINTS OF REMOVAL

E11JBAJ0

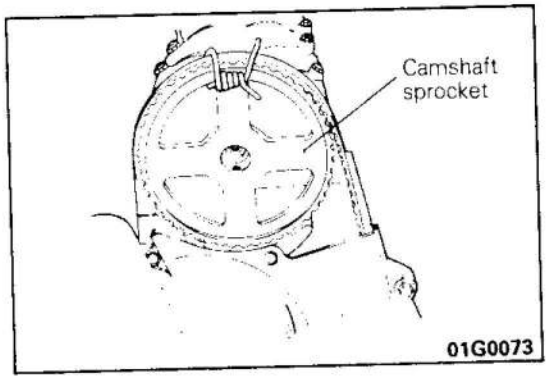
1. REMOVAL OF RADIATOR FAN SHROUD COVER

Refer to GROUP 14 – Radiator.



23. REMOVAL OF CAMSHAFT SPROCKET

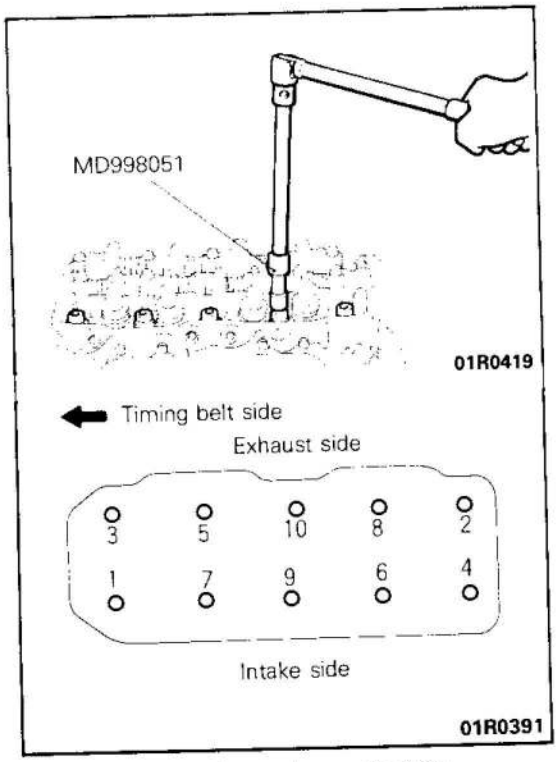
(1) Rotate crankshaft and align timing marks.



(2) Remove camshaft with timing belt and place it on timing belt front lower cover.

Caution
Do not rotate crankshaft after removing camshaft sprocket.

NOTE
Secure camshaft sprocket with wire etc., to prevent them from slipping out of place.

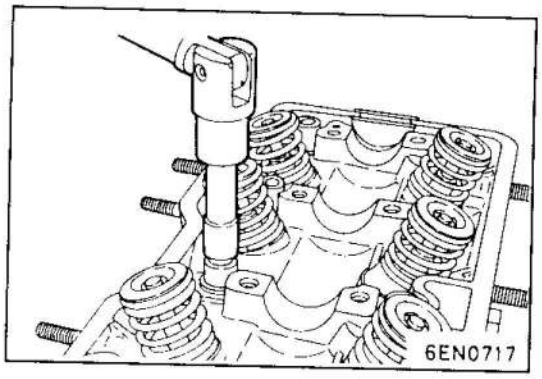


26. REMOVAL OF CYLINDER HEAD BOLT

<Hexagonal head bolts>

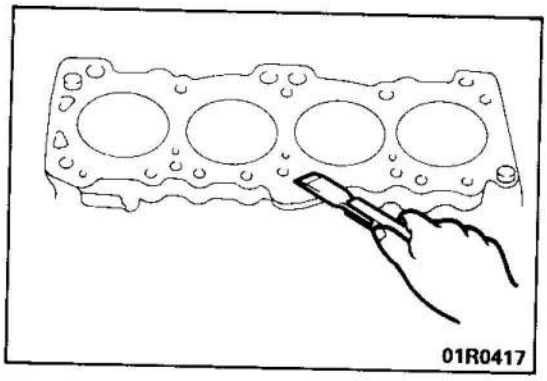
Loosen bolt in the numerical order indicated in the diagram with special tool and remove.

REVISED



<12-point head bolt>

Using the 12 mm – 12 points socket wrench, loosen the cylinder head bolts. Loosen evenly, little by little.

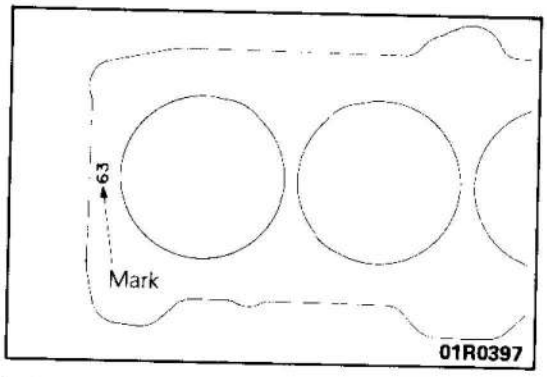


SERVICE POINTS OF INSTALLATION E11JDAUO

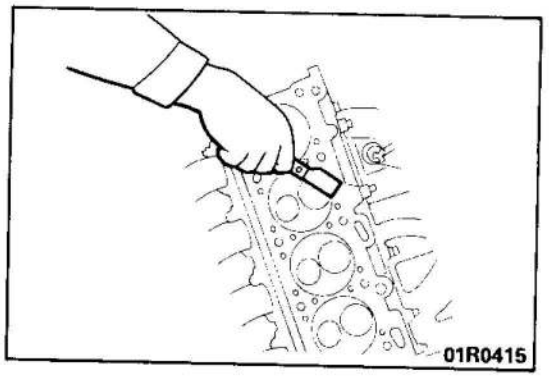
28. INSTALLATION OF CYLINDER HEAD GASKET

(1) Scrape off gasket adhered to cylinder block.

Caution
Be careful that foreign material does not fall into cylinder, or into coolant and oil passage ways.



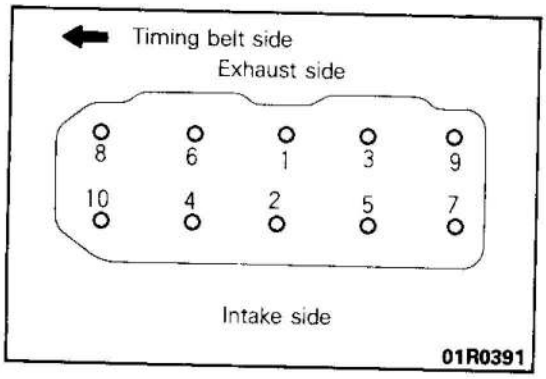
(2) Identification mark is provided on cylinder head gasket to ensure correct installation.
(3) Mount on cylinder block with mark at top.



27. INSTALLATION OF CYLINDER HEAD ASSEMBLY

Scrape off gasket adhered to cylinder head assembly.

Caution
Be careful that foreign material does not fall into coolant and oil passage ways.

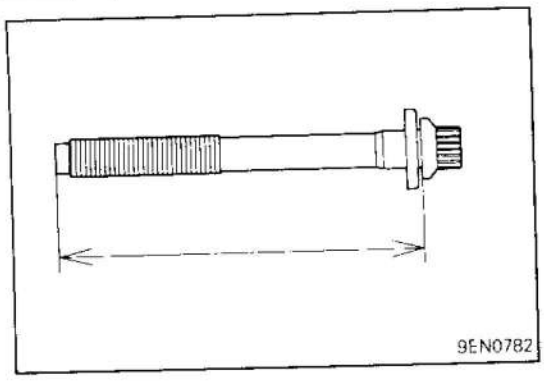


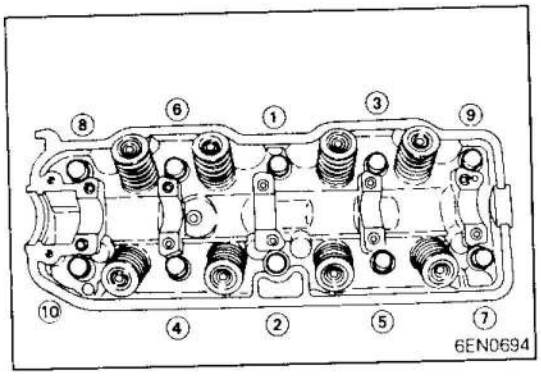
26. INSTALLATION OF CYLINDER HEAD BOLT

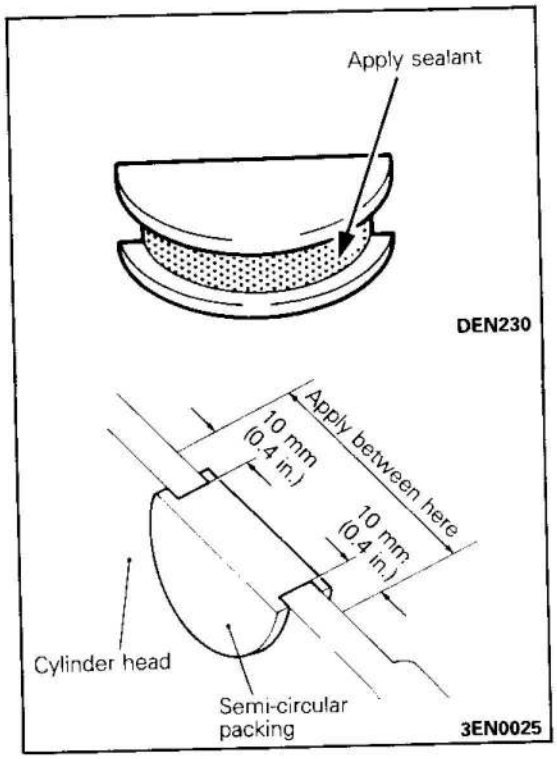
<Hexagonal head bolts>

Tighten in the numerical order indicated in the diagram in two or three groups with special tool (MD998051).

Tightening torque (cold engine):
90 – 100 Nm (9.0 – 10.0 kgm, 65 – 72 ft.lbs.)







<12-point head bolt>

(1) When installing the cylinder head bolts, check that the shank length of each bolt meets the limit. If the limit is exceeded, replace the bolt.

Limit: Max. 120.4 mm (4.74 in.)

(2) Apply engine oil to the threaded portions of bolts and to the washers.
(3) According to the tightening sequence, tighten the bolts to the specified torque 80 Nm (8.0 kgm, 58 ft.lbs.) use with 12 mm – 12 points socket wrench.
(4) Loosen bolts completely.
(5) Torque bolts to 20 Nm (2.0 kgm, 14.5 ft.lbs.)
(6) Tighten bolts 1/4 turns (90°) more.
(7) Tighten bolts 1/4 turns (90°) additionally.

25. INSTALLATION OF SEMI-CIRCULAR PACKING

Apply specified sealant to semi-circular packing and cylinder head to locations indicated in the diagram.

Specified sealant: 3M ATD Part No. 8660 or equivalent

24. INSTALLATION OF ROCKER COVER

Replace rocker cover gasket if cracked or deteriorated.

1. INSTALLATION OF RADIATOR FAN SHROUD COVER

Refer to GROUP 14 – Radiator

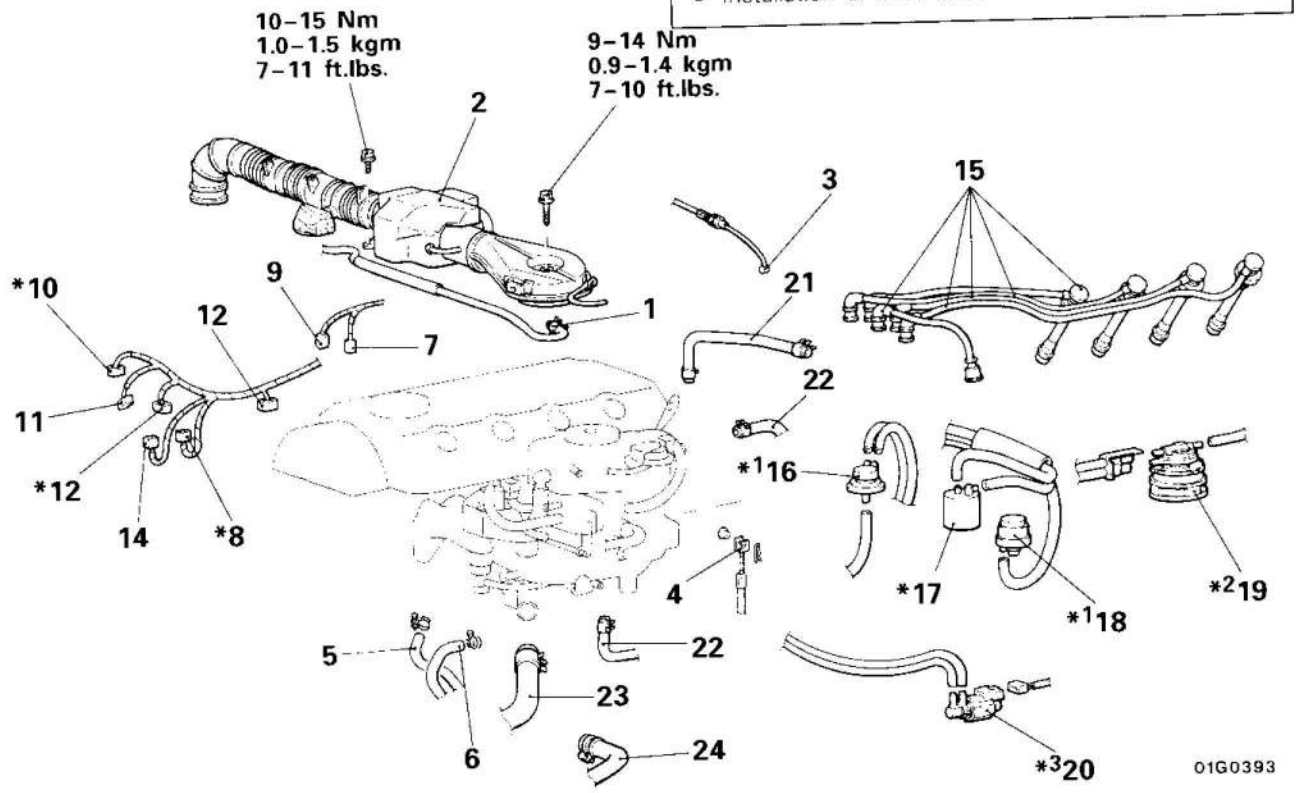
NOTES

CYLINDER HEAD GASKET (16 VALVE ENGINE – EXCEPT MPI)

REMOVAL AND INSTALLATION

Pre-removal Operation
- Removal of seat underframe
- Removal of front exhaust pipe (Refer to GROUP 15 – Exhaust Pipe and Mufflers.)
- Drainage of engine coolant
- Disconnection of purge and vapor hoses for emission control

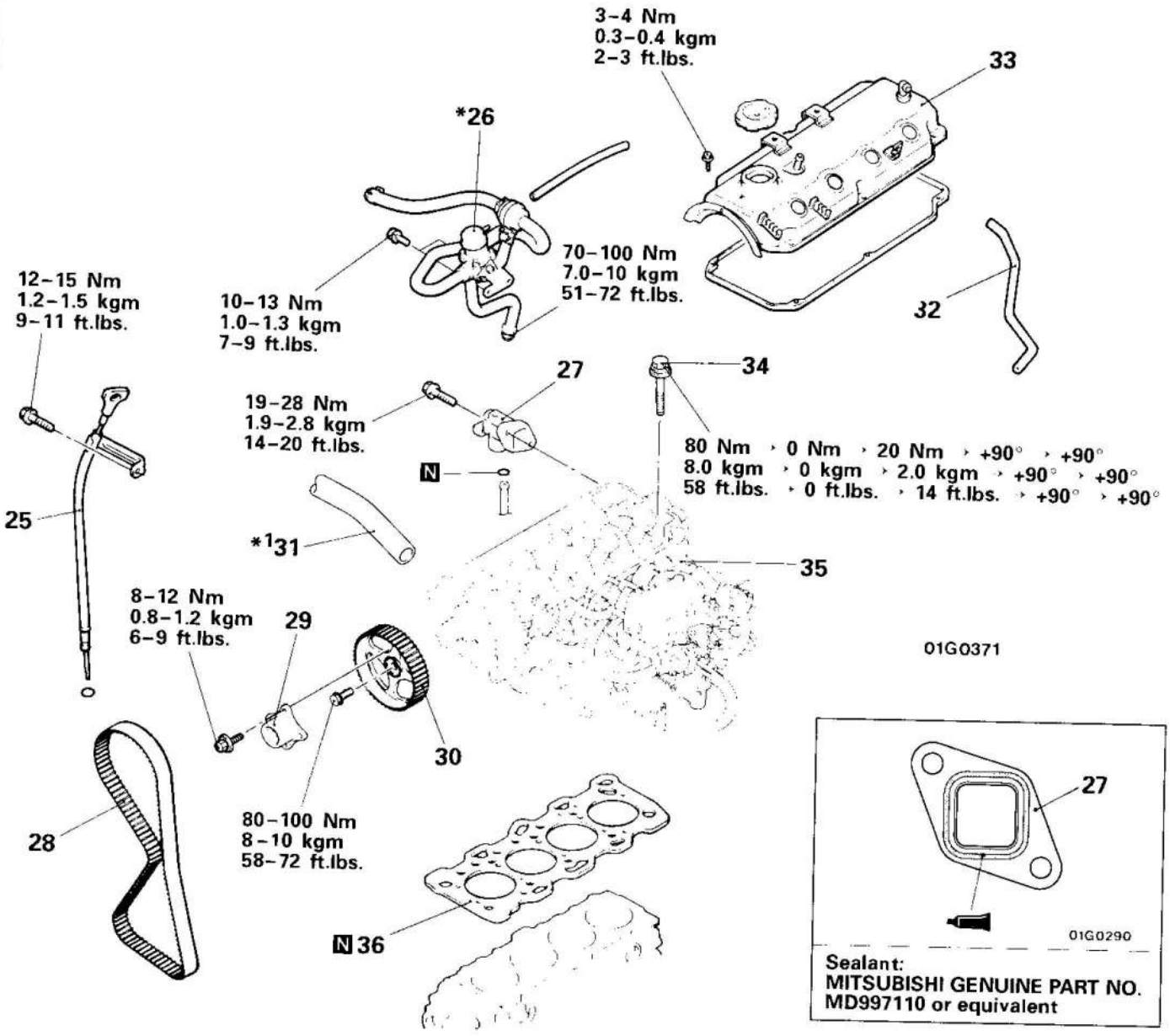
Post-installation Operation
- Reconnection of purge and vapor hoses for emission control
- Filling of engine coolant
- Checking of engine oil
- Adjustment of kick-down cable (Refer to GROUP 23 – Service Adjustment Procedures.)
- Adjustment of accelerator cable play (Refer to GROUP 13 – Service Adjustment Procedures.)
- Installation of front exhaust pipe (Refer to GROUP 15 – Exhaust Pipe and Mufflers.)
- Installation of seat underframe



Removal steps

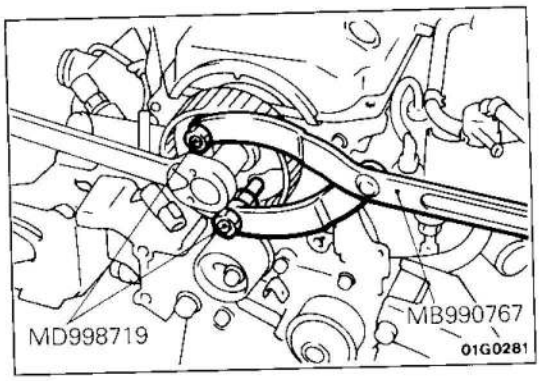
1. Innervent hose
2. Air intake hose and air horn
3. Accelerator cable
4. Kick down cable
5. Fuel main hose
6. Fuel return hose
7. Engine coolant temperature gauge unit connector
8. Engine coolant temperature sensor connector
9. Engine coolant temperature switch connector
10. Oxygen sensor connector
11. Distributor connector
12. Throttle position sensor connector
13. Solenoid valve connector
14. Ignition coil connector
15. Spark plug cables and high tension cable
16. Vacuum regulator valve
17. Vacuum tank
18. Vacuum switch
19. High altitude compensator
20. Idle up solenoid valve
21. Brake booster vacuum hose
22. Water hose
23. Radiator upper hose (Refer to GROUP 14 – Radiator.)
24. Heater hose

NOTE
(1) Reverse the removal procedures to reinstall.
(2) * : Vehicle with FBC.
(3) *1 : Vehicles for Australia and Europe with FBC.
(4) *2 : Vehicles with high altitude compensator.
(5) *3 : Vehicles with air-conditioner.



25. Oil level gauge guide
26. Reed valve assembly
◆◆ 27. Water by-pass fitting
28. Timing belt (Refer to P.11-55-1.)
29. Camshaft sprocket spacer (Refer to GROUP 16 – Distributor.)
◆◆ ◆◆ 30. Camshaft sprocket
31. Heat duct
32. Breather hose
33. Rocker cover
◆◆ ◆◆ 34. Cylinder head bolt
35. Cylinder head assembly
◆◆ 36. Cylinder head gasket

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".
(4) N : Non-reusable parts
(5) * : Vehicles with secondary air supply system.
(6) *1 : Vehicles with hot air control valve.

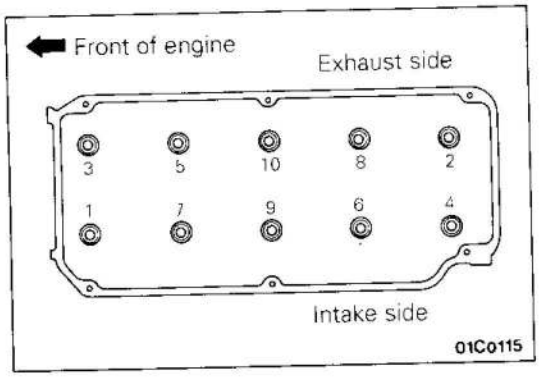


SERVICE POINTS OF REMOVAL

30. REMOVAL OF CAMSHAFT SPROCKET

Use the special tool to remove the camshaft sprocket.

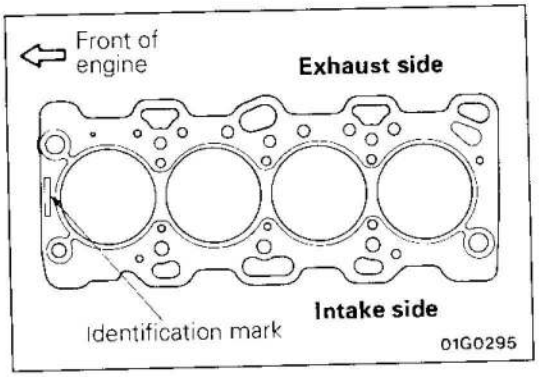
Caution
After removing the camshaft sprocket, be sure not to rotate the camshaft.



34. REMOVAL OF CYLINDER HEAD BOLT

Loosen the bolts in 2 or 3 steps in order of the numbers shown in the illustration, and remove the cylinder head assembly.

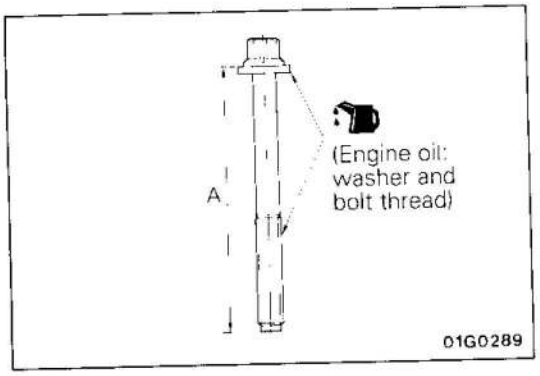
Caution
Because the plug guides cannot be replaced by themselves, be careful not to damage or deform them when removing the cylinder head bolts.



SERVICE POINTS OF INSTALLATION

36. INSTALLATION OF CYLINDER HEAD GASKET

(1) Wipe off all oil and grease from the gasket mounting surface.
(2) Install the gasket to the cylinder block with the identification mark facing upwards.



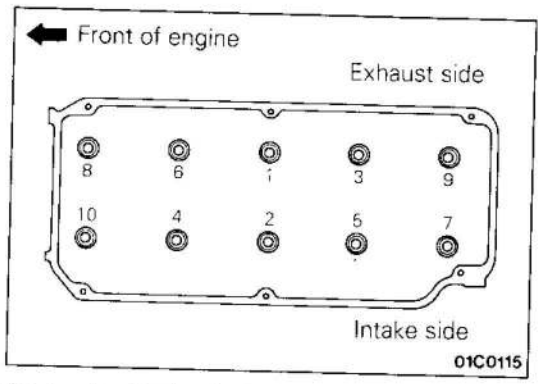
34. INSTALLATION OF CYLINDER HEAD BOLT

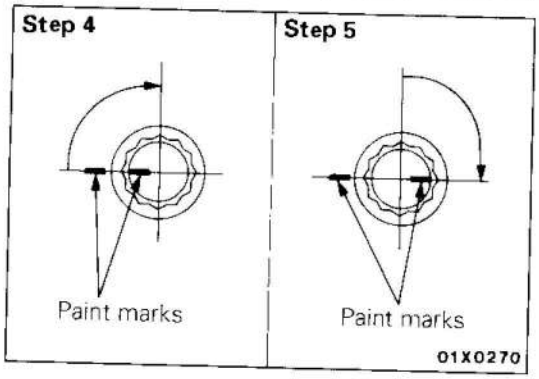
(1) When installing the cylinder head bolts, the length below the head of the bolts should be within the standard value. If it is outside the standard value, replace the bolts.

Limit (A): Within 99.4 mm (3.91 in.)

(2) Apply a small amount of engine oil to the thread section and the washer of the cylinder head bolt.

Caution
The head bolt washer should be installed with the burred side caused by tapping out facing upwards.





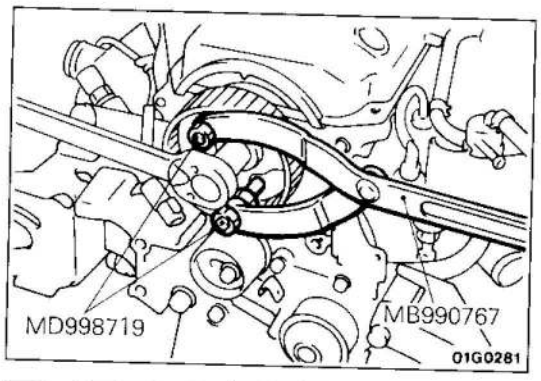
(3) Use a double hexagonal wrench of 12 mm to tighten the bolts by the following procedures.

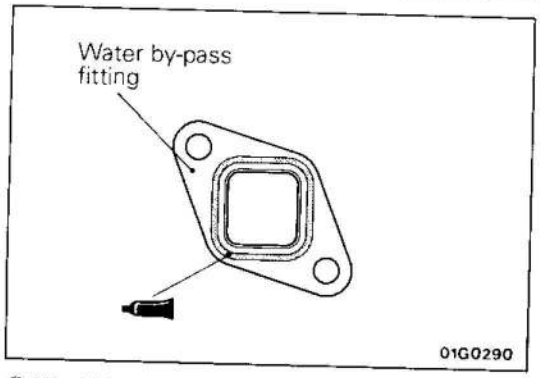
Step	Operation	Remarks
1	Tighten to 80 Nm (8.0 kgm, 58 ft.lbs.).	In the order shown in the illustration.
2	Loosen fully.	In the reverse order of that shown in the illustration.
3	Tighten to 20 Nm (2.0 kgm, 15 ft.lbs.)	In the order shown in the illustration
4	Tighten 90° of a turn.	In the order shown in the illustration Mark the head of the cylinder head bolt and cylinder head by paint.
5	Tighten 90° of a turn.	In the order shown in the illustration. Check that the painted mark of the head bolt is lined up with that of the cylinder head.

Caution

1. **If the tightening angle is less than 90°, enough tightness may not be obtained. Be careful about the tightening angle.**
2. **If the tightening angle is more than the specified, remove the bolt, and then retighten from step 1.**

30. INSTALLATION OF CAMSHAFT SPROCKET





27. INSTALLATION OF WATER BY-PASS FITTING

(1) Apply specified sealant to the thermostat case assembly in the places shown in the illustration.

Specified sealant: MITSUBISHI GENUINE PART No. MD970389 or equivalent

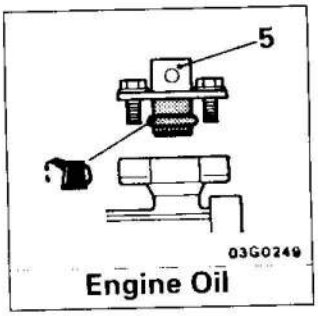
(2) Apply a small amount of water to the O-ring of the water inlet pipe, and then press the thermostat case assembly into the water pipe.

CYLINDER HEAD GASKET (16 VALVE ENGINE – MPI)

REMOVAL AND INSTALLATION

Pre-removal Operation
- Removal of seat underframe
- Removal of front exhaust pipe (Refer to GROUP 15 – Exhaust Pipe and Mufflers)
- Drainage of engine coolant

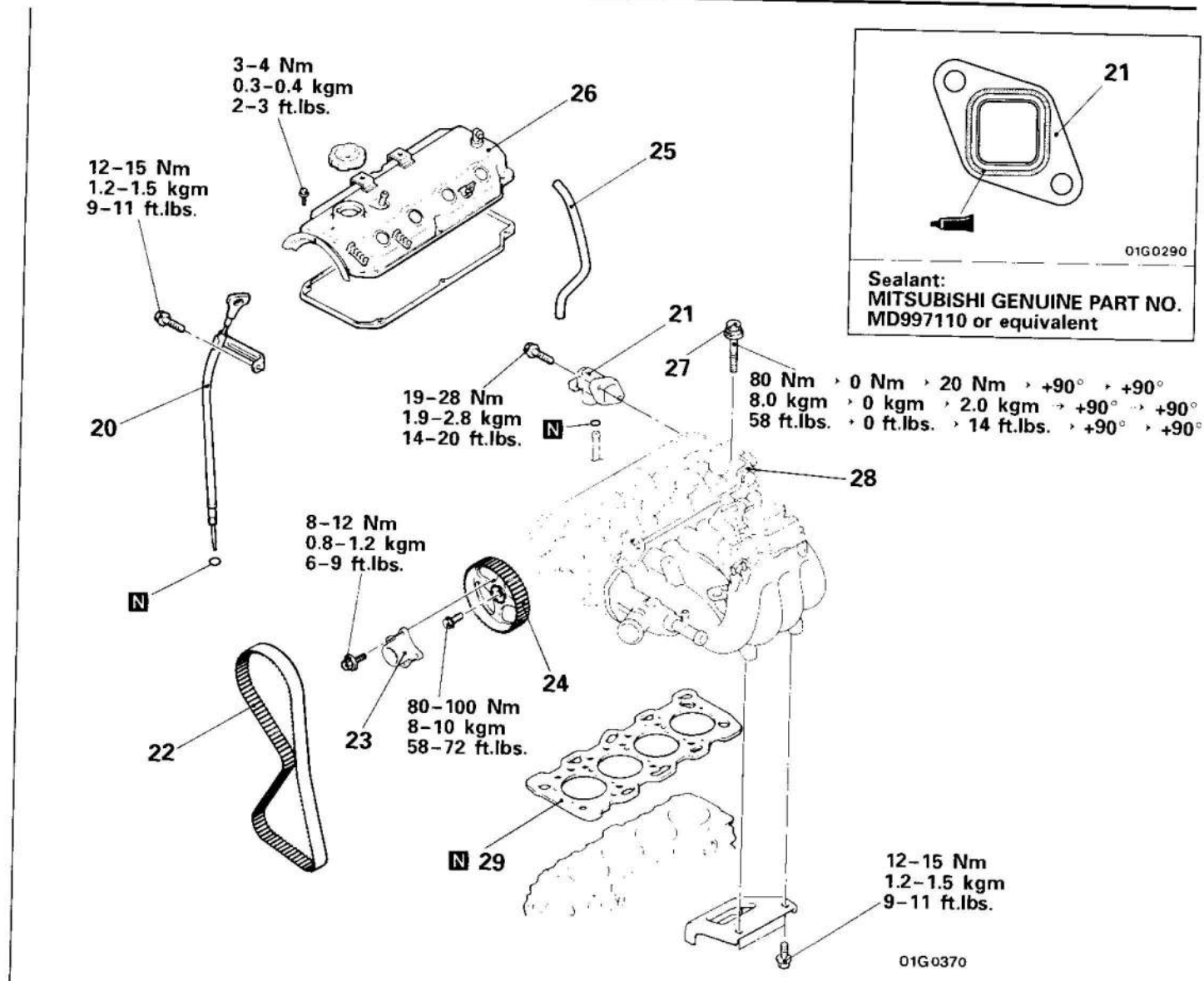
Post-installation Operation
- Filling of engine coolant
- Adjustment of accelerator cable play (Refer to GROUP 13 – Service Adjustment Procedures.)
- Checking of engine oil
- Installation of front exhaust pipe (Refer to GROUP 15 – Exhaust Pipe and Mufflers.)
- Installation of seat underframe



Removal steps

1. Resonance tank
2. Air hose
3. Accelerator cable
4. Fuel return hose
5. ◆◆ Fuel high pressure pipe
6. Engine coolant temperature sensor connector
7. Engine coolant temperature gauge unit connector
8. Oxygen sensor connector
9. Distributor connector
10. Power transistor connector
11. Throttle position sensor connector.
12. Idle speed control servo connector
13. Injection wiring harness connector
14. Spark plug cables and high tension cable
15. Vacuum hose
16. Brake booster vacuum hose
17. Water hose
18. Heater hose
19. Radiator upper hose (Refer to GROUP 14 – Radiator.)

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) N : Non-reusable parts



20. Oil level gauge guide
◆◆ 21. Water by-pass fitting
22. Timing belt (Refer to P.11-55-1.)
23. Camshaft sprocket spacer (Refer to GROUP 16 – Distributor.)
◆◆ ◆◆ 24. Camshaft sprocket
25. Breather hose
26. Rocker cover
◆◆ ◆◆ 27. Cylinder head bolt
28. Cylinder head assembly
◆◆ 29. Cylinder head gasket

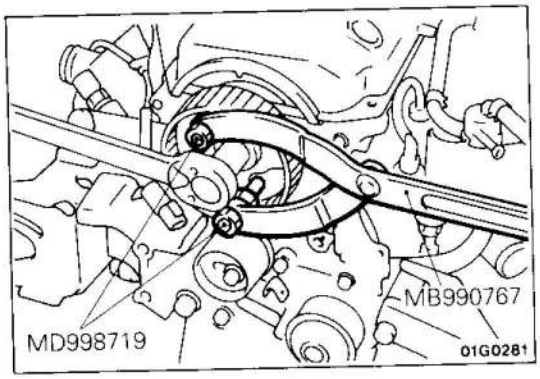
NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".
(4) N : Non-reusable parts

SERVICE POINTS OF REMOVAL E13WBAA

5. DISCONNECTION OF FUEL HIGH PRESSURE HOSE

Release residual pressure from the fuel pipe line to prevent fuel from spilling.
Refer to GROUP 13 for releasing residual pressure.

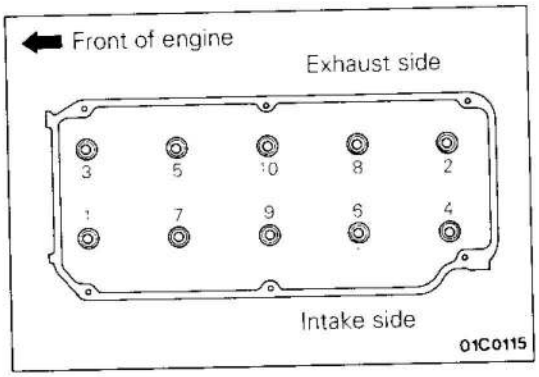
Caution
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.



24. REMOVAL OF CAMSHAFT SPROCKET

Use the special tool to remove the camshaft sprocket.

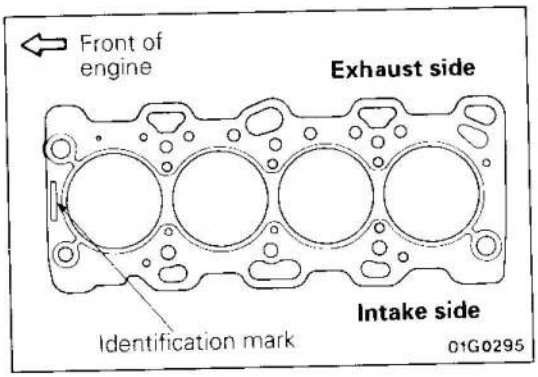
Caution
After removing the camshaft sprocket, be sure not to rotate the crankshaft.



27. REMOVAL OF CYLINDER HEAD BOLT

Loosen the bolts in 2 or 3 steps in order of the numbers shown in the illustration, and remove the cylinder head assembly.

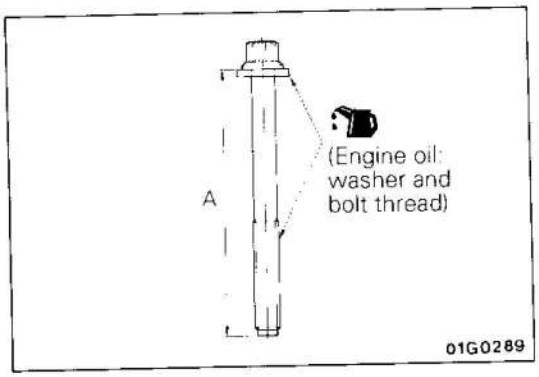
Caution
Because the plug guides cannot be replaced by themselves, be careful not to damage or deform them when removing the cylinder head bolts.



SERVICE POINTS OF INSTALLATION

29. INSTALLATION OF CYLINDER HEAD GASKET

(1) Wipe off all oil and grease from the gasket mounting surface.
(2) Install the gasket to the cylinder block with the identification mark facing upwards.



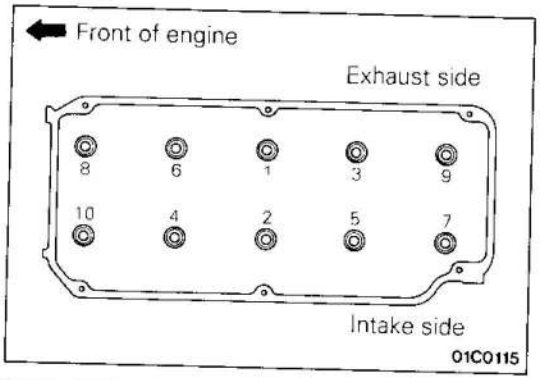
27. INSTALLATION OF CYLINDER HEAD BOLT

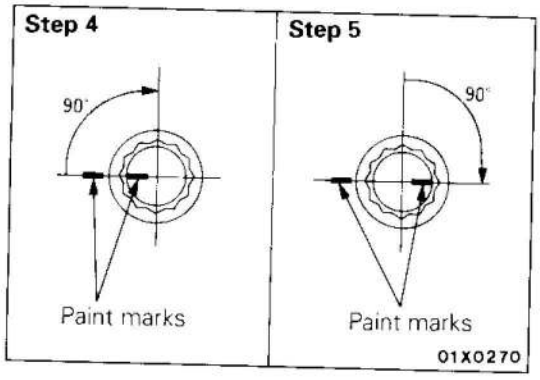
(1) When installing the cylinder head bolts, the length below the head of the bolts should be within the standard value. If it is outside the standard value, replace the bolts.

