SERVICE DATA

CHAIN SAW

ECHO: CS-2511WES

shindaiwa: 251Ws

(Serial number : 38000001 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.

SERVICE MANUAL Ref. No. 401-40 (Model : CS-2511TES, 251Ts and 251TCs) contains lots of information for servicing these models.

CONTENTS

Reference No. **00-25D-00**
ISSUED: 201907

1 SERVICE INFORMATION

1-1 Specifications

Dimensions	Length*	mm(in)	400 (15.7)
	Width	mm(in)	213 (8.4)
	Height	mm(in)	210 (8.3)
Dry weight*		kg(lb)	2.6 (5.7)
Engine	Type		YAMABIKO, air-cooled, two-stroke, single cylinder
	Rotation		Clockwise as viewed from the output end
	Displacement	$cm^3(in^3)$	25.0 (1.525)
	Bore	mm(in)	35.0 (1.378)
	Stroke	mm(in)	26.0 (1.024)
	Compression ratio		7.9
Carburetor	Type		Diaphragm horizontal-draft
	Model		Walbro WT-1230
	Venturi size-Throttle bore	mm(in)	11.11 - 14.3 (0.437 - 0.563)
Ignition	Type		CDI system, Digital magneto with PI (Proportional integral) Controller
	Spark plug		NGK CMR7H
Exhaust	Muffler type		Spark arrester muffl er with catalyst
Starter	Type		ES (Effortless-Start) / S (Soft-start)
	Rope diameter x length	mm(in)	3.0 x 720 (0.12 x 28.3)
Fuel	Type**		Mixed two-stroke fuel
	Mixture ratio		50 : 1 (2 %)
	Gasoline		Minimum 89 octane petrol
	Two-stroke air cooled engine oil		ISO-L-EGD (ISO/CD13738), JASO FC/FD
	Tank capacity	L (UK.fl.oz.)	0.19 (6.4)
Clutch	Type		Centrifugal type, 3-shoe slide with 3-tension spring
Guide bar / Saw chain lubrication type			Adjustable automatic oil pump
Oil	Tank capacity	L (UK.fl.oz.)	0.14 (4.7)
Auto oiler	Type		Clutch driven type
Sprocket	Type		Spur

CDI: Capacitor discharge ignition

* Without guide bar and saw chain.

** Premixed alkylate fuel for 2-stroke can be used.

1-1 Specifications (continued)

Cutting devices			*Sprocket nose bar*		
Guide bar	Type		C20S91-35SA	C25S91-40SL	C30S91-47ML
	Called length	cm	20	25	30
	Gauge	in	0.050		
Saw chain	Type		Carlton N1C-BL, OREGON 91PX		
	Number of drive links		35	40	47
	Pitch	in	3/8		
	Gauge	in	0.050		
Sprocket	Number of teeth		6		
	Pitch	in	3/8		

Cutting devices			*Carving bar*			
Guide bar	Type		C20SA4-52CL	C20HA4-52CL	C25SA4-60CL	C25HA4-60CL
	Called length	cm	20		25	
	Gauge	in	0.043			
Saw chain	Type		SUGIHARA A4S			
	Number of drive links		52		60	
	Pitch	in	1/4			
	Gauge	in	0.043			
Sprocket	Number of teeth		8			
	Pitch	in	1/4			

