



# SERVICE DATA

## CHAIN SAW

# ECHO: CS-280WES

## STAGE II MODEL

(Serial number : 37000001 and after)

### INTRODUCTION

We are constantly working on technical improvement of our products. For this reason, technical data, equipment and design are subject to change without notice. All specifications and directions in this SERVICE DATA are based on the latest product information available at the time of publication.

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Reference No. 00-27B-00

ISSUED: 201112



## 1 SERVICE INFORMATION

## 1-1 Specifications

Model		CS-280WES	
Dimensions	Length*	mm(in)	380 (14.96)
	Width	mm(in)	235 (9.25)
	Height	mm(in)	230 (9.06)
Dry weight*		kg(lb)	3.1 (6.8)
Engine	Type	YAMABIKO, air-cooled, two-stroke, single cylinder	
	Rotation	Clockwise as viewed from the output end	
	Displacement	cm <sup>3</sup> (in <sup>3</sup> )	26.9 (1.641)
	Bore	mm(in)	35.0 (1.378)
	Stroke	mm(in)	28.0 (1.102)
	Compression ratio		6.6
Carburettor	Type	Diaphragm horizontal-draught	
	Model	Walbro WT-1026 with Large D-shaped mixture needles	
	Venturi size-Throttle bore	mm(in)	11.11 - 14.3 (0.437 - 0.562)
Ignition	Type	CDI (Capacitor discharge ignition) system Digital magneto	
	Spark plug	BPMR8Y	
Starter	Type	ES (effortless)-start	
	Rope diameter x length	mm(in)	3.5 x 750 (0.14 x 29.5)
Fuel	Type	Premixed two-stroke fuel	
	Mixture ratio	50 : 1 (2 %)	
	Petrol	Minimum 89 octane petrol	
	Two-stroke air cooled engine oil	ISO-L-EGD (ISO/CD13738), JASO FC/FD	
	Tank capacity	L (U.S.fl.oz.)	0.24 (8.1)
Exhaust	Muffler type	Spark arrester muffler with catalyst	
Clutch	Type	Centrifugal, 3-shoe slide with 3-tension spring	
Guide bar / Saw chain lubrication type		Adjustable automatic oil pump	
Oil	Tank capacity	L (U.S.fl.oz.)	0.16 (5.4)
Auto oiler	Type	Clutch related type	
Sprocket	Type	Spur	
	Number of teeth	6 (Sproket nose bar), 8 (for Carving bar)	
	Pitch	in	3/8 (Sproket nose bar), 1/4 (for Carving bar)

\* Without guide bar and saw chain.

Cutting devices		Sproket nose bar			Carving
Guide bar	Type	20RC50S-3/8	25RC50S-3/8	30RC50M-3/8	30C50SL
	Called length	cm	20	25	30
	Gauge	in	0.050		
Saw chain	Type	Carlton N1C-BL Oregon 91VG / 91PX			Oregon 25A / 25AP
	Number of drive links	35	40	47	68
	Pitch	in	3/8		
	Gauge	in	0.050		

## 1-2 Technical data

Engine			
Idling speed	r/min	3,200 +/- 300	
Wide open throttle speed*	r/min	11,100 - 12,500	
Clutch engagement speed	r/min	4,400	
Engagement Minimum <sup>†</sup>	r/min	3,800	
Compression pressure	MPa (kgf/cm <sup>2</sup> ) (psi)	0.83 (8.5) (121)	
Ignition system			
Spark plug gap	mm(in)	0.6 - 0.7 (0.024 - 0.028)	
Minimum secondary voltage at 1,500 r/min	kV	22	
Primary coil resistance (Red Probe on stop terminal of module)	MΩ	2.0 - 2.5	
Secondary coil resistance	Ω	930 - 970	
Pole shoe air gaps	mm(in)	0.3 - 0.4 (0.012 - 0.016)	
Ignition timing	at 3,000 r/min	°BTDC	16
	at 8,000 r/min	°BTDC	31
	at 10,000 r/min	°BTDC	32
Carburettor			
Idle adjust screw initial setting	turns in**	1 3/8	
L mixture needle initial setting	turns out	2 1/2	
H mixture needle initial setting	turns out	2 3/4	
Test Pressure, minimum	MPa (kgf/cm <sup>2</sup> ) (psi)	0.05 (0.5) (7.0)	
Metering lever height	mm(in)	1.65 (0.06) lower than diaphragm seat	
Chain oil discharge volume at 7,000 r/min	mL/min(U.S.fl.oz./min)	Fixed 7 mL/min	

BTDC: Before top dead center.

