



# SERVICE DATA

## CHAIN SAW

### ECHO: CS-490ES

(Serial number : 37000001 and after)  
(Serial number : 38000001 and after)

### ECHO: CS-500ES shindaiwa: 491s

(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. **01-50D-05**

**REVISED: 201903**

ISSUED: 201106



## 1 SERVICE INFORMATION

## 1-1 Specifications

Dimensions	Length*	mm(in)	395 (15.55)
	Width	mm(in)	250 (9.84)
	Height	mm(in)	290 (11.42)
Dry weight*		kg(lb)	4.8 (10.5)
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> )	50.2 (3.063)
	Bore	mm(in)	44.0 (1.732)
	Stroke	mm(in)	33.0 (1.299)
	Compression ratio	7.8	
Carburetor	Type	Diaphragm, horizontal-draft	
	Model	Walbro WT-1011	
	Venturi size-Throttle bore	mm(in)	13.5-15.85 (0.531-0.624)
Ignition	Type	CDI (Capacitor discharge ignition) system	
	Spark plug	NGK BPMR8Y	
Exhaust	Muffler type	Spark arrester muffler	
Starter	Type	ES (Effortless-Start) / S (Soft-start)	
	Rope diameter x length	mm(in)	3.8 x 750 (0.150 x 29.5)
Fuel	Type**	Mixed two-stroke fuel	
	Mixture ratio	50 : 1 (2 %)	
	Gasoline	Minimum 89 octane gasoline	
	Two-stroke air cooled engine oil	ISO-L-EGD (ISO/CD13738), JASO FC/FD	
	Tank capacity	L (U.S.fl.oz.)	0.49 (16.6)
Clutch	Type	Centrifugal type	
Guide bar / Saw chain lubrication type		Adjustable automatic oil pump	
Oil	Tank capacity	L (U.S.fl.oz.)	0.28 (9.5)
Auto oiler	Type	Clutch driven type	
Sprocket	Type	Floating rim	
	Number of teeth	7	
	Pitch	in	0.325

\* Without guide bar and saw chain.

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

<b>Cutting devices</b>						
Guide bar	Type	CS-490ES	V38S21-64ML	V45S21-72ML	V50S21-80AL	
		491s			---	
			CS-500ES	V38R21-64AA	V45R21-72AA	V50R21-80AA
	Called length	cm	38	45	50	
		Gauge	in 0.058			
Saw chain	Type		Oregon 21BPX, Carlton K2L			
	Number of drive links		64	72	80	
	Pitch		in 0.325			
	Gauge		in 0.058			

<b>Cutting devices (CS-500ES only)</b>					
Guide bar	Type		V38R20-64AA	V45R20-72AA	V50R20-80AA
	Called length	cm	38	45	50
	Gauge		in 0.050		
Saw chain	Type		Oregon 95VPX, Carlton K1NK-BL		
	Number of drive links		64	72	80
	Pitch		in 0.325		
	Gauge		in 0.050		