Limit (A): Within 99.4 mm (3.91 in.)

(2) Apply a small amount of engine oil to the thread section and the washer of the cylinder head bolt.

Caution
The head bolt washer should be installed with the burred side caused by tapping out facing upwards.



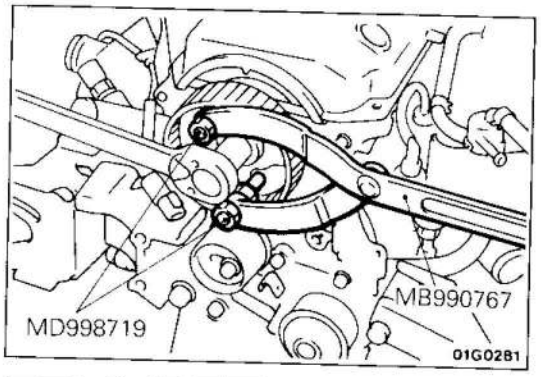


(3) Use a double hexagonal wrench of 12 mm to tighten the bolts by the following procedures.

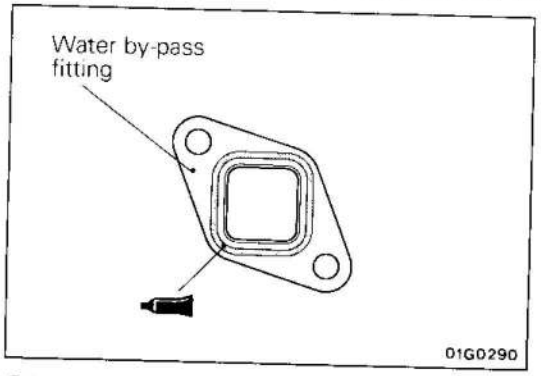
Step	Operation	Remarks
1	Tighten to 80 Nm (8.0 kgm, 58 ft.lbs.).	In the order shown in the illustration.
2	Loosen fully.	In the reverse order of that shown in the illustration.
3	Tighten to 20 Nm (2.0 kgm, 15 ft.lbs.)	In the order shown in the illustration
4	Tighten 90° of a turn.	In the order shown in the illustration Mark the head of the cylinder head bolt and cylinder head by paint.
5	Tighten 90° of a turn.	In the order shown in the illustration. Check that the painted mark of the head bolt is lined up with that of the cylinder head

Caution

1. **If the tightening angle is less than 90°, enough tightness may not be obtained. Be careful about the tightening angle.**
2. **If the tightening angle is more than the specified, remove the bolt, and then retighten from step 1.**



24. INSTALLATION OF CAMSHAFT SPROCKET



21. INSTALLATION OF WATER BY-PASS FITTING

(1) Apply specified sealant to the thermostat case assembly in the places shown in the illustration.

Specified sealant: MITSUBISHI GENUINE PART No. MD970389 or equivalent

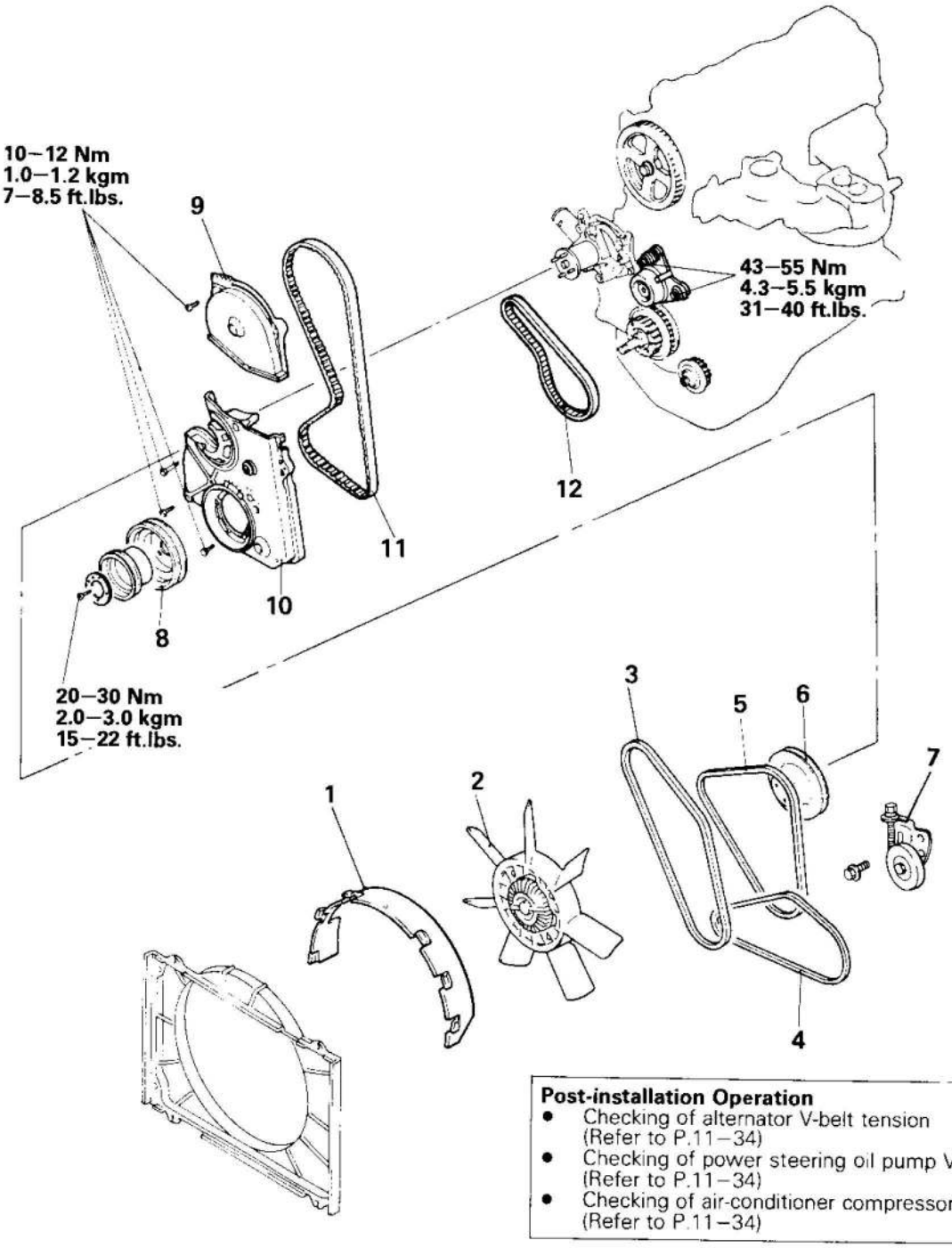
(2) Apply a small amount of water to the O-ring of the water inlet pipe, and then press the thermostat case assembly into the water pipe.

NOTES

TIMING BELT AND TIMING BELT B (8 VALVE ENGINE)

E11GA--1

REMOVAL AND INSTALLATION



Post-installation Operation
- Checking of alternator V-belt tension (Refer to P.11–34)
- Checking of power steering oil pump V-belt tension (Refer to P.11–34)
- Checking of air-conditioner compressor V-belt tension (Refer to P.11–34)

Removal steps

◆◆ 1. Radiator fan shroud cover (2WD)
2. Cooling fan
3. Power steering oil pump V-belt (vehicles with power steering)
4. Air-conditioner compressor V-belt (vehicles with air-conditioner)
5. Alternator V-belt
6. Water pump pulley
7. Tension pulley bracket for air-conditioner compressor
8. Crankshaft pulley
9. Timing belt upper cover
10. Timing belt lower cover
◆◆ ▶◀ 11. Timing belt
◆◆ ▶◀ 12. Timing belt B (vehicles for Europe and Australia)

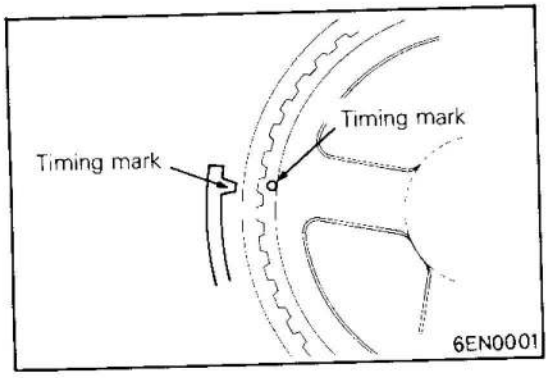
NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆: Refer to "Service Points of Removal".
(3) ▶◀: Refer to "Service Points of Installation".

SERVICE POINTS OF REMOVAL

E11GBDB

1. REMOVAL OF RADIATOR FAN SHROUD COVER

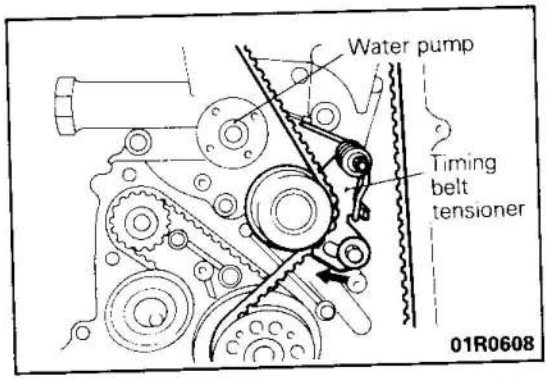
Refer to GROUP 14 COOLING–Radiator.



11. REMOVAL OF TIMING BELT

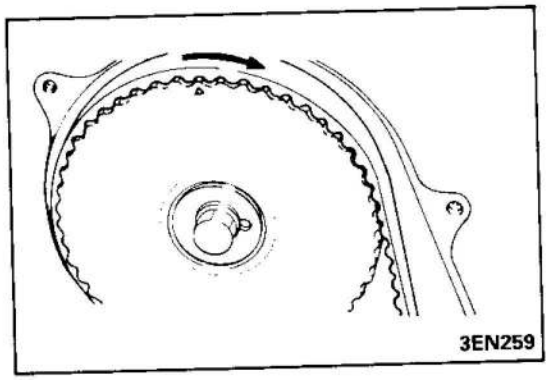
(1) Rotate crankshaft clockwise (to the right) and align timing marks.

Caution
Always rotate crankshaft clockwise.



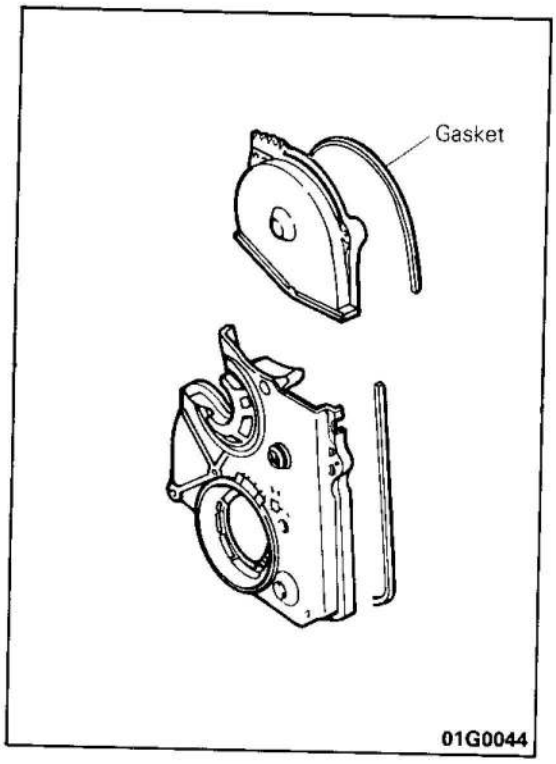
(2) Loosen timing belt tensioner bolt and nut.
(3) Push timing belt tensioner to water pump side and tighten nut. Secure so that tensioner will not move back.
(4) Remove timing belt.

Caution
When reinstalling timing belt, mark an arrow at the back of belt with chalk to show rotation direction (rotate to right).



12. REMOVAL OF TIMING BELT B

When reinstalling timing belt B, mark an arrow at the back of belt with chalk to show rotation direction (rotate to right).

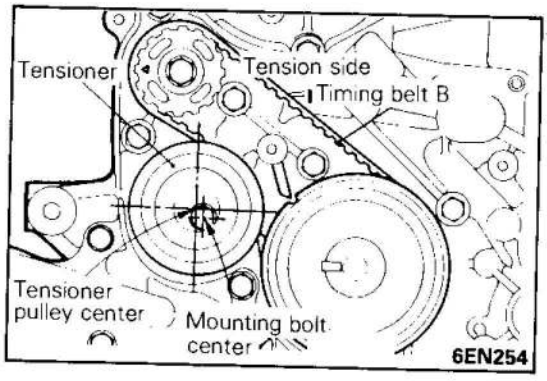


INSPECTION

E11GCAB1

TIMING BELT COVER

Cracking, splitting, deterioration of gasket.

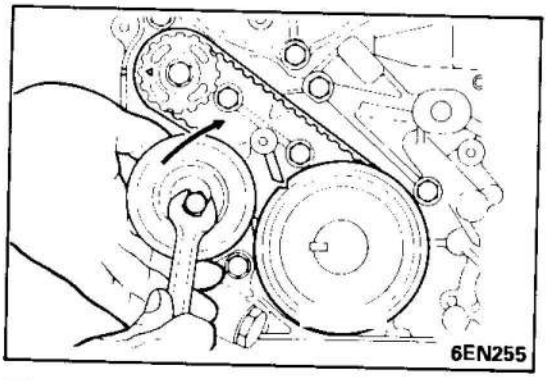


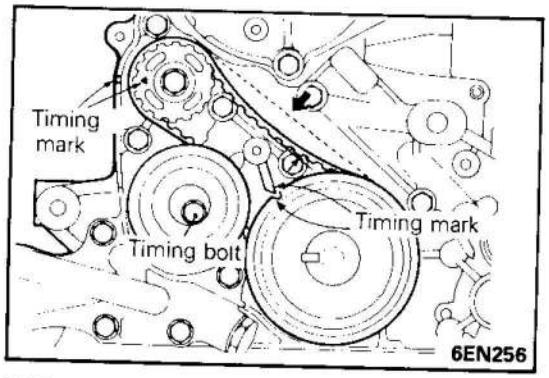
SERVICE POINTS OF INSTALLATION

E11GDDB

12. INSTALLATION AND ADJUSTMENT OF TIMING BELT B

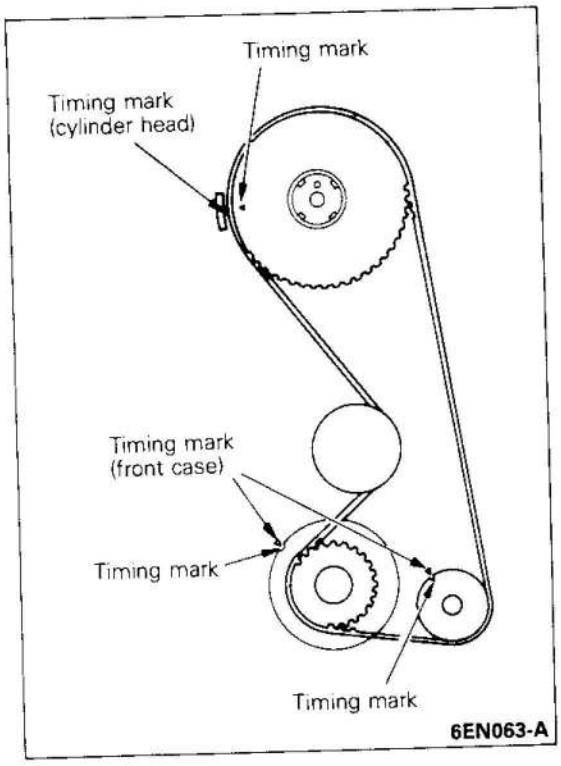
(1) Align timing marks.
(2) Place timing belt B around crankshaft sprocket B and silent shaft sprocket. Belt tension side should not slack.
(3) Install tensioner B. Assemble tensioner B so that the center of pulley is to the left of the installing bolt center and the pulley flange is at the engine front side.
(4) Push up tensioner B in the direction of the arrow and stretch timing belt tension side taut. Tighten bolt and secure tensioner B. When tightening bolt, secure tensioner B shaft so that it does not rotate. If the shaft rotates, timing belt tension will be too tight.





(5) Confirm correct alignment of timing marks on front case and sprocket.
(6) Push timing belt B tension side center with finger in the direction indicated by the arrow and check belt flex.

Standard value: 5–7 mm (0.20–0.28 in.)



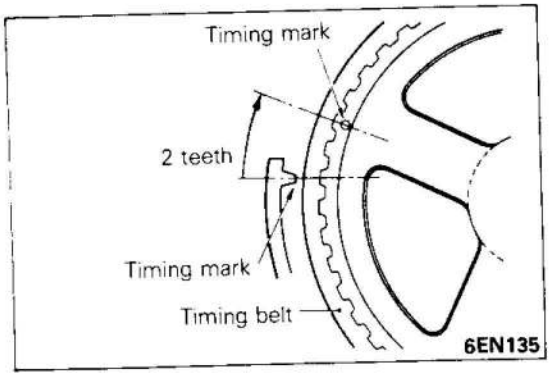
11. INSTALLATION AND ADJUSTMENT OF TIMING BELT

(1) Align sprocket timing marks.

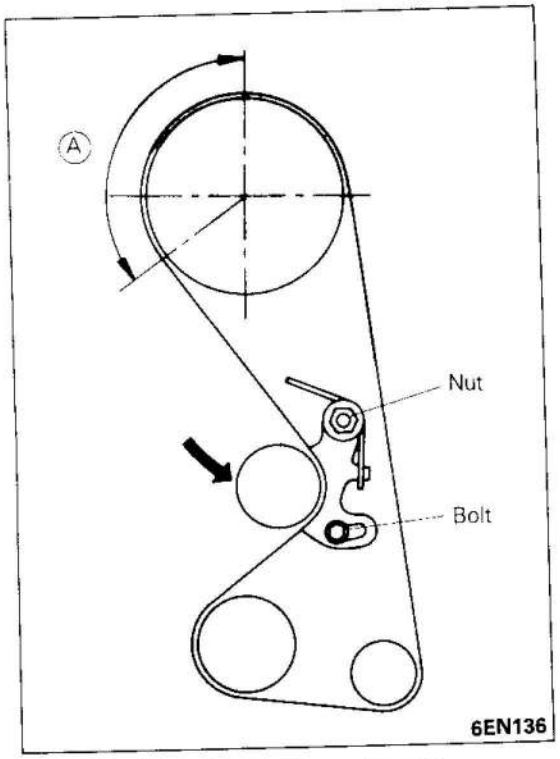
(2) First, put timing belt around crankshaft sprocket. Next, put timing belt around oil pump sprocket and then around camshaft sprocket. Install so that tension side has no slack.

(3) Push camshaft sprocket counter clockwise (to the left) and stretch belt tension side taut. Reconfirm correct timing mark alignments.

(4) Turn 1–2 times tensioner bolt and nut temporarily secured on water pump side first, and loosen. Stretch belt using tensioner spring force.

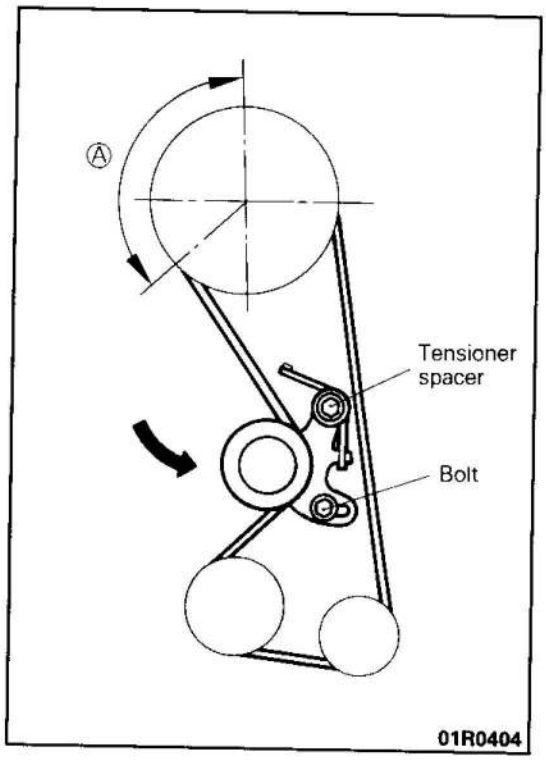


(5) Rotate crankshaft clockwise (to the right) for two teeth on the camshaft sprocket. This provides appropriate tension to timing belt, so do not rotate crankshaft counter clockwise (to the left) or check tension by pressing belt.



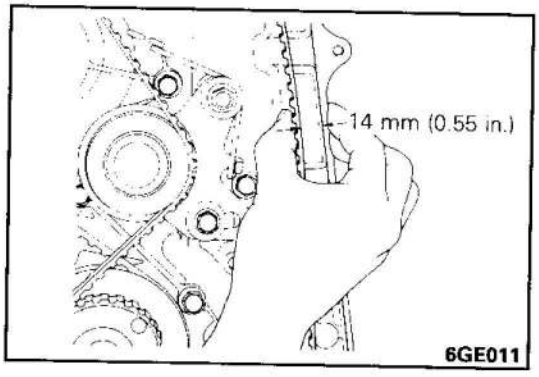
(6) [Vehicles built up to November 1987]
Push tensioner in rotation direction (indicated in diagram). Adjust so that belt does not rise at point (A) and meshes completely with camshaft sprocket.
Tighten tensioner installing bolt (lower tensioner) to specified torque.
Tighten tensioner installing nut (upper tensioner) to specified torque.

Caution
Tightening nut first may cause tensioner to rotate and loosen tension of belt. Therefore, tighten bolt (tensioner lower side) first and then tighten nut (upper).



[Vehicles built from December 1987]
Push tensioner in rotation direction (indicated in diagram). Adjust so that belt does not rise at point (A) and meshes completely with camshaft sprocket.
Tighten the tensioner slot side bolt to specified torque.
Tighten the pivot side tensioner spacer to specified torque.

Caution
Tightening the pivot side tensioner spacer first may cause tensioner to rotate and loosen tension of belt. Therefore, tighten the tensioner slot side bolt first and then tighten the pivot side tensioner spacer.



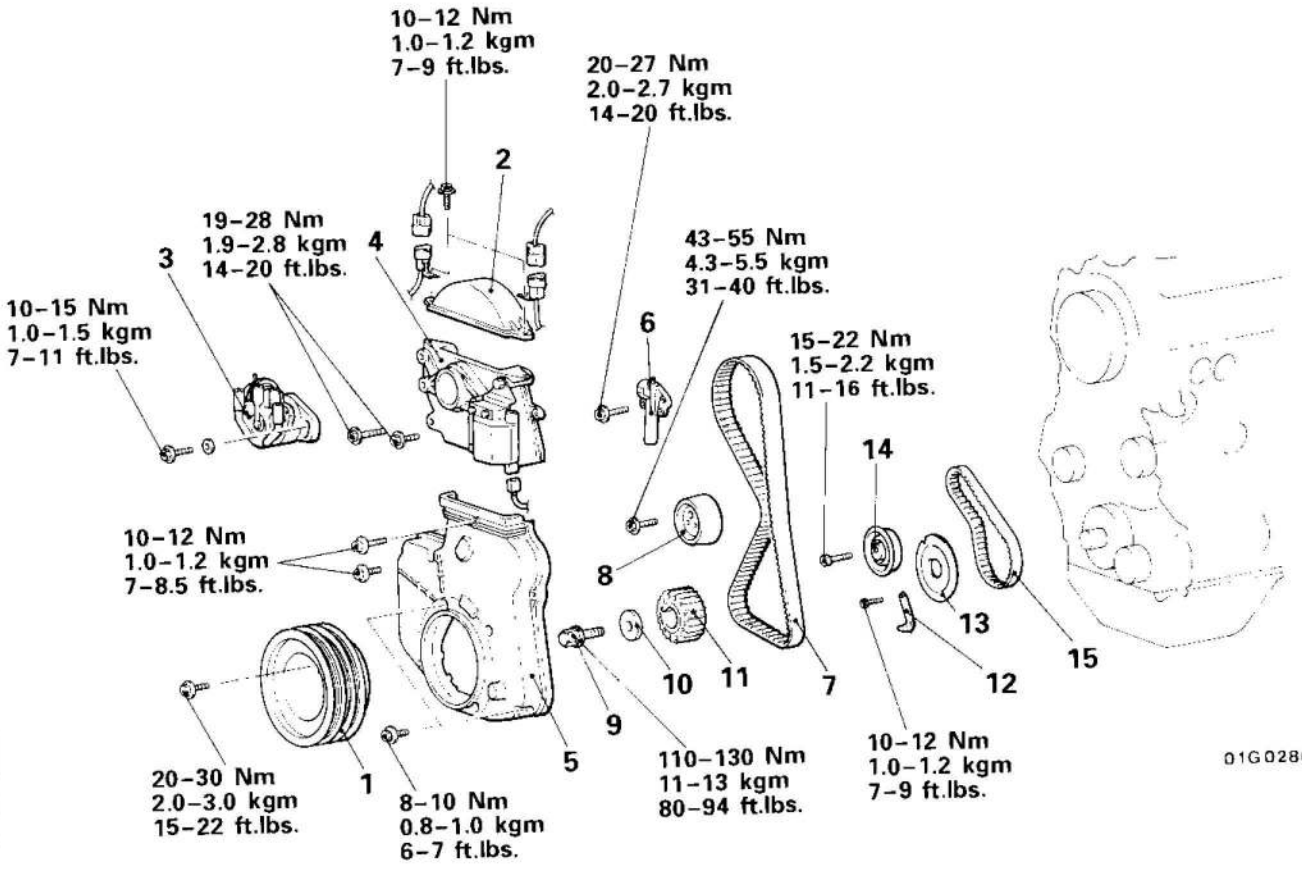
(7) Press center of timing belt tension side (between camshaft sprocket and oil pump sprocket) with thumb and pointer from both sides and confirm that gap between belt back and cover is at the standard value.

Standard value: 14 mm (0.55 in.)

TIMING BELT AND TIMING BELT B (16 VALVE ENGINE)

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and installation of cooling fan (Refer to GROUP 14 – Cooling Fan.)



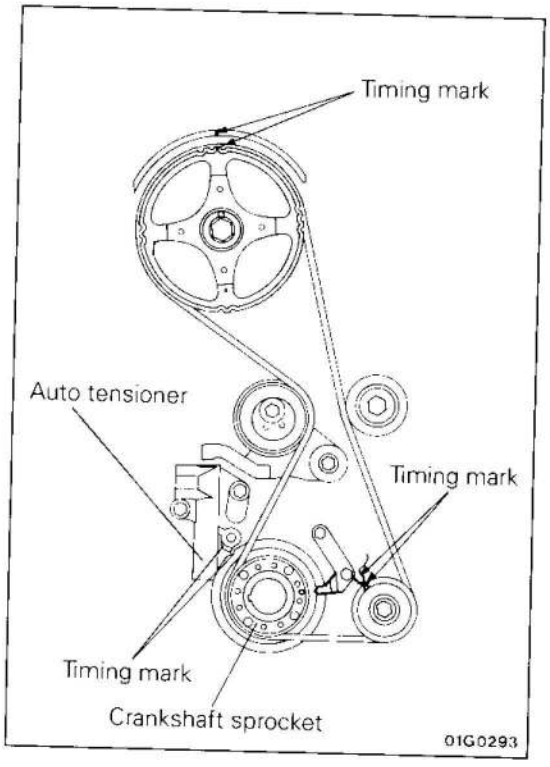
Removal steps

1. Crankshaft pulley
2. Timing belt front upper cover
3. Distributor (Refer to GROUP 16 – Distributor.)
4. Distributor bracket
5. Timing belt front lower cover
6. ◆◆ Auto tensioner
7. ◆◆ Timing belt
8. Tensioner pulley
9. Crankshaft sprocket bolt
10. Special washer
11. Crankshaft sprocket
12. Timing indicator bracket
13. Flange
14. Timing belt tensioner B
15. ◆◆ Timing belt B

Installation steps

14. Timing belt tensioner B
15. ◆◆ Timing belt B
- ◆◆ • Adjustment of timing belt B tension
13. ◆◆ Flange
12. Timing indicator bracket
11. ◆◆ Crankshaft sprocket
10. Special washer
9. Crankshaft sprocket bolt
6. ◆◆ Auto tensioner
8. ◆◆ Tensioner pulley
7. ◆◆ Timing belt
- ◆◆ • Adjustment of timing belt tension
5. Timing belt front lower cover
4. Distributor bracket
3. Distributor (Refer to GROUP 16 – Distributor.)
2. Timing belt front upper cover
1. Crankshaft pulley

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".



SERVICE POINTS OF REMOVAL

6. REMOVAL OF AUTO TENSIONER

(1) Turn the crankshaft clockwise and align the timing marks so as to bring the No. 1 cylinder to compression top-dead-centre position.
At this time the timing marks of the camshaft sprocket and the upper surface of the cylinder head should coincide, and the dowel pin of the camshaft sprocket should be at the upper side.

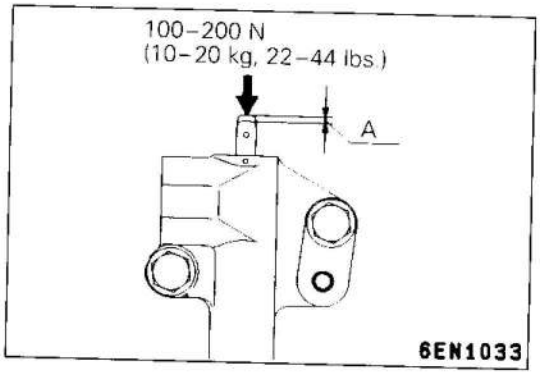
Caution
The crankshaft must always be rotated clockwise.

(2) Remove the auto tensioner.

7. REMOVAL OF TIMING BELT/15. TIMING BELT B

Make a mark on the back of the timing belt or timing belt B indicating the direction of rotation so it may be reassembled in the same direction if it is to be reused.

Caution
Water or oil on the belt shorten its life drastically, so the removed timing belt or timing belt B, sprocket, and tensioner must be free from oil and water. These parts should not be washed. Replace parts if seriously contaminated.
If there is oil or water on each part, check the front case oil seals, camshaft oil seal and water pump for leaks.



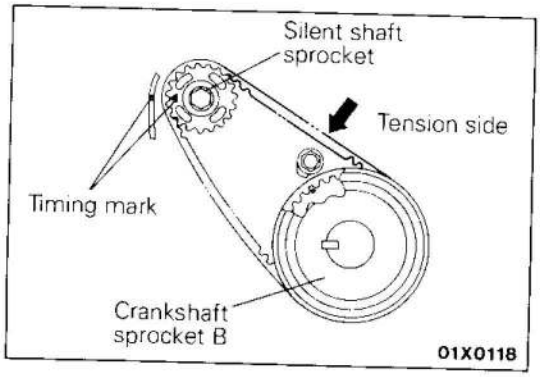
INSPECTION

INSPECTION OF AUTO TENSIONER

1. Press the rod with a force of 100 – 200 N (10 – 20 kg, 22 – 44 lbs.), and then measure the contraction amount.

   Standard value (A): Less than 1 mm

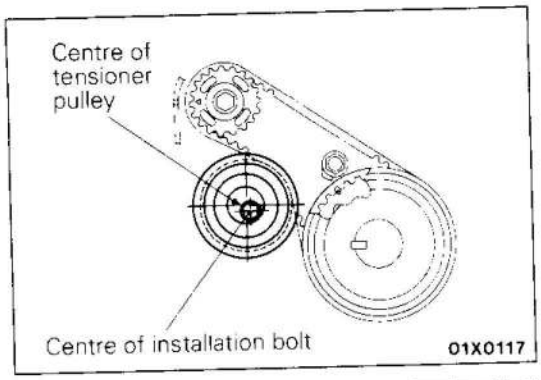
2. If not within the standard value, replace the auto tensioner.

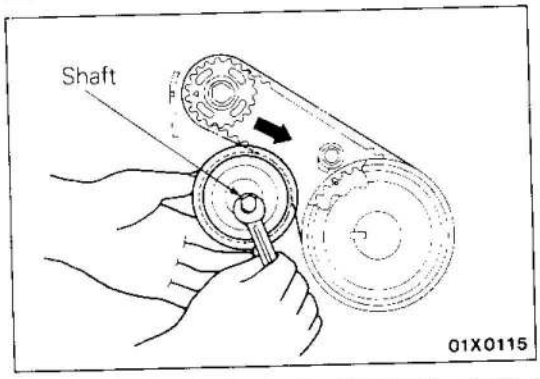


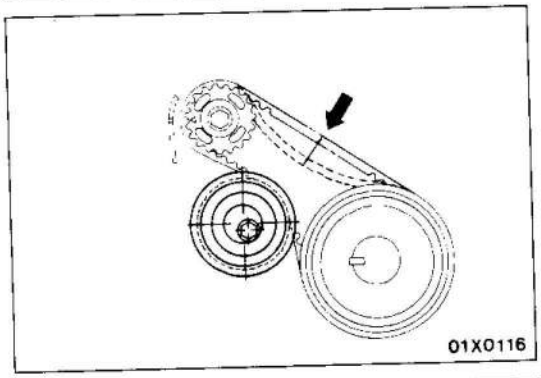
SERVICE POINTS OF INSTALLATION

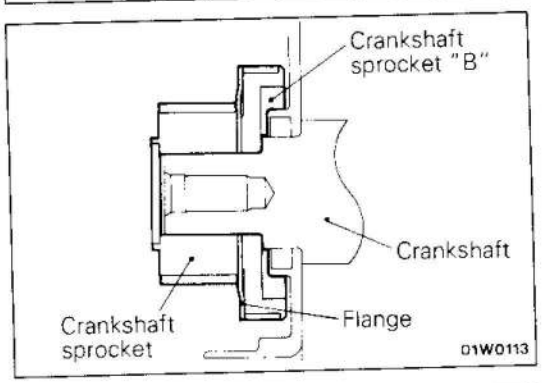
15. INSTALLATION OF TIMING BELT B

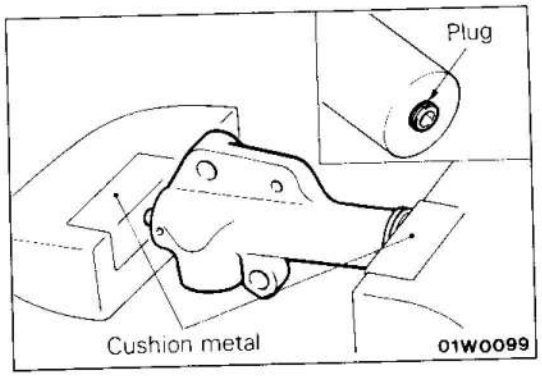
(1) Ensure that crankshaft sprocket B timing mark and the silent shaft sprocket timing mark are aligned.
(2) Fit timing belt B over crankshaft sprocket B and the silent shaft sprocket. Ensure that there is no slack in the belt.











- **ADJUSTMENT OF TIMING BELT B TENSION**

(1) Temporarily fix the timing belt B tensioner such that the center of the tensioner pulley is to the left and above the center of the installation bolt, and temporarily attach the tensioner pulley so that the flange is toward the front of the engine.

(2) Holding the timing belt "B" tensioner up with your finger in the direction of the arrow, place pressure on the timing belt so that the tension side of the belt is taut. Now tighten the bolt to fix the tensioner.

Caution
When tightening the bolt, ensure that the tensioner pulley shaft does not rotate with the bolt. Allowing it to rotate with the bolt can cause excessive tension on the belt.

(3) To ensure that the tension is correct, depress the belt (point A) with a finger. If not, adjust.

Standard value: 5 – 7 mm (0.20 – 0.28 in.)

13. INSTALLATION OF FLANGE/11. CRANKSHAFT SPROCKET

Install the flange and the crankshaft sprocket in correct direction as shown.

Caution
Pay special attention to the direction of the flange. If it is installed in the wrong direction, a broken timing belt could result.

6. INSTALLATION OF AUTO TENSIONER

(1) If the auto tensioner rod is in its fully extended position reset it as follows.
(2) Clamp the auto-tensioner in the vise with soft jaws.

Caution
The plug at the bottom of the auto tensioner protrudes. Insert a plain washer as illustrated to prevent the plug from being in direct contact with the vise.

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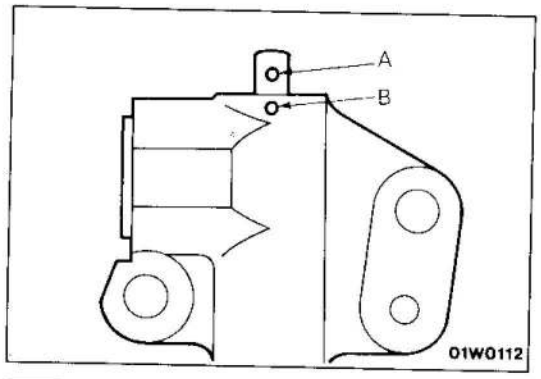
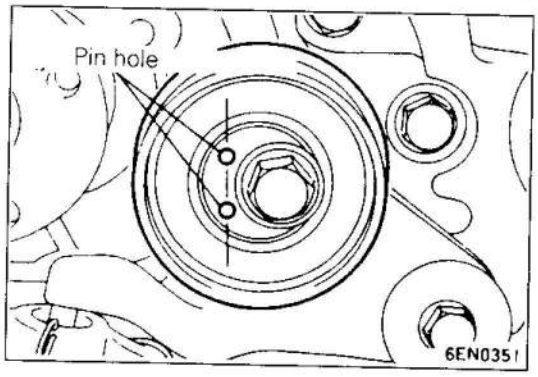


(3) Push in the rod little by little with the vise until the set hole A in the rod is aligned with the hole B in the cylinder.
(4) Insert a wire [1.4 mm in diameter] into the set holes.
(5) Unclamp the auto tensioner from the vise.
(6) Install the auto tensioner.

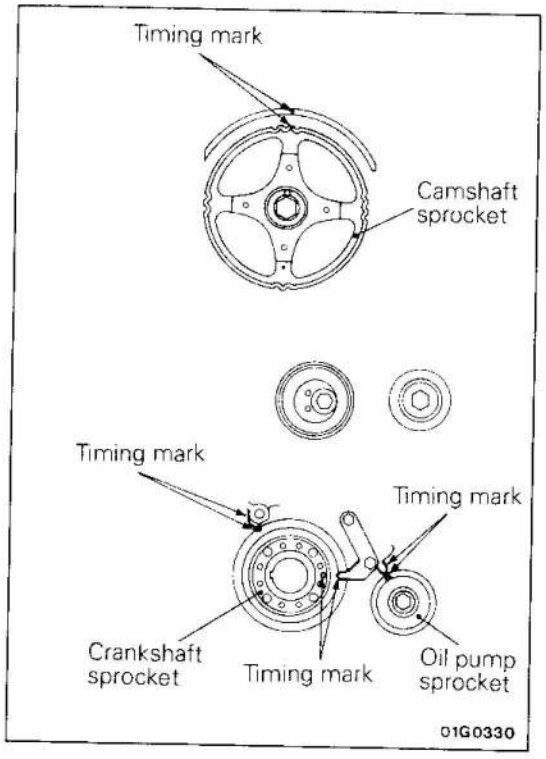
Caution
Leave the wire installed in the auto tensioner.



