

SST & SPECIFICATIONS

	page
SST(SPECIAL SERVICE TOOL)	11-2
MAIN PARTS TIGHTENING TORQUE	11-4
SERVICE SPECIFICATIONS	11-4
ENGINE TUNE-UP	11-4
ENGINE	11-5
LUBRICATING SYSTEM	11-10
COOLING SYSTEM	11-10
FUEL SYSTEM	11-11
STARTING SYSTEM	11-12
IGNITION SYSTEM	11-13
CHARGING SYSTEM(Exc. ALTERNATOR W/IC REGULATOR)	11-14
CHARGING SYSTEM(For ALTERNATOR W/IC REGULATOR)	11-14

SST(SPECIAL SERVICE TOOL)

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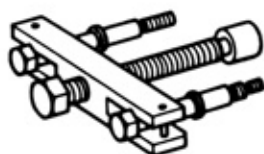
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1	09201-60011	Valve Stem Guide Remover & Replacer
2	09202-43012	Valve Spring Compressor
3	09212-41010	Distributor Shaft Bush Replacer
4	09213-31021	Crankshaft Pulley Puller
5	09213-36010	Timing Gear Remover
6	09214-41010	Crankshaft Pulley Replacer
7	09222-30010	Connecting Rod Bushing Remover & Replacer
8	09223-41010	Crankshaft Rear Oil Seal Replacer
9	09223-50010	Crankshaft Front Oil Seal Replacer
10	09228-44010	Oil Filter Wrench

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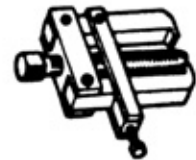
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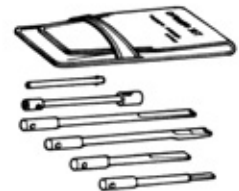
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11	09233-41010	Pump Drive Shaft Bearing Replacer
12	09236-28011	Water Pump Overhaul Tool
13	09236-36010	Water Pump Overhaul Tool
14	09238-40010	Water Pump Bearing Remover & Replacer
15	09240-00014	Carburetor Adjusting Gauge Set
16	09240-00020	Wire Gauge Set
17	09243-00010	Idle Adjust Screw Wrench
18	09286-46011	Injection Pump Spline Shaft Puller
19	09303-35010	Input Shaft Front Bearing Puller
20	09304-30012	Input Shaft Front Bearing Replacer
21	09325-12010	Transmission Plug (For Alternator)
22	09860-11011	Carburetor Driver Set

MAIN PARTS TIGHTENING TORQUE

Tightening Parts	Tightening Torque	
	kg-m	ft-lb
Cylinder head		
12 mm bolt	7.5 – 8.5	54.3 – 61.5
8 mm bolt	1.5 – 2.2	10.9 – 15.9
Intake manifold	1.5 – 2.1	10.9 – 15.2
Exhaust manifold	1.7 – 2.3	12.3 – 16.6
Camshaft bearing cap	1.7 – 2.3	12.3 – 16.6
Camshaft timing gear	6.5 – 7.5	47.0 – 54.3
Pump drive shaft gear	1.0 – 1.6	7.2 – 11.6
Crankshaft bearing cap	9.9 – 10.9	71.6 – 78.8
Connecting rod cap	4.2 – 4.8	30.4 – 34.7
Oil pan	0.65 – 0.95	4.7 – 6.9
Crankshaft pulley	13.5 – 16.5	97.7 – 119.3
Flywheel	7.0 – 8.0	50.6 – 57.9
Thermostatic VSV	3.0 – 6.5	21.7 – 47.0
Chain tensioner	3.0 – 4.0	21.7 – 28.9

SERVICE SPECIFICATIONS

ENGINE TUNE-UP (FOR AUSTRALIA)

Drive belt tension at 10 kg (22 lb)				
Water pump – Crankshaft	8 – 12 mm		0.31 – 0.47 in.	
Air pump – Crankshaft	18 – 21.5 mm		0.70 – 0.846 in.	
Air pump – Vane pump	8 – 10.5 mm		0.31 – 0.41 in.	
Battery specific gravity at 20°C (70°F)	1.25 – 1.27			
Engine oil capacity				
MX	Total	5.2 Liter	5.5 US qt	4.6 Imp.qts
	Crankcase	4.4 Liter	4.6 US qt	3.9 Imp.qts
MS	Total	5.6 Liter	5.9 US qt	4.9 Imp.qts
	Crankcase	4.8 Liter	5.1 US qt	4.2 Imp.qts
Coolant capacity (w/heater)		11.0 Liter	11.6 US qt	9.7 Imp.qts
Spark plug heat range				
	ND	W16EP (Exc. ECE)	W20EPR (For ECE)	
	NGK	BP5ES-L (Exc. ECE)	BPR6ES (For ECE)	
Spark plug gap		0.7 – 0.8 mm	0.028 – 0.031 in.	