## 1-2 Technical data

Engine			
Compression pressure	MPa (kgf/cm <sup>2</sup> ) (psi)	1.05 (10.7) (152)	
Clutch engagement speed	r/min	3,900	
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	kΩ	2.5 - 2.9	
Pole shoe air gaps	mm(in)	0.3 - 0.4 (0.012 - 0.016)	
Ignition timing	at 3,000 r/min	°BTDC	17
	at 8,000 r/min	°BTDC	29
	at 10,000 r/min	°BTDC	35
PET-9000	Parameter 1		324
	Parameter 2		03
Carburetor			
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	
Tool to adjust mixture needles		D-shaped tool (L) P/N X645-000031 (Carb. adjustment tool P/N Y089-000094)	
Carburetor adjustment			
1) Initial setting	H mixture needle	turn out	3 1/8
	L mixture needle	turn out	1 1/2
	Throttle adjust screw	turn in* <sup>1</sup>	2
Engine warm-up	Idle - WOT : Total	sec.	5 - 5 : 100
2) Find idle maximum speed			Adjust L mixture needle to maximum idle speed* <sup>2</sup>
3) Set idle maximum speed w/ TAS		r/min	3,500
4) Set idle speed by turning L mixture needle CCW		r/min	2,900
5) Confirm H mixture needle position before WOT setting			Turn H mixture needle CCW to confirm engine speed decreases less than or equal to 11,400 r/min.
6) WOT setting		r/min	Turn H mixture needle CW in 1/8 turn increments with the engine at idle, then accelerate to WOT and check engine speed. The final engine speed should fall within: 11,800 - 12,000
7) Verify final engine speed with standard equipment		r/min	Idle: 2,800 - 3,500 WOT: 11,800 - 12,500
8) 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.
Chain oil discharge volume at 7,000 r/min		mL/min (US.fl.oz./min)	Adjustable: 3.0 - 16.5 (0.10 - 0.56) (Factory set: 7 mL/min)

**BTDC:** Before top dead center **WOT:** Wide open throttle **CCW:** Counterclockwise **TAS:** Throttle adjust screw

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

\*<sup>2</sup> If chain starts to rotate during adjustment process step 2), decrease engine speed by turning TAS ACW until chain stops and then redo step 2). Repeat this until chain no longer rotates after the adjustment step 2).