8. INSTALLATION OF TENSIONER PULLEY

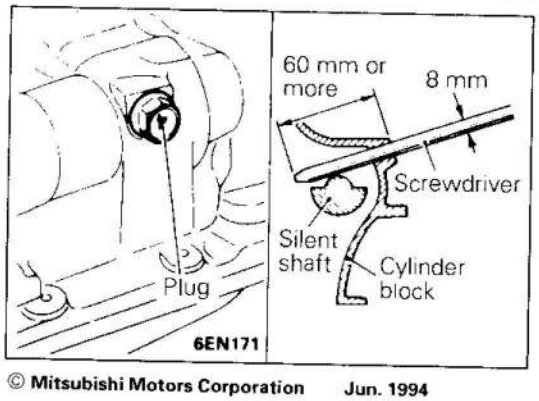
(1) Install the tensioner pulley onto the tensioner arm.
(2) Locate the pinhole in the tensioner pulley shaft to the left of the center bolt. Then, tighten the center bolt finger-tight.

Caution
Leave the wire installed in the auto tensioner.



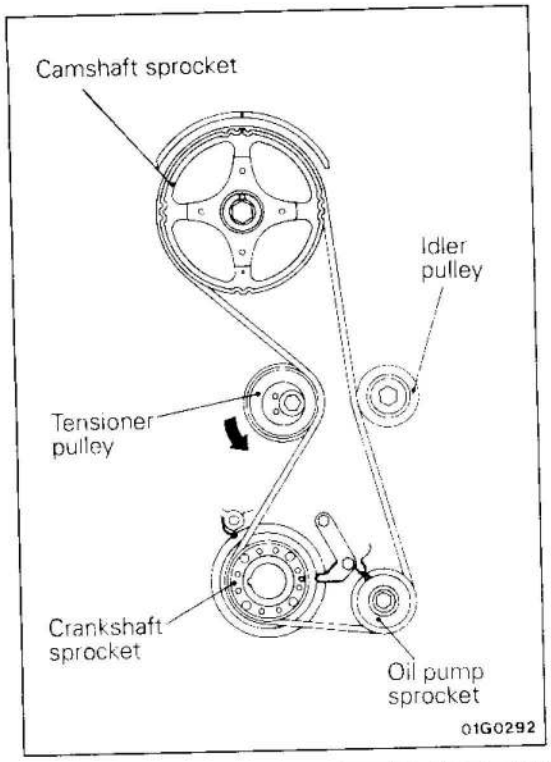
7. INSTALLATION OF TIMING BELT

(1) Ensure that the timing marks of the camshaft sprocket, the crankshaft sprocket, and the oil pump sprocket are all aligned.

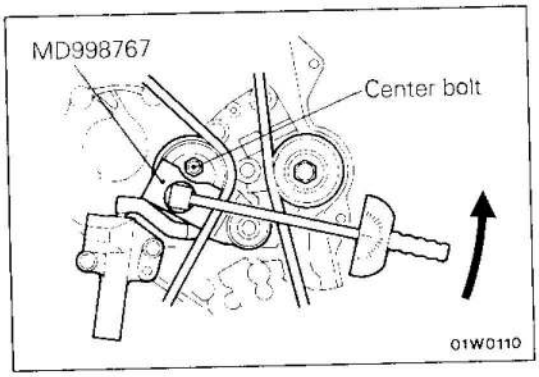


(2) Remove the plug on the cylinder block and insert a Phillips screwdriver [shank diameter 8 mm (0.31 in.)] through the hole.
If it can be inserted as deep as 60 mm (2.4 in.) or more, the timing marks are correctly aligned. If the inserted depth is only 20 – 25 mm (0.8 – 1.0 in.), turn the oil pump sprocket one turn and realign timing marks. Then check to ensure that the screwdriver can be inserted 60 mm (2.4 in.) or more. Keep the screwdriver inserted until the installation of the timing belt is finished.

NOTE
Step (2) is performed to ensure that the oil pump sprocket is correctly positioned with reference to the silent shafts.



(3) Install the timing belt around sprocket as follows.
1. Install the timing belt around the tensioner pulley and crankshaft sprocket and secure the timing belt onto the tensioner pulley with your left hand.
2. Pulling the belt with your right hand, install it around the oil pump sprocket.
3. Install the belt around the idler pulley.
4. Turn the camshaft sprocket one tooth clockwise to align its timing mark with the cylinder head top surface (see illustration in step 1.) Then, pulling the belt with both hands, install it around the camshaft sprocket.
5. Gently down the tensioner pulley as shown by the arrow, so that the belt does not sag, and temporarily tighten the center bolt.

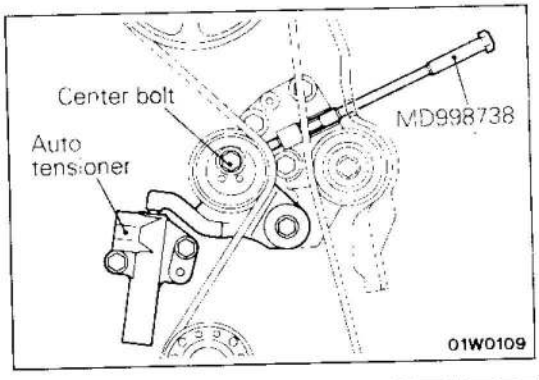


• ADJUSTMENT OF TIMING BELT TENSION

(1) After turning the crankshaft 1/4 turn counterclockwise, turn it clockwise to move the No. 1 cylinder to top dead center.

(2) Loosen the center bolt, and then, as shown in the illustration, attach the special tool and a torque wrench and apply a torque of 3.6 Nm (0.36 kgm, 2.6 ft.lbs.). If the body interferes with the special tool and the torque wrench, use a jack to slightly raise the engine assembly.

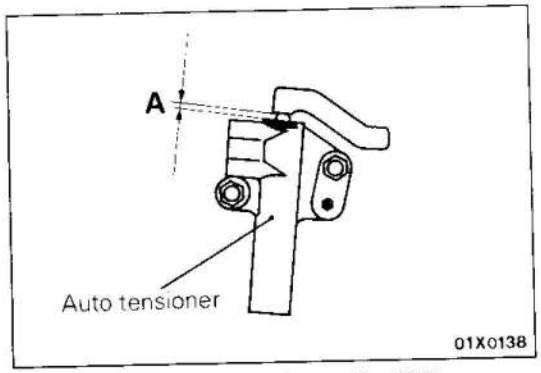
NOTE
Use a torque wrench that is capable of measurement within a range of 0–5 Nm (0–0.5 kgm, 0–2.2 ft.lbs.)



(3) Holding the tensioner pulley with the special tool and torque wrench, tighten the center bolt to specification.

(4) Screw the tool into the engine left support bracket until its end makes contact with the tensioner arm. At that point, screw the tool in some more and then remove the set wire attached to the auto tensioner.

(5) Remove the tool.



(6) Rotate the crankshaft two complete turns clockwise and leave it as is for about 15 minutes. Then, measure the auto tensioner protrusion "A" (distance between the tensioner arm and auto tensioner body) to ensure that it is up to specification.

Standard value: 3.8–4.5 mm (0.15–0.18 in.)

If it is out of specification, repeat steps (1) through (5) until the specified value is obtained.

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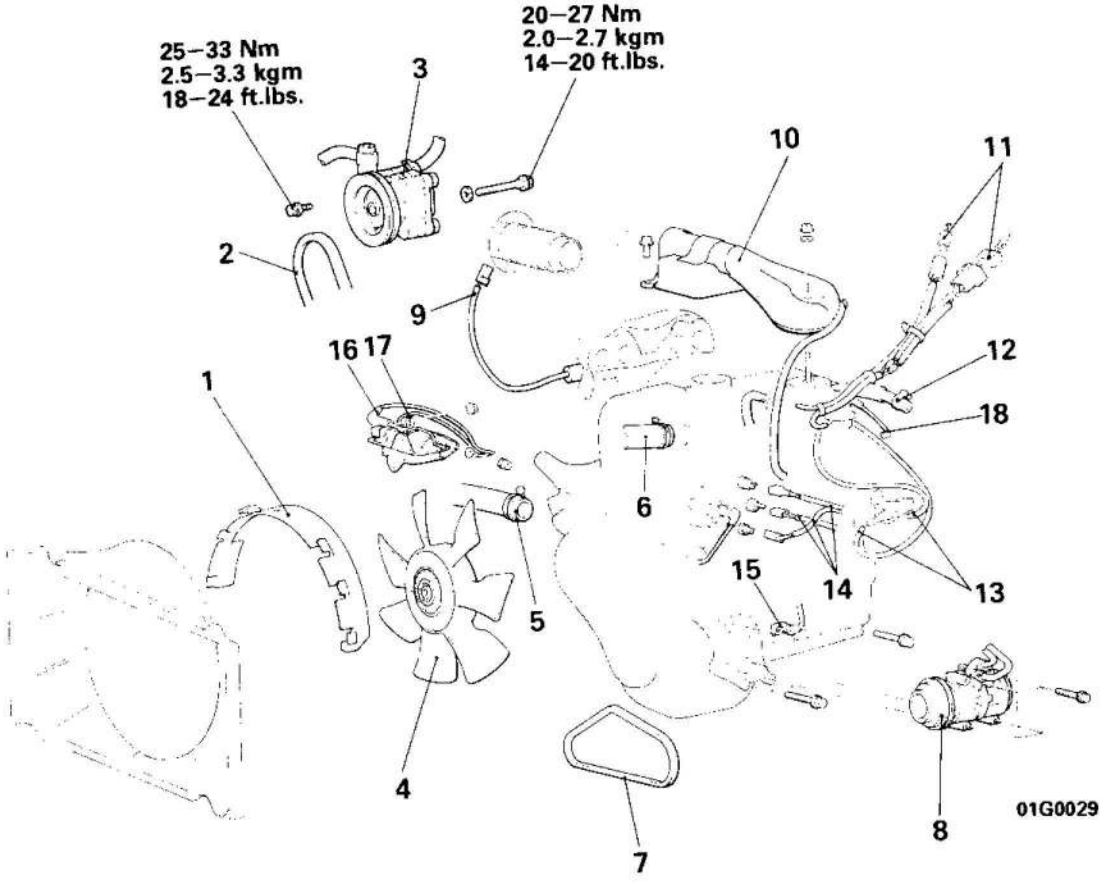
NOTES

ENGINE AND TRANSMISSION ASSEMBLY (2WD – 8 VALVE ENGINE)

REMOVAL AND INSTALLATION



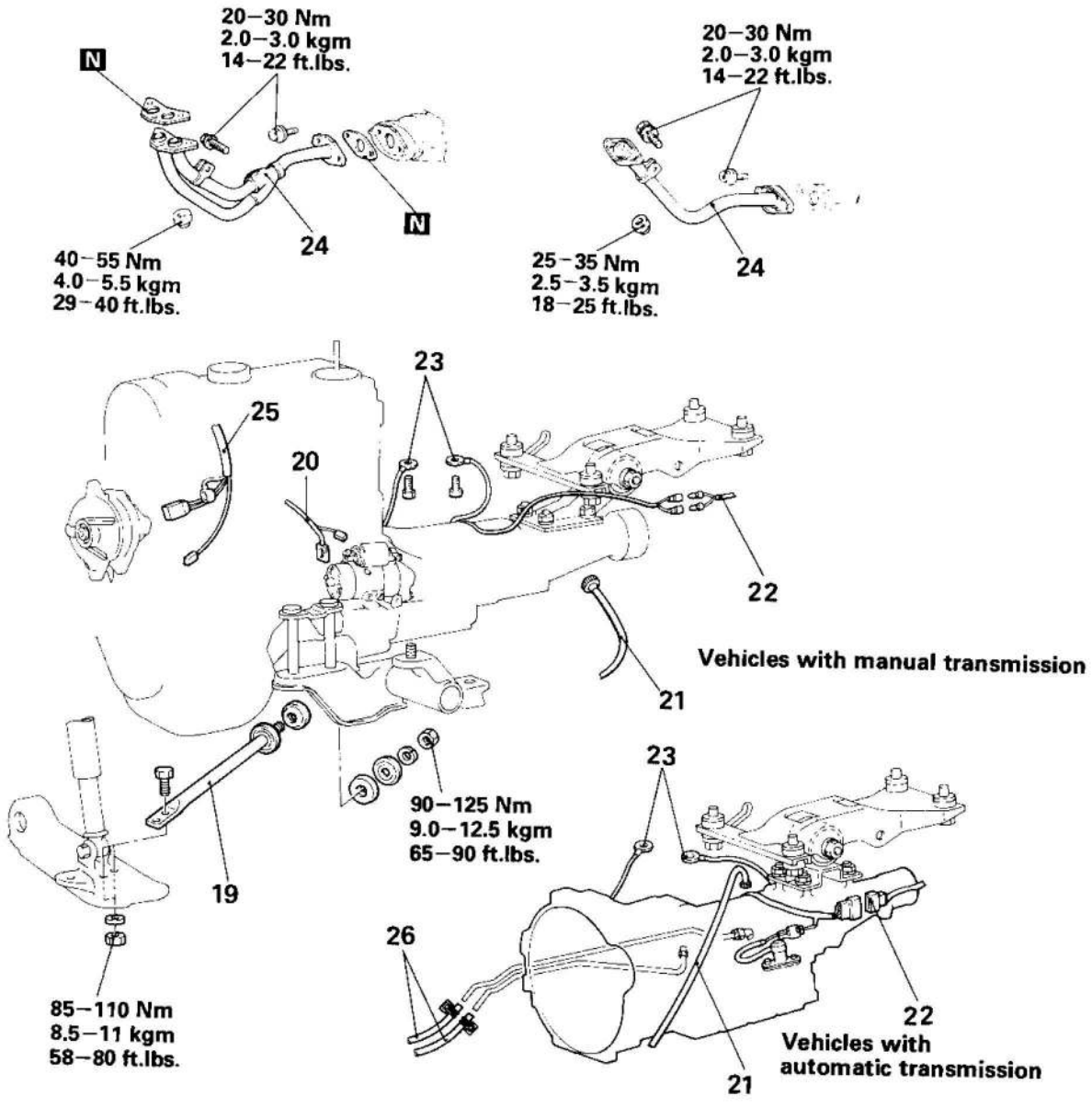
Removal steps

◆◆ ◆◆ 1. Radiator fan shroud cover
2. Power steering oil pump V-belt (vehicles with power steering)
3. Power steering oil pump (vehicles with power steering)
4. Cooling fan
5. Radiator lower hose
6. Radiator upper hose
7. Air-conditioner compressor V-belt (vehicles with air-conditioner)
8. Air-conditioner compressor (vehicles with air-conditioner)
9. Oxygen sensor harness connector (G63B engine)
10. Air horn
11. Control harness connector
12. Brake vacuum hose
13. Vacuum hose for air-conditioner idle-up (vehicles with air-conditioner)
14. Water temperature sensor harness connector
15. Engine earth
16. High tension cable
17. Noise condensor harness connector
18. Accelerator cable

Pre-removal Operation

- Removal of seat underframe (Refer to GROUP 01 GENERAL– Engine Compartment Work.)
- Drainage of engine coolant
- Removal of undercover (Refer to GROUP 42 BODY–Undercover.)
- Drainage of auromatic transmission fluid (Refer to GROUP 23 AUTOMATIC TRANSMISSION – Service Adjustment Procedures.)
- Drainage of transmission oil (Refer to GROUP 22 MANUAL TRANSMISSION– Service Adjustment Procedures.)
- Disconnection of purge and vapor hoses for emission control.

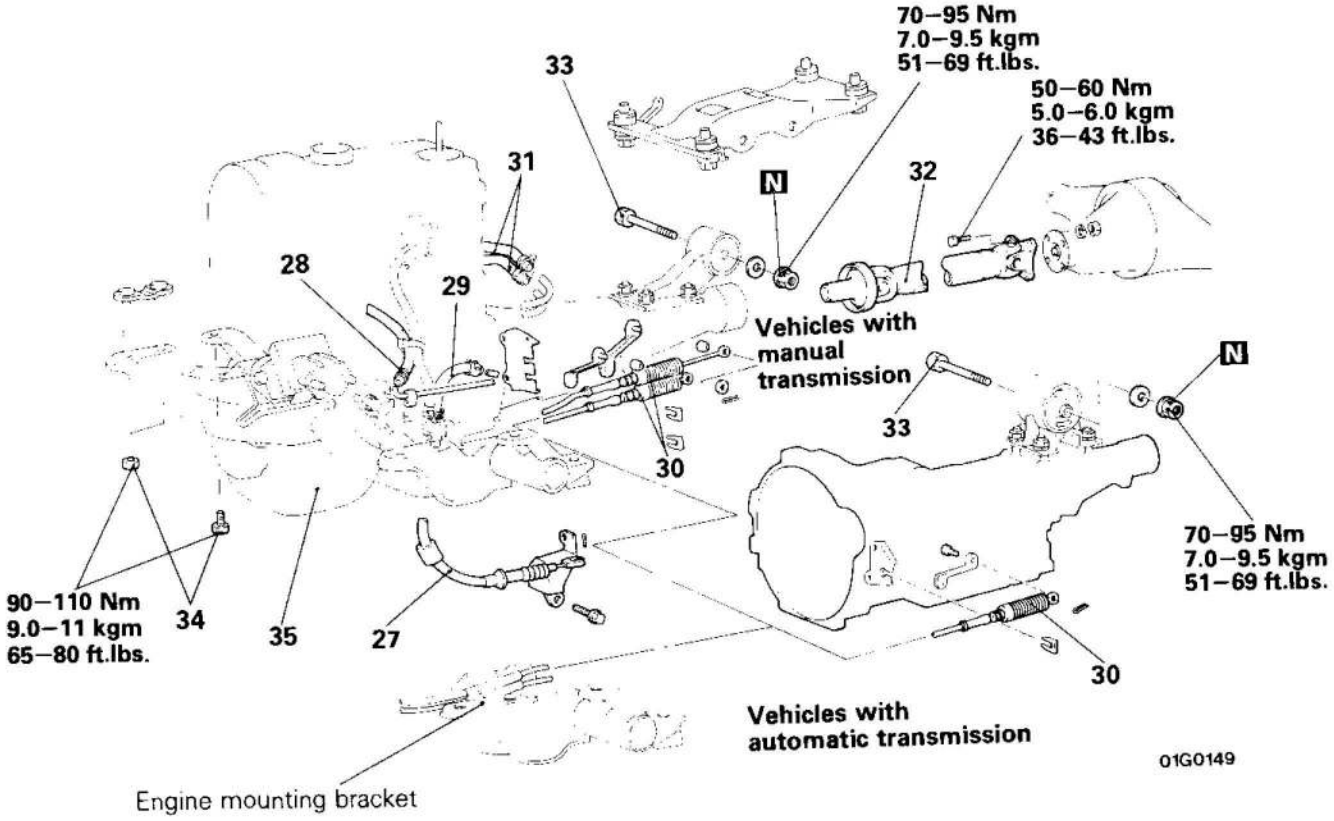
NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆: Refer to "Service Points of Removal".
(3) ◆◆: Refer to "Service Points of Installation".



Removal steps

19. Strut bar
20. Starter harness connector
21. Speedometer cable
22. Transmission harness connector
23. Earth cable
24. Exhaust pipe
25. Alternator and oil pressure switch harness connector
26. Automatic transmission oil cooler hose (vehicles with automatic transmission)

NOTE
(1) Reverse the removal procedures to reinstall.
(2) N : Non-reusable parts



Removal steps

27. Clutch control cable (vehicles with manual transmission)
28. Fuel return hose
29. Fuel main hose
◆▶ ▶◆ 30. Transmission control cable
31. Heater hose
32. Propeller shaft
◆▶ 33. Rear engine mounting installation bolt
34. Engine mounting to crossmember installation bolt and nut
35. Engine and transmission assembly

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆▶: Refer to "Service Points of Removal".
(3) ▶◆: Refer to "Service Points of Installation".
(4) N : Non-reusable parts

Post-installation Operation
- Reconnection of purge and vapor hoses for emission control
- Filling of engine coolant
- Installation of undercover (Refer to GRDUP 42 BODY–Undercover.)
- Filling of automatic transmission fluid (vehicles with automatic transmission) (Refer to GROUP 23 AUTOMATIC TRANSMISSION–Service Adjustment Procedures.)
- Filling of transmission oil (Refer to GROUP 22 MANUAL TRANSMISSION–Service Adjustment Procedures.)
- Filling of engine oil (Refer to P.11–33.)
- Checking of alternator V-belt tension (Refer to P.11–34.)
- Checking of power steering oil pump V-belt tension (Refer to P.11–34.)
- Checking of air-conditioner compressor V-belt tension (Refer to P.11–34.)
- Adjustment of accelerator cable play (Refer to GROUP 13 FUEL–Service Adjustment Procedures.)
- Checking of clutch operation (Refer to GROUP 21 CLUTCH–Service Adjustment Procedures.)
- Installation of seat underframe

SERVICE POINTS OF REMOVAL

E11SBBH0

1. REMOVAL OF RADIATOR FAN SHROUD COVER

Refer to GROUP 14 COOLING–Radiator.

30. HANDLING OF TRANSMISSION CONTROL CABLE

Refer to GROUP 22 MANUAL TRANSMISSION–Transmission Control (2WD) or GROUP 23 AUTOMATIC TRANSMISSION–Transmission Control.

33. REMOVAL OF REAR ENGINE MOUNTING INSTALLATION BOLT

Support the engine and transmission before removing.

SERVICE POINTS OF INSTALLATION

E11SDBH0

30. INSTALLATION OF TRANSMISSION CONTROL CABLE

Refer to GROUP 22 MANUAL TRANSMISSION–Transmission Control (2WD) or GROUP 23 AUTOMATIC TRANSMISSION–Transmission Control.

1. INSTALLATION OF RADIATOR FAN SHROUD COVER

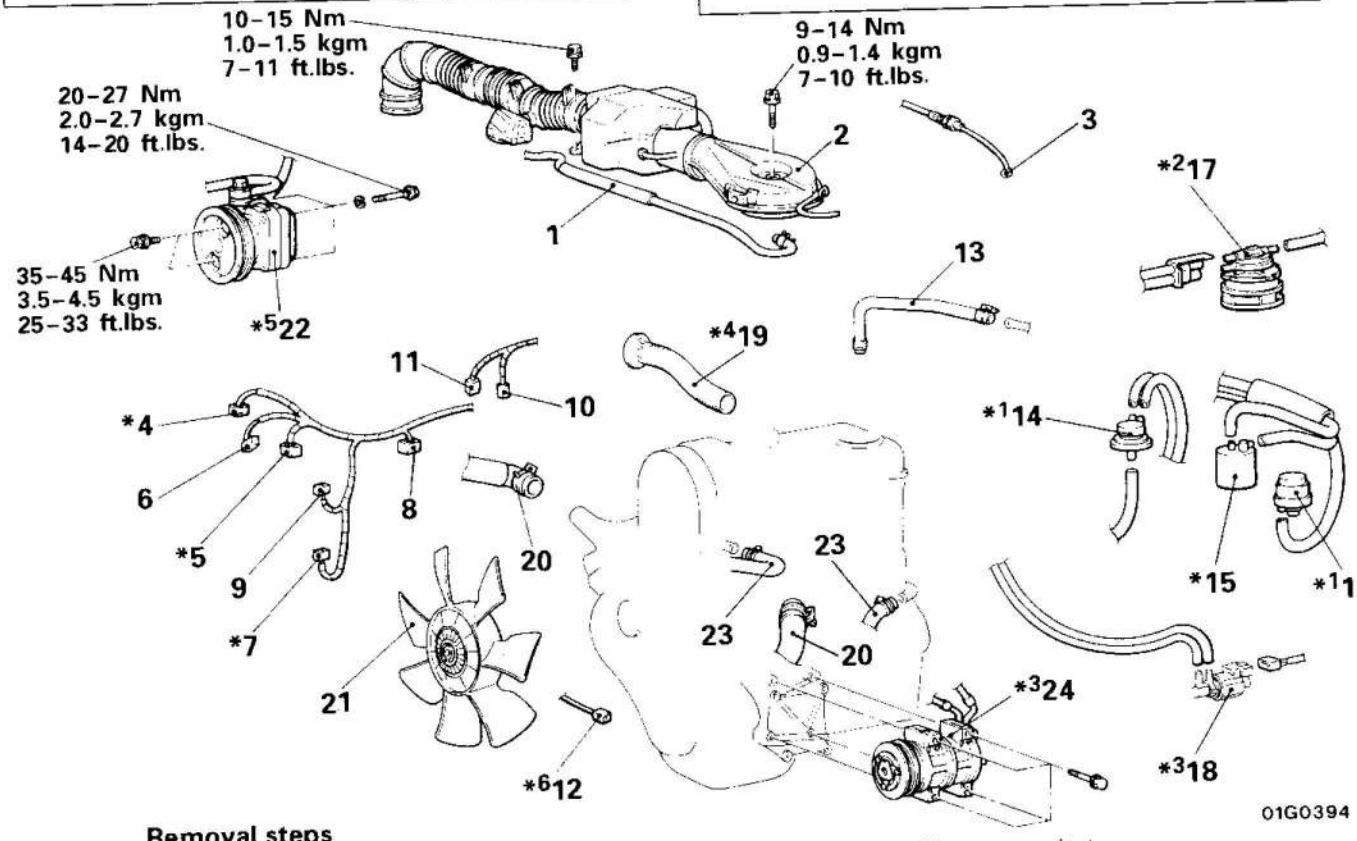
Refer to GROUP 14 COOLING–Radiator.

ENGINE AND TRANSMISSION ASSEMBLY [2WD – 16 VALVE ENGINE (EXCEPT MPI)]

REMOVAL AND INSTALLATION

Pre-removal Operation
- Removal of seat underframe
- Drainage of engine coolant
- Removal of undercover
- Removal of front exhaust pipe (Refer to GROUP 15 – Exhaust Pipe and Mufflers.)
- Drainage of automatic transmission fluid
- Drainage of transmission oil
- Disconnection of purge and vapor hoses for emission control.

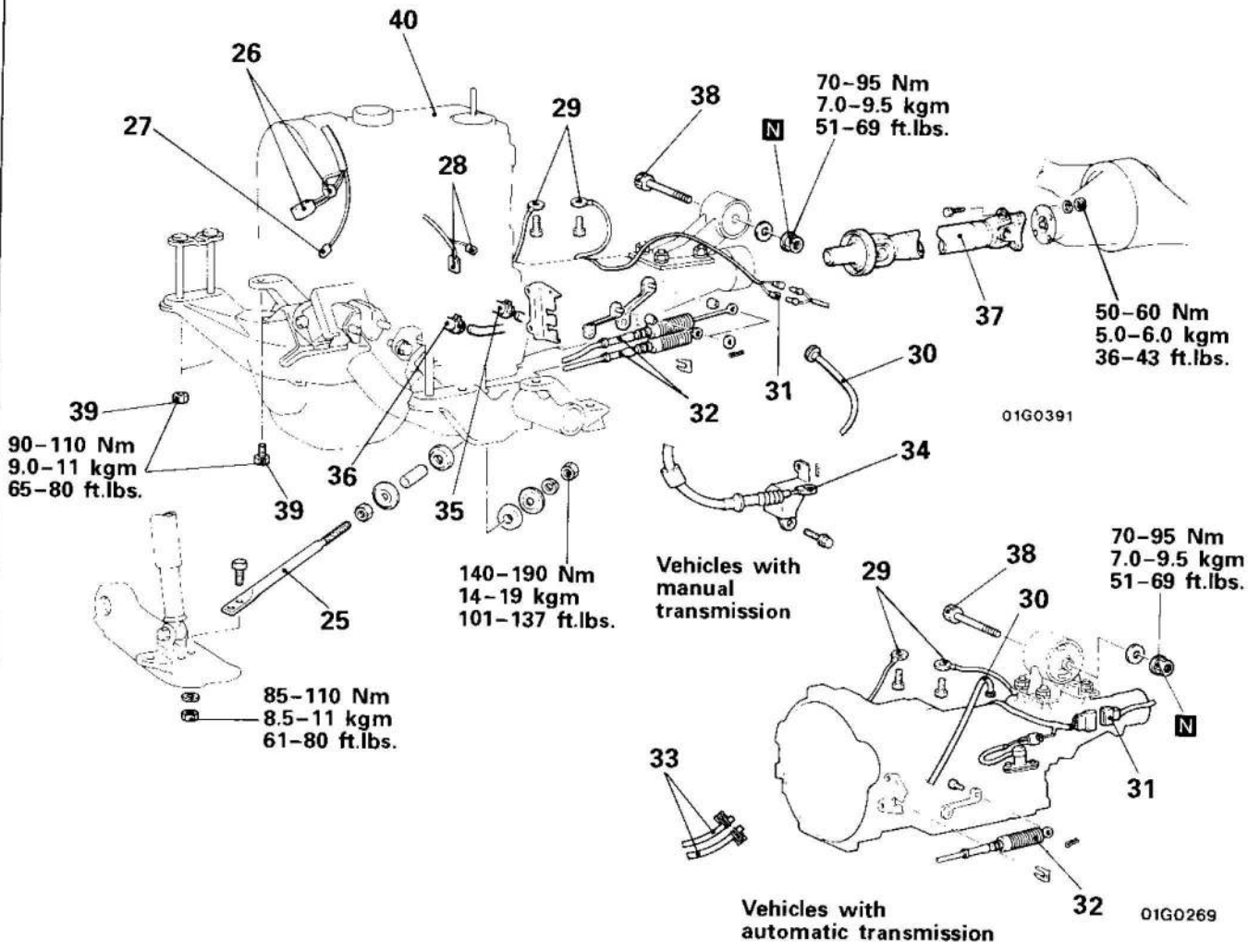
Post-installation Operation
- Installation of front exhaust pipe (Refer to GROUP 15 – Exhaust Pipe and Mufflers.)
- Filling of engine coolant
- Installation of undercover
- Installation of seat underframe
- Filling of automatic transmission fluid
- Filling of transmission oil
- Adjustment of accelerator cable play
- Reconnection of purge and vapor hoses for emission control



Removal steps

1. Innervent hose
2. Air intake hose and air horn
3. Accelerator cable
4. Oxygen sensor connector
5. Throttle position sensor connector
6. Distributor connector
7. Ignition coil connector
8. Solenoid valve connector
9. Engine coolant temperature sensor connector
10. Engine coolant temperature gauge connector
11. Engine coolant temperature switch connector
12. Engine oil level sensor connector
13. Brake vacuum hose
14. Vacuum regulator valve
15. Vacuum tank
16. Vacuum switch
17. High altitude compensator
18. Idle up solenoid valve
19. Heat duct
20. Radiator hose (Refer to GROUP 14 – Radiator.)
21. Cooling fan (Refer to GROUP 14 – Cooling Fan.)
22. ◆◆ Power steering oil pump
23. Heater hose
24. ◆◆ Air-conditioner compressor

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) * : Vehicles with FBC.
(4) *1 : Vehicles for Australia and Europe with FBC.
(5) *2 : Vehicles with high altitude compensator.
(6) *3 : Vehicles with air-conditioner.
(7) *4 : Vehicles with hot air control valve.
(8) *5 : Vehicles with power steering.
(9) *6 : Vehicles with engine oil level sensor.



25. Strut bars (Refer to GROUP 33 – Strut Bar.)
26. Alternator connector
27. Oil pressure switch connector
28. Starter motor connector
29. Earth cable
30. Speedometer cable
31. Transmission control harness connector
32. Transmission control cable
33. Automatic transmission oil cooler hose
34. Clutch cable
35. Fuel return hose
36. Fuel main hose
37. Propeller shaft
38. Rear engine mounting installation bolt
39. Engine mounting to crossmember installation bolt and nut
40. Engine and transmission assembly

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".
(4) N : Non-reusable parts

SERVICE POINTS OF REMOVAL E13WBAA

22. REMOVAL OF POWER STEERING OIL PUMP

Remove the power steering oil pump from the bracket with the hose attached.

NOTE
Place the removed power steering oil pump in a place where it will not be a hindrance when removing and installing the engine assembly, and tie it with a cord.

24. REMOVAL OF A/C COMPRESSOR

Disconnect the A/C compressor connector and remove the compressor from the compressor bracket with the hose still attached.

NOTE
Place the removed A/C compressor in a place where it will not be a hindrance when removing and installing the engine assembly, and tie it with a cord.

40. REMOVAL OF ENGINE AND TRANSMISSION ASSEMBLY

(1) Check that all cables, hoses, harness connectors, etc. are disconnected from the engine.
(2) Lower the engine and transmission assembly slowly.

SERVICE POINT OF INSTALLATION

40. INSTALLATION OF ENGINE AND TRANSMISSION ASSEMBLY

Install the engine and transmission assembly while checking that the cables, hoses, harness connectors, etc. are not clamped.

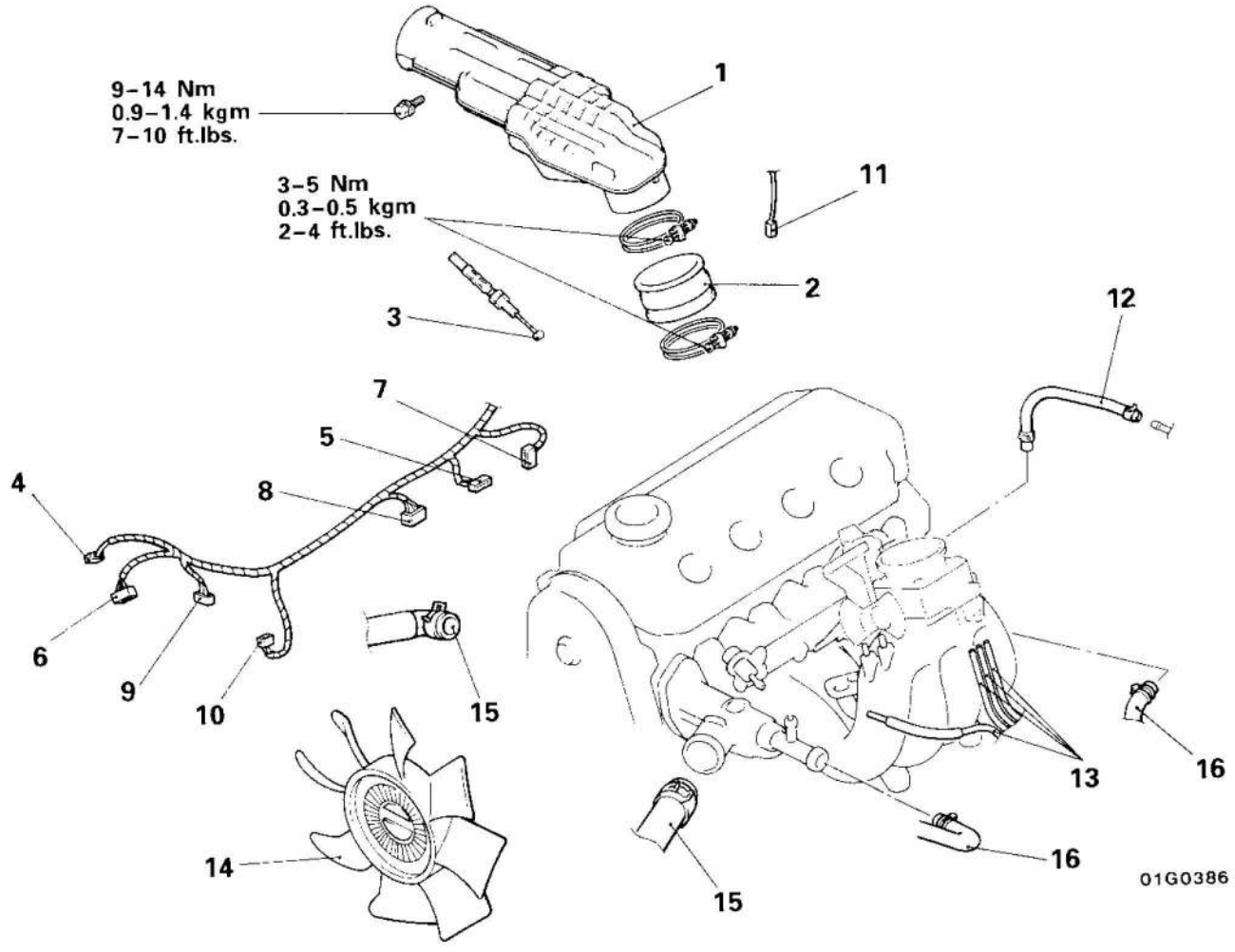
NOTES

ENGINE AND TRANSMISSION ASSEMBLY [2WD – 16 VALVE ENGINE (MPI)]

REMOVAL AND INSTALLATION

Pre-removal Operation
- Removal of seat underframe
- Removal of undercover
- Removal of front exhaust pipe (Refer to GROUP 15 – Exhaust Pipe and Mufflers.)
- Drainage of engine coolant
- Drainage of transmission oil

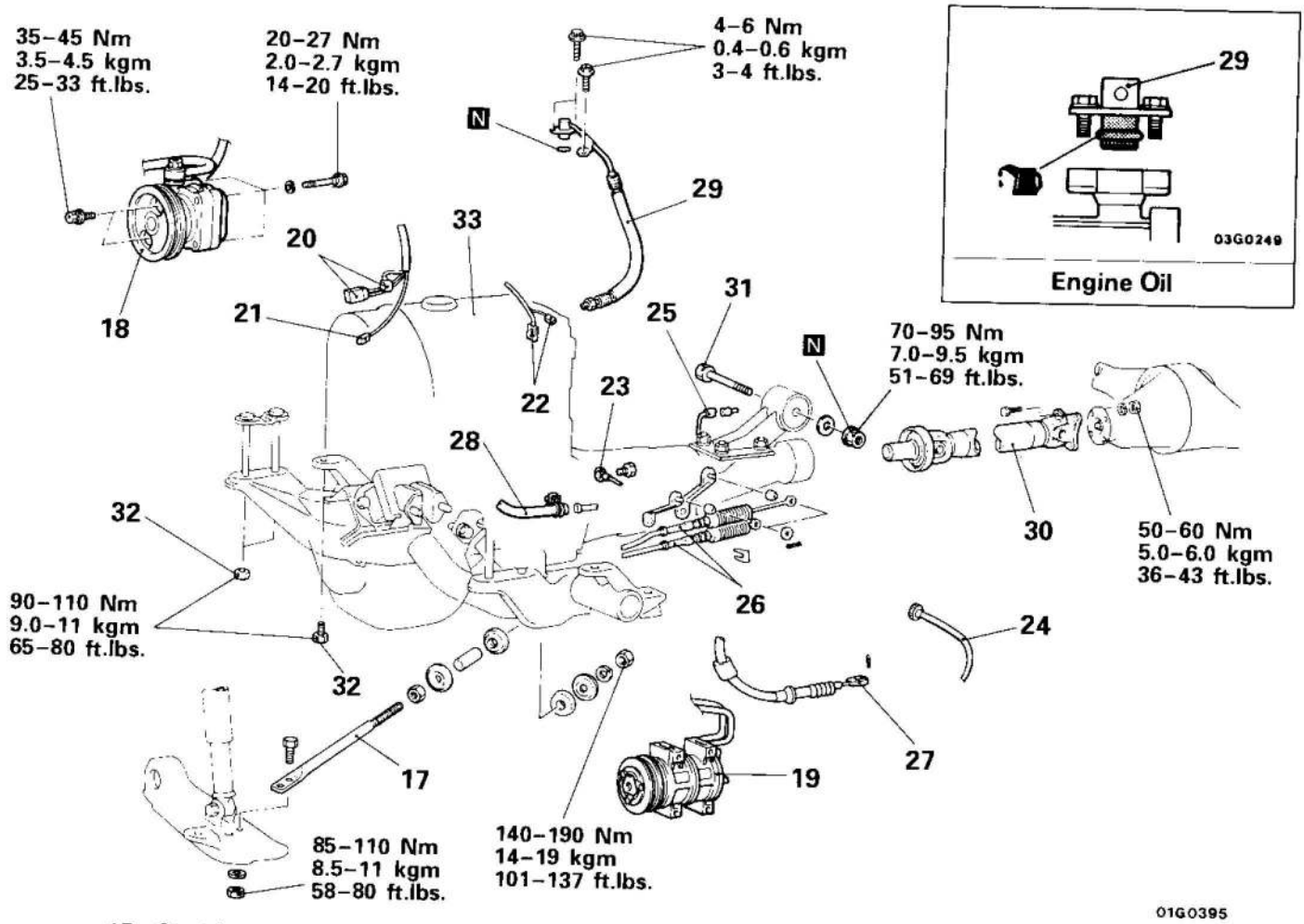
Post-installation Operation
- Installation of front exhaust pipe (Refer to GROUP 15 – Exhaust Pipe and Mufflers.)
- Installation of undercover
- Installation of seat underframe
- Filling of engine coolant
- Filling of transmission oil
- Adjustment of accelerator cable play



Removal steps

1. Resonance tank
2. Air hose
3. Accelerator cable
4. Oxygen sensor connector
5. Throttle position sensor connector
6. Distributor connector
7. Idle speed control servo connector
8. Injection wiring harness connector
9. Power transistor connector
10. Engine coolant temperature sensor connector
11. Engine coolant temperature gauge unit connector
12. Brake booster vacuum hose
13. Vacuum hose
14. Cooling fan (Refer to GROUP 14 – Cooling Fan.)
15. Radiator hose (Refer to GROUP 14 – Radiator.)
16. Heater hose

NOTE
(1) Reverse the removal procedures to reinstall.