1-2 Technical data

Engine			
Compression pressure		MPa (kgf/cm^2) (psi)	1.03 (10.5) (150)
Clutch engagement speed		r/min	4,400
Ignition system			
Spark plug gap		mm(in)	0.6 - 0.7 (0.024 - 0.028)
Spark test	Tester gap w/ spark plug	mm(in)	4.0 (0.16)
	Tester gap w/o spark plug	mm(in)	6.0 (0.24)
Secondary coil resistance		Ω	960 - 1,000
Pole shoe air gaps		mm(in)	0.3 - 0.4 (0.012 - 0.016)
Ignition timing	at 1,000 r/min	°BTDC	9
	at 3,000 r/min	°BTDC	9
	at 10,000 r/min	°BTDC	30
Carburetor			
Test Pressure, minimum		MPa (kgf/cm^2) (psi)	0.05 (0.5) (7.0)
Metering lever height		mm(in)	1.65 (0.06) lower than diaphragm seat
Tool to adjust mixture needles			D-shaped tool (L) P/N X645-000031
Chain oil discharge volume		mL/min (UK.fl.oz./min)	Adjustable: 1.5 - 13 (0.05 - 0.46) (Factory set: 6 mL/min)

BTDC: Before top dead center

1-2 Technical data (continued)

Carburetor adjustment

Fuel type			Mixed two-stroke regular fuel	Mixed two-stroke E10 fuel	Premixed alkylate fuel
1) Initial setting	H mixture needle	turn out	1 3/4	2	2 1/4
	L mixture needle	turn out	2 1/2		
	Throttle adjust screw	turn in*1	1 1/2		

*1 Set Throttle adjust screw to the point that its tip just contacts throttle plate before initial setting.

IMPORTANT: Use Tachometer PET-1000R to measure engine speed (Refer to 1-6 Special tools).

IMPORTANT: The PI controller installed model has 2 mode; Carburetor adjustment mode and Operation mode. When adjusting carburetor, must be changed from Operation mode to Carburetor adjustment mode. The mode will return to the Operation mode when the engine is stopped.

To change the mode,

1. Start engine without brake activated. (Do not touch throttle lever.)

2. Engine warm-up with fast idle for 120 seconds. (The speed should be within 6,000 - 10,000 r/min. If it is not, adjust the speed by turning H mixture needle.)

CAUTION: Chain will start to rotate during engine warm-up with fast idle.

NOTE: Do not stop engine during carburetor adjustment. If the engine is stopped, restart this procedure from the beginning.

The carburetor adjustment continues.

Engine warm-up	Idle - WOT : Total sec.	5 - 5 : 30
2) Confirm that the mode has changed		Confirm to vary the idle engine speed by turning L mixture needle 1/4 turn CW. If the speed does not vary, change the mode again. **(The idle engine speed returns to 3,200 r/min for a few seconds in Operation mode, when the engine speed is deviated.)**
3) Find idle maximum speed		Adjust L mixture needle to maximum idle speed*2
4) Set idle maximum speed w/ TAS	r/min	4,100
5) Set idle speed by turning L mixture needle CCW	r/min	3,300
6) Verify final engine speed with standard equipment	r/min	Idle: 3,100 - 3,300 WOT: 12,800 - 13,400 If the WOT speed is not within above range, readjust H mixture needle and reverify the speed. If that does not work, adjust H mixture needle by 1/8 turn and reverify the speed.
7) Verify clutch engagement speed		Confirm clutch engagement speed. If it is less than 1.25 times the idle speed, adjust the idle speed by turning TAS CCW.

WOT: Wide open throttle **CCW:** Counterclockwise **TAS:** Throttle adjust screw

*2 If clutch engages during adjustment process 2), decrease engine speed by turning TAS CCW until clutch disengages and then redo 2).