\* With 30 cm guide bar and properly adjusted saw chain.

\*\*Set idle adjust screw to the point that its tip contacts throttle plate before initial setting.

† If clutch engagement speed is lower than minimum r/min, replace clutch assembly with new one.

### 1-3 Torque limits

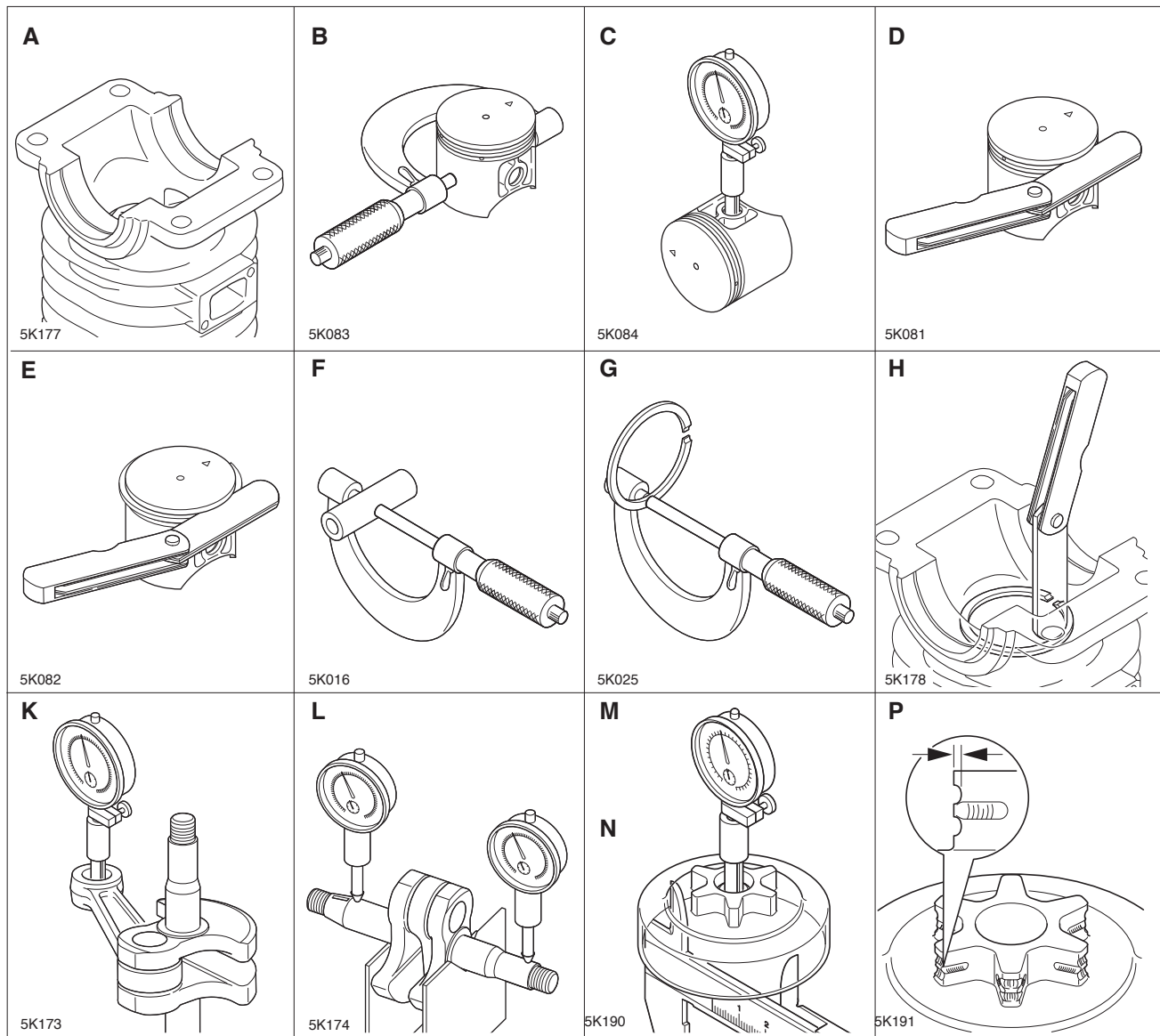
Descriptions		Size	kgf·cm	N·m	in·lbf		
Starter system	Starter pawl	M5*	30 - 45	3 - 4.5	25 - 40		
	Starter case	M4	10 - 20	1 - 2	9 - 18		
Ignition system	Magneto rotor (Flywheel)	M8	250 - 290	25 - 29	220 - 255		
	Ignition coil	M4*	30 - 45	3 - 4.5	25 - 40		
	ON-OFF switch	M10	15 - 30	1.5 - 3	13 - 25		
	Spark plug	M14	130 - 170	13 - 17	113 - 150		
Fuel system	Carburetor	M5	30 - 45	3 - 4.5	25 - 40		
	Intake bellows	M4	35 - 50	3.5 - 5	30 - 45		
Clutch	Clutch hub	LM10	230 - 260	23 - 26	200 - 230		