17. Strut bar
(Refer to GROUP 33 – Strut Bar.)
◆◆ 18. Power steering oil pump
(Vehicles with power steering)
◆◆ 19. Air-conditioner compressor
(Vehicles with power steering)
20. Alternator connector
21. Oil pressure switch connector
22. Starter motor connector
23. Earth cable
24. Speedometer cable
25. Transmission control harness connector
26. Transmission control cable
27. Clutch cable
28. Fuel return hose
◆◆ 29. Fuel high pressure hose
30. Propeller shaft
31. Rear engine mounting installation bolt
32. Engine mounting to crossmember installation bolt and nut
◆◆ ◆◆ 33. Engine and transmission assembly

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".
(4) N : Non-reusable parts

SERVICE POINTS OF REMOVAL E13WBAA

29. DISCONNECTION OF FUEL HIGH PRESSURE HOSE

Release residual pressure from the fuel pipe line to prevent fuel from spilling.
Refer to GROUP 13 for releasing residual pressure.

Caution
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

ADDED

18. REMOVAL OF POWER STEERING OIL PUMP

Remove the power steering oil pump from the bracket with the hose attached.

NOTE
Place the removed power steering oil pump in a place where it will not be a hindrance when removing and installing the engine assembly, and tie it with a cord.

19. REMOVAL OF A/C COMPRESSOR

Disconnect the A/C compressor connector and remove the compressor from the compressor bracket with the hose still attached.

NOTE
Place the removed A/C compressor in a place where it will not be a hindrance when removing and installing the engine assembly, and tie it with a cord.

33. REMOVAL OF ENGINE AND TRANSMISSION ASSEMBLY

(1) Check that all cables, hoses, harness connectors, etc. are disconnected from the engine.
(2) Lower the engine and transmission assembly slowly.

SERVICE POINTS OF INSTALLATION

33. INSTALLATION OF ENGINE AND TRANSMISSION ASSEMBLY

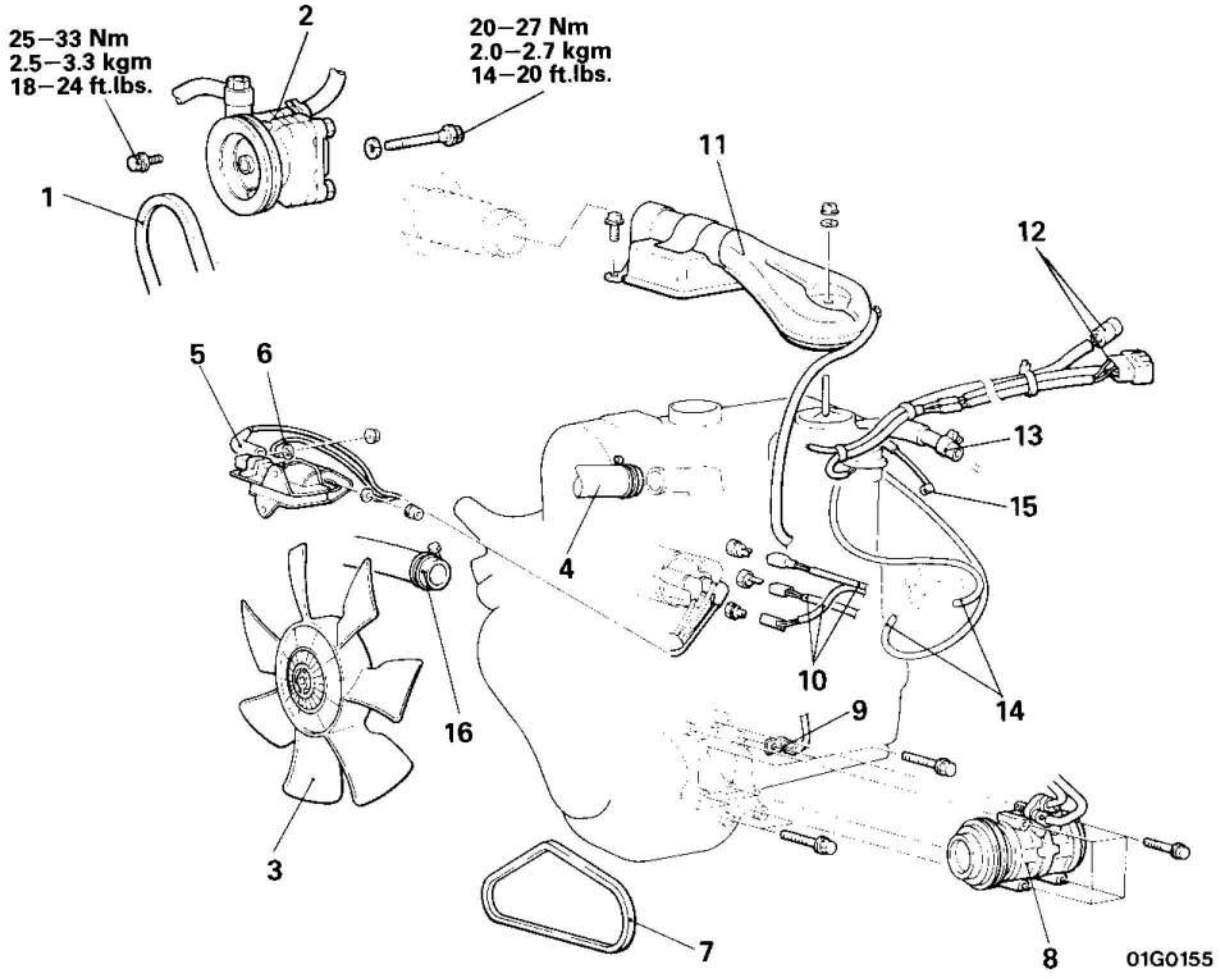
Install the engine and transmission assembly while checking that the cables, hoses, harness connectors, etc. are not clamped.

NOTES

ENGINE AND TRANSMISSION ASSEMBLY (4WD)

E11SA--2

REMOVAL AND INSTALLATION



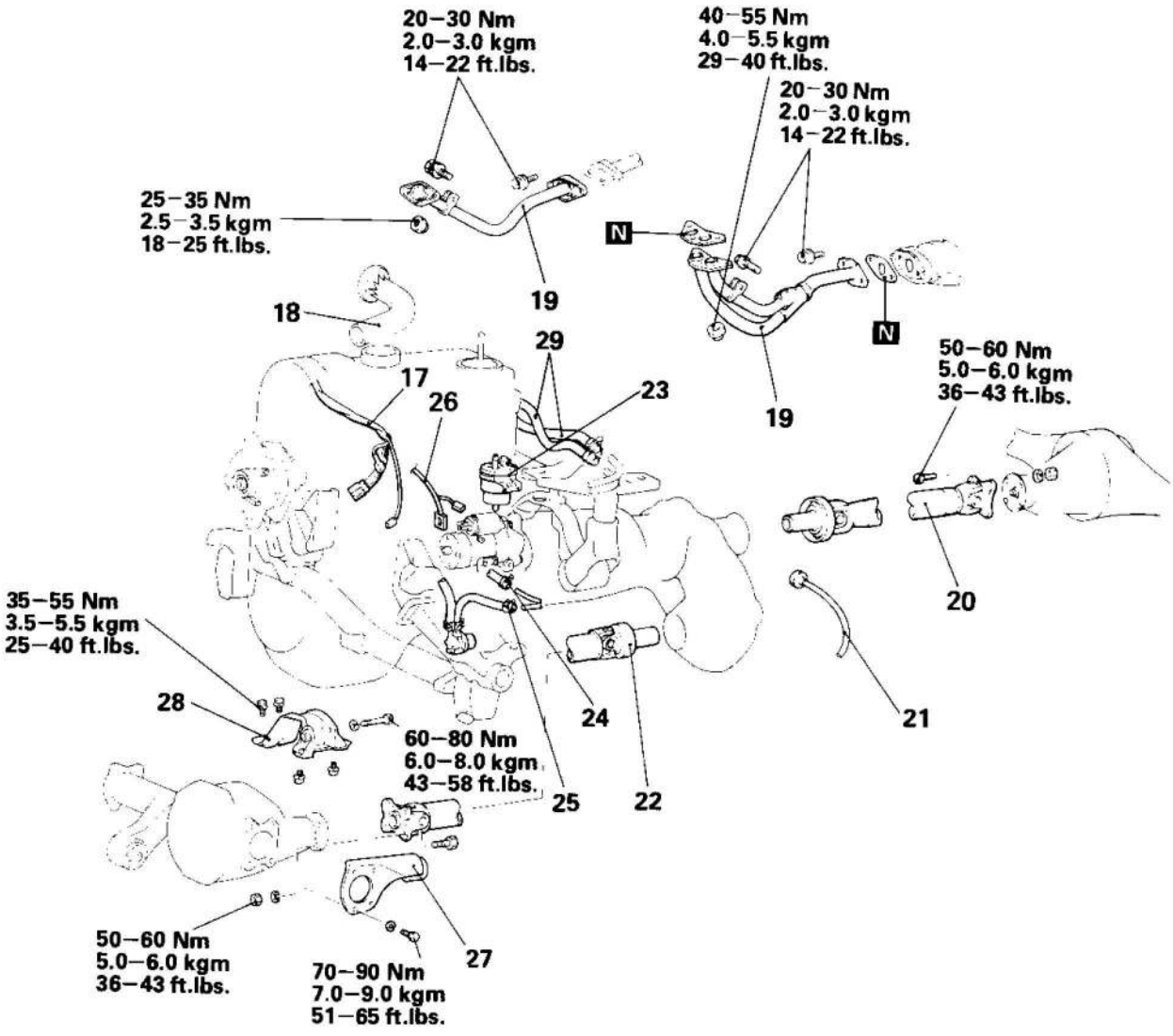
Removal steps

1. Power steering oil pump V-belt (vehicles with power steering)
2. Power steering oil pump (vehicles with power steering)
3. Cooling fan
4. Radiator upper hose
5. High tension cable
6. Noise condensor harness connector
7. Air-conditioner compressor V-belt (vehicles with air-conditioner)
8. Air-conditioner compressor (vehicles with air-conditioner)
9. Engine earth
10. Water temperature sensor harness connector
11. Air horn
12. Control harness connector
13. Brake vacuum hose
14. Vacuum hose for air-conditioner idle-up (vehicles with air-conditioner)
15. Accelerator cable
16. Radiator lower hose

Pre-removal Operation

- Removal of seat underframe (Refer to GROUP 01 GENERAL– Engine Compartment Work.)
- Drainage of engine coolant
- Removal of undercover (Refer to GROUP 42 BODY–Undercover.)
- Removal of oil pan protector (Refer to GROUP 42 BODY–Undercover.)
- Removal of transfer protector (Refer to GROUP 42 BODY–Undercover.)
- Drainage of transmission and transfer oil (Refer to GROUP 22 MANUAL TRANSMISSION– Service Adjustment Procedures.)
- Disconnection of vapor and purge hoses for emission control.

NOTE
Reverse the removal procedures to reinstall.

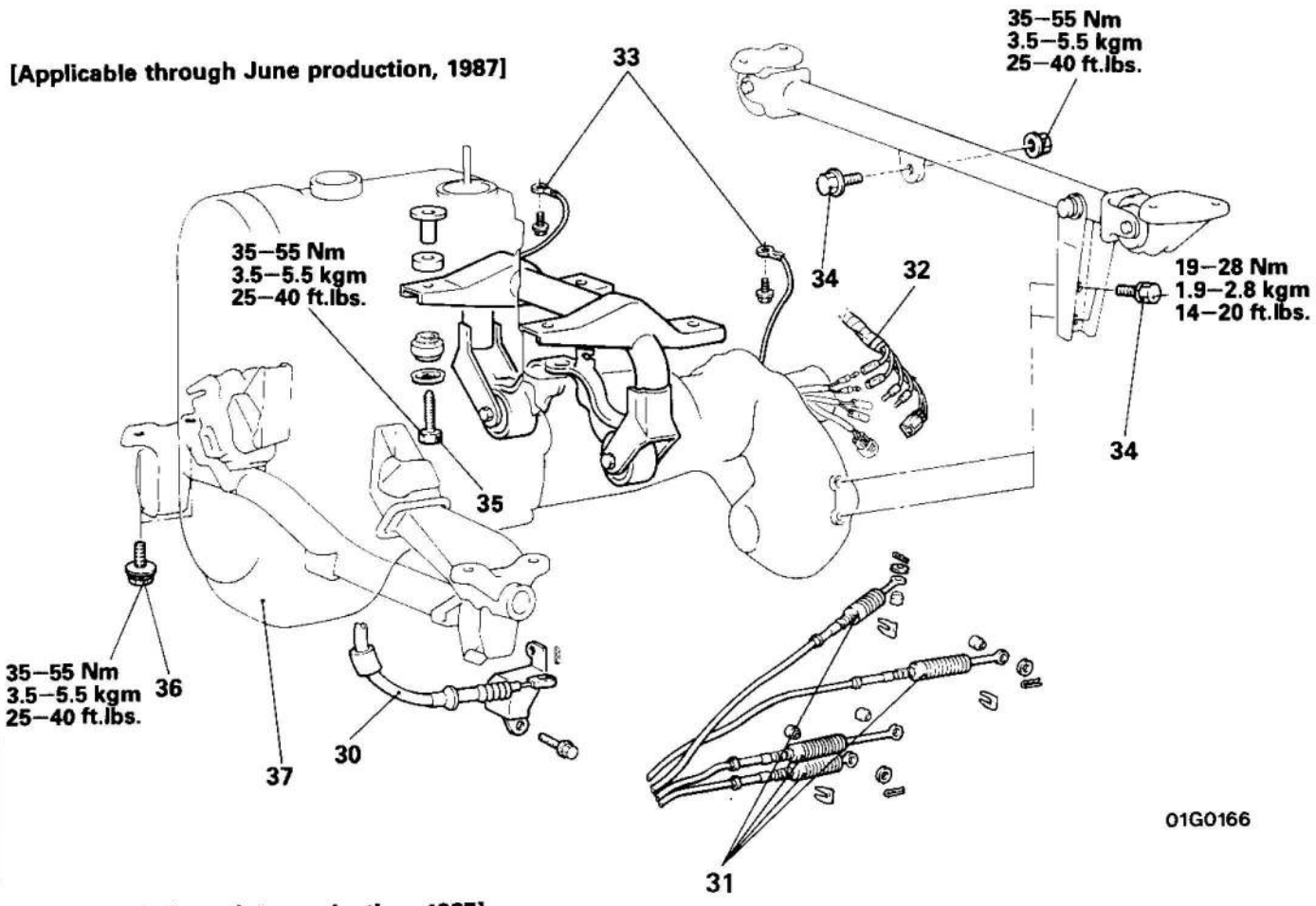


Removal steps

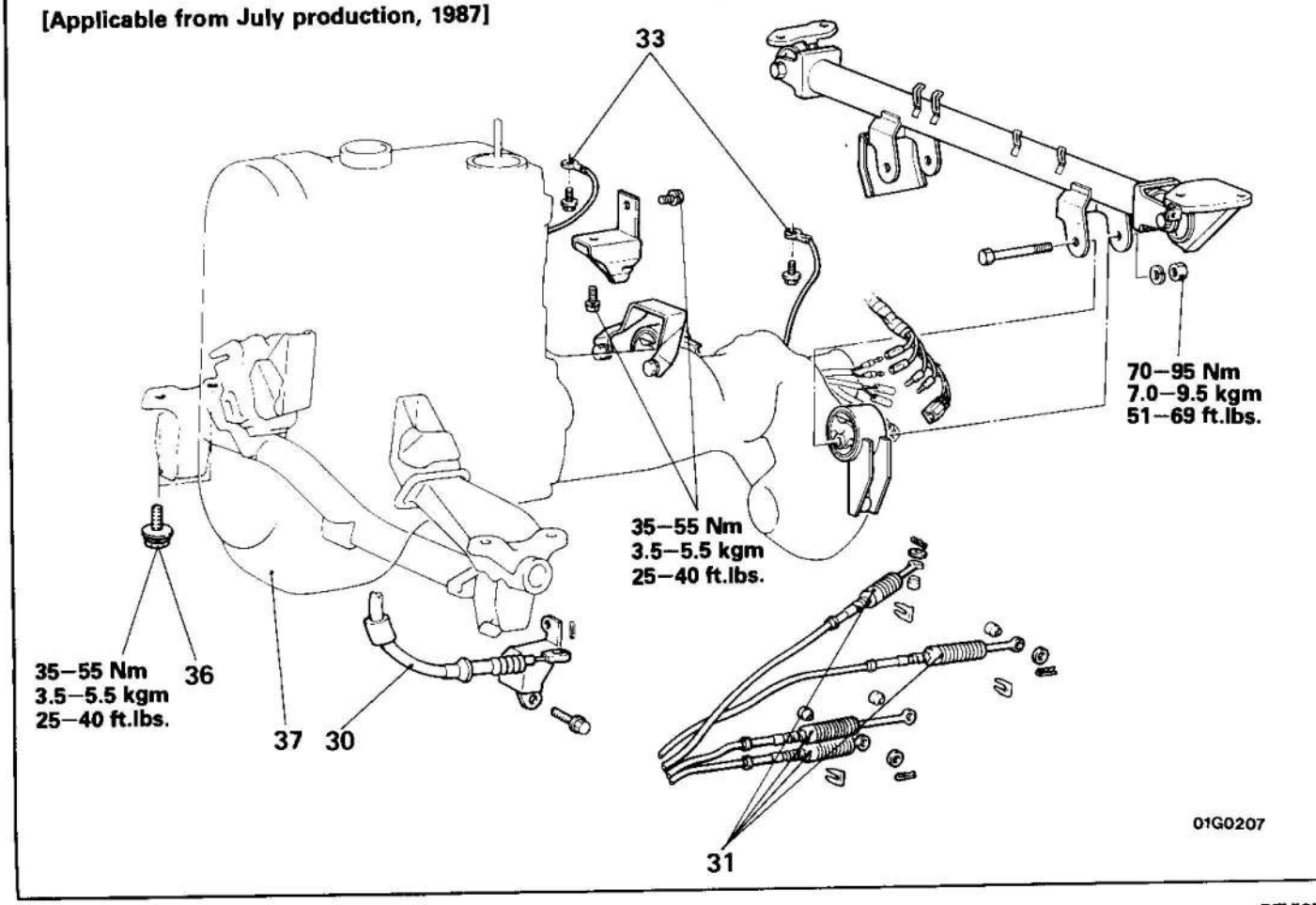
17. Alternator and oil pressure switch harness connector
18. Warm air inlet duct
19. Exhaust pipe
20. Propeller shaft
21. Speedometer cable
22. Front propeller shaft
23. Canister
24. Fuel return hose
25. Fuel main hose
26. Starter harness connector
27. ◆◆ Differential mounting bracket
28. ◆◆ Stopper bracket assembly
29. Heater hose

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) N : Non-reusable parts

[Applicable through June production, 1987]



[Applicable from July production, 1987]



Removal steps

30. Clutch control cable
◆◆ ◆◆ 31. Transmission and transfer control cable
32. Transmission harness connector
33. Earth cable
34. Transfer mounting installation bolt
◆◆ 35. Transmission mounting installation bolt
36. Engine mounting to crossmember installation bolt
37. Engine and transmission assembly

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".

Post-installation Operation
- Reconnection of vapor and purge hoses for emission control
- Filling of engine coolant
- Installation of undercover (Refer to GROUP 42 BODY–Undercover.)
- Installation of oil pan protector (Refer to GROUP 42 BODY–Undercover.)
- Installation of transfer protector (Refer to GROUP 42 BODY–Undercover.)
- Filling of transmission and transfer oil (Refer to GROUP 22 MANUAL TRANSMISSION–Service Adjustment Procedures.)
- Filling of engine oil (Refer to P.11–33.)
- Checking of alternator V-belt tension (Refer to P.11–34.)
- Checking of power steering oil pump V-belt tension (Refer to P.11–34.)
- Checking of air-conditioner compressor V-belt tension (Refer to P.11–34.)
- Adjustment of accelerator cable play (Refer to GROUP 13 FUEL–Service Adjustment Procedures.)
- Checking of clutch operation (Refer to GROUP 21 CLUTCH–Service adjustment Procedures.)
- Installation of seat underframe

SERVICE POINTS OF REMOVAL

E11SBBI0

27. REMOVAL OF DIFFERENTIAL MOUNTING BRACKET/28. STOPPER BRACKET ASSEMBLY

Refer to GROUP 32 POWER PLANT MOUNT–Front Differential Mounting.

31. HANDLING OF TRANSMISSION AND TRANSFER CONTROL CABLE

Refer to GROUP 22 MANUAL TRANSMISSION–Transmission Control (4WD).

35. REMOVAL OF TRANSMISSION MOUNTING INSTALLATION BOLT

Support the engine and transmission before removing.

SERVICE POINTS OF INSTALLATION

31. INSTALLATION OF TRANSMISSION AND TRANSFER CONTROL CABLE

E11SDBI0

Refer to GROUP 22 MANUAL TRANSMISSION–Transmission Control (4WD).

ENGINE (4G64 and G64B engines)

ENGINE ADJUSTMENT E11FIAC 1

CHECKING RADIATOR CAP

Refer to P.11–11 for checking procedures.

CHECKING ENGINE COOLANT E11FJAD 1

Refer to P.11–11 for checking procedures.

CHECKING BATTERY (Maintenance-free type battery) E11FLAC 1

Refer to P.11–11 for checking procedures.

CHECKING BATTERY (Conventional type battery) E11FLAE

Refer to P.11–32 for checking procedures.

CHECKING ENGINE OIL E11FMAC 1

Refer to P.11–33 for checking procedures.

REPLACEMENT ENGINE OIL E11FOAC

Refer to P.11–33 for replacement procedures.

CHECKING AND CLEANING AIR CLEANER ELEMENT E11FPAC 1

Refer to P.11–12 for checking procedures.

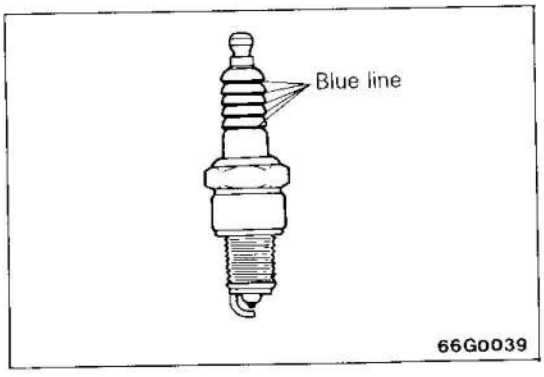
CHECKING AND CLEANING SPARK PLUG

(Except platinum plug) E11FRAC

Refer to P.11–33 for checking procedures.

Plug gap:

Vehicles for Europe	**1.0–1.1mm (0.028–0.031 in.)**
Vehicles for Australia	
8 valve engine	**0.7–0.8 mm (0.028–0.031 in.)**
16 valve engine	**1.0–1.1 mm (0.040–0.043 in.)**
Vehicles for Hong Kong	**1.0–1.1mm (0.040–0.043 in.)**



CHECKING AND CLEANING SPARK PLUG

(Platinum plug) E11FRAD

Platinum-tipped spark plugs are equipped.
They are identified by blue lines on the ceramic.
They do not require replacement as frequent as the conventional type and will last much longer than conventionals: Do not reuse them by cleaning or regapping.

INSPECTION AND ADJUSTMENT OF V-BELT FLEX E11FQAD 1

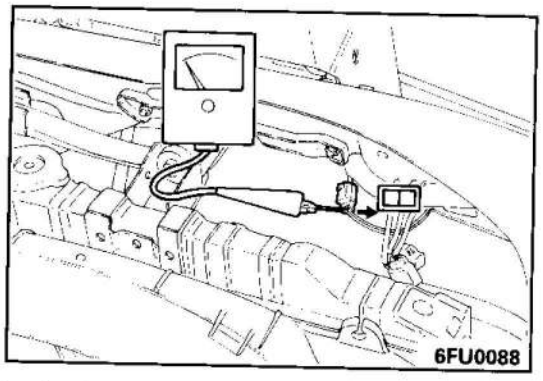
Refer to P.11–34 for checking procedures.

INSPECTION AND ADJUSTMENT OF IGNITION TIMING (16 Valve Engine)

Refer to P.11-36-2 for inspection and adjustment procedures.

INSPECTION AND ADJUSTMENT OF IGNITION TIMING (8 Valve Engine) E11FVAD

1. Before inspection and adjustment set vehicle in the following condition.
   (1) Engine coolant temperature: 80 – 90°C (176 – 194°F)
   (2) Lamps and all accessories: OFF
   (3) Transmission: Neutral (N or P range on vehicles with automatic tansmission)

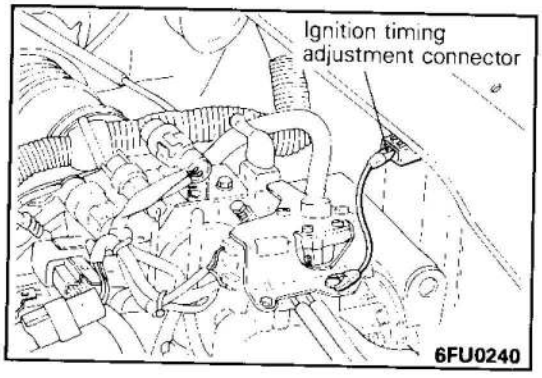


2. Insert paper clip on short-circuit harness connector (2-pin), and connect tachometer.

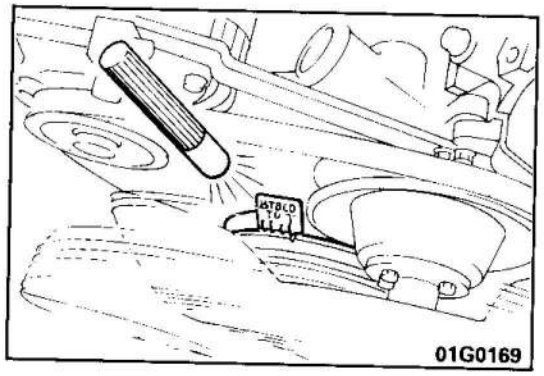
   Caution
   - **Do not disconnect connector.**
   - **Paper clip can be inserted to either terminal.**

3. Confirm that idling rpm is within the standard value.

   Standard value:
   Vehicles for Europe and Hong Kong 750±100 r/min.
   Vehicles for Australia 800±100 r/min.



4. When checking the basic ignition timing, stop the engine and disconnect the water-proof female connector from the ignition timing adjusting connector.
   Connect a lead wire with an alligator clip to the ignition timing adjusting terminal to earth it.

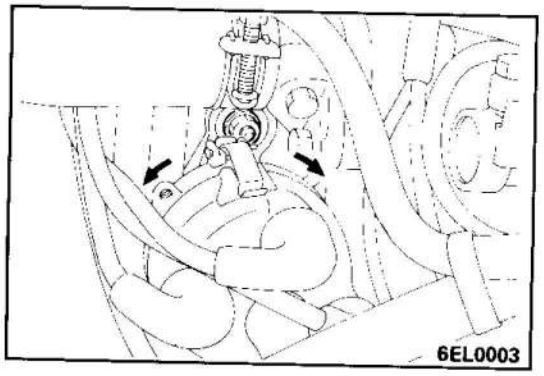


5. Check that ignition timing is within the standard value.

   Standard value: 5°±2°BTDC

6. If not within the standard value, loosen distributor fixing nut and adjust by rotating distributor body.

   NOTE
   Turning distributor body to the right delays ignition timing.
   Turning distributor body to the left advances ignition timing.



7. After adjusting, tighten nut.
8. Stop the engine and return the ignition timing adjustment terminal (earthed in step 4) to its original condition.
9. Sealing tape is to be attached only for vehicles for Switzerland built from December 1988.

   NOTE
   Sealing tape has been attached at the factory for all other vehicles for Europe.

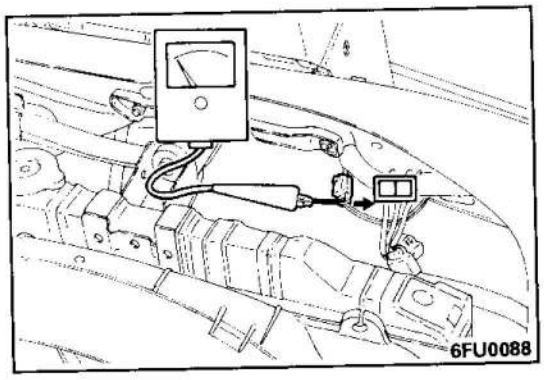
INSPECTION OF ENGINE IDLING SPEED (16 Valve Engine)

Refer to P.11-39 for inspection and adjustment procedures.

INSPECTION OF ENGINE IDLING SPEED (8 Valve Engine)

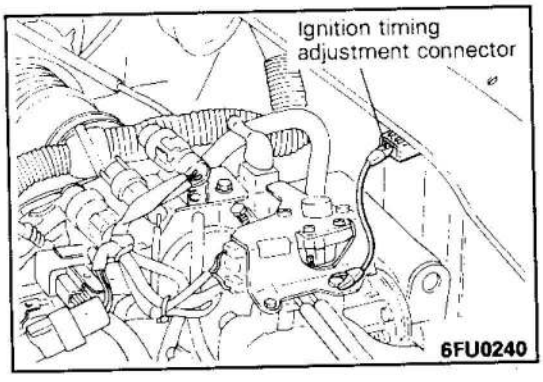
E11FXAF

1. Before inspection and adjustment set vehicle in the following condition.
   (1) Engine coolant temperature: 80 – 90°C (176 – 194°F)
   (2) Lamps and all accessories: OFF
   (3) Transmission: Neutral (N or P range on vehicles with automatic tansmission)

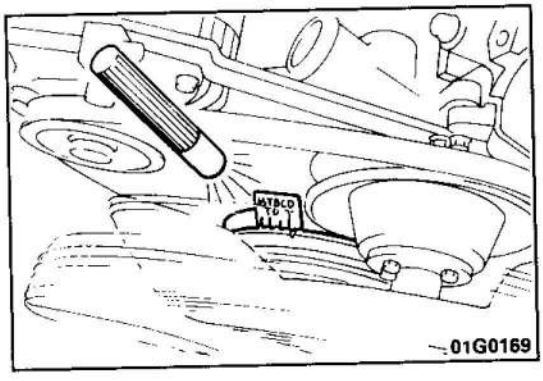


2. Insert paper clip on short-circuit harness connector (2-pin), and connect tachometer.

   Caution
   - **Do not disconnect connector.**
   - **Paper clip can be inserted to either terminal.**



3. When checking the basic ignition timing, stop the engine and disconnect the water-proof female connector from the ignition timing adjusting connector.
   Connect a lead wire with an alligator clip to the ignition timing adjusting terminal to earth it.



4. Check that ignition timing is within the standard value.

   Standard value: 5±2°BTDC

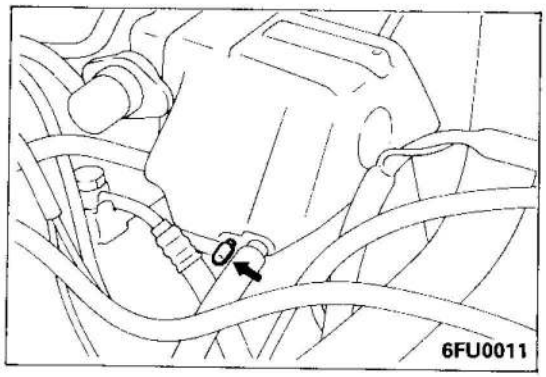
5. Disconnect the lead wire to break the earth connection of the ignition timing adjustment terminal.

6. Check that engine idling speed is within the standard value.

   Standard value:
   Vehicles for Europe and Hong Kong 750±100 r/min.
   Vehicles for Australia 800±100 r/min.

7. If not within the standard value, check ISC (Idle Speed Control) System.

   NOTE
   The idle speed adjustment is usually unnecessary since this system controls the idle speed.



INSPECTION OF MANIFOLD VACUUM (8 Valve Engine) E11FWAB

1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 90°C (176°F to 194°F).
2. Set an engine tachometer in place.
3. Set the vacuum gauge at illustrated position on the intake manifold.
4. Start the engine and check that the idle speed is within the standard value range. Then read off the vacuum gauge.

   Limit: min. 450 mmHg (17.7 in.Hg)
5. If not at standard value, refer to following chart for cause and repair.

INSPECTION OF MANIFOLD VACUUM (16 Valve Engine)

Refer to P.11-40-2 for inspection and adjustment procedures.

CHECKING OF COMPRESSION PRESSURE E11FGBC

Refer to ENGINE(4G32 and 4G33 engine)–Engine Adjustment, P.11–18 for the procedure for inspecting the compression pressure.

Standard value (at engine speed 250–400 r/min.):
- **8 valve engine**
  - **1,200 kPa (12.0 kg/cm^2, 171 psi)**
- **16 valve engine**
  - **1,350 kPa (13.5 kg/cm^2, 192 psi)**

Limit (at engine speed of 250–400 r/min.):
- **8 valve engine**
  - **840 kPa (8.4 kg/cm^2, 127 psi)**
- **16 valve engine**
  - **1,020 kPa (10.2 kg/cm^2, 145 psi)**

INSPECTION OF LASH ADJUSTER

Refer to P.11-43 for inspection procedures.

CHECKING AND ADJUSTMENT OF VALVE CLEARANCE (G64B engine) E11FDBI

Refer to ENGINE (4G63 and G63B engines) – Engine Adjustment, for inspecting and adjusting the valve clearance (G63B engine).

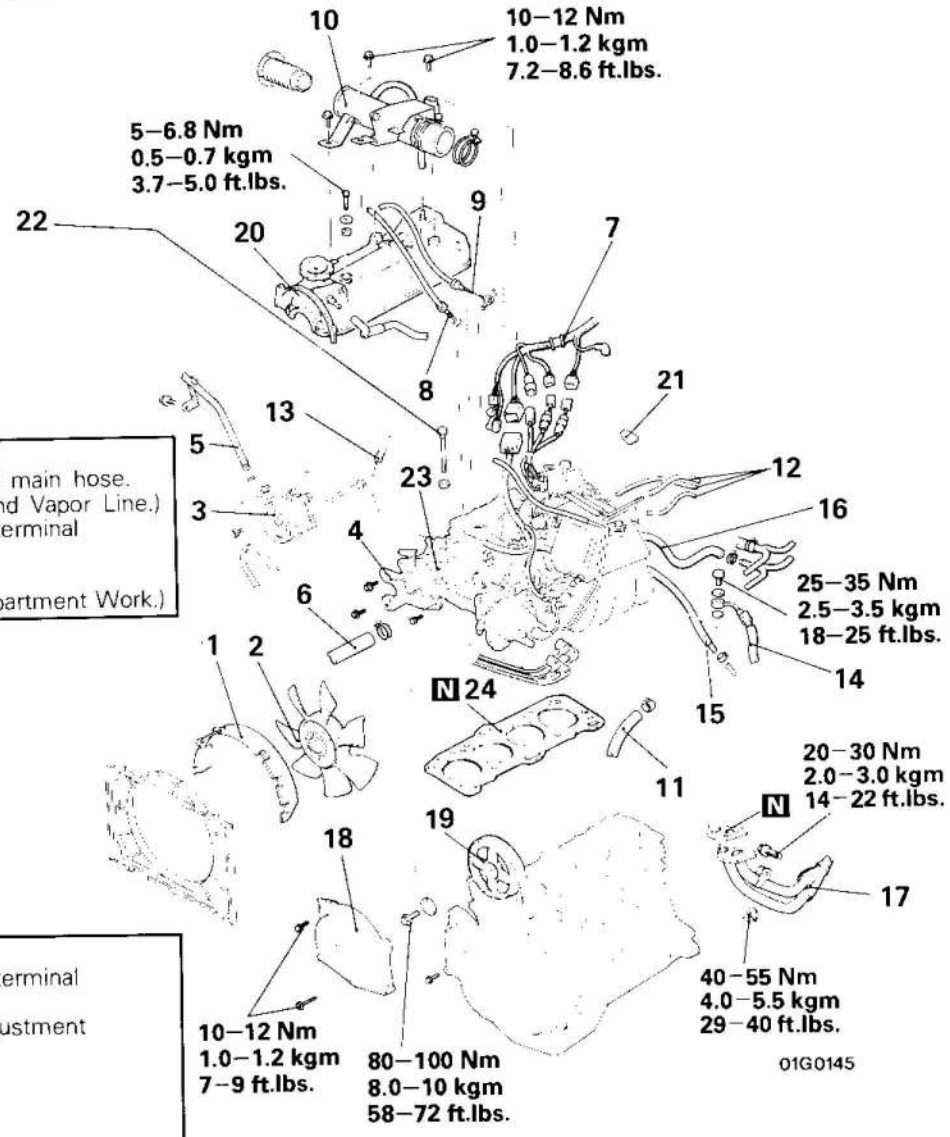
ADJUSTMENT OF TIMING BELT TENSION (8 Valve Engine)

Refer to P.11–45 for adjustment procedures.

CYLINDER HEAD GASKET (8 VALVE ENGINE)

REMOVAL AND INSTALLATION

E11JA – – 2



Pre-removal Operation
- Decreasing of fuel pressure in fuel main hose. (Refer to GROUP 13 – Fuel Line and Vapor Line.)
- Disconnection of battery negative terminal
- Drainage of engine coolant
- Removal of seat underframe (Refer to GROUP 01 – Engine Compartment Work.)