ENGINE TUNE-UP (Cont'd)

Distributor				
		Dwell angle	38 – 44°	
		Point gap	0.4 – 0.5 mm	0.016 – 0.020 in.
Ignition timing (at idle speed)			8° BTDC (Exc. ECE)	
			12° BTDC (For ECE)	
Firing order			1-5-3-6-2-4	
Valve clearance				
	Cold	Intake	0.25 mm	0.0098 in.
		Exhaust	0.33 mm	0.0130 in.
	Hot	Intake	0.28 mm	0.0110 in.
		Exhaust	0.35 mm	0.0138 in.
Idle mixture speed			820 rpm	
Idle speed			750 rpm	
CO concentration at idling (at AI "OFF")			1 – 2 % (Exc. ECE)	
			1.5 – 2.5 % (For ECE)	
Fast idle speed			2500 ± 200 rpm	
TP setting speed			1050 ± 50 rpm (Exc. ECE)	
			1150 ± 50 rpm (For ECE)	
Intake manifold vacuum at idle speed			More than 430 mm Hg, 16.9 in. Hg	
Compression pressure (at 250 rpm)				
		STD	11.0 kg/cm ²	156 psi (Exc. ECE)
			12.0 kg/cm ²	171 psi (For ECE)
		Limit	9.0 kg/cm ²	128 psi
Difference of pressure between cylinders			Less than 1.0 kg/cm ²	14 psi

ENGINE**Cylinder Head**

Head surface warpage limit			0.05 mm	0.0019 in.
Head surface warpage maximum reface limit			0.2 mm	0.0079 in.
Valve seat refacing angle		Intake	25°, 45°, 60°, 75°	
		Exhaust	30°, 45°, 60°	
Valve seat contacting width			1.2 – 1.6 mm	0.047 – 0.063 in.

Valve Guide Bushing

Inner diameter		8.01 – 8.03 mm	0.3154 – 0.3161 in.
Outer diameter			
	STD	13.025 – 13.035 mm	0.5128 – 0.5132 in.
	O/S 0.05	13.075 – 13.085 mm	0.5148 – 0.5152 in.
Cylinder head temperature when drive in		80°C	175°F

Valve

Valve overall length				
	STD	Intake	116.3 mm	4.579 in.
		Exhaust	113.3 mm	4.461 in.
	Limit	Intake	115.7 mm	4.555 in.
		Exhaust	112.7 mm	4.437 in.
Valve stem diameter				
		Intake	7.970 – 7.985 mm	0.3138 – 0.3144 in.
		Exhaust	7.960 – 7.975 mm	0.3134 – 0.3140 in.
Valve stem oil clearance				
	STD	Intake	0.025 – 0.060 mm	0.0010 – 0.0024 in.
		Exhaust	0.035 – 0.070 mm	0.0014 – 0.0028 in.
	Limit	Intake	0.10 mm	0.0039 in.
		Exhaust	0.13 mm	0.0051 in.
Valve head margin limit				
		Intake	0.6 mm	0.0236 in.
		Exhaust	1.0 mm	0.0394 in.
Valve head contacting face angle degree			45.5°	

Valve Spring

Free length		Inner	44.9 mm	1.768 in.
		Outer	46.9 mm	1.846 in.
Installed length		Inner	37.9 mm	1.492 in.
		Outer	41.4 mm	1.630 in.
Installed tension				
	STD	Inner	6.4 – 7.8 kg	14.1 – 17.2 lb
		Outer	17.1 – 21.1 kg	37.3 – 46.5 lb
	Limit	Inner	6.0 kg	13.2 lb
		Outer	15.0 kg	33.1 lb
Squareness				
	Limit	Inner	1.6 mm	0.063 in.
		Outer	1.6 mm	0.063 in.