Engine	Crankcase	M5*	55 - 95	5.5 - 9.5	48 - 85		
	Engine mount	M5	70 - 110	7 - 11	60 - 95		
	Muffler	M5	70 - 100	7 - 10	60 - 90		
	Muffler cover	M5	10 - 20	1 - 2	9 - 18		
Others	Auto-oiler	M4	20 - 30	2 - 3	18 - 25		
	Front handle	Clutch side	M5	20 - 40	2 - 4	18 - 35	
		Recoil side	M5	30 - 40	3 - 4	25 - 35	
	Rear handle assembly	Flange bolt	M5	70 - 100	7 - 10	60 - 90	
			4 Bolt	M4	20 - 30	2 - 3	18 - 25
			M4	10 - 20	1 - 2	9 - 18	
	Cushion	M4	10 - 20	1 - 2	9 - 18		
	Brake cover	M4	10 - 20	1 - 2	9 - 18		
	Sprocket guard plate	M4	10 - 20	1 - 2	9 - 18		
	Brake lever (Hand guard)	M5	25 - 45	2.5 - 4.5	22 - 40		
	Chain catcher	M5	20 - 40	2 - 4	18 - 35		
	Guide bar	M8	180 - 250	18 - 25	160 - 220		
	Regular bolt, nut and screw	M3	6 - 10	0.6 - 1	5 - 9		
M4		15 - 25	1.5 - 2.5	13 - 22			
M5		25 - 45	2.5 - 4.5	22 - 40			
M6		45 - 75	4.5 - 7.5	40 - 65			