Post-installation Operation
- Reconnection of battery negative terminal
- Filling of engine coolant (Refer to GROUP 14 – Service Adjustment Procejures.)
- Checking of engine oil (Refer to P. 11-33.)
- Adjustment of kick-down cable (Refer to GROUP 23 – Service Adjustment Procedures.)
- Adjustment of accelerator cable play (Refer to GROUP 13 – Service Adjustment Procedures.)

Removal steps

◆◆ ◆◆ 1. Radiator fan shroud <2WD>
2. Cooling fan
3. Power steering oil pump assembly
4. Oil pump bracket
5. Oil level gauge pipe
6. Radiator upper hose connection
7. Control harness connectors
8. Accelerator cable connection
9. Kick-down cable connection (vehicles with automatic transmission)
10. Air intake pipe
11. Brake vacuum hose connection
12. Vacuum hoses connections
13. Oxygen sensor connector
14. Fuel main hose connection
15. Fuel return hose connection
16. Heater hose connection
17. Exhaust pipe connection
18. Timing belt upper cover
◆◆ 19. Camshaft sprocket
◆◆ 20. Rocker cover
◆◆ 21. Semi-circular packing
◆◆ ◆◆ 22. Cylinder head bolt
◆◆ 23. Cylinder head assembly
◆◆ 24. Cylinder head gasket

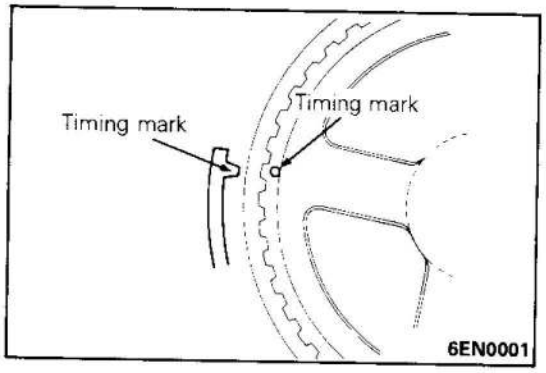
NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆: Refer to "Service Points of Removal".
(3) ◆◆: Refer to "Service Points of Installation".
(4) N : Non-reusable parts

SERVICE POINTS OF REMOVAL

E11JBAG 1

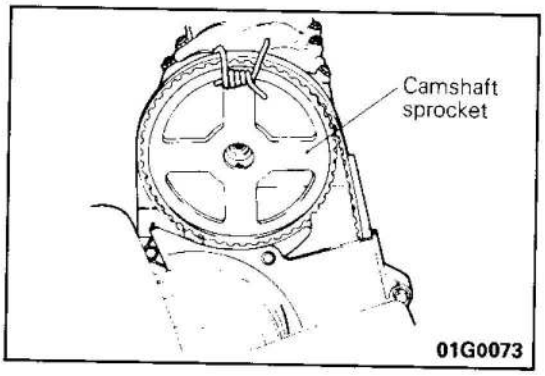
1. REMOVAL OF RADIATOR FAN SHROUD

Refer to GROUP 14 – Radiator.



19. REMOVAL OF CAMSHAFT SPROCKET

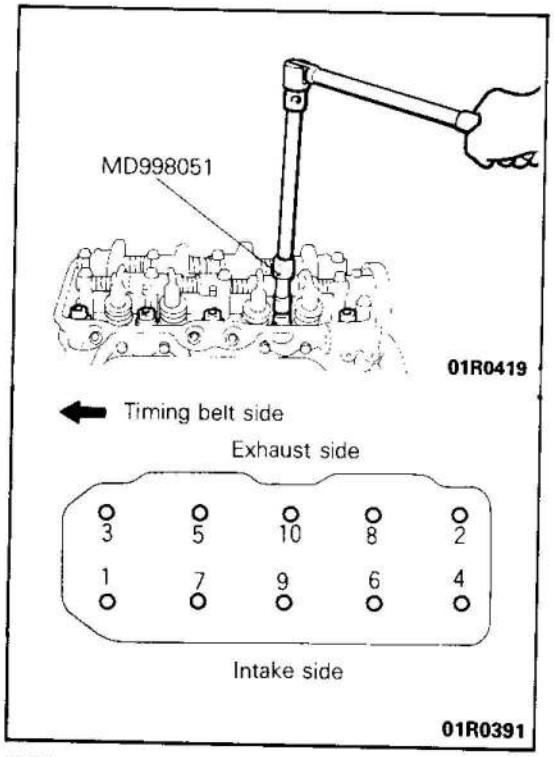
(1) Rotate crankshaft and align timing marks.



(2) Remove camshaft sprocket with timing belt and place it on timing belt front lower cover.

Caution
Do not rotate crankshaft after romoving camshaft sprocket.

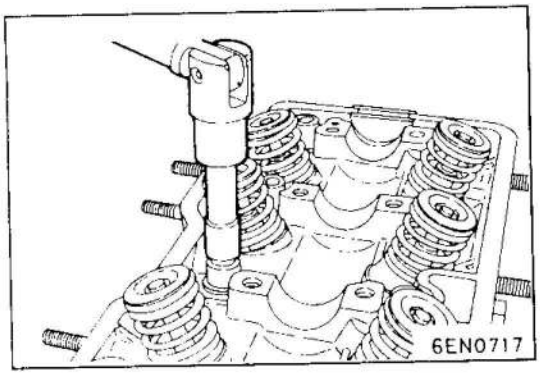
NOTE
Secure camshaft sprocket with wire etc., to prevent them from slipping out of place.



22. REMOVAL OF CYLINDER HEAD BOLT

<Hexagonal head bolts>

Loosen bolt in the numerical order indicated in the diagram with special tool and remove.

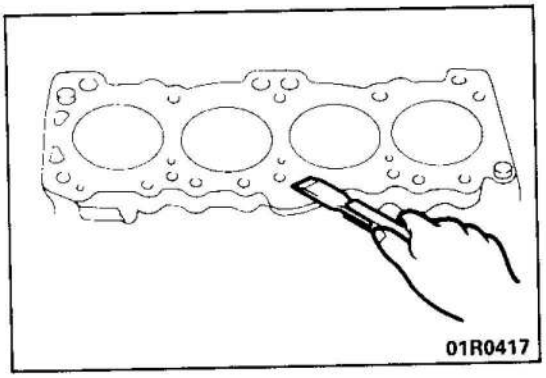


<12-point head bolt>

Using the 12 mm – 12 points socket wrench, loosen the cylinder head bolts. Loosen evenly, little by little.

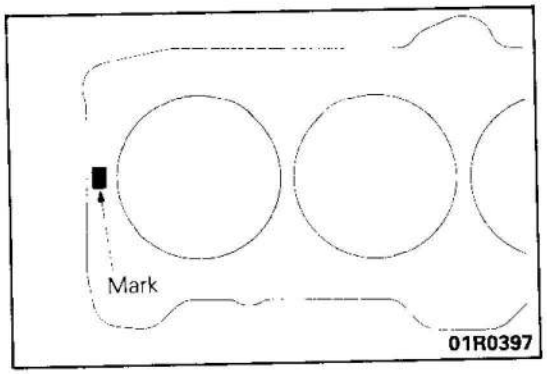
SERVICE POINTS OF INSTALLATION E11JDAU 1

24. INSTALLATION OF CYLINDER HEAD GASKET



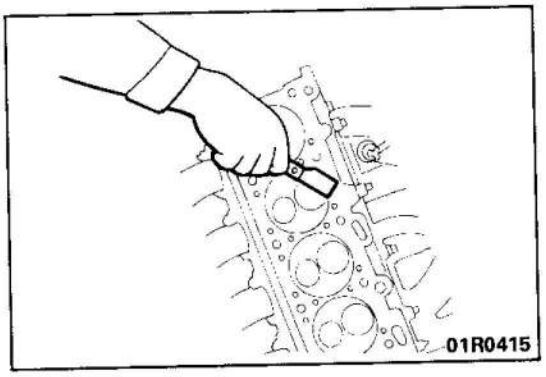
(1) Scrape off gasket adhered to cylinder block.

Caution
Be careful that foreign material does not fall into cylinder, or into coolant and oil passage ways.



(2) Identification mark is provided on cylinder head gasket to ensure correct installation.
(3) Mount on cylinder block with mark at top.

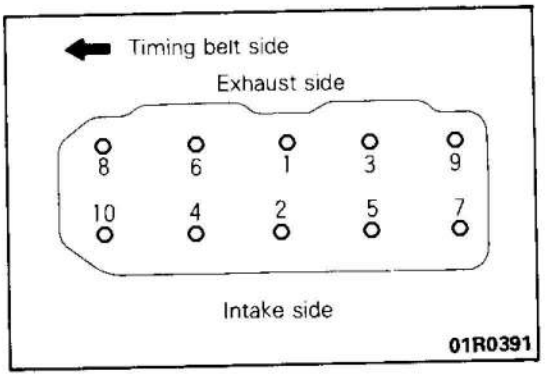
23. INSTALLATION OF CYLINDER HEAD ASSEMBLY



Scrape off gasket adhered to cylinder head assembly.

Caution
Be careful that foreign material does not fall into coolant and oil passage ways.

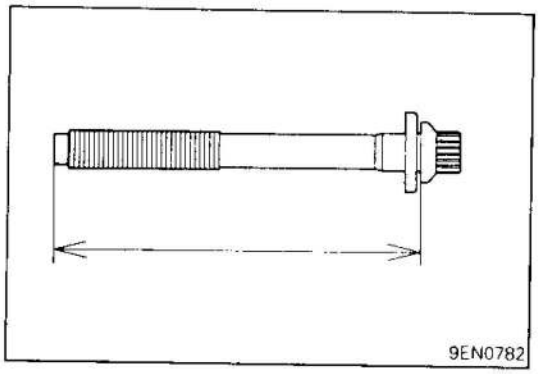
22. INSTALLATION OF CYLINDER HEAD BOLT

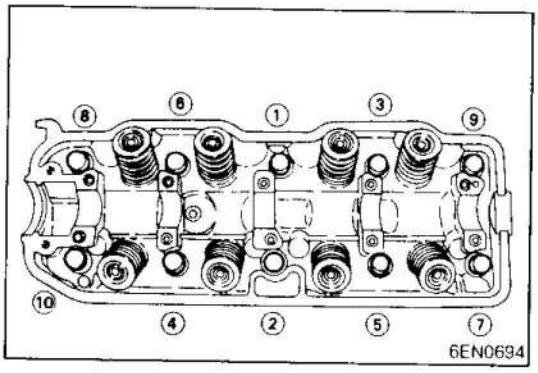


<Hexagonal head bolts>

Tighten in the numerical order indicated in the diagram in two or three groups with special tool (MD998051).

Tighten torque (cold engine):
90 – 100 Nm (9.0 – 10.0 kgm, 65 – 72 ft.lbs.)



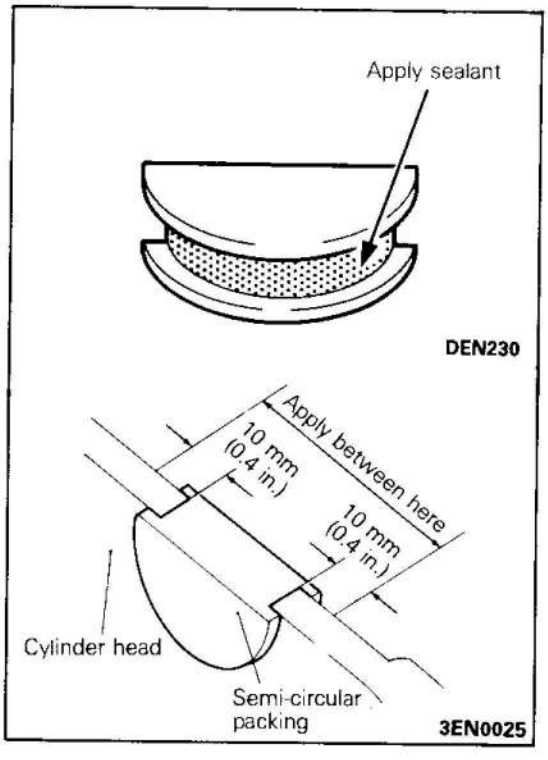


<12-point head bolt>

(1) When installing the cylinder head bolts, check that the shank length of each bolt meets the limit. If the limit is exceeded, replace the bolt.

Limit: Max. 120.4 mm (4.74 in.)

(2) Apply engine oil to the threaded portions of bolts and to the washers.
(3) According to the tightening sequence, tighten the bolts to the specified torque 80 Nm (8.0 kgm, 58 ft.lbs.) use with 12 mm – 12 points socket wrench.
(4) Loosen bolts completely.
(5) Torque bolts to 20 Nm (2.0 kgm, 14.5 ft.lbs.)
(6) Tighten bolts 1/4 turns (90°) more.
(7) Tighten bolts 1/4 turns (90°) additionally.



21. INSTALLATION OF SEMI-CIRCULAR PACKING

Apply specified sealant to semi-circular packing and cylinder head location indicated in the diagram.

Specified sealant: 3M ATD Part No. 8660 or equivalent

20. INSTALLATION OF ROCKER COVER

Replace rocker cover gasket if cracked or deteriorated.

1. INSTALLATION OF RADIATOR FAN SHROUD

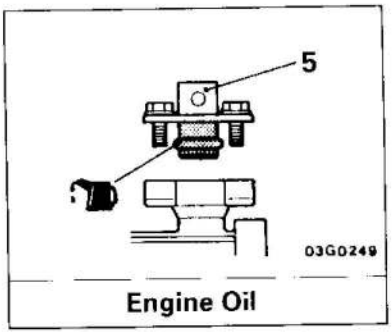
Refer to GROUP 14–Radiator.

CYLINDER HEAD GASKET (16 VALVE ENGINE)

REMOVAL AND INSTALLATION

Pre-removal Operation
- Removal of seat underframe
- Removal of front exhaust pipe (Refer to GROUP 15 – Exhaust Pipe and Mufflers.)
- Drainage of engine coolant

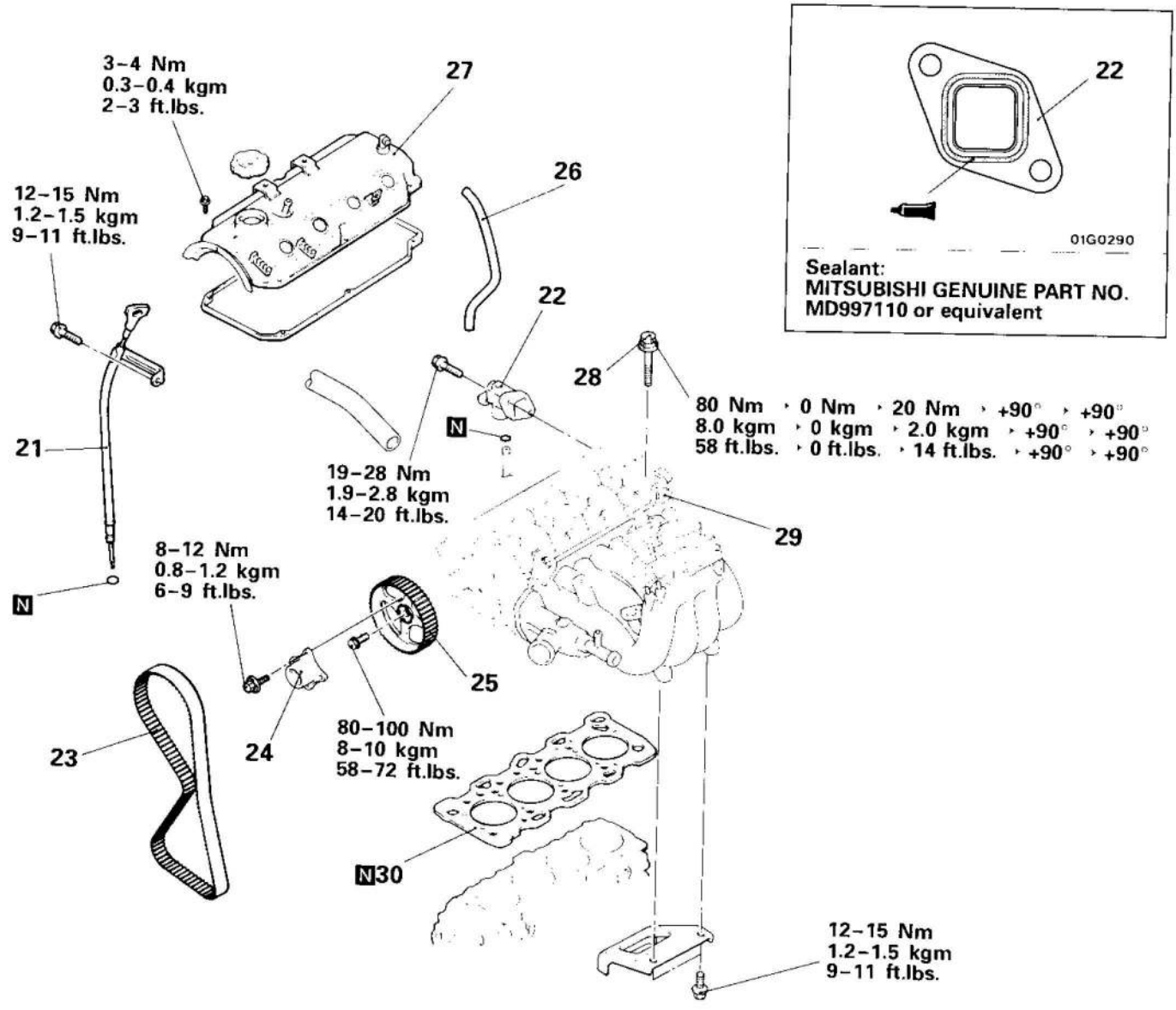
Post-installation Operation
- Filling of engine coolant
- Checking of engine oil
- Adjustment of accelerator cable play (Refer to GROUP 13 – Service Adjustment Procedures.)
- Installation of front exhaust pipe (Refer to GROUP 15 – Exhaust Pipe and Mufflers.)
- Installation of seat underframe



Removal steps

1. Resonance tank
2. Air hose
3. Accelerator cable
4. Fuel return hose
◆◆ 5. Fuel high pressure pipe
6. Engine coolant temperature sensor connector
7. Engine coolant temperature gauge unit connector
8. Engine coolant temperature switch connector
9. Oxygen sensor connector
10. Distributor connector
11. Power transistor connector
12. Throttle position sensor connector
13. Idle speed control servo connector
14. Injection wiring harness connector
15. Spark plug cable and high tension cable
16. Vacuum hose
17. Brake booster vacuum hose
18. Water hose
19. Heater hose
20. Radiator upper hose (Refer to GROUP 14 – Radiator.)

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) N : Non-reusable parts



21. Oil level gauge guide
◆◆ 22. Water by-pass fitting
23. Timing belt (Refer to P.11-51.)
24. Camshaft sprocket spacer (Refer to to GROUP 16 – Distributor.)
◆◆ ◆◆ 25. Camshaft sprocket
26. Breather hose
27. Rocker cover
◆◆ ◆◆ 28. Cylinder head bolt
29. Cylinder head assembly
◆◆ 30. Cylinder head gasket

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".
(4) N : Non-reusable parts

SERVICE POINTS OF REMOVAL

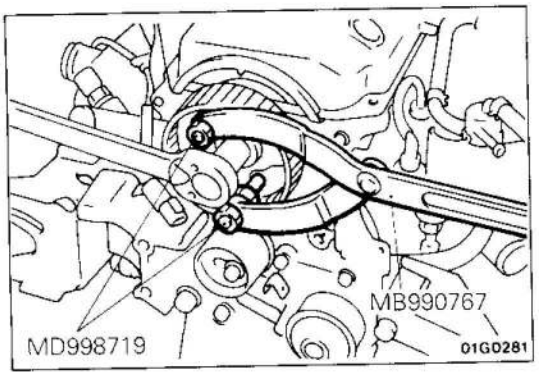
E13WBAA

5. DISCONNECTION OF FUEL HIGH PRESSURE HOSE

Release residual pressure from the fuel pipe line to prevent fuel from spilling.
Refer to GROUP 13 for releasing residual pressure.

Caution
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

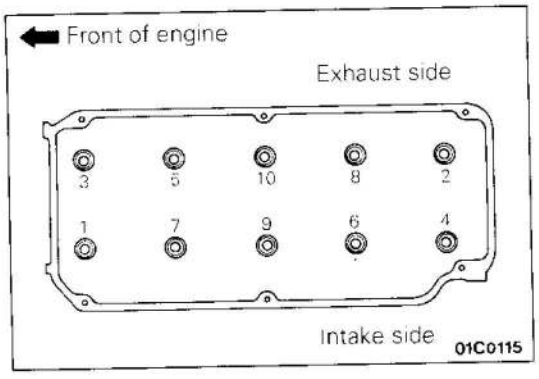
ADDED



25. REMOVAL OF CAMSHAFT SPROCKET

Use the special tool to remove the camshaft sprocket.

Caution
After removing the camshaft sprocket, be sure not to rotate the crankshaft.

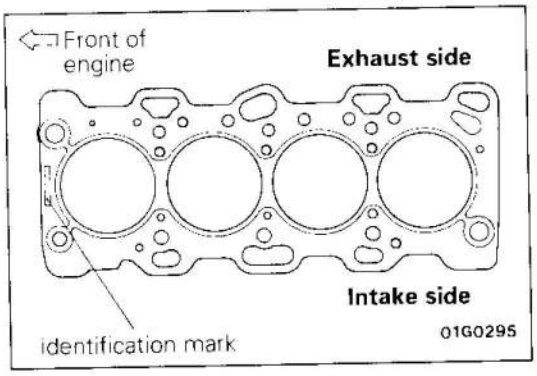


28. REMOVAL OF CYLINDER HEAD BOLT

Loosen the bolts in 2 or 3 steps in order of the numbers shown in the illustration, and remove the cylinder head assembly.

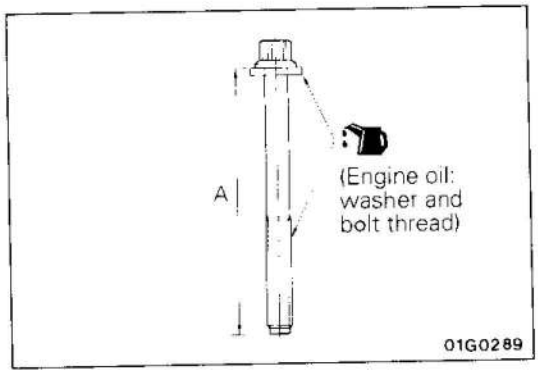
Caution
Because the plug guides cannot be replaced by themselves, be careful not to damage or deform them when removing the cylinder head bolts.

SERVICE POINTS OF INSTALLATION



30. INSTALLATION OF CYLINDER HEAD GASKET

(1) Wipe off all oil and grease from the gasket mounting surface.
(2) Install the gasket to the cylinder block with the identification mark facing upwards.



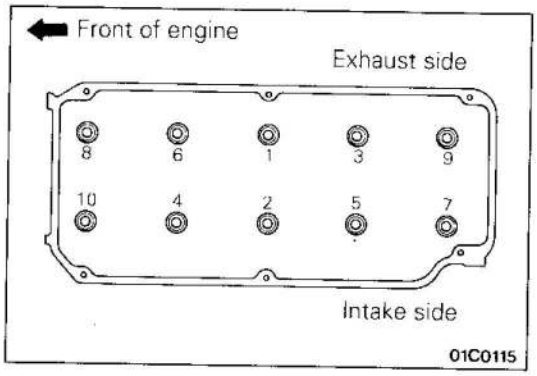
28. INSTALLATION OF CYLINDER HEAD BOLT

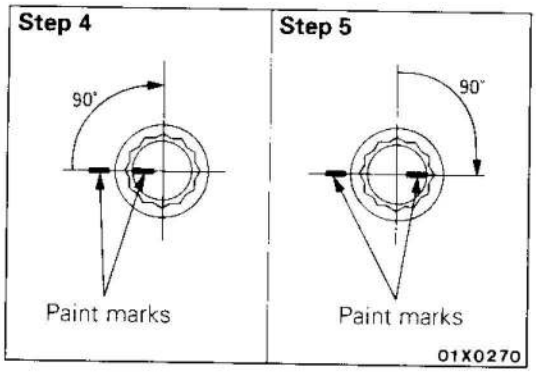
(1) When installing the cylinder bolts, the length below the head of the bolts should be within the standard value. If it is outside the standard value, replace the bolts.

Limit (A): Within 99.4 mm (3.91 in.)

(2) Apply a small amount of engine oil to the thread section and the washer of the cylinder head bolt.

Caution
The head bolt washer should be installed with the burred side caused by tapping out facing upwards.





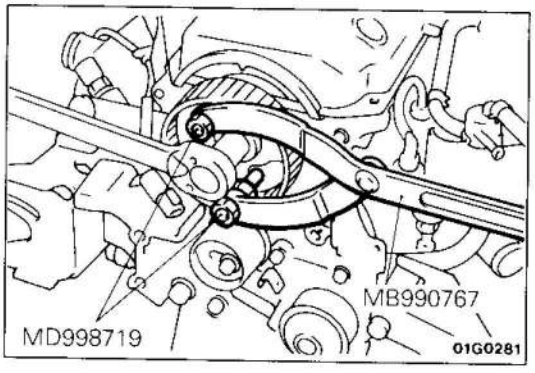
(3) Use a double hexagonal wrench of 12 mm to tighten the bolts by the following procedures.

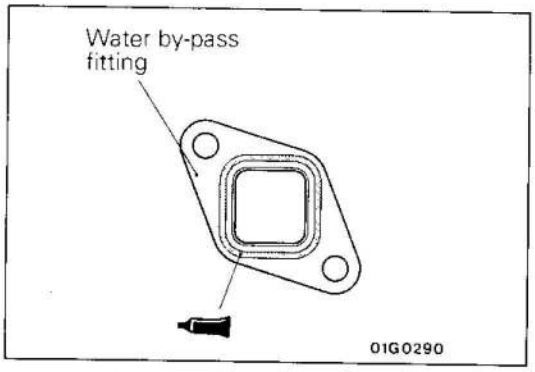
Step	Operation	Remarks
1	Tighten to 80 Nm (8.0 kgm, 58 ft.lbs.).	In the order shown in the illustration.
2	Loosen fully.	In the reverse order of that shown in the illustration.
3	Tighten to 20 Nm (2.0 kgm, 15 ft.lbs.)	In the order shown in the illustration
4	Tighten 90° of a turn.	In the order shown in the illustration Mark the head of the cylinder head bolt and cylinder head by paint.
5	Tighten 90° of a turn.	In the order shown in the illustration. Check that the painted mark of the head bolt is lined up with that of the cylinder head.

Caution

1. **If the tightening angle is less than 90°, enough tightness may not be obtained. Be careful about the tightening angle.**
2. **If the tightening angle is more than the specified, remove the bolt, and then retighten from step 1.**

25. INSTALLATION OF CAMSHAFT SPROCKET





22. INSTALLATION OF WATER BY-PASS FITTING

(1) Apply specified sealant to the thermostat case assembly in the places shown in the illustration.

Specified sealant: MITSUBISHI GENUINE PART No. MD970389 or equivalent

(2) Apply a small amount of water to the O-ring of the water inlet pipe, and then press the thermostat case assembly into the water pipe.

TIMING BELT AND TIMING BELT B

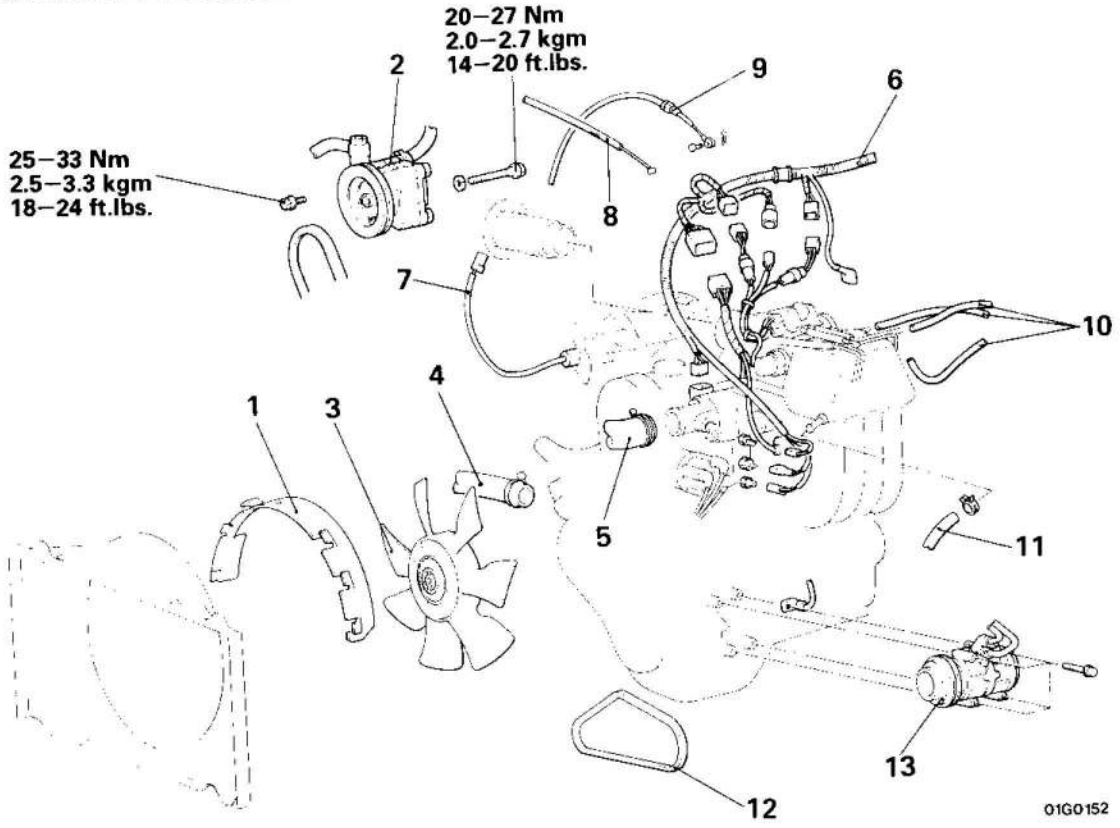
Refer to P.11-51 for removal and installation procedures.

NOTES

ENGINE AND TRANSMISSION ASSEMBLY (2WD – 8 VALVE ENGINE)

E11SA--3

REMOVAL AND INSTALLATION

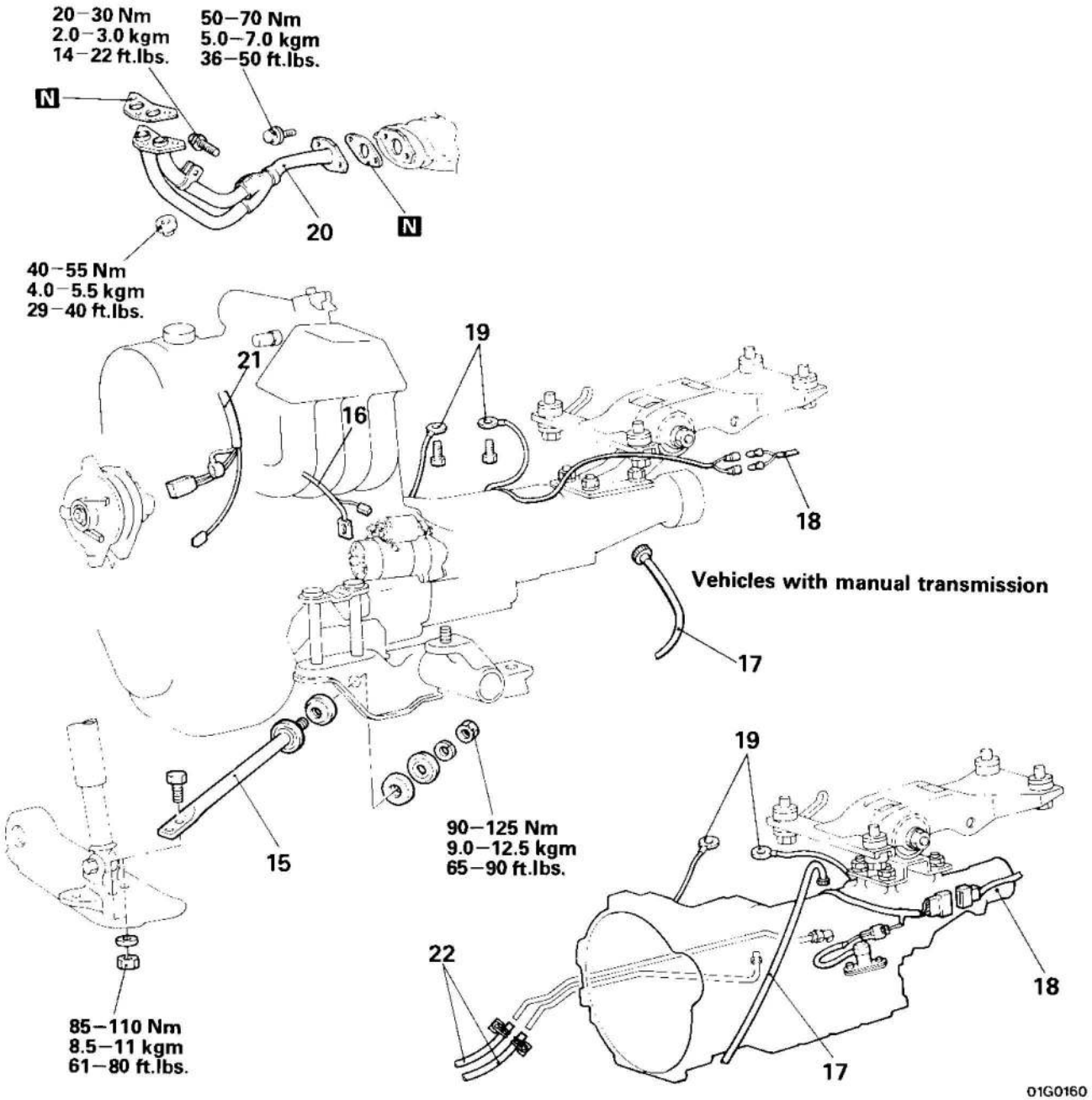


Pre-removal Operation
- Decreasing of fuel pressure in fuel main hose. (Refer to GROUP 13 FUEL–Fuel Line and Vapor Line.)
- Disconnection of battery negative terminal
- Drainage of engine coolant
- Drainage of automatic transmission fluid (vehicles with automatic transmission) (Refer to GROUP 23 AUTOMATIC TRANSMISSION–Service Adjustment Procedures.)
- Drainage of transmission oil (Refer to GROUP 22 MANUAL TRANSMISSION–Service Adjustment Procedures.)
- Removal of seat underframe (Refer to GROUP 01 GENERAL–engine Compartment Work.)

Removal steps

◆◆ ●◆ 1. Radiator fan shroud
2. Power steering oil pump assembly
3. Cooling fan
4. Radiator lower hose connection
5. Radiator upper hose connection
6. Control harness connectors connections
7. Oxygen sensor harness connector connection
8. Accelerator cable connection
9. Kick-down cable connection (vehicles with automatic transmission)
10. Vacuum hoses connections
11. Brake vacuum hose connection
12. Air-conditioner compressor V-belt
13. Air-conditioner compressor
14. Engine earth connection

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ●◆ : Refer to "Service Points of Installation".

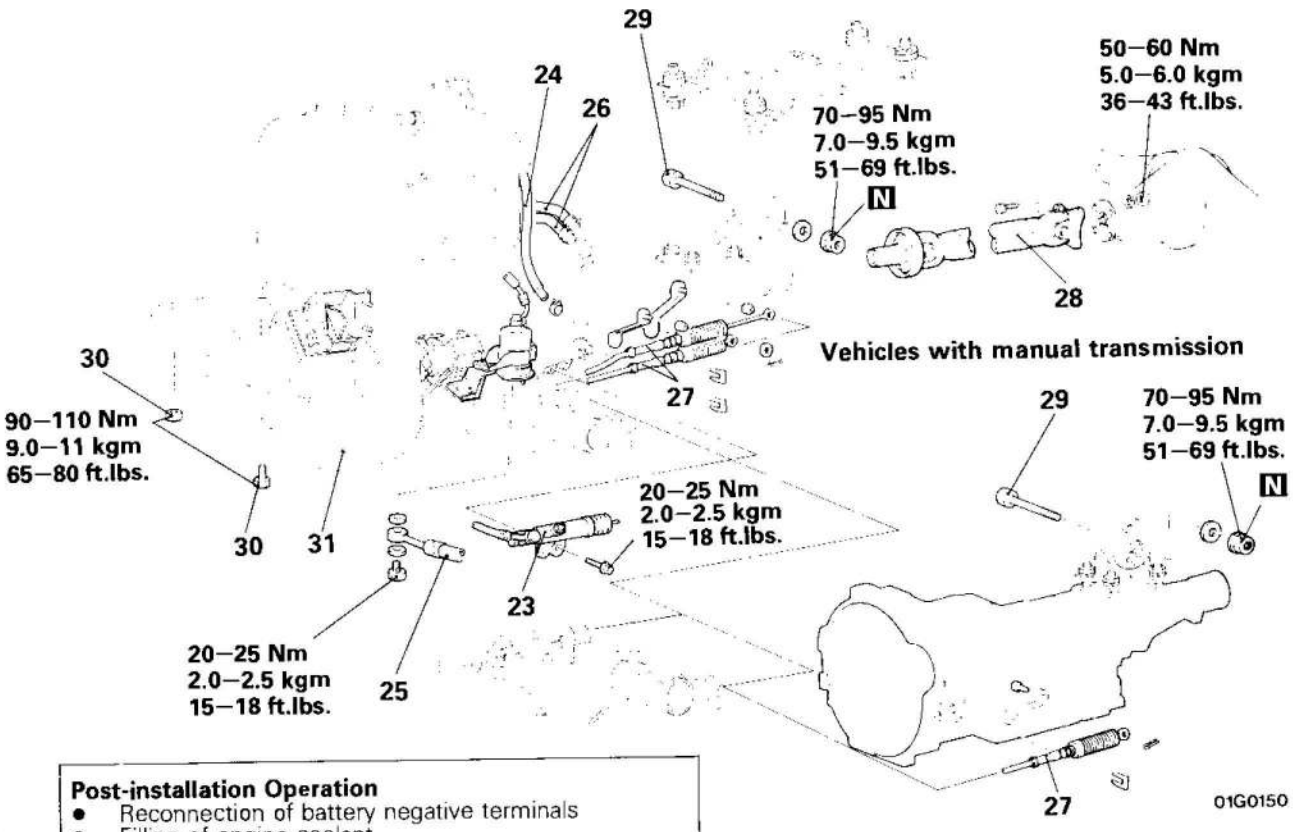


Vehicles with automatic transmission

Removal steps

15. Strut bars
16. Starter harness connector
17. Speedometer cable connection
18. Transmission harness connector
19. Earth cable connection
20. Exhaust pipe
21. Alternator and oil pressure switch harness connectors
22. Automatic transmission fluid cooler hoses connections (vehicles with automatic transmission)

NOTE
(1) Reverse the removal procedures to reinstall.
(2) N : Non-reusable parts



Post-installation Operation
- Reconnection of battery negative terminals
- Filling of engine coolant (Refer to GROUP 14 COOLING–Service Adjustment Procejures.)
- Filling of automatic transmission fluid (Refer to GROUP 23 AUTOMATIC TRANSMISSION–Service Adjustment Precedures.)
- Filling of transmission oil (Refer to GROUP 22 MANUAL TRANSMISSION–Service Adjustment Procedures.)
- Filling of engine oil (Refer to P.11–33.)
- Checking of alternator V-belt tension (Refer to P.11–34.)
- Checking of power steering oil pump V-belt tension (Refer to P.11–34.)
- Checking of air-conditioner compressor V-belt tension (Refer to P.11–34.)
- Adjustment of accelerator cable play (Refer to GROUP 13 FUEL–Service Adjustment Procedures.)
- Checking of clutch operation (Refer to GROUP 21 CLUTCH–Service Adjustment Procedures.)
- Checking of shift lever operation
- Checking of engine operation
- Checking of gauges operations

Removal steps

23. Clutch release cylinder (vehicles with manual transmission)
24. Fuel return hose connection
25. Fuel main hose connection
26. Heater hoses connections
◆◆ ◆◆ 27. Transmission control cables connections
28. Propeller shaft
◆◆ 29. Rear engine mounting installation bolt
30. Engine mounting to crossmember installation bolt and nuts
31. Engine and transmission assembly

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".
(4) N : Non-reusable parts

SERVICE POINTS OF REMOVAL E11SDBH 1

1. REMOVAL OF RADIATOR FAN SHROUD

Refer to GROUP 14 COOLING–Radiator.