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	20 - 30	2 - 3	20 - 25
Ignition system	Magneto rotor (Flywheel)	M8	250 - 290	25 - 29	220 - 255
	Ignition coil	M4*	30 - 45	3 - 4.5	25 - 40
	Ignition switch	M3*	3 - 5	0.3 - 0.5	3 - 4
	Spark plug	M10	100 - 150	10 - 15	90 - 135
Fuel system	Carburetor	M5	30 - 45	3 - 4.5	26 - 40
	Intake bellows	M4	30 - 45	3 - 4.5	26 - 40
Clutch	Clutch hub	LM8	250 - 290	25 - 29	220 - 255
Engine	Crankcase	M4	30 - 45	3 - 4.5	26 - 40
	Cylinder	M4	30 - 45	3 - 4.5	26 - 40
	Engine mount	M4	35 - 50	3.5 - 5	30 - 45
	Muffler	M5	60 - 90	6 - 9	52 - 80
	Muffler cover	M4†	20 - 30	2 - 3	20 - 25
Others	Auto-oiler	M4	30 - 45	3 - 4.5	26 - 40
	Front handle Clutch side	M5	30 - 40	3 - 4	26 - 35
	Recoil side	M4†	25 - 30	2.5 - 3	18 - 26
	Compression spring	M4†	20 - 35	2 - 3.5	20 - 30
	Brake cover	M4†	20 - 30	2 - 3	20 - 25
	Sprocket guard plate (Sprocket guard side)	M4†	20 - 30	2 - 3	20 - 25
	Brake lever (Hand guard)	M5	30 - 45	3 - 4.5	26 - 40
	Chain catcher	M5	30 - 45	3 - 4.5	26 - 40
	Stud bolt	M8*	150 - 200	15 - 20	130 - 220
	Bolt (at guide bar mount)	M5	30 - 45	3 - 4.5	26 - 40
	Guide bar nut	M8	120 - 150	12 - 15	105 - 135
	Spike	M5†	30 - 45	3 - 4.5	26 - 40
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

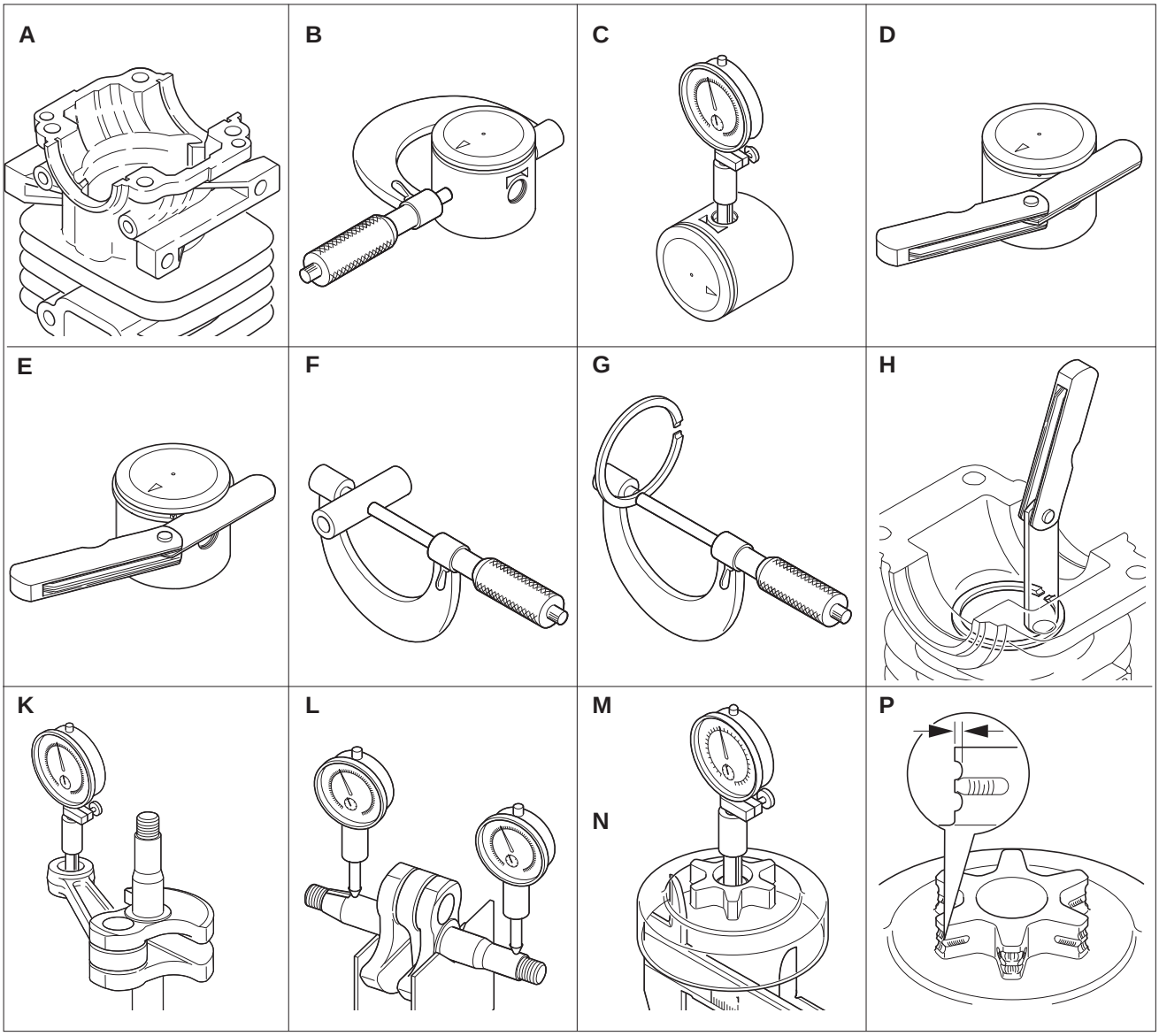
LM: Left-hand thread * Apply thread locking sealant. (See below)