Camshaft

Runout		Limit	0.03 mm	0.0012 in.
Cam height	STD	Intake	42.664 mm	1.6797 in.
		Exhaust	42.727 mm	1.6822 in.
	Limit	Intake	42.26 mm	1.6638 in.
		Exhaust	42.32 mm	1.6661 in.
Thrust clearance	STD		0.08 – 0.18 mm	0.0031 – 0.0071 in.
	Limit		0.3 mm	0.012 in.
Bearing oil clearance	STD		0.017 – 0.057 mm	0.0007 – 0.0022 in.
	Limit		0.1 mm	0.0039 in.
Journal diameter	STD		33.979 – 33.995 mm	1.3378 – 1.3384 in.
	Limit		33.89 mm	1.334 in.

Valve Rocker Arm and Shaft

Shaft to arm oil clearance	STD		0.012 – 0.033 mm	0.0005 – 0.0013 in.
	Limit		0.06 mm	0.0024 in.

Timing Chain, Timing Gear and Damper

Vibration damper No.1 thickness limit			4.0 mm	0.157 in.
Vibration damper No.2 thickness limit			5.0 mm	0.197 in.
Timing chain elongation limit (at 17 links)			147.0 mm	5.787 in.
Crankshaft gear wear limit (with chain)			64.9 mm	2.555 in.
Pump drive shaft gear wear limit (with chain)			95.9 mm	3.776 in.
Camshaft timing gear wear limit (with chain)			126.0 mm	4.961 in.

Pump Drive Shaft

Thrust clearance	STD		0.06 – 0.13 mm	0.0024 – 0.0051 in.
	Limit		0.3 mm	0.012 in.
Bearing oil clearance	STD		0.025 – 0.066 mm	0.0010 – 0.0026 in.
	Limit		0.08 mm	0.0031 in.
Journal diameter	Front		40.959 – 40.975 mm	1.6126 – 1.6132 in.
	Rear		32.959 – 32.975 mm	1.2976 – 1.2982 in.

Cylinder Block

Warpage limit		0,05 mm	0,0020 in.
Cylinder bore	STD	79,99 – 80,04 mm	3,1492 – 3,1512 in.
Cylinder bore wear limit		0,2 mm	0,008 in.
Difference of bore limit between cylinders		0,05 mm	0,0019 in.
Cylinder bore taper and out-of-round limit		0,02 mm	0,0008 in.

Piston and Piston Ring

Piston diameter	STD	79,93 – 79,98 mm	3,1466 – 3,1485 in.
Piston O/S type		0,50, 0,75, 1,00	
Cylinder to piston clearance		0,05 – 0,07 mm	0,0019 – 0,0027 in.
Piston ring end-gap			
	Compression ring No.1	0,10 – 0,28 mm	0,0039 – 0,0110 in.
	Compression ring No.2	0,15 – 0,28 mm	0,0059 – 0,0110 in.
	Oil ring	0,20 – 0,90 mm	0,0079 – 0,0354 in.
Piston ring to ring groove clearance			
	Compression ring No.1	0,03 – 0,07 mm	0,0012 – 0,0028 in.
	Compression ring No.2	0,02 – 0,06 mm	0,0008 – 0,0024 in.
Piston pin installing temperature		60°C	140°F

Connecting Rod, Bearing and Piston Pin

Thrust clearance	STD	0,160 – 0,296 mm	0,0063 – 0,0117 in.
	Limit	0,30 mm	0,0118 in.
Bearing oil clearance	STD	0,021 – 0,053 mm	0,0008 – 0,0021 in.
	Limit	0,08 mm	0,0031 in.
Bearing U/S type		0,05, 0,25, 0,50	
Piston pin to bushing oil clearance	STD	0,005 – 0,011 mm	0,0002 – 0,0004 in.
	Limit	0,015 mm	0,0006 in.
Piston pin diameter		21,997 – 22,009 mm	0,86602 – 0,86649 in.
Bent limit	per 100 mm (3,94 in.)	0,05 mm	0,0019 in.
Twist limit	per 100 mm (3,94 in.)	0,15 mm	0,0059 in.