27. DISCONNECTION OF TRANSMISSION CONTROL CABLES

Refer to GROUP 22 MANUAL TRANSMISSION–Transmission Control (2WD) or GROUP 23 AUTOMATIC TRANSMISSION– Transmission Control.

29. REMOVAL OF REAR ENGINE MOUNTING INSTALLATION BOLT

Support the engine and transmission before removing.

SERVICE POINTS OF INSTALLATION E11SDDH 1

27. RECONNECTION OF TRANSMISSION CONTROL CABLES

Refer to GROUP 22 MANUAL TRANSMISSION–Transmission Control (2WD) or GROUP 23 AUTOMATIC TRANSMISSION– Transmission Control.

1. INSTALLATION OF RADIATOR FAN SHROUD

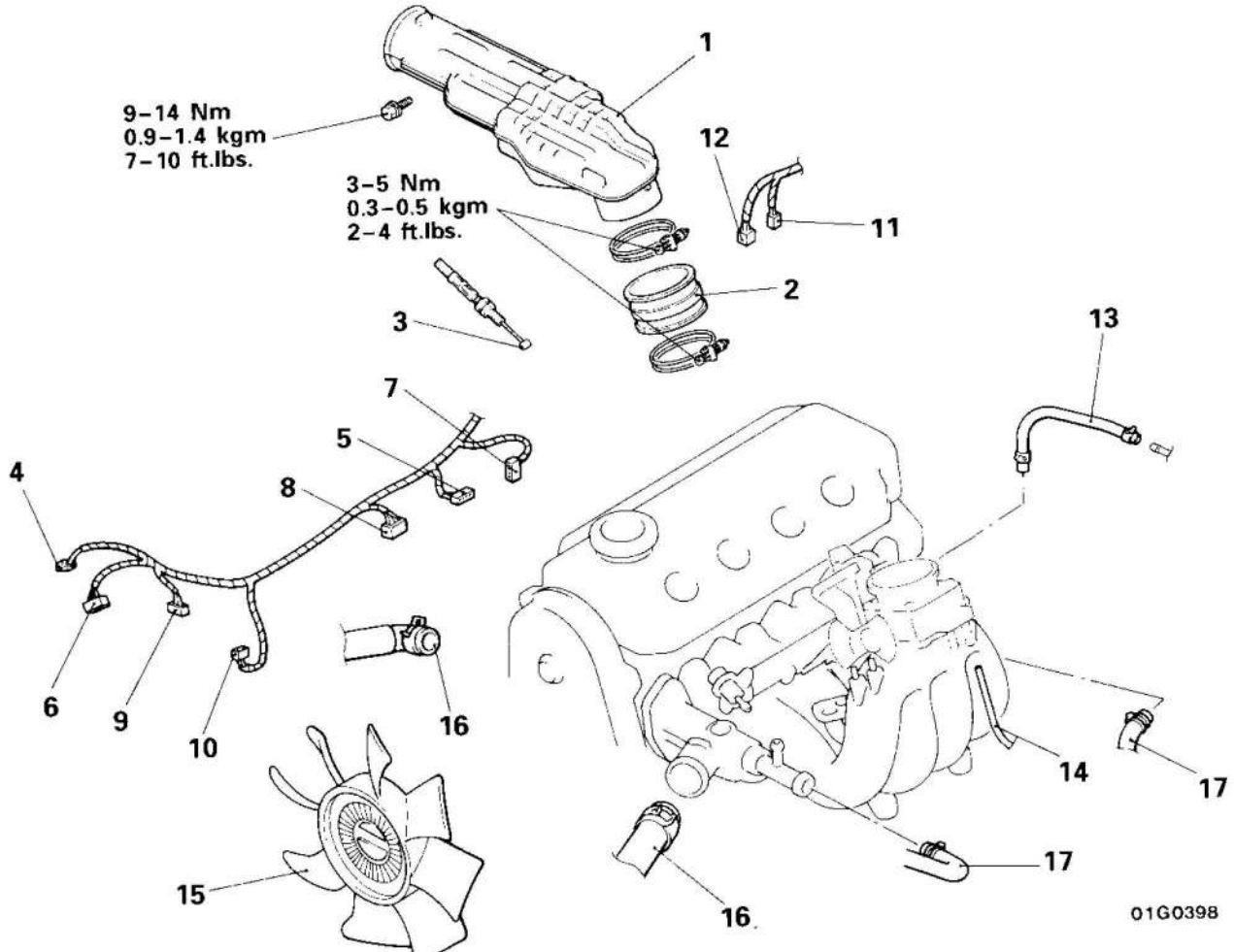
Refer to GROUP 14 COOLING–Radiator.

ENGINE AND TRANSMISSION ASSEMBLY (2WD – 16 VALVE ENGINE)

REMOVAL AND INSTALLATION

Pre-removal Operation
- Removal of seat underframe
- Removal of undercover
- Removal of front exhaust pipe (Refer to GROUP 15 – Exhaust Pipe and Mufflers.)
- Drainage of engine coolant
- Drainage of transmission oil
- Drainage of automatic transmission oil

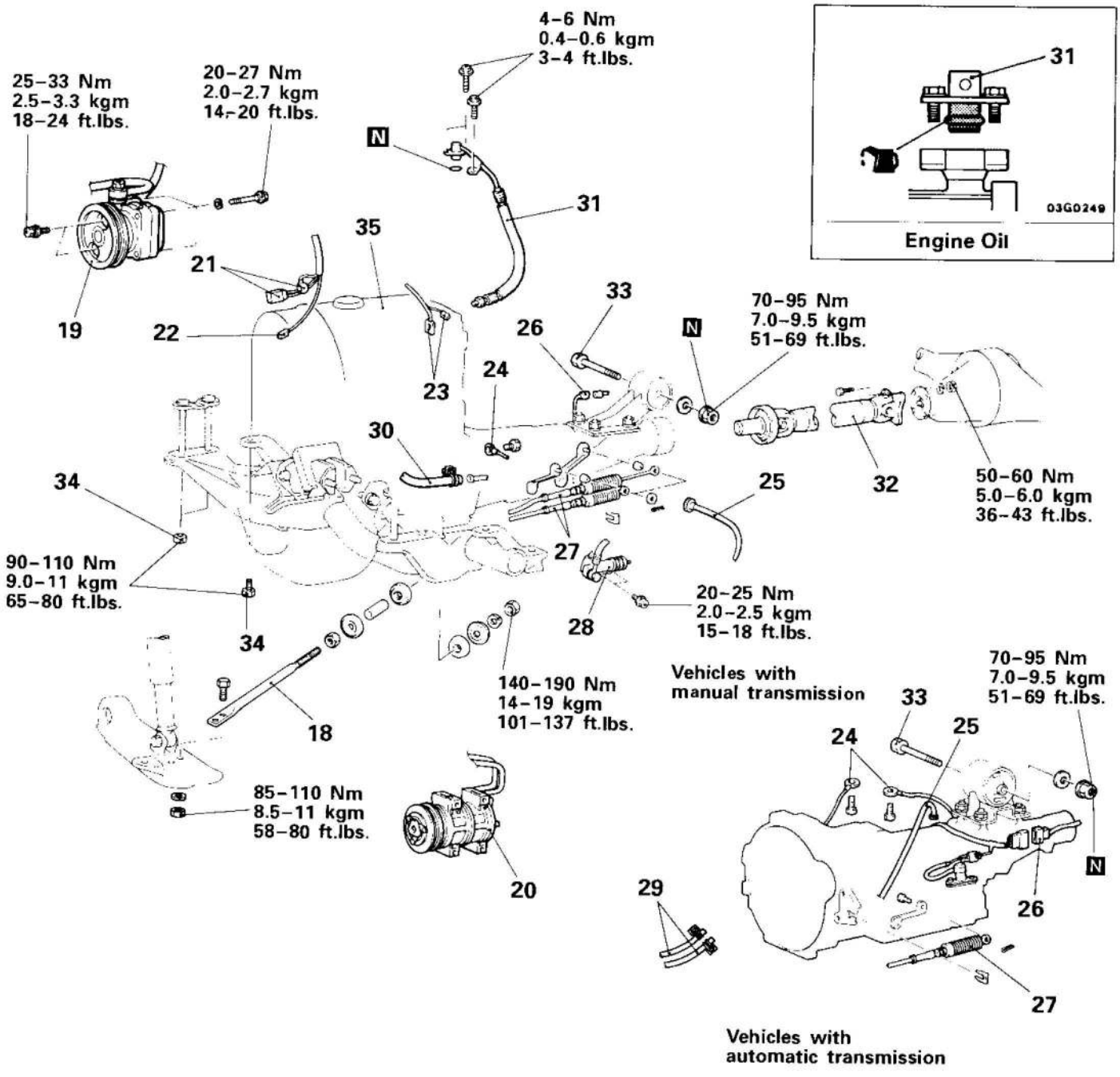
Post-installation Operation
- Installation of front exhaust pipe (Refer to GROUP 15 – Exhaust Pipe and Mufflers.)
- Installation of undercover
- Installation of seat underframe
- Filling of engine coolant
- Filling of transmission oil
- Filling of automatic transmission oil
- Adjustment of accelerator cable play



Removal steps

1. Resonance tank
2. Air hose
3. Accelerator cable
4. Oxygen sensor connector
5. Throttle position sensor connector
6. Distributor connector
7. Idle speed control servo connector
8. Injection wiring harness connector
9. Power transistor connector
10. Engine coolant temperature sensor connector
11. Engine coolant temperature gauge unit connector
12. Engine coolant temperature switch connector
13. Brake booster vacuum hose
14. Vacuum hose
15. Cooling fan (Refer to GROUP 14 – Cooling Fan.)
16. Radiator hose (Refer to GROUP 14 – Radiator.)
17. Heater hose

NOTE
(1) Reverse the removal procedures to reinstall.



Engine Oil

18. Strut bar
(Refer to GROUP 33 – Strut Bar.)
◆◆ 19. Power steering oil pump
(Vehicles with power steering)
◆◆ 20. Air-conditioner compressor
(Vehicles with air-conditioner)
21. Alternator connector
22. Oil pressure switch connector
23. Starter motor connector
24. Earth cable
25. Speed meter cable
26. Transmission harness connector
27. Transmission control cable
28. Clutch release cylinder
29. Automatic transmission oil cooler hose
30. Fuel return hose
◆◆ 31. Fuel high pressure hose
32. Propeller shaft
33. Rear engine mounting installation bolt
34. Engine mounting to crossmember
installation bolt and nut
◆◆ ◆◆ 35. Engine and transmission assembly

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".

SERVICE POINTS OF REMOVAL

19. REMOVAL OF POWER STEERING OIL PUMP

Remove the power steering oil pump from the bracket with the hose attached.

NOTE
Place the removed power steering oil pump in a place where it will not be a hindrance when removing and installing the engine assembly, and tie it with a cord.

20. REMOVAL OF A/C COMPRESSOR

Disconnect the A/C compressor connector and remove the compressor from the compressor bracket with the hose still attached.

NOTE
Place the removed A/C compressor in a place where it will not be a hindrance when removing and installing the engine assembly, and tie it with a cord.

31. DISCONNECTION OF FUEL HIGH PRESSURE HOSE

Release residual pressure from the fuel pipe line to prevent fuel from spilling.
Refer to GROUP 13 for releasing residual pressure.

Caution
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

35. REMOVAL OF ENGINE AND TRANSMISSION ASSEMBLY

(1) Check that all cables, hoses, harness connectors, etc. are disconnected from the engine.
(2) Lower the engine and transmission assembly slowly.

SERVICE POINTS OF INSTALLATION

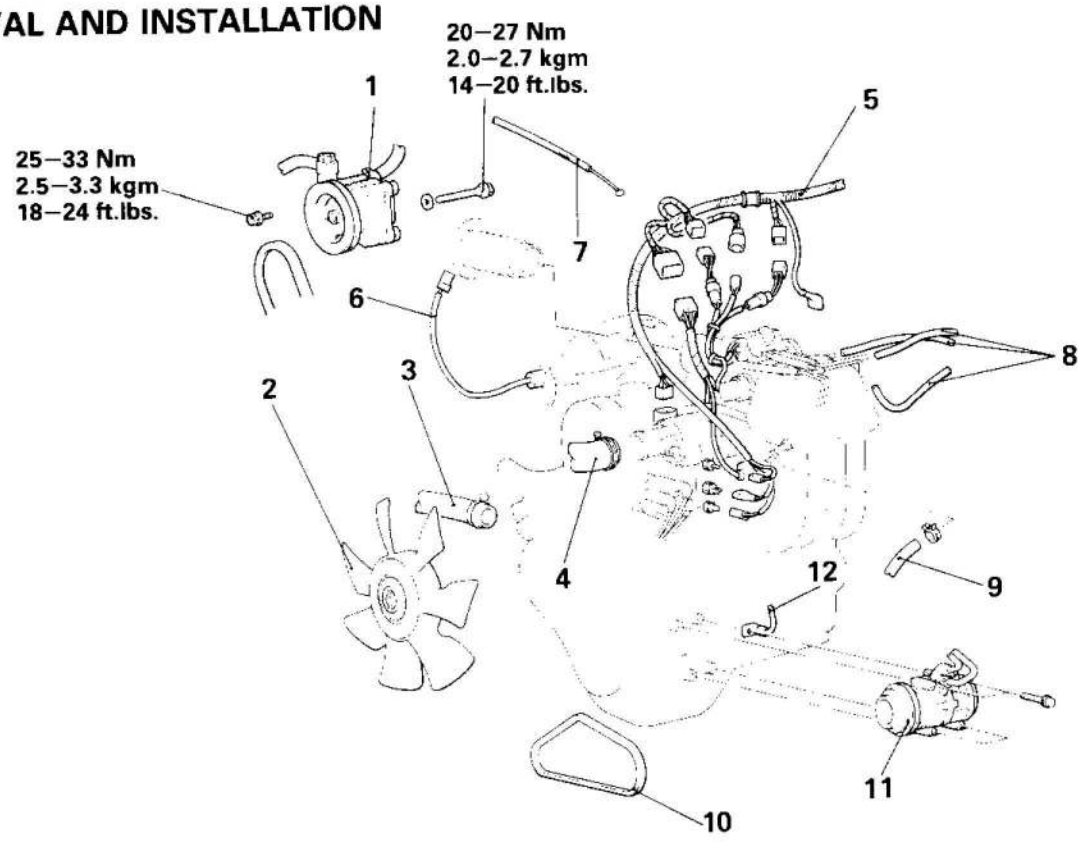
35. INSTALLATION OF ENGINE AND TRANSMISSION ASSEMBLY

Install the engine and transmission assembly while checking that the cables, hoses, harness connectors, etc. are not clamped.

NOTES

ENGINE AND TRANSMISSION ASSEMBLY (4WD – 8 VALVE ENGINE)

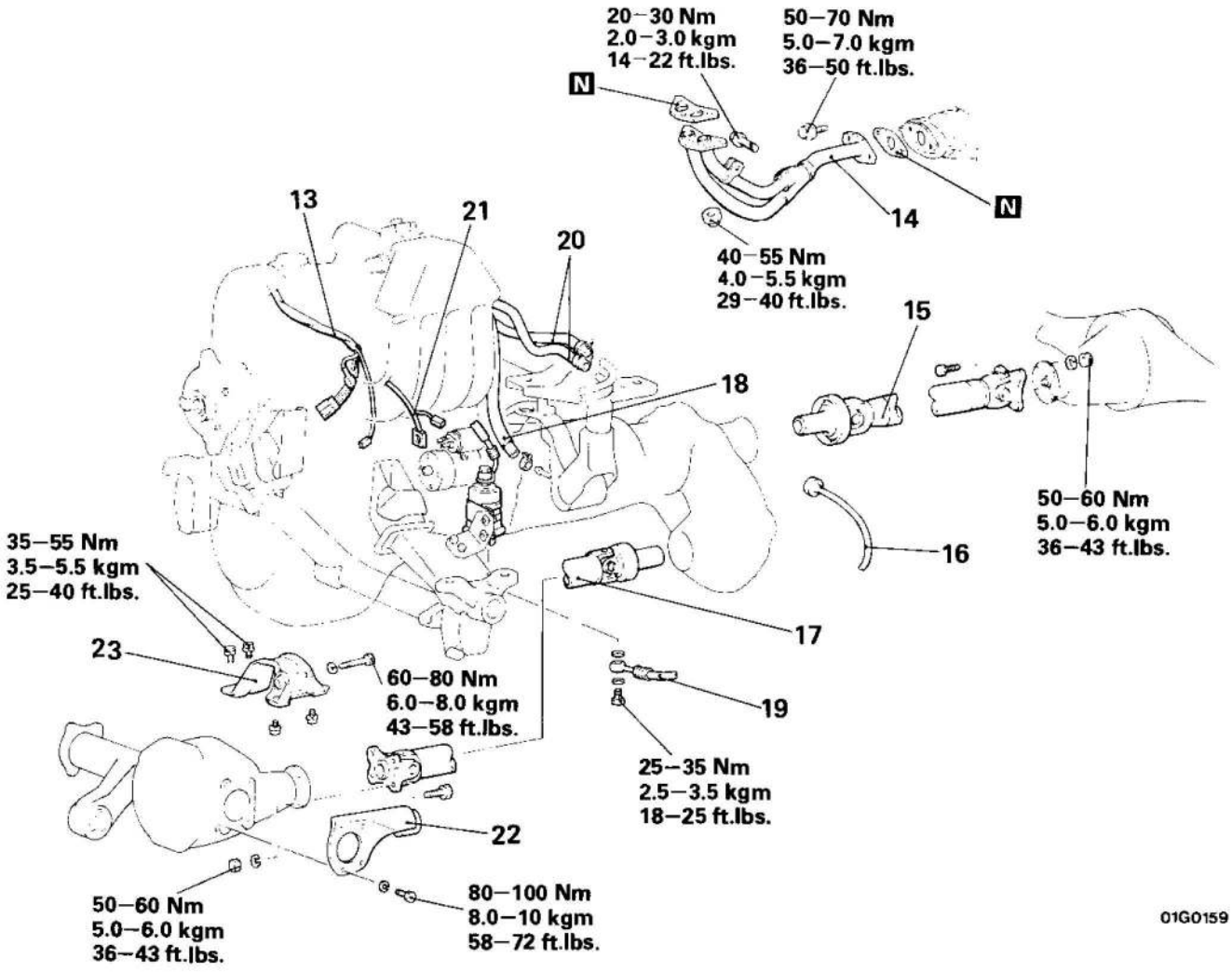
REMOVAL AND INSTALLATION



Pre-removal Operation
- Decreasing of fuel pressure in fuel main hose (Refer to GROUP 13 FUEL–Fuel Line and Vaper Line.)
- Disconnection of battery negative terminal
- Drainage of engine coolant
- Removal of undercover (Refer to GROUP 42 BODY–Undercover.)
- Removal of oil pan protector (Refer to GROUP 42 BODY–Undercover.)
- Removal of transfer protector (Refer to GROUP 42 BODY–Undercover.)
- Drainage of transmission and transfer oil (Refer to GROUP 22 MANUAL TRANSMISSION–Service Adjustment Procedures.)
- Removal of seat underframe (Refer to GROUP 01 GENERAL–Engine Compartment Work.)

Removal steps
1. Power steering oil pump assembly
2. Cooling fan
3. Radiator lower hose connection
4. Radiator upper hose connection
5. Control harness connectors connections
6. Oxygen sensor harness connector (Mini-bus)
7. Accelerator cable connection
8. Vacuum hoses connections
9. Brake vacuum hose connection
10. Air-conditioner compressor V-belt
11. Air-conditioner compressor
12. Engine earth connection

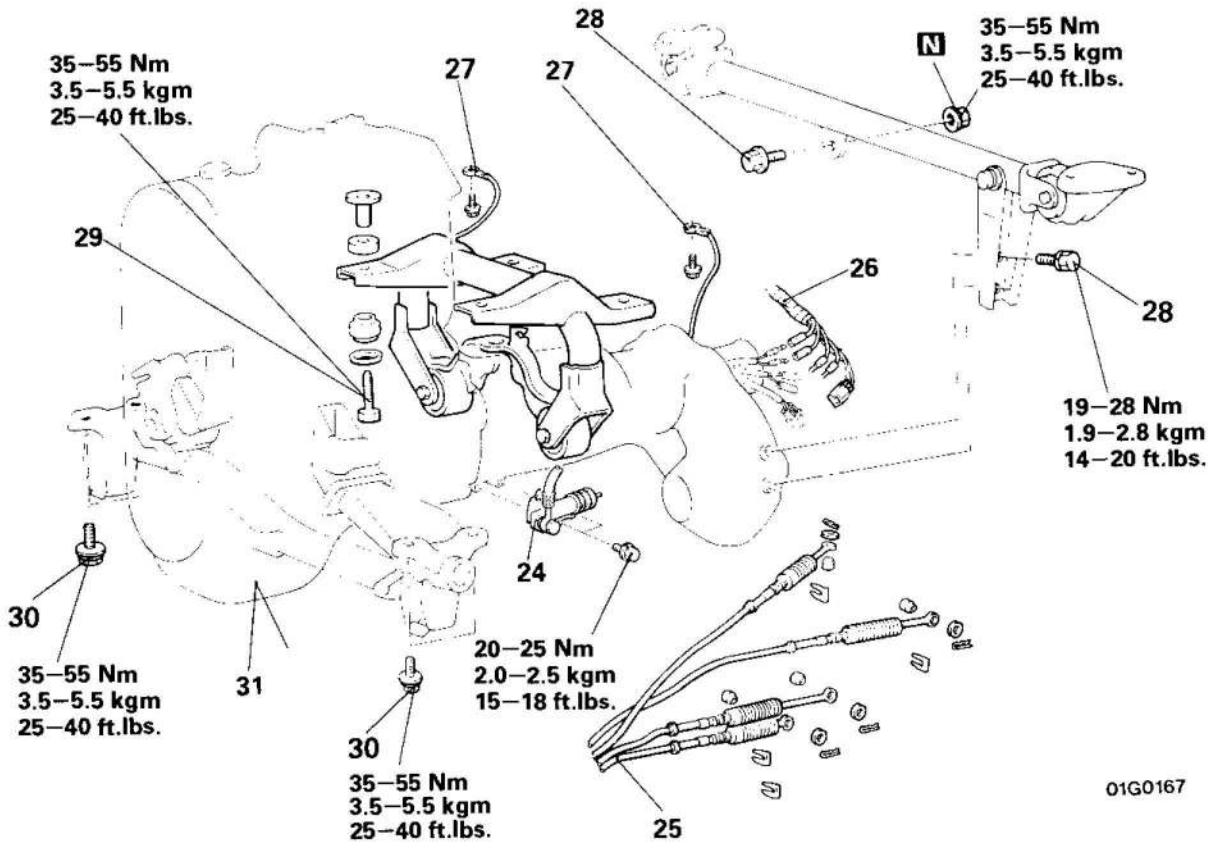
NOTE
Reverse the removal procedures to reinstall.



Removal steps

13. Alternator and oil pressure switch harness connectors
14. Exhaust pipe
15. Rear propeller shaft
16. Speedometer cable connection
17. Front propeller shaft
18. Fuel return hose connection
19. Fuel main hose connection
20. Heater hoses connections
21. Starter harness connectors
◆◆ 22. Differential mounting bracket (L.H.)
◆◆ 23. Stopper bracket assembly

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) N : Non-reusable parts



Removal steps

- 24. Clutch release cylinder
- ◆◆ ◆◆ 25. Transmission and transfer control cables connections
- 26. Transmission harness connectors connections (back-up, 4WD indicator, Auto free wheel indicator)
- 27. Earth cable connection
- 28. Transfer mounting installation bolts
- ◆◆ 29. Transmission mounting bracket installation bolts
- 30. Engine mounting to crossmember installation bolts
- 31. Engine and transmission assembly

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".
(4) N : Non-reusable parts

Post-installation Operation

- Reconnection of battery negative terminals
- Filling of engine coolant
  (Refer to GROUP 14 COOLING–Service Adjustment Procedures.)
- Installation of undercover
  (Refer to GROUP 42 BODY–Undercover.)
- Installation of oil pan protector
  (Refer to GROUP 42 BODY–Undercover.)
- Installation of transfer protector
  (Refer to GROUP 42 BODY–Undercover.)
- Filling of transmission and transfer oil
  (Refer to GROUP 22 MANUAL TRANSMISSION–Service Adjustment Procedures.)
- Filling of engine oil
  (Refer to P.11–33.)
- Checking of alternator V-belt tension
  (Refer to P.11–34.)
- Checking of power steering oil pump V-belt tension
  (Refer to P.11–34.)
- Checking of air-conditioner compressor V-belt tension
  (Refer to P.11–34.)
- Adjustment of accelerator cable play
  (Refer to GROUP 13 FUEL–Service Adjustment Procedures.)
- Checking of clutch operation
  (Refer to GROUP 21 CLUTCH–Service Adjustment Procedures.)
- Checking of shift lever operation
- Checking of engine operation
- Checking of gauges operations

SERVICE POINTS OF REMOVAL E11SBBI 1

22. REMOVAL OF DIFFRENTIAL MOUNTING BRACKET/ 23.STOPPER BRACKET

Refer to GROUP 32 POWER PLANT MOUNT–Front Differential mounting.

25. HANDLING OF TRANSMISSION AND TRANSFER CONTROL CABLE

Refer to GROUP 22 MANUAL TRANSMISSION–Transmission Control (4WD).

29. REMOVAL OF TRANSMISSION MOUNTING BRACKET INSTALLATION BOLT

Support the engine and transmission before removing.

SERVICE POINTS OF INSTALLATION E11SDOI 1

25. RECONNECTION OF TRANSMISSION AND TRANSFER CONTROL CABLE

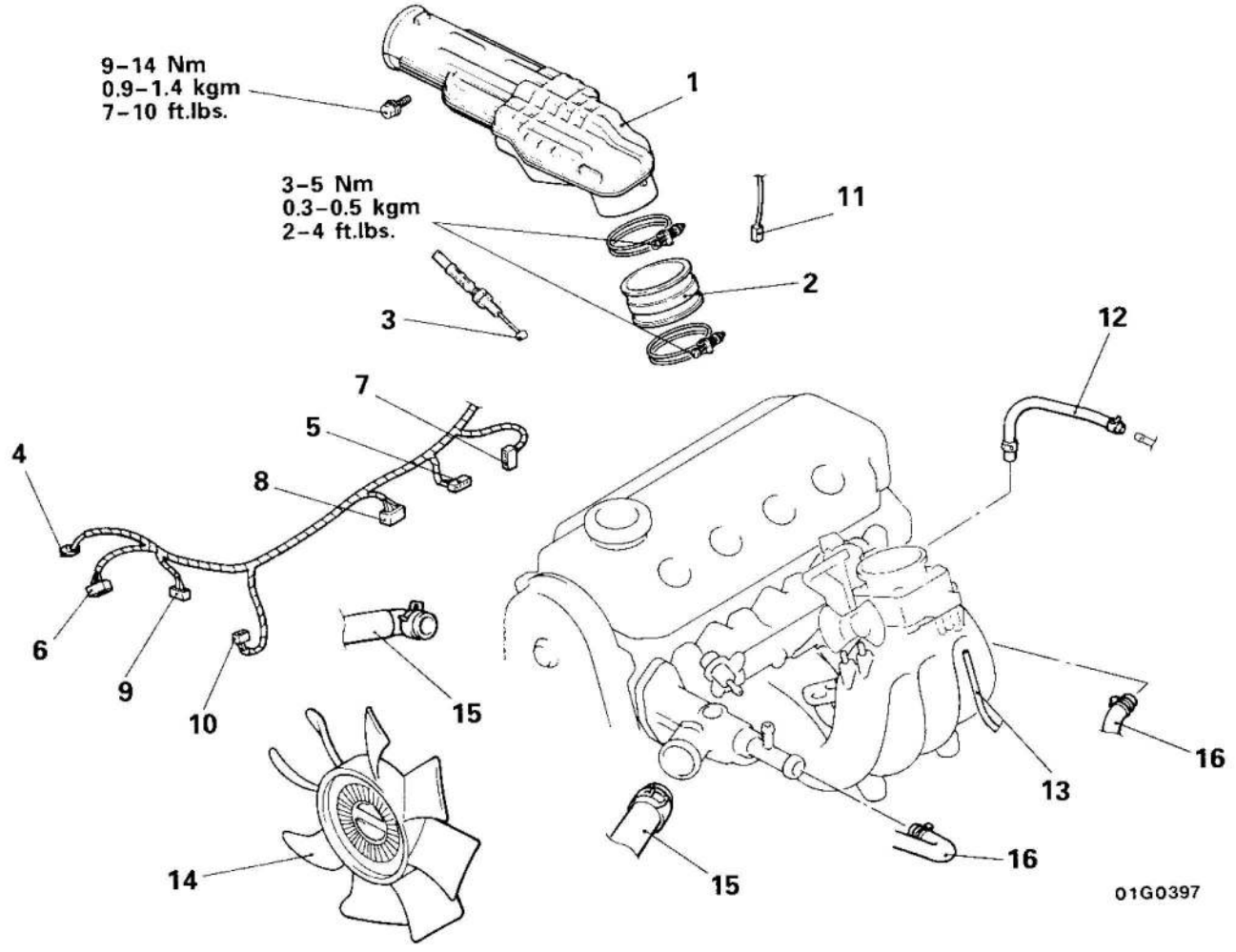
Refer to GROUP 22 MANUAL TRANSMISSION–Transmission Control (4WD).

ENGINE AND TRANSMISSION ASSEMBLY (4WD – 16 VALVE ENGINE)

REMOVAL AND INSTALLATION

Pre-removal Operation
- Removal of seat underframe
- Removal of undercover
- Removal of front exhaust pipe (Refer to GROUP 15 – Exhaust Pipe and Mufflers.)
- Drainage of engine coolant
- Drainage of transmission oil

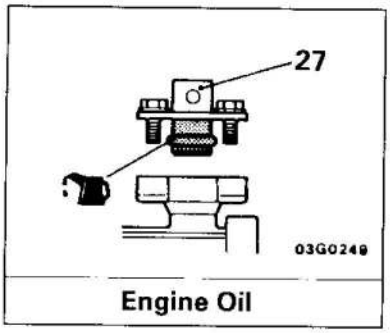
Post-installation Operation
- Installation of front exhaust pipe (Refer to GROUP 15 – Exhaust Pipe and Mufflers.)
- Installation of undercover
- Installation of seat underframe
- Filling of engine coolant
- Filling of transmission oil
- Adjustment of accelerator cable play

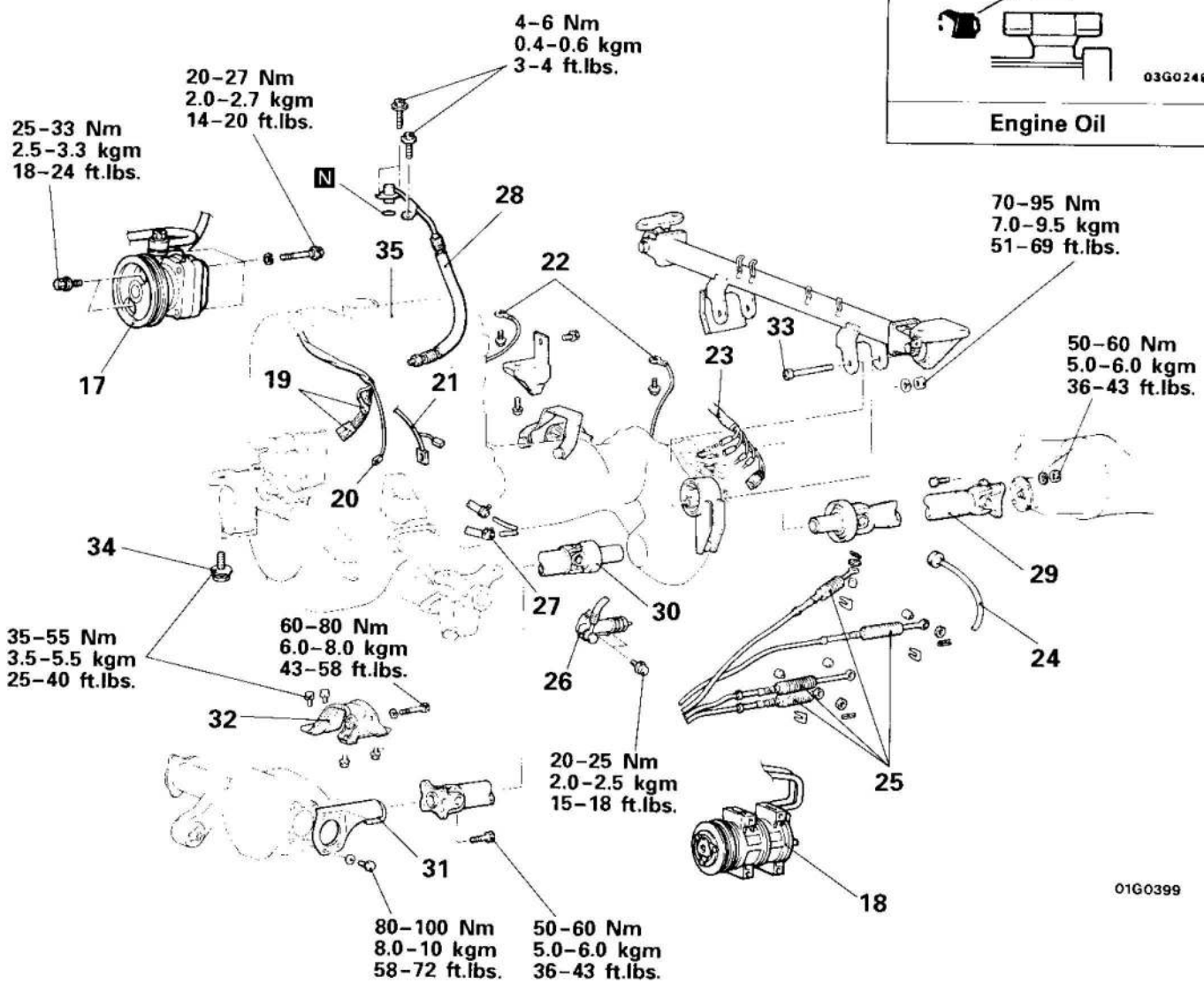


Removal steps

1. Resonance tank
2. Air hose
3. Accelerator cable
4. Oxygen sensor connector
5. Throttle position sensor connector
6. Distributor connector
7. Idle speed control servo connector
8. Injection wiring harness connector
9. Power transistor connector
10. Engine coolant temperature sensor connector
11. Engine coolant temperature gauge unit connector
12. Brake booster vacuum hose
13. Vacuum hose
14. Cooling fan (Refer to GROUP 14 – Cooling Fan.)
15. Radiator hose (Refer to GROUP 14 – Radiator.)
16. Heater hose

NOTE
(1) Reverse the removal procedures to reinstall.





◆◆ 17. Power steering oil pump (Vehicles with power steering)
◆◆ 18. Air-conditioner compressor (Vehicles with air-conditioner)
19. Alternator connector
20. Oil pressure switch connector
21. Starter motor connector
22. Earth cable
23. Transmission harness connector
24. Speed meter cable
25. Transmission and transfer control cable
26. Clutch release cylinder
27. Fuel return hose
◆◆ 28. Fuel high pressure hose
29. Rear propeller shaft
30. Front propeller shaft
31. Differential mounting bracket (L.H.)
32. Stopper bracket assembly
33. Rear engine mounting installation bolt
34. Engine mounting to crossmember installation bolts
◆◆ ◆◆ 35. Engine and transmission assembly

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".

SERVICE POINTS OF REMOVAL

17. REMOVAL OF POWER STEERING OIL PUMP

Remove the power steering oil pump from the bracket with the hose attached.

NOTE
Place the removed power steering oil pump in a place where it will not be a hindrance when removing and installing the engine assembly, and tie it with a cord.

18. REMOVAL OF A/C COMPRESSOR

Disconnect the A/C compressor connector and remove the compressor from the compressor bracket with the hose still attached.

NOTE
Place the removed A/C compressor in a place where it will not be a hindrance when removing and installing the engine assembly, and tie it with a cord.

28. DISCONNECTION OF FUEL HIGH PRESSURE HOSE

Release residual pressure from the fuel pipe line to prevent fuel from spilling.
Refer to GROUP 13 for releasing residual pressure.

Caution
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

35. REMOVAL OF ENGINE AND TRANSMISSION ASSEMBLY

(1) Check that all cables, hoses, harness connectors, etc. are disconnected from the engine.
(2) Lower the engine and transmission assembly slowly.

SERVICE POINTS OF INSTALLATION

35. INSTALLATION OF ENGINE AND TRANSMISSION ASSEMBLY

Install the engine and transmission assembly while checking that the cables, hoses, harness connectors, etc. are not clamped.

NOTES

ENGINE (4D56)

ENGINE ADJUSTMENT

CHECKING RADIATOR CAP E11FIAC 2

Refer to P.11–11 for checking procedures.

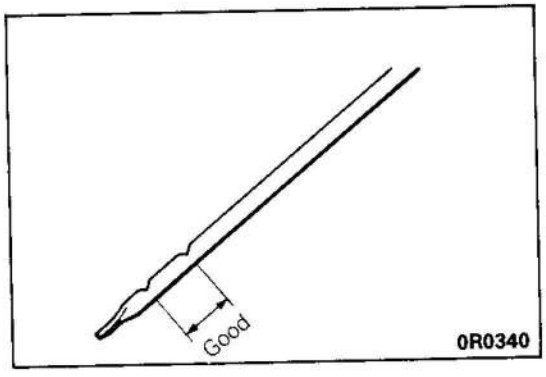
CHECKING ENGINE COOLANT E11FJAD 2

Refer to P.11–11 for checking procedures.

CHECKING BATTERY (Maintenance-free type battery) E11FLAC 2

Refer to P.11–11 for checking procedures.

INSPECTION OF ENGINE OIL LEVEL E11FNAA 1



1. Pull out the oil level gauge and remove oil adhered to the level gauge, wiping with clean cloth.
2. Insert the level gauge into the oil level gauge guide.
3. Pull out the level gauge slowly and check that the oil level is in the illustrated range.