LM: Left-hand thread      \*Apply special repairing materials

### 1-4 Special repairing materials

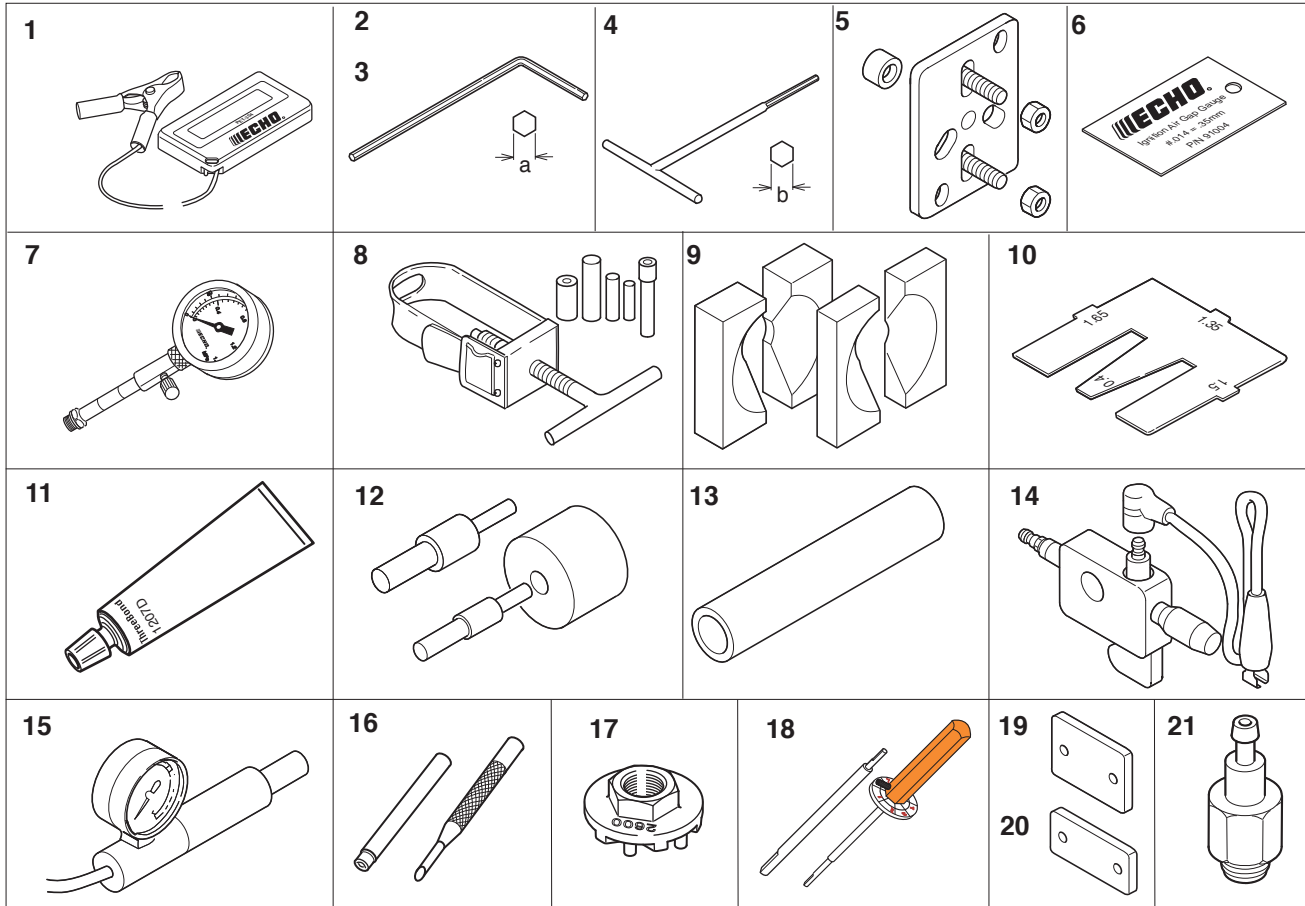
Material	Location	Remarks
Adhesive	Ball bearing outer / crankcase	Loctite #675 or equivalent
Liquid gasket	Crankcase seams	ThreeBond 1207D
Thread locking sealant	Starter pawl	Loctite #222, ThreeBond #1342 or equivalent
	Ignition coil	
Grease	Clutch needle bearing	Lithium based grease or ECHO XTended Protection™ Lubricant
	Rear handle cushion	
	Collar	
	Starter grip rope guide	
	Oil seal lip	
	Chain brake (metal contact part)	Molybdenum grease (approx.1 gram)

1-5 Service Limits



Description		mm (in)
A	Cylinder bore	When plating is worn and aluminum can be seen
B	Piston outer diameter	Min. 34.91 (1.374)
C	Piston pin bore	Max. 8.030 (0.3161)
D	Piston ring groove	Max. 1.6 (0.063)
E	Piston ring side clearance	Max. 0.1 (0.004)
F	Piston pin outer diameter	Min. 7.98 (0.3142)
G	Piston ring width	Min. 1.45 (0.057)
H	Piston ring end gap	Max. 0.5 (0.02)
K	Con-rod small end bore	Max. 12.000 (0.4724)
L	Crankshaft runout	Max. 0.02 (0.001)
M	Sprocket bore	Max. 12.80 (0.5039)
N	Clutch drum bore	Max. 55.5 (2.19)
P	Sprocket wear limit	Max. 0.5 (0.02)