Crankshaft

Runout limit		0,03 mm	0,0012 in.
Crank journal taper and out-of-round limit		0,02 mm	0,0008 in.
Crankpin journal taper and out-of round limit		0,02 mm	0,0008 in.
Thrust clearance	STD	0,05 – 0,25 mm	0,0020 – 0,0098 in.
	Limit	0,3 mm	0,012 in.
Thrust washer thickness	STD	2,925 – 2,975 mm	0,1152 – 0,1171 in.
	O/S 0,125	2,988 – 3,038 mm	0,1176 – 0,1196 in.
	O/S 0,250	3,050 – 3,100 mm	0,1201 – 0,1220 in.
Crank journal oil clearance	STD	0,034 – 0,058 mm	0,0013 – 0,0023 in.
	Limit	0,10 mm	0,0031 in.
U/S bearing type		0,25, 0,50	
Crank journal diameter	STD	59,988 – 60,012 mm	2,3617 – 2,3627 in.
U/S finished diameter	U/S 0,05	59,936 – 59,946 mm	2,3597 – 2,6007 in.
	U/S 0,25	59,730 – 59,740 mm	2,3516 – 2,3520 in.
	U/S 0,50	59,490 – 59,510 mm	2,3421 – 2,3429 in.
Crankpin journal oil clearance	STD	0,021 – 0,053 mm	0,0008 – 0,0021 in.
	Limit	0,10 mm	0,0039 in.
U/S bearing type		0,25, 0,50	
Crankpin journal diameter	STD	51,976 – 52,000 mm	2,0463 – 2,0472 in.
U/S finished diameter	U/S 0,005	51,925 – 51,939 mm	2,0443 – 2,0448 in.
	U/S 0,25	51,725 – 51,735 mm	2,0364 – 2,0368 in.
	U/S 0,50	51,475 – 51,485 mm	2,0266 – 2,0270 in.

Intake and Exhaust Manifold

Manifold surface warpage limit	Intake	0,3 mm	0,012 in.
	Exhaust	0,3 mm	0,012 in.

Flywheel

Flywheel runout limit	0,1 mm	0,0039 in.
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LUBRICATING SYSTEM**Oil Pump**

Side clearance	STD	0.03 – 0.09 mm	0.0012 – 0.0035 in.
	Limit	0.15 mm	0.0059 in.
Body clearance	STD	0.03 – 0.06 mm	0.0012 – 0.0024 in.
	Limit	0.2 mm	0.008 in.
Gear back lash	STD	0.5 – 0.6 mm	0.020 – 0.024 in.
	Limit	0.9 mm	0.035 in.
Driven shaft diameter	STD	14.0 – 14.01 mm	0.5511 – 0.5517 in.
	Limit	13.9 mm	0.547 in.
Relief valve poening pressure		5.0 – 6.0 kg/cm ²	71.1 – 85.3 psi

Oil Cooler

Oil adjusting valve operating pressure		2.7 – 3.5 kg/cm ²	38.4 – 49.8 psi
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COOLING SYSTEM**Water Pump**

Bearing fitting temperature		80°	176°F
Fluid coupling fluid		Silicone oil	
Fluid viscosity	MX	350 cst	
	MS	450 cst	
Fluid capacity	MX	30 cc	1.83 cu.in.
	MS	50 cc	3.05 cu.in.

Radiator

Relief valve opening pressure	STD	0.75 – 1.05 kg/cm ²	10.6 – 14.9 psi
	Limit	0.6 kg/cm ²	8.5 psi

Thermostat

Valve opening temperature	Start to open at	80 – 84°C	176 – 183°F
	Fully open at	95°C	203°F
Valve opening travel		8 mm	0.31 in.

FUEL SYSTEM**Carburetor**

Accelerating pump stroke	5.5 mm	0.217 in.
Float level	Raised position	13 mm
	Lowered position	1.0 mm
Throttle valve closed angle		
	First	9°
	Second	20°
Throttle valve fully opened angle		
	First	90°
	Second	90°
Seco-touch angle		64°
Kick up		
Second throttle valve to body clearance	0.4 mm	0.016 in.
[First throttle valve fully opened]		
Fast idle angle	24° (Exc. Australia)	
	26° (For Australia)	
Throttle positioner angle	17° (For Australia)	
	18.5° (For ECE)	
Unloader angle	40°	
Choke valve fully closed angle	15°	
Choke opener (Australia only)		
Fast idle cam pin to breaker lever	0.5 – 1.5 mm	0.02 – 0.06 in.
Dash pot (Exc. ECE & Australia)		
Actuating time	1 – 2 sec	
Choke breaker		
Choke valve to body clearance	(Exc. Australia) 2.1 – 2.3 mm	0.08 – 0.09 in.
	(For Australia) 2.3 – 2.5 mm	0.09 – 0.10 in.
Idle mixture adjusting screw preset position	Screw out	2½ turns (Exc. ECE)
		3½ turns (For ECE)
Heating coil resistance	6.7 – 7.7 Ω (Exc. Australia)	
	7.7 – 8.7 Ω (For Australia)	