   NOTE
   1. For this inspection, place the vehicle on a level surface.
   2. Check while the engine is stationary. If the engine has been started, stop it and allow for some time before inspection.

4. If below the minimum level, refill with specified oil.

   Specified oil: (API classification)

Vehicles without a turbocharger	
Europe	**CD or higher**
General Export	**CC or higher**
Vehicles with a turbocharger	**CD or higher**

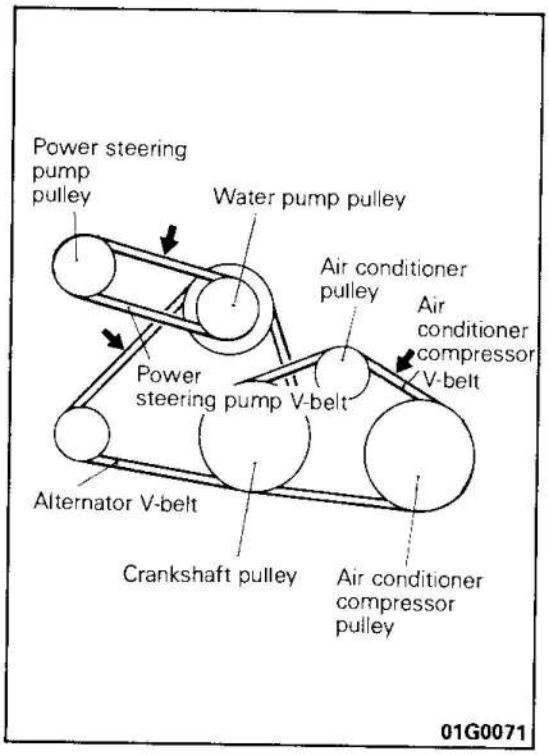
   Caution
   Refilling beyond the maximum level has adverse effect on engine performance.

5. Run the engine at idle and stop. Then allow some time and check oil level again to make sure it is within the specified range.

CHECKING AND CLEANING OF AIR CLEANER ELEMENT

E11FPAQ

Refer to P. 11-12 for checking procedures.



INSPECTION AND ADJUSTMENT OF DRIVE BELT FLEX

E11FQAD1

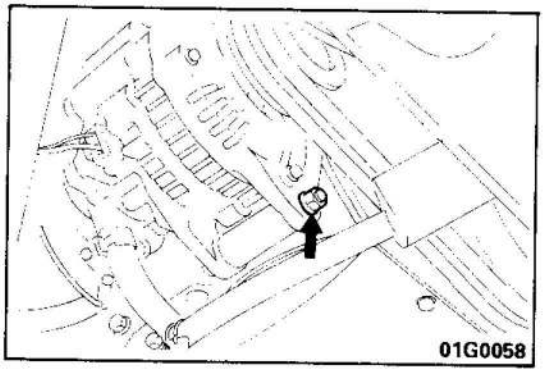
1. Check belt for damage or wear. Confirm that belt is set correctly in pulley groove.

   NOTE
   If the belt "squeals" or slips, check belt for friction, damage or breaks and check pulley contact surface for damage.

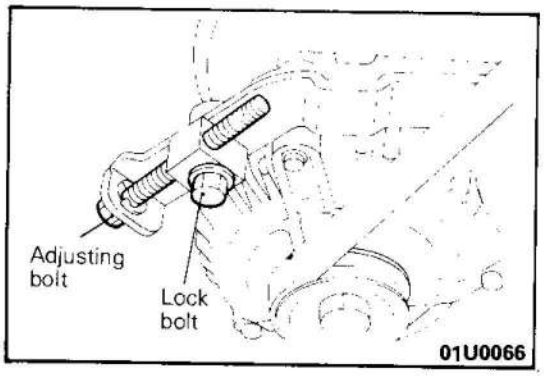
2. Press at 100N (10 kg, 22 lbs.) centre of belt between pulleys as indicated in the diagram. Measure drive belt flex.

   Standard value:
   Alternator:
   Single belt type
   New belt: 9 – 12 mm (0.35 – 0.47 in.)
   Reused belt: 11 – 14 mm (0.43 – 0.55 in.)
   Double belt type (per belt)
   13–16 mm (0.51–0.63 in.)
   Power steering oil pump: 8 – 11 mm (0.31 – 0.43 in.)
   Air-conditioner compressor: 6 – 9 mm (0.24 – 0.35 in.)

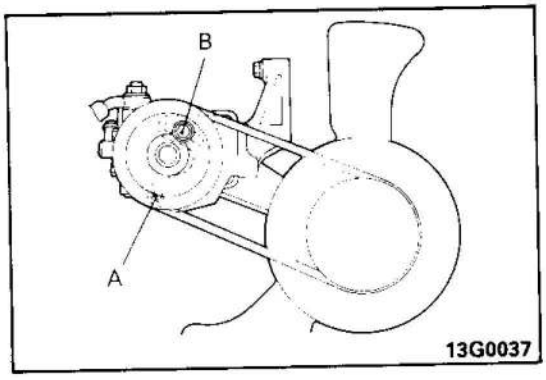
   Caution
   - **Measure belt flex between specified pulleys (→).**
   - **When the drive belt of double belt type is replaced, replace two belts at the same time.**



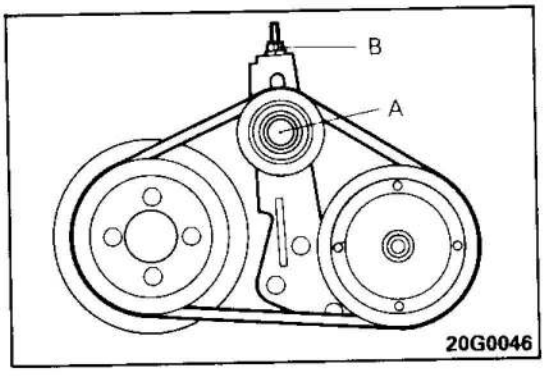
3. Adjust alternator drive belt flex by the following precedures.
   (1) Loosen alternator support bolt nut.



   (2) Loosen belt tension adjuster lock bolt.
   (3) Adjust belt flex by turning adjuster bolt.
   (4) Tighten lock bolt.
   (5) Tjghten alternator support bolt nut.
   (6) Check belt flex and adjust if necessary.

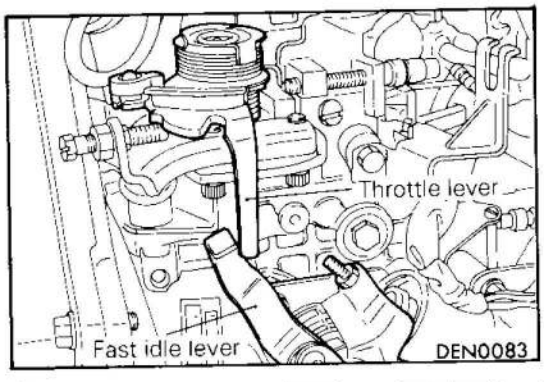


4. Adjust power steering oil pump V-belt flex by the following procedures.
   (1) Loosen power steering pump fixing bolt A and B.
   (2) Move power steering pump, tension belt moderately and adjust flex.
   (3) Tighten fixing bolt B and then A.
   (4) Check belt flex and adjust if necessary.

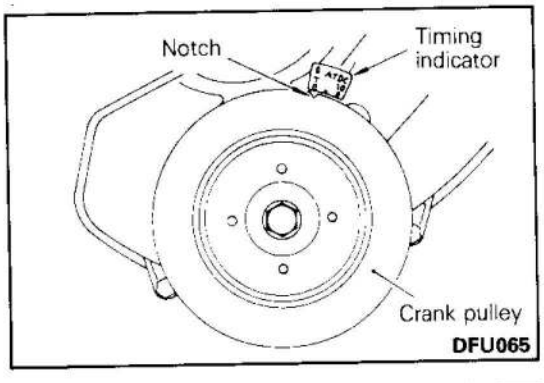


5. Adjust air-conditioner compressor V-belt flex by the following procedures.
   (1) Loosen tension pulley fixing bolt A.
   (2) Adjust belt flex with adjusting bolt B.
   (3) Tighten fixing bolt A.
   (4) Check belt flex and adjust if necessary.

INJECTION TIMING ADJUSTMENT E11FVAB

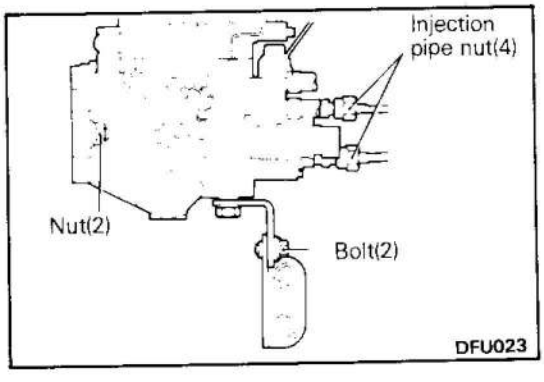


1. Warm up the engine and then check that the fast idle lever is separated from the throttle lever. (Vehicles with cold start device)

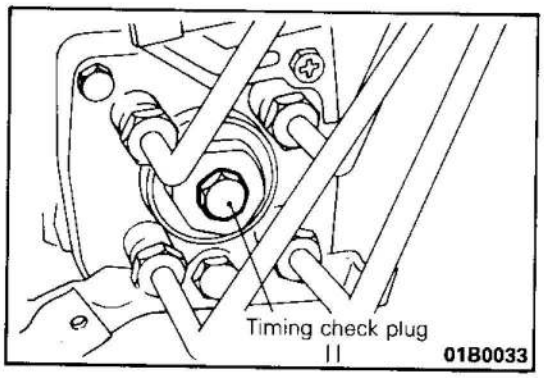


Caution
Injection timing should be adjusted with engine stationary.

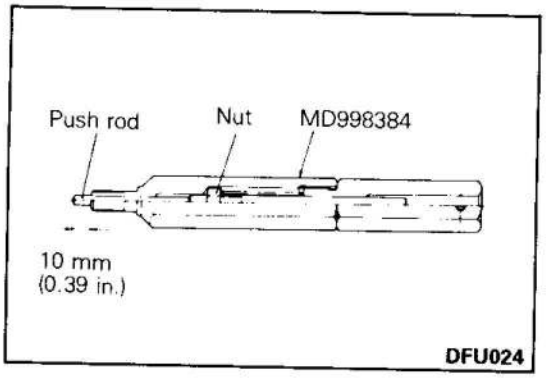
2. Turn crankshaft to place in No.1 cylinder at top dead center on compression stroke.



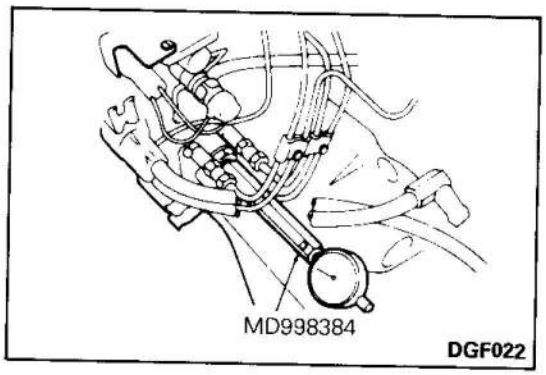
3. Loosen (but do not remove) injection pipe union nuts (4 in all) on injection pump side. When loosening union nuts, hold delivery valve holder with a spanner to prevent it from rotating with nut.
4. Loosen two nuts and two bolts securing injection pump, but do not remove these nuts and bolts.



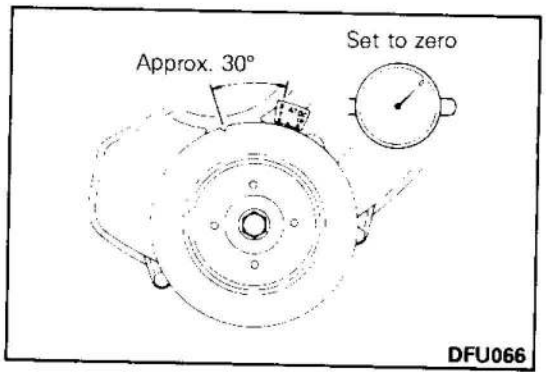
5. Remove timing check plug from injection pump head.



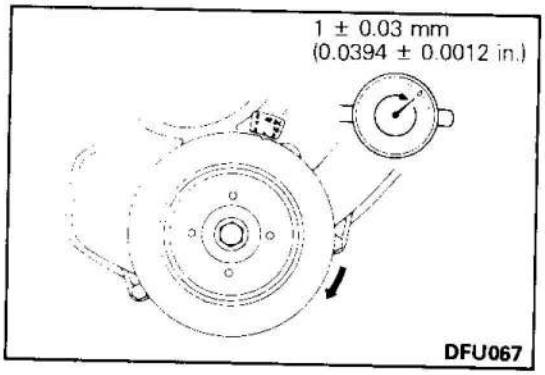
6. Before installation of special tool, make sure that push rod is protruding by 10 mm (0.39 in.). Protrusion of push rod can be adjusted with an inner nut.



7. Attach the special tool and a dial indicator.



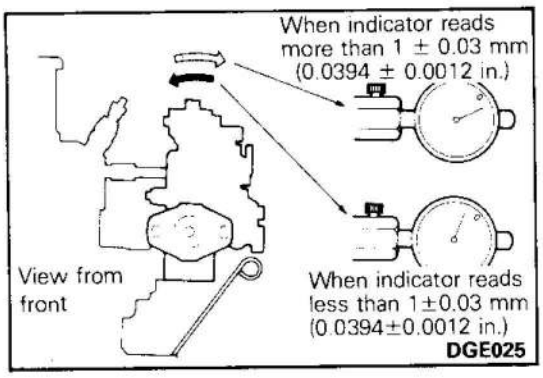
8. Turn crankshaft to such a position that the notch on pulley is at approximately 30° before top dead center on compression stroke of piston in No.1 cylinder. Then, set dial indicator to zero. Slightly turn crankshaft clockwise and counterclockwise to make sure that dial indicator pointer dose not deviate from zero position. If it does, readjust pulley position so that the notch on pulley is at 30° before top dead center.



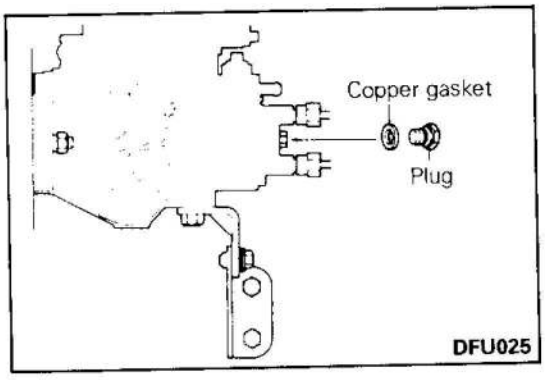
9. Turn the crankshaft in the normal direction to position the crankshaft notch at 7° ATDC (9° ATDC*), and then make sure that the dial indicator is indicating the standard value.

Standard value: 1 ± 0.03 mm (0.0394 ± 0.0012 in.)

*** Vehicles with EGR built from July, 1993 and Vehicles from Europe and Hong Kong built from June, 1994**



10. If the dial indicator does not indicate the specified value, tilt the injection pump body to the right or left until the indicator does indicate the standard value. Then, tighten injection pump mounting nuts and bolts to specified torque.
11. Repeat Steps 7 and 8 to check that adjustment has been made correctly.



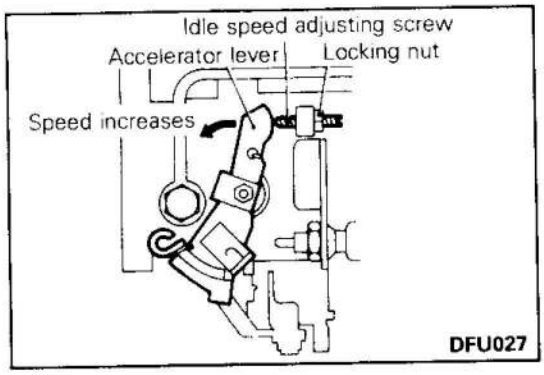
12. Remove the special tool and a dial indicator.
13. Install new copper gasket and timing check plug, then tighten plug to specified torgue.
14. Tighten injection pipe nuts to specified torque. When nuts are tightened, hold delivery valve holder with a spanner to prevent it from rotating with nut.

Tightening torque: 23–37 Nm (2.3–3.7 kgm, 17–27 ft.lbs.)

INSPECTION AND ADJUSTMENT OF IDLING RPM E11FXAG

1. Before inspection and adjustment set vehicle in the following condition.
   (1) Coolant temperature: 80–90°C (176–194°F)
   (2) Lights and all accessories: OFF
   (3) Transmission: Neutral
2. Check injection timing and valve clearance, and adjust as necessary.
3. Connect a tachometer.
4. Check that idling rpm is within the standard value.

   Standard value: 750±30 r/min.



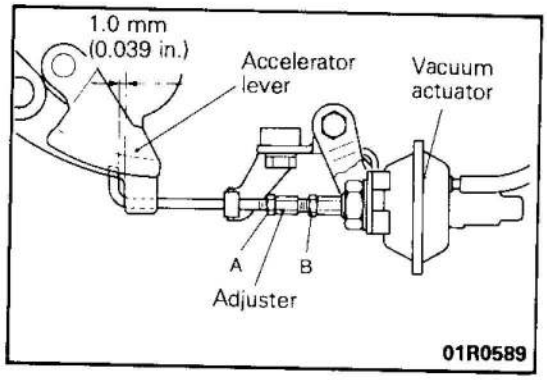
5. If not within the standard value, loosen idle adjusting screw lock nut and adjust the standard value by rotating adjusting screw.
6. After adjustment, tighten locking nut.

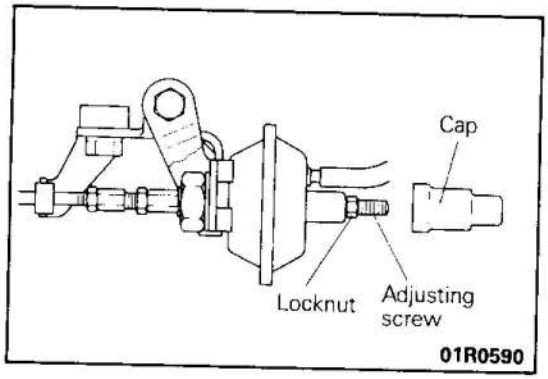
   Caution
   Do not disturb other screws.

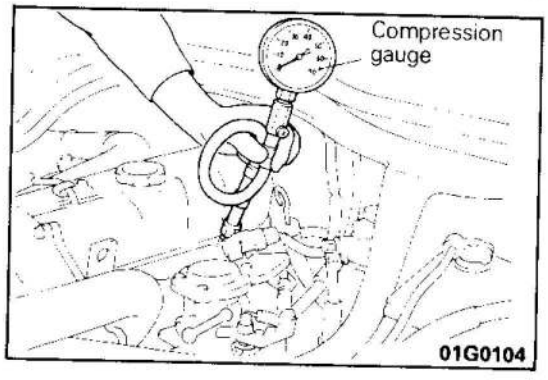
INSPECTING AND ADJUSTING OF THE IDLE UP DEVICE (for air-conditioner) E11FZAD

1. Place the vehicle in the following condition before inspecting and adjusting.
   (1) Coolant temperature: 80–90°C (176–194°F)
   (2) Lights and all accessories: OFF
   (3) Transmission: Neutral.
2. Inspect and adjust the idling speed.
3. Connect a tachometer.
4. Turn on the air-conditioner switch and check whether or not the engine speed is the standard value.

   Standard value: 1,000±50 r/min.







5. When the engine speed is not the standard value, adjust using the following procedure.
   (1) Loosen locknuts A and B of the vacuum actuator.
   (2) Adjust the adjuster so that the gap between the tip of the vacuum actuator rod and the accelerator lever is approximately 1.0 mm (0.04 in.).
   (3) Tighten locknuts A and B.
   (4) Start the engine and make sure that the rod contacts the accelerator lever when the air-conditioner switch is on and does not contact the accelerator lever when the air-conditioner switch is turned off.
   (5) Remove the vacuum actuator cap and loosen the locknut.
   (6) Turn the adjusting screw and adjust the engine speed to the standard value.

   Caution
   Do not push the adjusting screw deeper than the surface of the locknut.

   (7) Tighten the locknut and install the cap.

CHECKING ENGINE COMPRESSION PRESSURE E11FGAD

1. Check to be sure that the engine oil, starting motor and battery are in the normal condition.
2. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 90°C (176°F to 194°F).
3. Loosen the nuts at the nozzle side of the injection pipes, and disconnect the pipes from the nozzle holders.

   Caution
   Caps must be used to prevent entry of foreign materials into the nozzles.

4. Remove the glow plug plate and all 4 glow plugs.
5. Set an engine tachometer in place.
6. Place a compression gauge adaptor and compression gauge in the glow plug hole.
7. Crank the engine with the throttle valve fully open, and measure the compression at the place where the compression gauge indicator shows a stabilized reading.

   Standard value (at engine speed of 250 r/min.):
   2,700 kPa (27.0 kg/cm², 384 psi)
   3,100 kPa (31.0 kg/cm², 441 psi)*
   Limit (at engine speed of 250 r/min.):
   Compression 1,920 kPa (19.2 kg/cm², 273 psi)
   2,240 kPa (22.4 kg/cm², 319 psi)*
   Difference between each cylinder
   300 kPa (3.0 kg/cm², 43 psi) or less

   *** Vehicles with EGR built from July, 1993 and Vehicles from Europe and Hong Kong built from June, 1994**

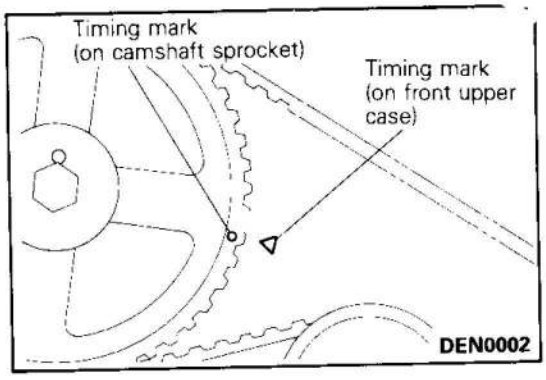
8. If after the measurement, the compression is below the limit, put a small amount of engine oil through the glow plug hole into the cylinder; then measure the compression once again and determine the cause of the malfunction.

9. If, after oil is added, the compression rises, the cause of the malfunction is a worn or damaged piston ring and/or cylinder inner surface.
   If, however, the compression does not rise, the cause is a bad valve or a bad gasket.
   For information regarding the servicing procedures for these causes of malfunction, refer to the ENGINE WORKSHOP MANUAL.

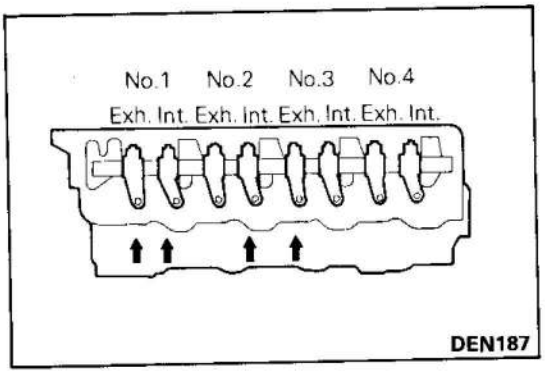
CHECKING AND ADJUSTMENT OF VALVE CLEARANCE

E11FDAM

1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 90°C (176°F to 194°F).
2. Check the injection timing and the idling speed, and adjust if necessary.(Refer to P.11–82, 84)
3. Remove the upper timing belt cover.
4. Remove the rocker cover.

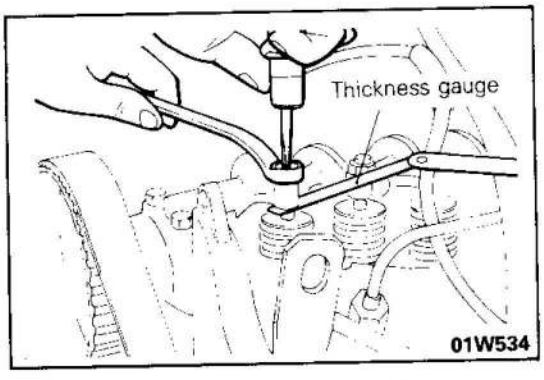


5. Turn the crankshaft clockwise and align the timing mark on the camshaft sprocket with the timing mark on the top of the front upper case.



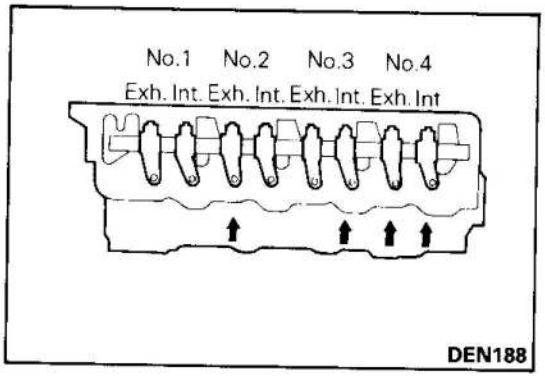
6. Check that valve clearance indicated in the diagram (⬅) is at the standard value.

   Standard value (hot engine): 0.25 mm (0.0098 in.)



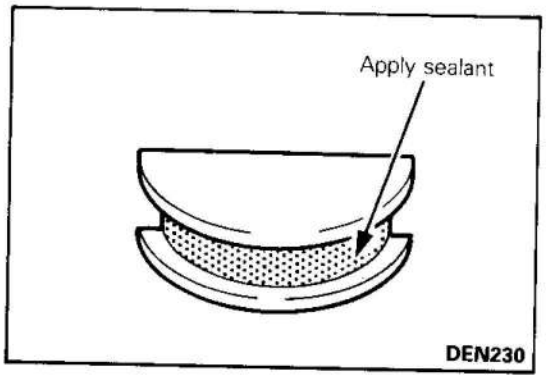
7. If not within the standard value, loosen the adjusting screw locking nut and, while turning the adjusting screw, use a thickness gauge to adjust the valve clearance to the standard value.
8. Block the adjusting screw with a screwdriver, so that it cannot move and tighten the locknut to the specified torque.

   Tightening torque: 12–18 Nm (1.2–1.8 kgm, 8.7–13 ft.lbs.)



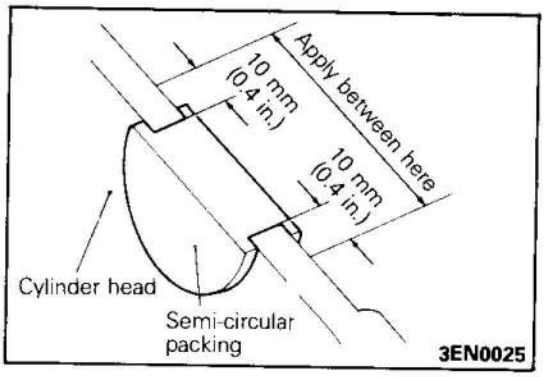
9. Rotate clockwise the crankshaft one complete turn (360° degree).
10. Check that valve clearance indicated in the diagram (⬅) is at the standard value.

    Standard value (hot engine): 0.25 mm (0.0098 in.)
11. If not within the standard value, repeat steps (7) to (8) to adjust the valve clearance of remaining valves.



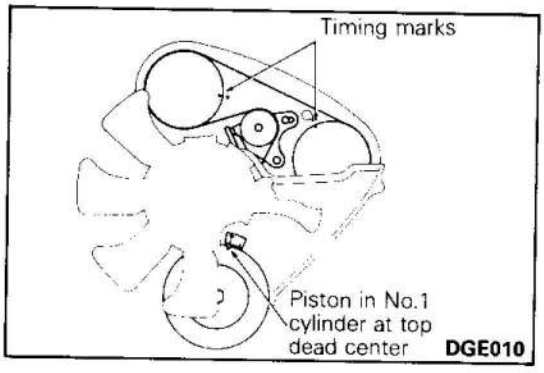
12. When installing the rocker cover assembly to the cylinder head, apply a coating of the specified sealant to the semi-circular packing and cylinder head top surfaces, and then tighten at the specified torque.

    Specified sealant: 3M ATD Part No.8660 or equivalent
    Tighening torque: 5–7Nm(0.5–0.7kgm, 4–5ft.lbs.)
    Caution
    If they are overtorqued, a deformed rocker cover or oil leakage could result.



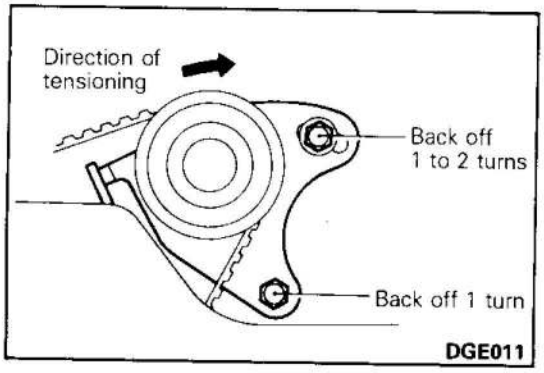
ADJUSTMENT OF TIMING BELT TENSION E11FFAG

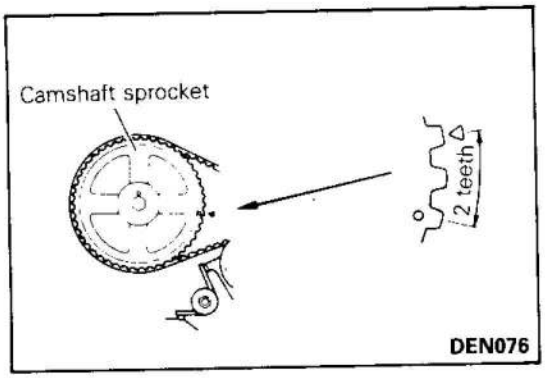
1. Remove timing belt upper cover and bring piston in No.1 cylinder to top dead center on compression stroke. Check that timing marks of sprockets are aligned.



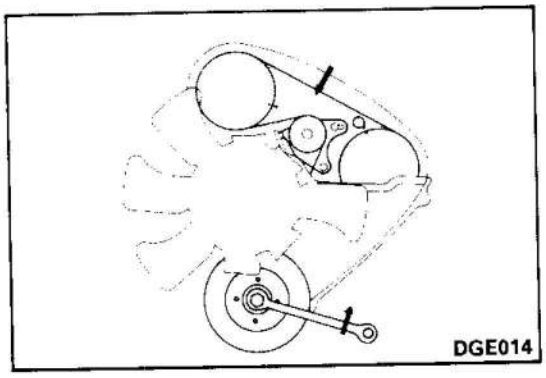
2. Loosen the timing belt tensioner mounting bolts.

    Caution
    Do not loosen the belts more than necessary. They could drop in the lower cover.





3. Turn crankshaft in normal direction (clockwise) through two camshaft sprocket teeth and hold.



4. Tighten tensioner mounting bolts.

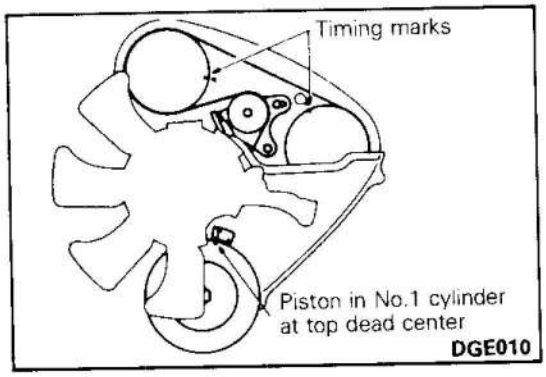
Caution
Tighten the upper bolts first and then the lower ones.

5. Reverse crankshaft to align timing marks, and push down belt at a point halfway with forefinger to check that tension of belt is up to standard value.

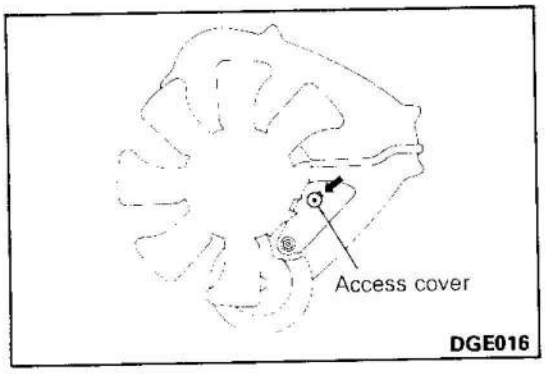
Standard value: 4--5 mm (0.16—0.20 in.)

6. Mount the timing belt upper cover.

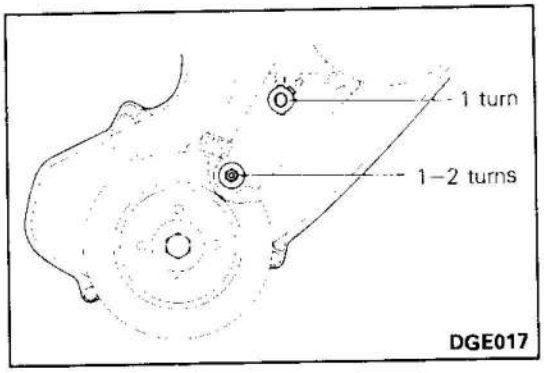
ADJUSTMENT OF TIMING BELT "B" TENSION E11FFBB



1. Remove timing belt upper cover and bring piston in No.1 cylinder to top dead center on compression stroke. Check that timing marks of sprockets are aligned.



2. Remove the access cover.



3. Loosen the timing belt "B" tensioner mounting nut and bolt.

Caution
Do not loosen the bolts (upper) more than necessary. They could drop in the lower cover.

4. Tighten tensioner mounting nut and bolt.

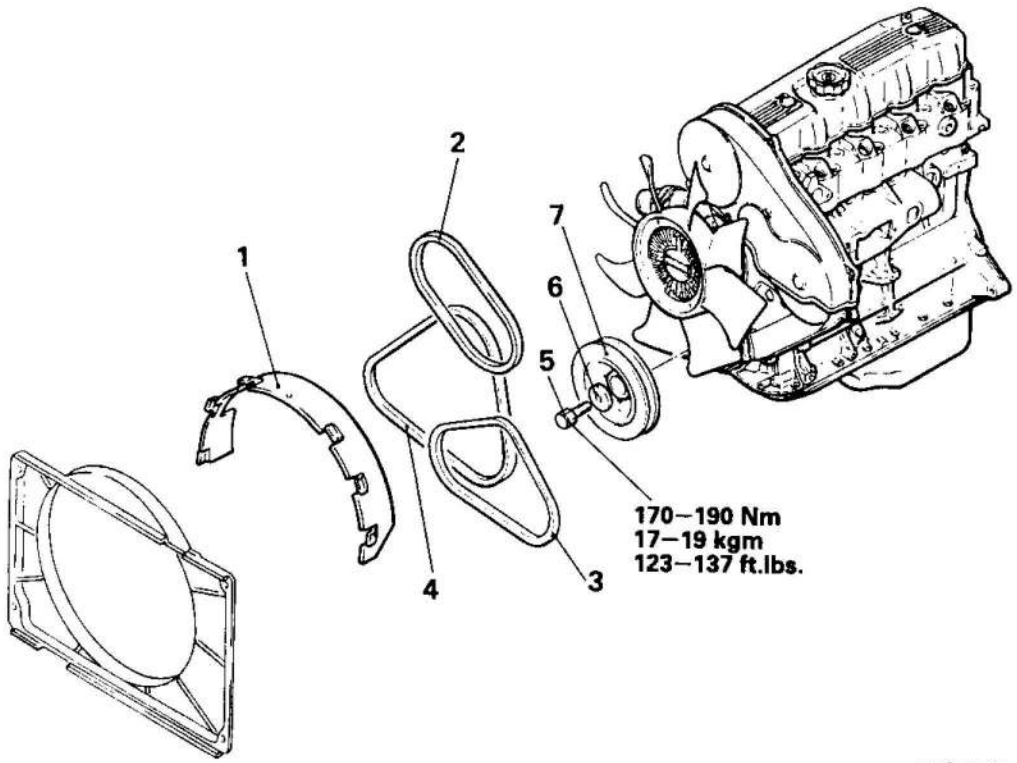
Caution
Tighten the nut (lower) first and then the bolt (upper).

5. Mount the access cover.
6. Mount the timing belt upper cover.

CRANKSHAFT PULLEY

E11LA--

REMOVAL AND INSTALLATION



01G0089

Pre-removal Operation
- Removal of undercover
  (Refer to GROUP 42 BODY–Undercover.)

Post-installation Operation
- Intallation of undercover
  (Refer to GROUP 42 BODY–Undercover.)
- Checking of alternator V-belt tension
  (Refer to P.11–81.)
- Checking of power steering oil pump V-belt tension
  (Refer to P.11–81.)
- Checking of air-conditioner compressor V-belt tension
  (Refer to P.11–81.)

Removal steps

◆◆ ▶◆ 1. Fan shroud cover
2. Power steering oil pump V-belt (vehicles with power steering)
3. Air-conditioner compressor V-belt (vehicles with air-conditioner)
4. Alternator V-belt
◆◆ ▶◆ 5. Crankshaft pulley bolt
6. Special washer
▶◆ 7. Crankshaft pulley

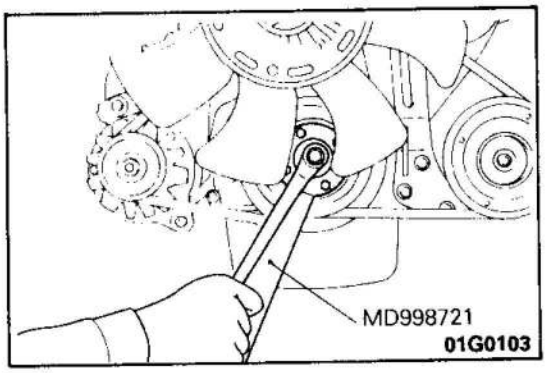
NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆: Refer to "Service Points of Removal".
(3) ▶◆: Refer to "Service Points of Installation".

SERVICE POINTS OF REMOVAL

E11LBAC

1. REMOVAL OF FAN SHROUD COVER

Refer to GROUP 14 COOLING–Radiator.

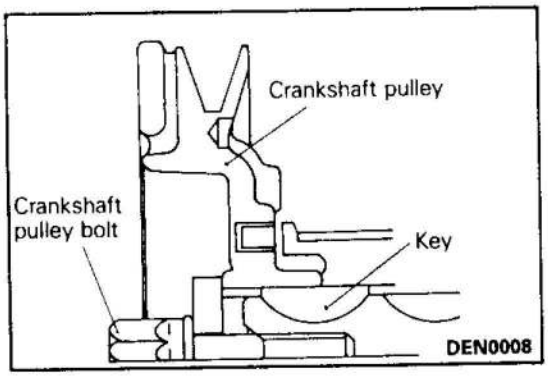


5. REMOVAL OF CRANKSHAFT PULLEY BOLT

Use the special tool to keep the crankshaft from turning and remove the bolts.