† Tapping screw

1-4 Special repairing materials

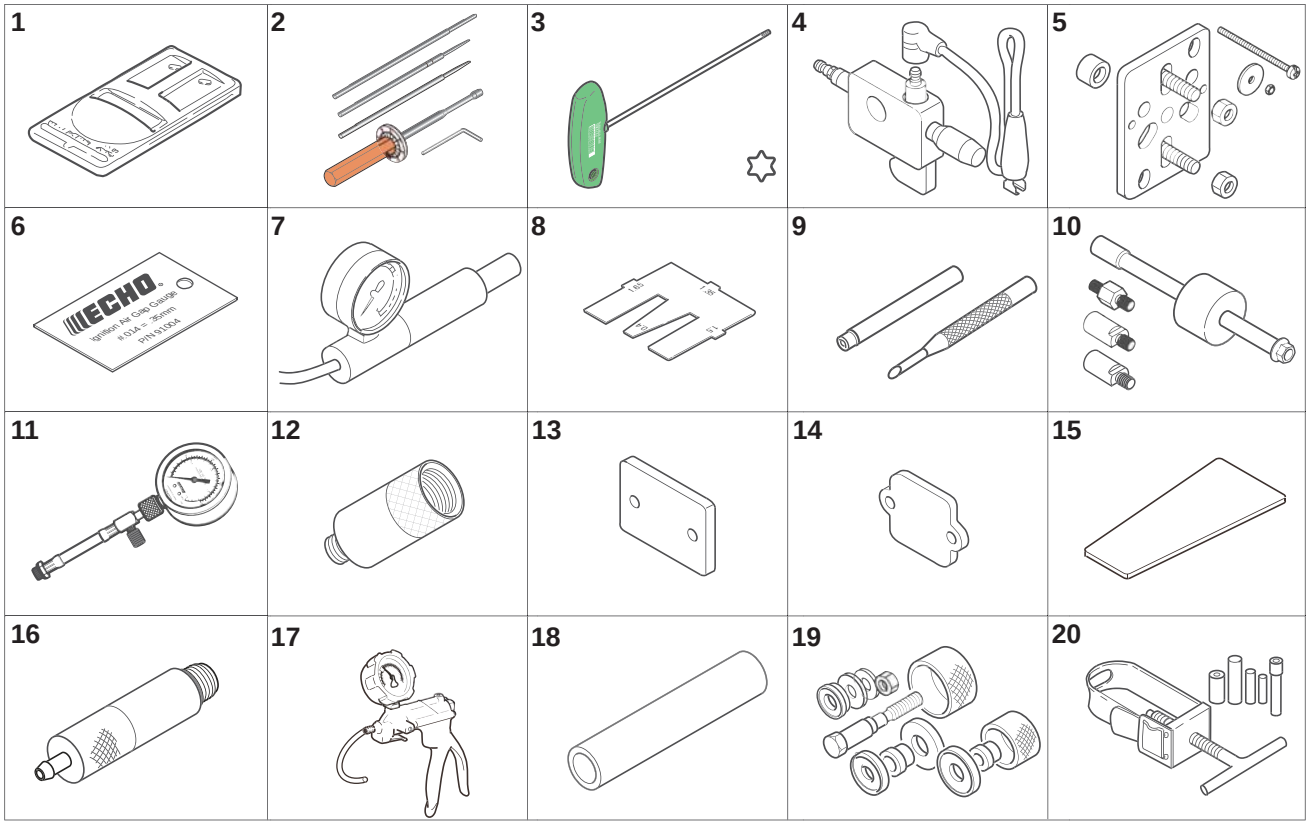
Material	Location	Remarks
Thread locking sealant	Stud bolt	Loctite #242, ThreeBond #1324 or equivalent
	Ignition coil	Loctite #222, ThreeBond #1342 or equivalent
	Ignition switch	Loctite #242, ThreeBond #1324 or equivalent
Grease	Recoil starter	EPNOC AP2 (Lithium based grease) P/N X695-000060
	Needle bearing, clutch	
	Worm gear	
	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 aluminium can be seen
B	Piston outer diameter	Min.	34. 92 (1.375)
C	Piston pin bore	Max.	8. 035 (0.3163)
D	Piston ring groove	Max.	1. 3 (0.051)
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. 15 (0.045)
H	Piston ring end gap	Max.	0. 5 (0.02)
K	Con-rod small end bore	Max.	11. 03 (0.4341)
L	Crankshaft runout	Max.	0. 02 (0.001)
M	Sprocket bore	Max.	13. 07 (0.5146)
N	Clutch drum bore	Max.	53. 5 (2.11)
P	Sprocket wear limit	Max.	0. 5 (0.02)