## 1-6 Special tools



Key	Part Number	Description	Reference
1	G310-000050	Tachometer PET-304	Measuring engine speed
2	895612-79920	L-hex wrench (3 mm)	Removing and installing hex. socket bolt (M4)
3	895610-79920	L-hex wrench (4 mm)	Removing and installing hex. socket bolt (M5)
4	897559-02831	T-hex wrench (4 mm)	Removing and installing hex. socket bolt (M5)
5	897501-03938	Puller	Removing magneto rotor
6	91004	Module air gap gauge	Adjusting pole shoe air gaps
7	91037	Compression gauge	Measuring cylinder compression
8	897702-30131	Piston pin tool	Removing and installing piston pin
9	897701-06030	Bearing wedge	Removing and crankshaft ball bearings
10	897563-19830	Metering lever gauge	Measuring metering lever height on carburetor
11	X686-000000	ThreeBond 1207D	Applying crankcase seam
12	897705-11520	Bearing tool	Replacing needle bearing on con-rod small end
13	897726-09130	Oil seal tool	Installing oil seals
14	897800-79931	Spark tester	Checking ignition system
15	897803-30133	Pressure tester	Testing carburetor and crankcase leakage
16	500-500	Welch plug tool	Removing and installing welch plug tool
17	X640-000011	Clutch tool	Removing and assembling clutch assembly
18	Y089-000090	D-shaped tool	Adjusting mixture needle
19	897826-16131	Pressure rubber plug	Plugging intake port to test crankcase / cylinder leakages
20	897828-12330	Pressure rubber plug	Plugging intake port to test crankcase / cylinder leakages
21	897835-16131	Pressure connector	Checking crankcase and cylinder leakages

## 2 CARBURETTOR ADJUSTMENT PROCEDURE

### 2-1 General adjusting rules

A. Before starting the unit for adjustment, check the following items.

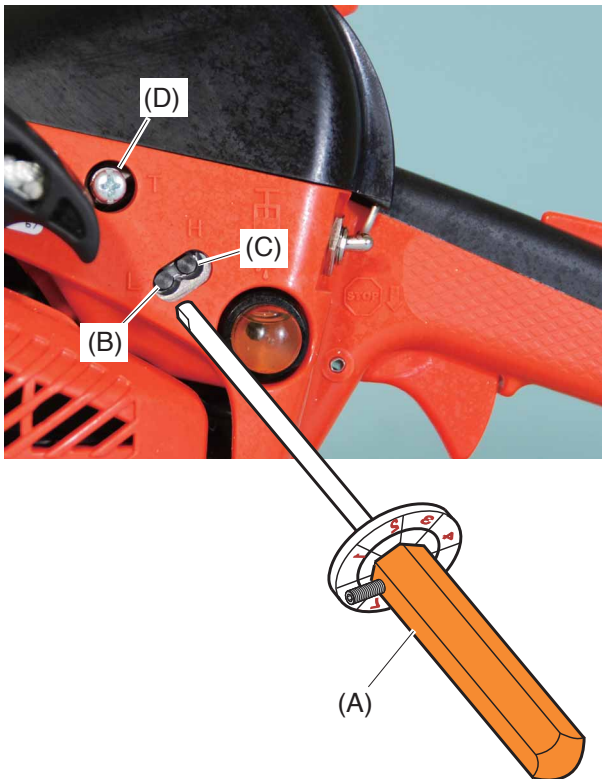
1. The correct spark plug must be clean and properly gapped.
2. The air filter element must be clean and properly installed.
3. The muffler exhaust port must be clear of carbon.
4. The fuel lines, tank vent and fuel filter are in good condition and clear of debris.
5. The fuel is fresh ( > 89 octane : RON ) and properly mixed at 50 : 1 with "ISO L-EGD" or "JASO FC/FD" 2-stroke oil.
6. The recommended bar and chain must be installed, and properly tensioned.

**NOTE :** In order to achieve proper carburettor adjustment, a 20, 25 or 30 cm bar and chain combination should be installed on the unit, otherwise serious engine damage will occur due to overspeeding.