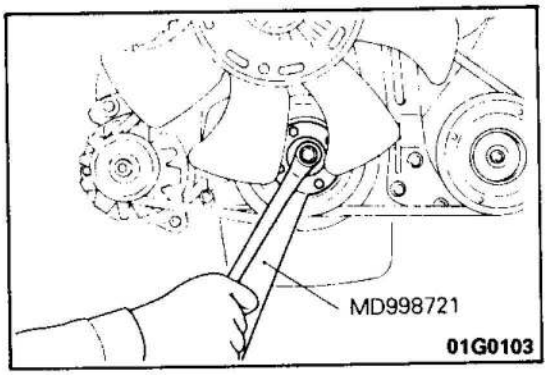
SERVICE POINTS OF INSTALLATION

E11LDAC



7. INSTALLATION OF CRANKSHAFT PULLEY

Align the crankshaft with the key and fasten the crankshaft pulley to the crankshaft.



5. INSTALLATION OF CRANKSHAFT PULLEY BOLT

Use the special tool to keep the crankshaft from turning and tighten the bolts.

1. INSTALLATION OF FAN SHROUD COVER

Refer to GROUP 14 COOLING–Radiator.

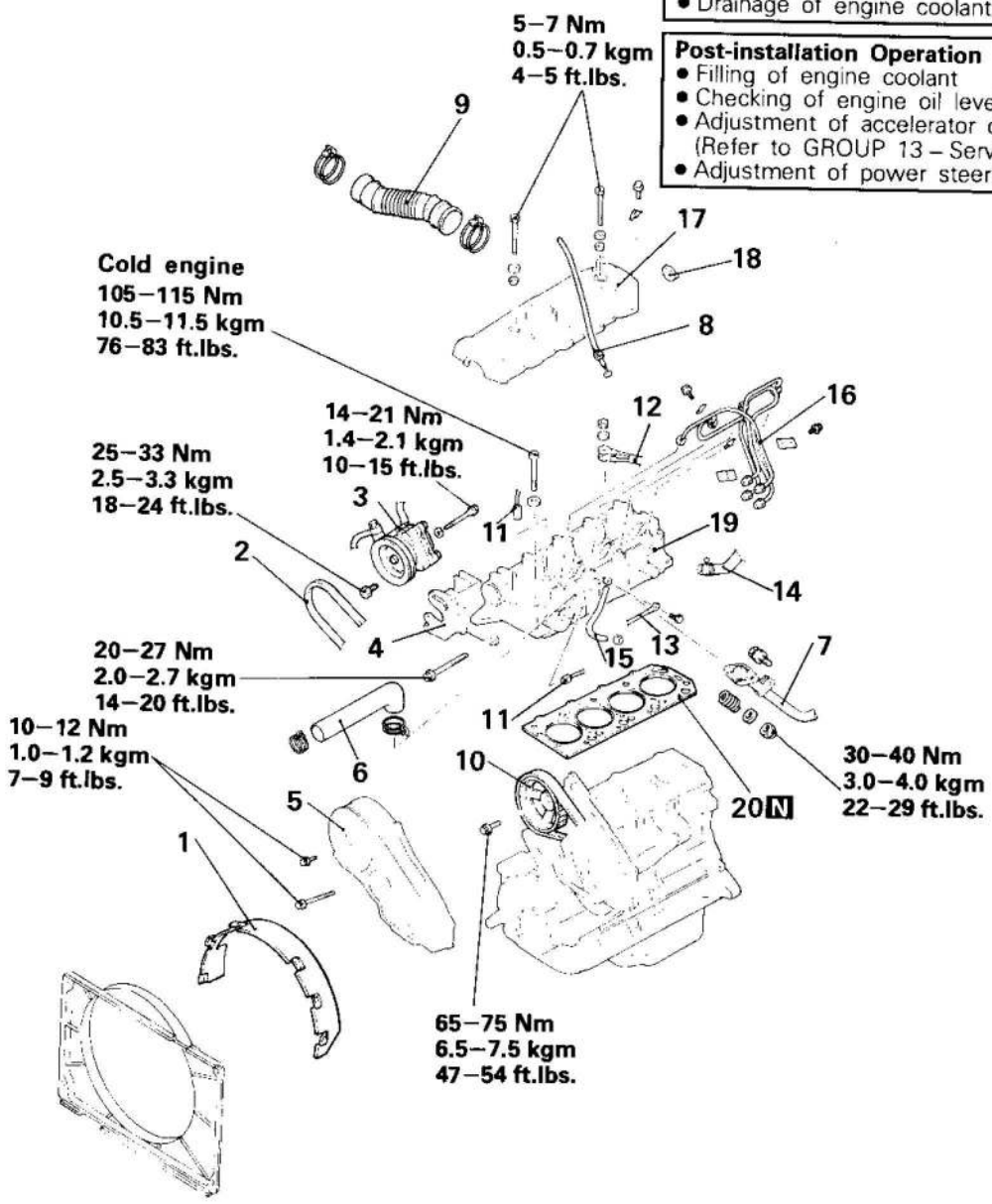
CYLINDER HEAD GASKET

REMOVAL AND INSTALLATION

E11JA--3

Pre-removal Operation
- Removal of seat underframe
  (Refer to GROUP 01 – Engine Compartment Work.)
- Drainage of engine coolant

Post-installation Operation
- Filling of engine coolant
- Checking of engine oil level
- Adjustment of accelerator cable
  (Refer to GROUP 13 – Service Adjustment Procedures.)
- Adjustment of power steering oil pump drive belt tension



01G0147

Removal steps

◆◆ ◆◆ 1. Fan shroud cover
2. Power steering oil pump drive belt
3. Power steering oil pump
4. Power steering oil pump bracket
5. Timing belt upper cover
6. Radiator upper hose
7. Exhaust pipe
8. Accelerator cable
9. Intake hose
◆◆ 10. Camshaft sprocket
11. Water temperature sensor connector
12. Glow plug harness
13. Earth cable
14. Heater hose
15. Fuel return hose
(injection pipe to injection pump)
16. Fuel injection pipe
◆◆ 17. Rocker cover
◆◆ 18. Semi-circular packing
◆◆ ◆◆ 19. Cylinder head
◆◆ 20. Cylinder head gasket

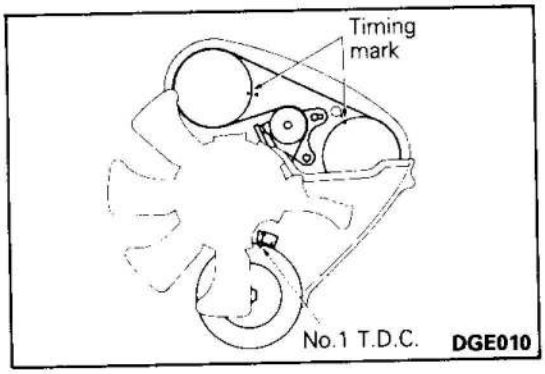
NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".
(4) N : Non-reusable parts

SERVICE POINTS OF REMOVAL

E11JBAH

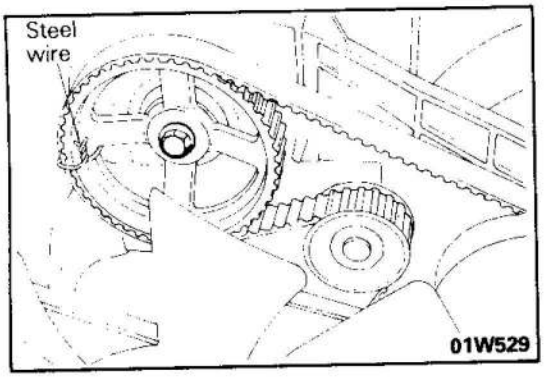
1. REMOVAL OF FAN SHROUD

Refer to GROUP 14 – Radiator.



10. REMOVAL OF CAMSHAFT SPROCKET

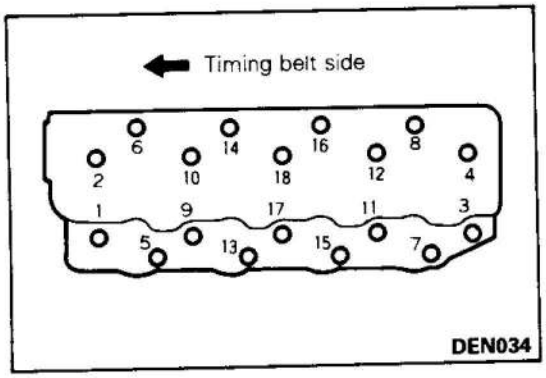
(1) Rotate crankshaft and align timing marks.



(2) Remove camshaft sprocket with timing belt and place it on timing belt front lower cover.

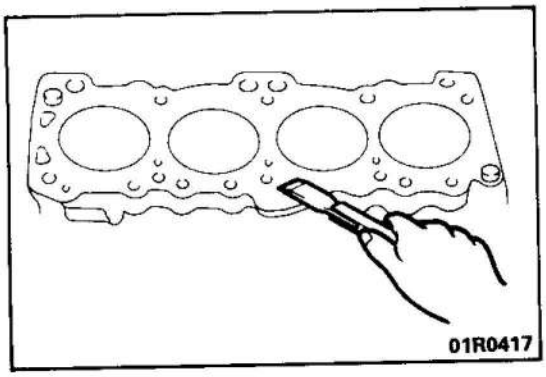
NOTE

1. Secure timing belt to sprocket with wire etc., to prevent them from slipping out of place.
2. Do not rotate crankshaft after removing camshaft sprocket.



19. REMOVAL OF CYLINDER HEAD

Loosen bolt in the numerical order indicated in the diagram with special tool (MD998051) and remove.



SERVICE POINTS OF INSTALLATION

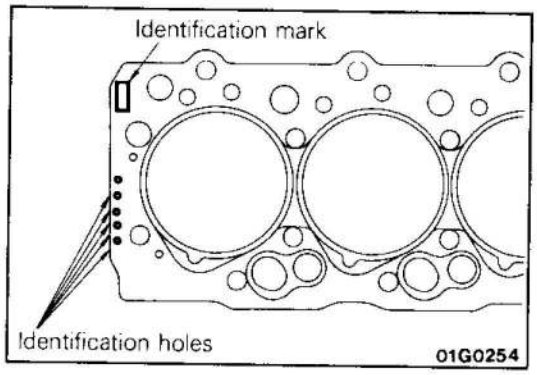
E11JDAV

20. INSTALLATION OF CYLINDER HEAD GASKET <Vehicles built up to June 1993>

Scrape off gasket adhered to cylinder block.

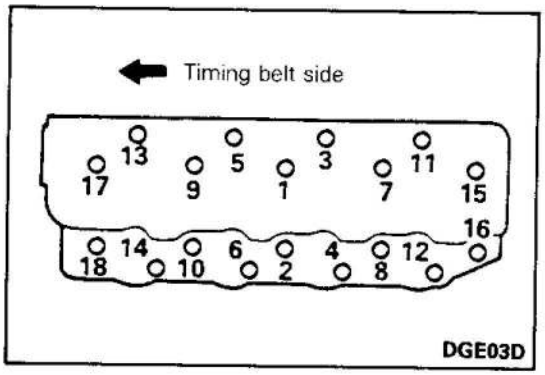
Caution

Be careful that foreign material does not fall into cylinder, or into coolant and oil passage ways.



<Vehicles built from July 1993>

(1) Wipe off any oil or grease from the gasket mounting surface.
(2) Check the number of identification holes on the cylinder head gasket that was removed, and select a cylinder head gasket with the same number of identification holes.
(3) Place the cylinder head gasket on top of the cylinder block so that the identification mark is facing upwards as in the illustration.

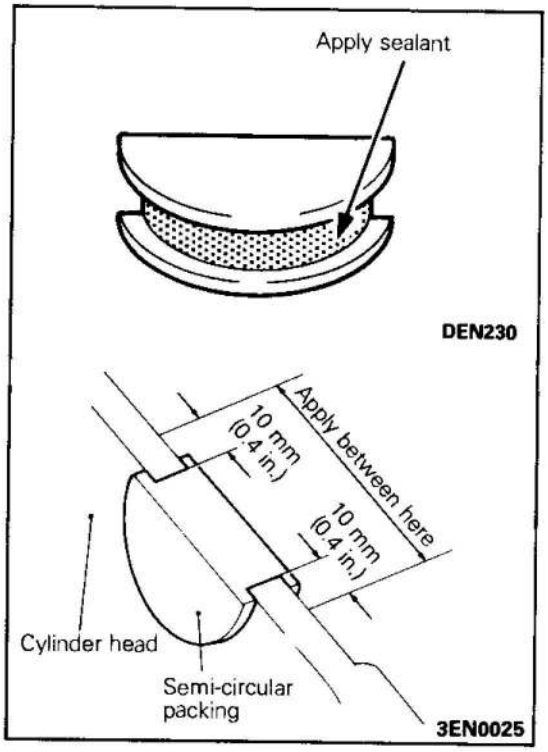


19. INSTALLATION OF CYLINDER HEAD

(1) Scrape off gasket adhered to cylinder head assembly.

Caution
Be careful that foreign material does not fall into coolant and oil passage ways.

(2) Tighten in the numerical order indicated in the diagram in two or three groups with special tool (MD998051).



18. INSTALLATION OF SEMI-CIRCULAR PACKING

Apply a coating of the specified sealant to the semi-circular packing and the cylinder head top surfaces.

Specified sealant: 3M ATD Part No.8660 or equivalent

17. CHECKING OF ROCKER COVER

Replace rocker cover gasket if cracked or deteriorated.

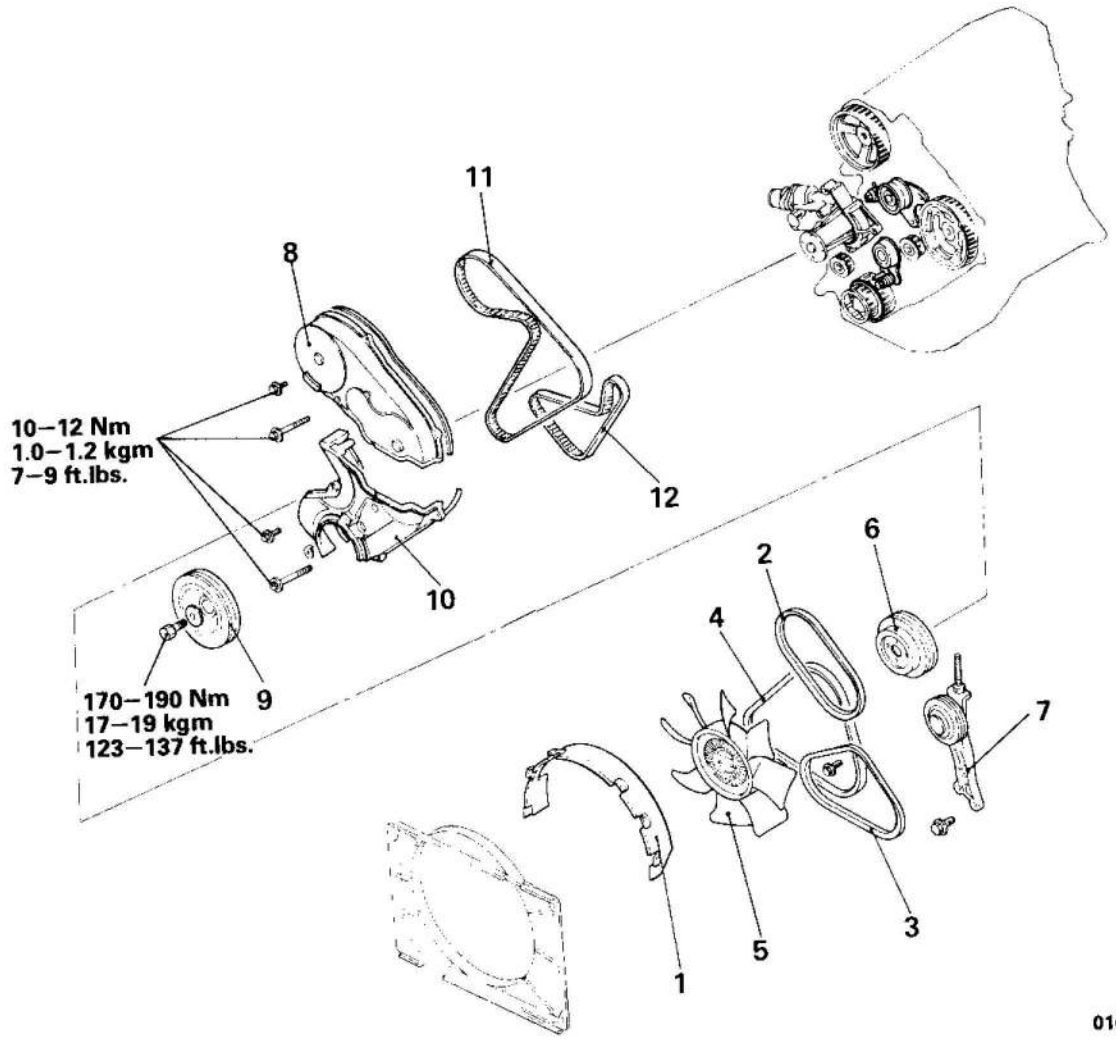
1. INSTALLATION OF FAN SHROUD

Refer to GROUP 14 – Radiator.

TIMING BELT AND TIMING BELT B

E11GA--2

REMOVAL AND INSTALLATION



Post-installation Operation
- Adjustment of alternator V-belt tension (Refer to P.11–81.)
- Adjustment of power steering oil pump V-belt (Refer to P.11–81.)
- Adjustment of air-conditioner compressor V-belt tension (Refer to P.11–81.)

Removal steps

◆◆ 1. Fan shroud cover
2. Power steering V-belt
3. Air-conditioner compressor V-belt
4. Alternator V-belt
5. Cooling fan
6. Water pump pulley
7. Air-conditioner compressor V-belt tensioner
8. Timing belt upper cover
◆◆ 9. Crankshaft pulley
10. Timing belt lower cover
◆◆ ◆◆ 11. Timing belt
◆◆ ◆◆ 12. Timing belt B

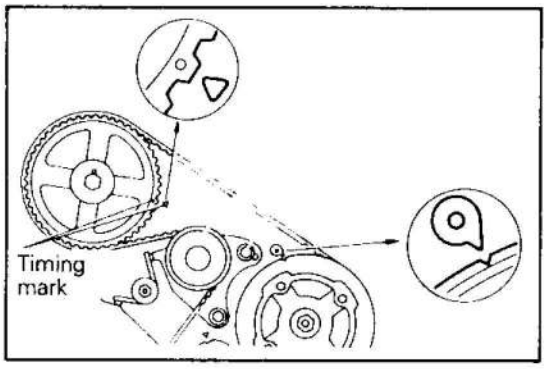
NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ◆◆ : Refer to "Service Points of Installation".

SERVICE POINTS OF REMOVAL

E11GBDD

1. REMOVAL OF FAN SHROUD

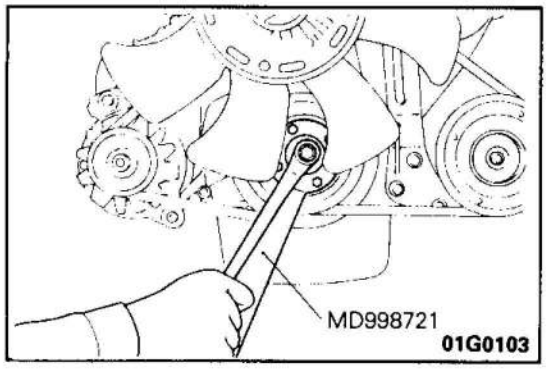
Refer to GROUP 14 COOLING–Radiator.



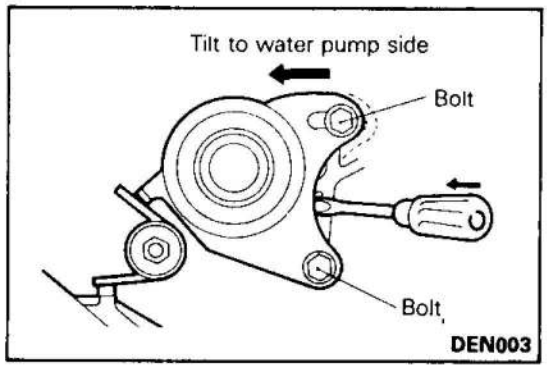
9. REMOVAL OF CRANKSHAFT PULLEY

(1) Position the No.1 cylinder at compression TDC and remove the crankshaft pulley.

NOTE
The No.1 cylinder is at compression TDC when the marks are aligned as shown in the diagram.

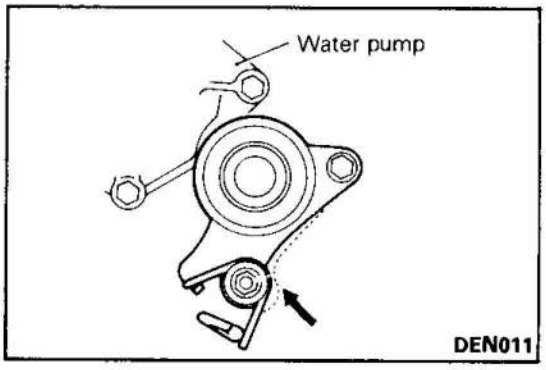


(2) Use the special tool to keep crankshaft from turning and remove the bolts.



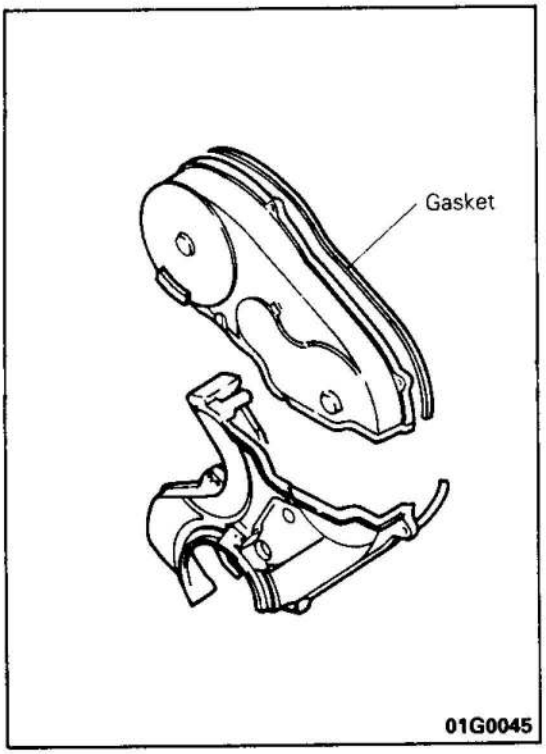
11. REMOVAL OF TIMING BELT

(1) When reinstalling timing belt, mark an arrow at the belt to show rotation direction.
(2) Push timing belt tensioner to water pump side and tighten nut. Secure so that tensioner will not move back.



12. REMOVAL OF TIMING BELT B

(1) When reinstalling timing belt B, mark an arrow at the belt to show rotation direction.
(2) Push timing belt tensioner to water pump side and tighten nut. Secure so that tensioner will not move back.

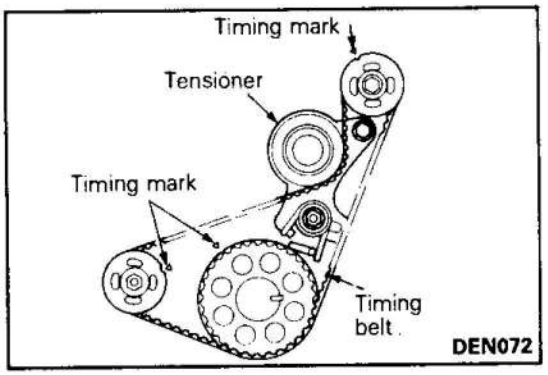


INSPECTION

E11GCAB2

- **TIMING BELT COVER**

  Cracking, splitting, deterioration of gasket.

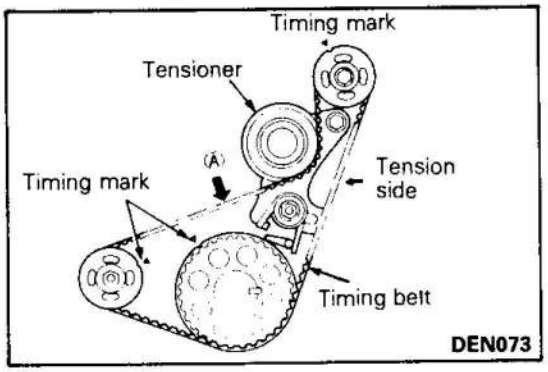


SERVICE POINTS OF INSTALLATION

E11GDDC

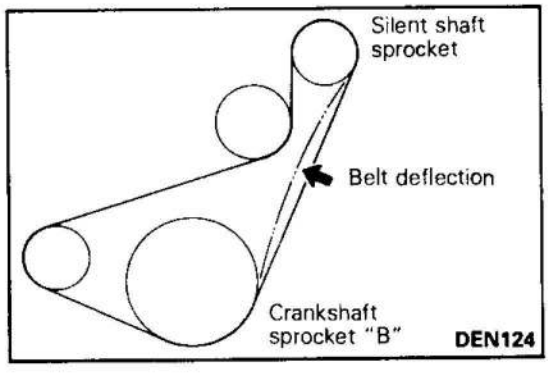
12. INSTALLATION OF TIMING BELT B

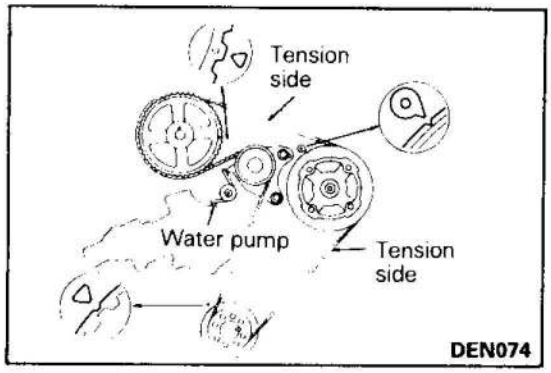
(1) Align the timing marks of the 3 sprockets.
(2) When reusing timing belt B, make sure the arrow mark is pointing in the same direction as when the belt was removed.



(3) Install timing belt B and make sure there is no deflection on the tension side.
(4) Press the deflection side of timing belt B (indicated by arrow (A)) with the hand and fully stretch the tensioner side.
(5) Make sure that the timing marks are aligned.
(6) Loosen the tensioner mounting bolt and nut so that only the pressure of the spring is applied to timing belt B.
(7) Tighten the tensioner mounting bolt and nut, tightening the nut first. If the bolt is tightened first, the tensioner will move and tension the belt.
(8) Press in the direction of the arrow in the diagram with the index finger to check the amount of deflection.

Standard value: 4–5 mm (0.16–0.20 in.)

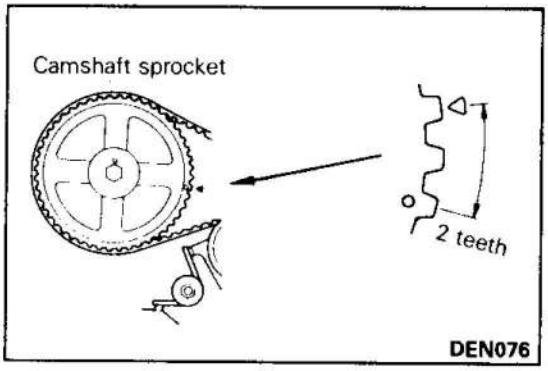




11. INSTALLATION OF TIMING BELT

(1) Align the timing marks of the 3 sprockets.
(2) When reusing timing belt, make sure the arrow mark is pointing in the same direction as when the belt was removed.
(3) Install the timing belt to the crankshaft sprocket, to injection pump sprocket, to tensioner and to camshaft sprocket in that order, using care not to allow defection on the tension side of the timing belt.

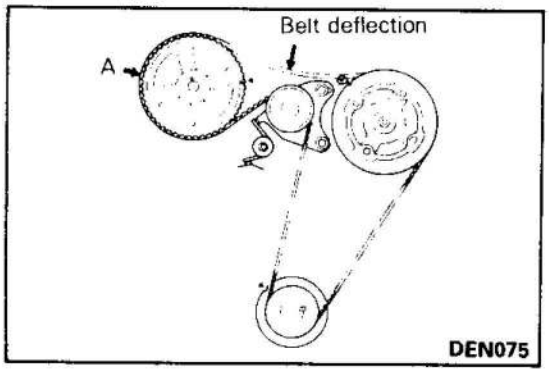
Caution
1. **Engage the belt on the various sprockets while maintaining tension on the belt of tension side.**
2. **Align the injection pump sprocket with the timing mark, hold the sprocket so that it does not turn and engage the belt.**

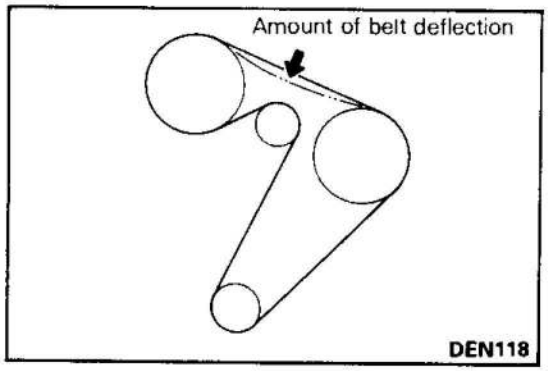


(4) Loosen the tensioner mounting bolts and apply tension with the spring.
(5) Turn the crankshaft clockwise and stop at the second lobe of the camshaft sprocket.

Caution
1. **When turning the crankshaft in item (5), strictly observe the specified amount of rotation (2 teeth on the camshaft sprocket) in order to apply a constant force to the tension side of the belt.**
2. **Do not turn the crankshaft counterclockwise.**
3. **Do not touch the belt during adjustment.**

(6) Inspect to make sure that the part indicated by arrow A dose not float upward.
(7) Tighten the tensioner mounting bolts, starting with the bolt in the elongated hole. If the lower bolt is tightened first, belt tension will become too tight.





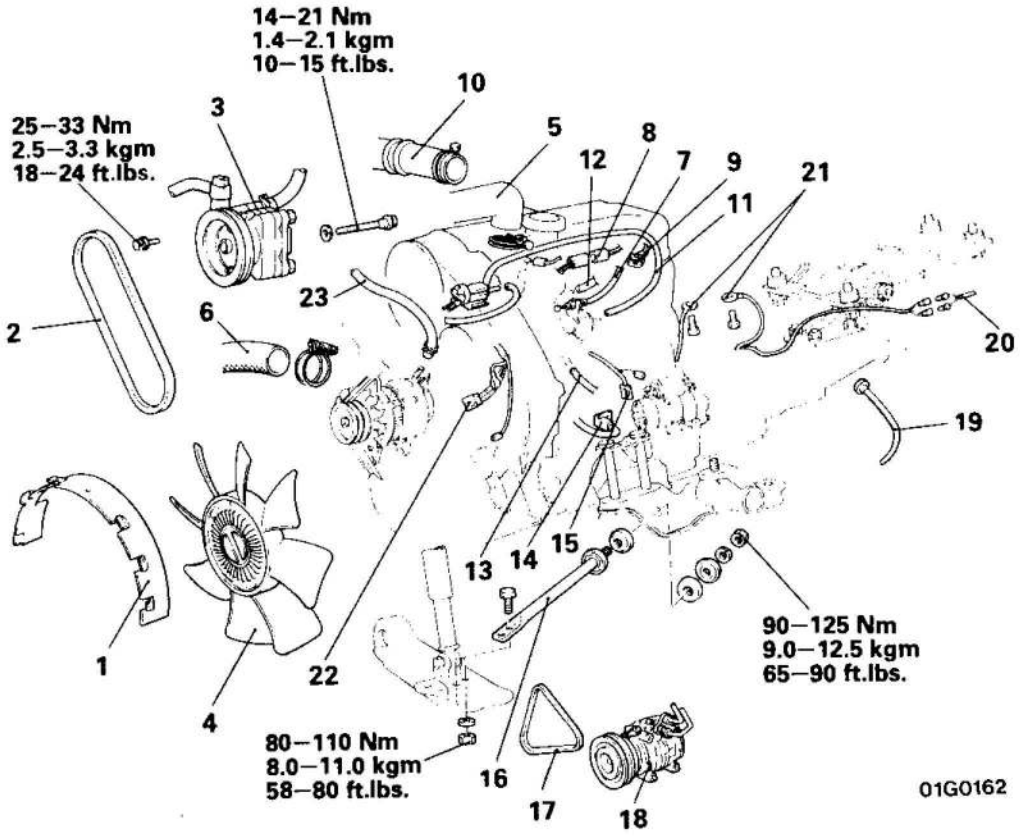
(8) Turn the crankshaft conterclockwise and align the timing mark. Next, make sure that the timing marks of all sprockets are aligned.
(9) Press on the center of the belt with an index finger to check the amount of deflection.

Standard value: 4–5 mm (0.16–0.20 in.)

ENGINE AND TRANSMISSION ASSEMBLY

REMOVAL AND INSTALLATION

E11SA—5

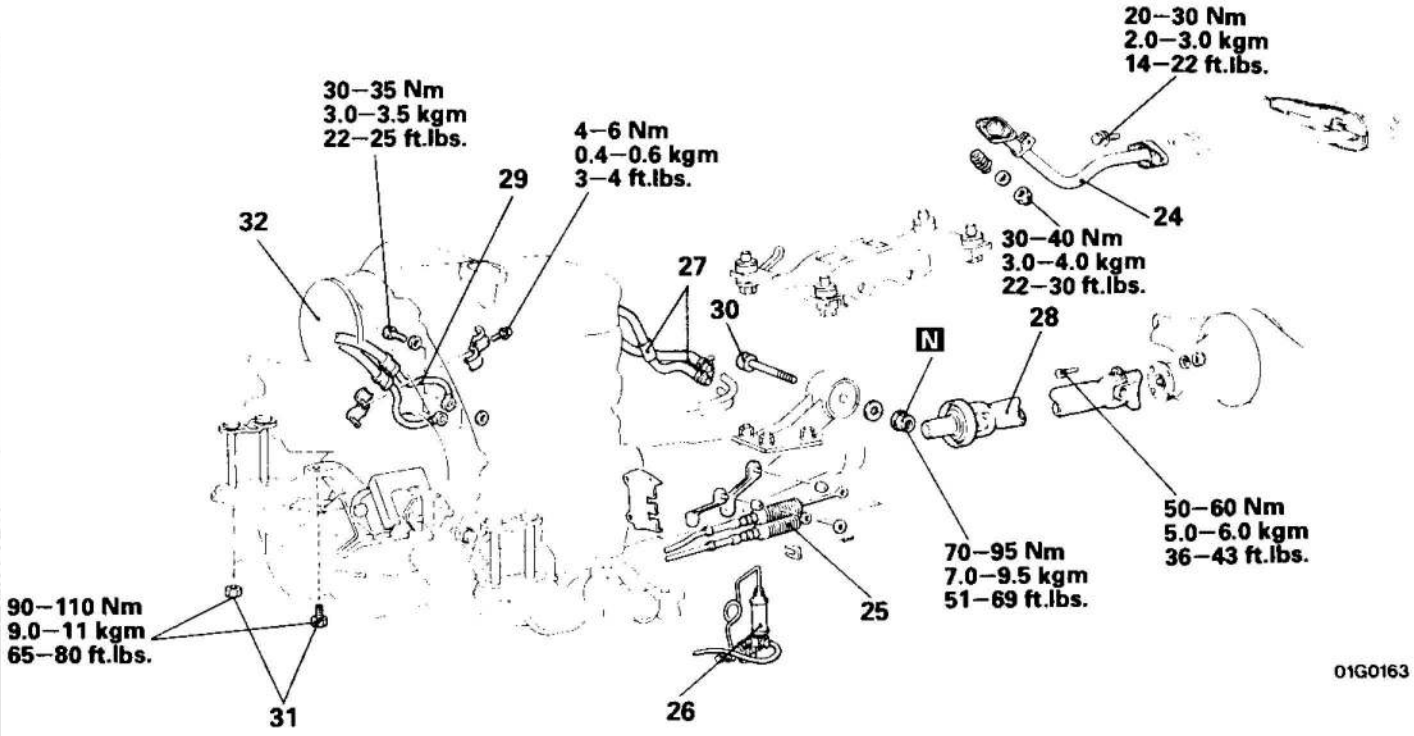


Removal steps

◆◆ ◆◆ 1. Fan shroud cover
2. Power steering oil pump V-belt (vehicles with power steering)
3. Power steering oil pump (vehicles with power steering)
4. Cooling fan
5. Radiator upper hose
6. Radiator lower hose
7. Accelerator cable
8. Control harness connector
9. Glow plug earth
10. Air-intake duct
11. Vacuum hose for air-conditioner idle-up (vehicles with air-conditioner)
12. Fuel return hose
13. Fuel main hose
14. Engine earth cable
15. Starter harness connector
16. Strut bar
17. Air-conditioner compressor V-belt
18. Air-conditioner compressor
19. Speedometer cable
20. Back-up lamp harness connector
21. Earth cable
22. Alternator harness connector
23. Vacuum hose

Pre-removal Operation
- Removal of seat underframe (Refer to GROUP 01 GENERAL–Engine Compartment Work.)
- Drainage of engine coolant
- Removal of undercover (Refer to GROUP 42 BODY–Undercover.)
- Drainage of transmission oil (Refer to GROUP 22 MANUAL TRANSMISSION–Service Adjustment Procedures.)

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆: Refer to "Service Points of Removal".
(3) ◆◆: Refer to "Service Points of Installation".



Removal steps

- 24. Exhaust pipe
- ◆◆ ●◆ 25. Transmission control cable
- 26. Clutch release cylinder and fluid chamber
- 27. Heater hose
- 28. Propeller shaft
- ●◆ 29. Oil pipe for engine oil cooler
- ◆◆ 30. Rear engine mounting installation bolt
- 31. Engine mounting to crossmember installation bolt and nut
- 32. Engine and transmission assembly

Post-installation Operation

- Installation of seat underframe
- Filling of engine coolant (Refer to GROUP 14 COOLING-Service Adjustment Procedures.)
- Installation of undercover (Refer to GROUP 42 BODY–Undercover.)
- Filling of transmission oil (Refer to GROUP 22 MANUAL TRANSMISSION–Service Adjustment Procedures.)
- Filling of engine oil (Refer to P.11–80.)
- Checking of alternator V-belt tension (Refer to P.11–81.)
- Checking of power steering oil pump V-belt tension (Refer to P.11–81.)
- Checking of air-conditioner compressor V-belt tension (Refer to P.11–81.)
- Checking of accelerator cable play (Refer to GROUP 13 FUEL–Service Adjustment Procedures.)
- Checking of clutch operation (Refer to GROUP 21 CLUTCH–Service Adjustment Procedures.)

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".
(3) ●◆ : Refer to "Service Points of Installation".
(4) N : Non-reusable parts

SERVICE POINTS OF REMOVAL E11SBBJ

1. REMOVAL OF FAN SHROUD COVER

Refer to GROUP 14 COOLING–Radiator.

25. HANDLING OF TRANSMISSION CONTROL CABLE

Refer to GROUP 22 MANUAL TRANSMISSION–Transmission Control (2WD).

30. REMOVAL OF REAR ENGINE MOUNTING INSTALLATION BOLT

Support the engine and transmission before removing.

SERVICE POINTS OF REMOVAL E11SDBI

29. INSTALLATION OF OIL PIPE FOR ENGINE OIL COOLER

Refer to GROUP 12 LUBRICATION–Engine Oil Cooler.

25. INSTALLATION OF TRANSMISSION CONTROL CABLE

Refer to GROUP 22 MANUAL TRANSMISSION–Transmission Control (2WD).

1. INSTALLATION OF FAN SHROUD COVER

Refer to GROUP 14 COOLING–Radiator.