Fuel Pump

Type		Diaphragm
Delivery capacity at 4000 rpm (Camshaft)		More than 940 (0.993, 0.827)
	cc/min (US.qts/min, Imp. qts/min)	
Discharge pressure	kg/cm ² (Psi)	0.30 to 0.38 (4.2 to 5.4)

STARTING SYSTEM**Starter**

Rated voltage and output power		12V 1KW	
No load characteristic	Amperage	Less than 50A at 11V	
	Revolution	More than 5000 rpm	
Armature shaft outer diameter		12.43 mm	0.4893 in.
Armature shaft to bush clearance	STD	0.06 mm	0.0024 in.
	Limit	0.2 mm	0.008 in.
Armature shaft thrust clearance	STD	0.01 – 0.35 mm	0.0004 – 0.014 in.
	Limit	0.8 mm	0.032 in.
Commutator outer diameter	STD	32.7 mm	1.287 in.
	Limit	30.7 mm	1.208 in.
Commutator out-of-round	STD	0.01 mm	0.0004 in.
	Limit	0.3 mm	0.012 in.
Mica depth	STD	0.5 – 0.8 mm	0.020 – 0.031 in.
	Limit	0.2 mm	0.008 in.
Brush length	STD	19 mm	0.74 in.
	Limit	12 mm	0.47 in.
Brush spring installed tension	STD	1050 – 1350 g	2.31 – 2.32 lb
	Limit	600 g	1.3 lb
Magnetic switch moving stud length		34 mm	1.34 in.
Pinion end to stop collar clearance		0.1 – 4.0 mm	0.004 – 0.157 in.

IGNITION SYSTEM**Distributor**

Point gap	0.4 – 0.5 mm	0.016 – 0.020 in.	
Dwell angle	38 – 44°		
Distributor shaft thrust clearance	0.15 – 0.50 mm	0.0059 – 0.0197 in.	
Advance characteristics			
Exc. ECE Governor advance angle	Dis. rpm	Dis. advance angle	
	460 – 640	Advance begins	
	1150	5.5° – 7.5°	
	3000	9.5° – 11.5°	
Exc. ECE Vacuum advance angle	mm Hg	in. Hg	Dis. advance angle
	110	4.33	Advance begins
	160	6.30	2° – 4.6°
	200	7.87	4.3° – 6.9°
	240	9.45	6.5° – 8.5°
For ECE Governor advance angle	Dis. rpm	Dis. advance angle	
	410 – 590	Advance begins	
	900	5.1° – 6.9°	
	2100	8.0° – 10.0°	
	3000	7.7° – 9.7°	
For ECE Vacuum advance angle	mm Hg	in. Hg	Dis. advance angle
	100	3.94	Advance begins
	180	7.09	1.2° – 3.4°
	280	11.02	3.5° – 5.5°

Ignition Coil

Primary coil resistance	1.3 – 1.6 Ω
Secondary coil resistance	12600 – 15400 Ω
Resister resistance	1.3 – 1.5 Ω
Insulation resistance at 500V	More than 10 M Ω

High Tension Cord

Resistance limit	Less than 25 K Ω
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Spark Plug

Plug gap	0.7 – 0.8 mm	0.028 – 0.031 in.
Recommended spark plug	ND: W16EP (Exc. ECE) W20EPR (For ECE) NGK: BP5ES-L BPR6ES (For ECE)	

CHARGING SYSTEM (Exc. ALTERNATOR WITH IC REGULATOR)**Alternator**

Maximum current		50A, 55A	
Rotor coil resistance		4.2 Ω	
Brush length	STD	12.5 mm	0.492 in.
	Limit	5.5 mm	0.217 in.

Alternator Regulator

Regulating voltage	13.8 – 14.8V
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CHARGING SYSTEM (For ALTERNATOR WITH IC REGULATOR)**Alternator with IC Regulator**

Maximum current		60A	
Rotor coil resistance		2.9 Ω	
Brush length	STD	12.5 mm	0.492 in.
	Limit	5.5 mm	0.217 in.
Regulating voltage		14.0 – 14.7V	at 25°C (77.0°F)

Charge Lamp Relay

Actuating voltage	less than 3.4V
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