B. Preliminary adjustment. Adjustment by Idle adjust screw of carburetor.

Start and run engine for two minutes alternating engine speed between WOT and idle every 5 seconds. Adjust idle adjust screw to 3,200 +/- 200 r/min. Make sure WOT engine speed in range 11,100 - 12,500 r/min. If engine does not run correctly after this adjustment, proceed to the next step 2-2.

### 2-2 Presetting Idle adjust screw, L mixture needle and H mixture needle



Tools Required : Small screwdriver with 2.5 mm blade, P/N G310-000050 electronic tachometer, P/N Y089-000090 D-shaped tool (A).

1. Turn L and H mixture needle clockwise until lightly seated, and then turn out both mixture needles following turns.

L mixture needle (B) : 2 1/2

H mixture needle (C) : 2 3/4

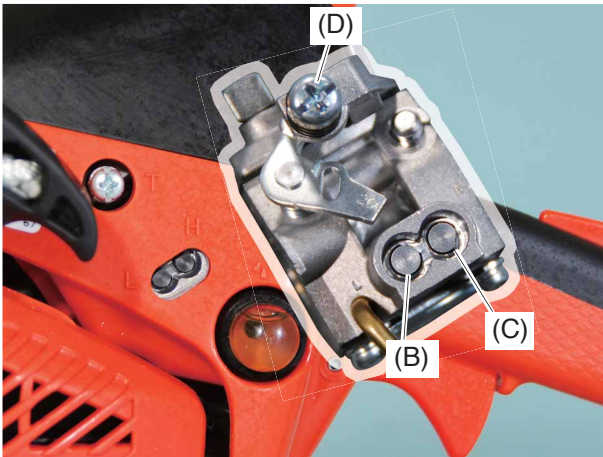
**NOTE :** If needles are overtightened during seating, damage to carburettor may occur.

2. Remove cleaner lid to expose the Idle adjust screw and throttle plate. Turn Idle adjust screw (D) anticlockwise until Idle adjust screw tip just touches throttle plate. Then turn it clockwise 1 3/8 turns. Reinstall cleaner lid.

**NOTE :** The initial carburettor settings for Idle adjust screw, Idle and H mixture needles are intended to start and run the engine before final carburettor adjustments are made through this procedure. The actual number of turns needed for engine operation may vary.



## 2-3 Adjusting carburettor



1. Start and warm engine for 100 seconds alternating engine speed between WOT and idle every 5 seconds. Turn H mixture needle (C) anticlockwise until engine speed drops to approx. 11,000 r/min at WOT.

**NOTE :** Do not run engine at high speed without load longer than 10 seconds, or engine damage may occur.

2. Adjust L mixture needle (B) using D-shaped tool (A) to reach maximum engine speed just before lean drop off.

3. Set idle engine speed to 3,800 r/min by turning Idle adjust screw (D). Engine speed should be stable at 3,800 +/- 50 r/min after Idle adjust screw adjustment.

4. Turn L mixture needle (B) anticlockwise reducing engine idle speed 600 r/min to set idle speed at 3,200 r/min. The engine idle speed ranges 3,100 - 3,300 r/min.

**NOTE :** Engine speed must be allowed to stabilize a minimum of 20 seconds after each adjustment of L mixture needle to assure accurate tachometer readings.

5. Before adjustment, WOT engine speed should be 11,000 r/min or less. If engine speed is higher, turn H mixture needle (C) anticlockwise until 11,000 r/min is achieved. To make the final WOT engine speed adjustment, turn H mixture needle (C) clockwise in 1/8 turn increments with the engine at idle, then squeeze throttle trigger and check WOT engine speed. The final WOT engine speed should fall within 11,400 - 11,800 r/min range.

6. Start engine, and verify engine idle speed ranges from 2,900 to 3,500 r/min, and WOT engine speed ranges from 11,100 to 12,500 r/min. Make sure the chain does not rotate when engine is idling. When final adjustment is completed, the engine should idle, accelerate smoothly, and attain WOT per above specifications.

**NOTE:** Engine WOT, and idle engine speed in field operation may vary from final adjustment specifications due to changing ambient conditions, fuel, and engine loads. Safe engine speed variances should be within the WOT, Idle engine speed ranges listed in Section 1-2, otherwise the carburettor should be readjusted.