1-6 Special tools



Key	Part Number	Description	Reference
1	897802-33330	Tachometer PET-1000R	Measuring engine speed to adjust Carburetor
2	Y089-000095	Carburetor Adjustment tool	Adjusting Carburetor
3	X602-000340	Torx wrench (T27)	Removing and installing Torx bolt
4	897800-79931	Spark tester	Checking ignition system
5	Y089-000111	Puller	Removing magneto rotor and crankcase
6	91004	Module air gap gauge	Adjusting pole shoe air gaps
7	897803-30133	Pressure tester	Testing Carburetor and crankcase leakage
8	897563-19830	Metering lever gauge	Measuring metering lever height on Carburetor
9	500-500	Welch plug tool	Removing and installing welch plug
10	P021-044870	PTO shaft puller	Removing plug from auto-oiler assembly
11	91037	Compression gauge	Measuring cylinder compression
12	P021-051690	Adapter (M10)	Measuring cylinder compression(for 10mm dia. spark plug)
13	897826-16131	Pressure rubber plug	Plugging intake port to test crankcase / cylinder leakages
14	897827-16131	Pressure plate	Plugging intake port to test crankcase / cylinder leakages
15	91041	Pressure rubber plug	Plugging exhaust port to test crankcase / cylinder leakages
16	A131-000160	Pressure connector(M10)	Checking crankcase and cylinder leakages
17	91149	Pressure / vacuum tester	Testing tank vent and crankcase leakages
18	897726-09130	Oil seal tool	Installing oil seals
19	897701-14732	Bearing tool	Removing and installing ball bearings on crankcase
20	897702-30131	Piston pin tool	Removing and installing piston pin