1-3 Torque limits

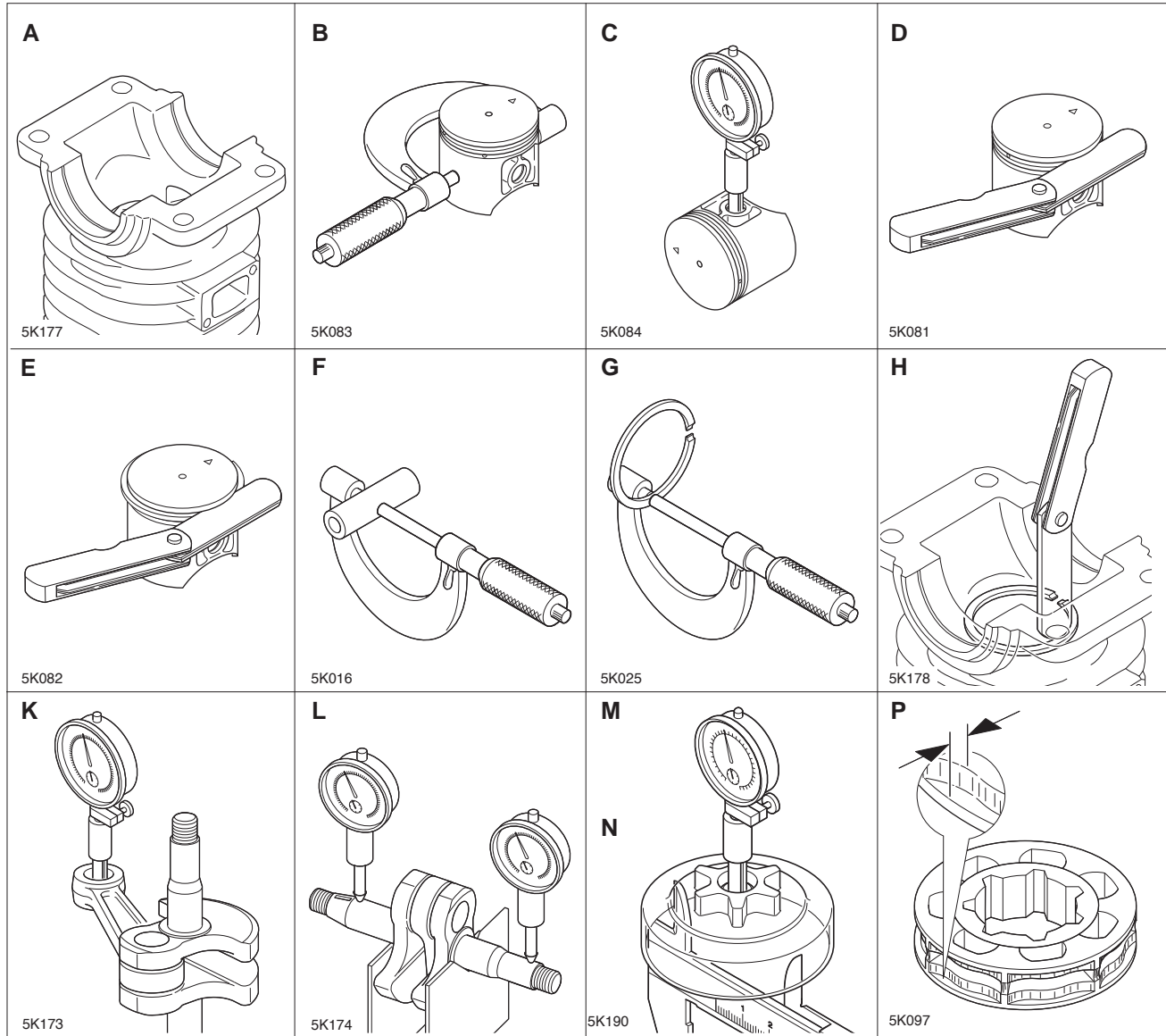
Descriptions		Size	kgf•cm	N•m	in•lbf	
Starter system	Starter pawl	M5	90 - 120	9 - 12	80 - 105	
	Starter case	M5	20 - 30	2 - 3	18 - 25	
Ignition system	Magneto rotor (Flywheel)	M8	150 - 170	15 - 17	130 - 150	
	Ignition coil	M4	30 - 45	3 - 4.5	25 - 40	
	Igniton switch	M10	20 - 30	2 - 3	18 - 25	
	Spark plug	M14	130 - 170	13 - 17	113 - 150	
Fuel system	Carburetor	M5	20 - 30	2 - 3	18 - 25	
	Carburetor elbow	M4	20 - 30	2 - 3	18 - 25	
	Intake insulator	M4	20 - 30	2 - 3	18 - 20	
Clutch	Clutch shoe	LM10	280 - 300	28 - 30	245 - 265	
	Clutch drum	M8	150 - 170	15 - 17	130 - 150	
Engine	Crankcase	M5	70 - 90	7 - 9	60 - 80	
	Muffler	M5	70 - 90	7 - 9	60 - 80	
	Cylinder	M5	70 - 90	7 - 9	60 - 80	
	Cylinder cover	M5	25 - 35	2.5 - 3.5	22 - 30	
Others	Auto-oiler	M4	30 - 45	3 - 4.5	25 - 40	
	Oiler cover	M4	30 - 45	3 - 4.5	25 - 40	
	Crankcase (at oil bypass)	M5	55 - 70	5.5 - 7	48 - 60	
	Cushion	M5	20 - 30	2 - 3	18 - 25	
	Front handle	M5	40 - 55	4 - 5.5	35 - 48	
		M4	30 - 45	3 - 4.5	25 - 40	
	Rear handle assembly	M5	40 - 55	4 - 5.5	35 - 48	
	Handle lid	M4	20 - 30	2 - 3	18 - 25	
	Brake lever	(D side)	M5	40 - 60	4 - 6	35 - 40
		(M side)	M5	50 - 70	5 - 7	45 - 60
	Brake cover	M4	10 - 20	1 - 2	9 - 18	
	Washer (at brake band)	M4	15 - 25	1.5 - 2.5	13 - 22	
	Sprocket guard plate	M4	15 - 25	1.5 - 2.5	13 - 22	
	Chain catcher	M5	50 - 70	5 - 7	45 - 60	
	Guide bar nut	M8	200 - 230	20 - 23	175 - 200	
	Spike	M5	50 - 70	5 - 7	45 - 60	
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

1-4 Special repairing materials

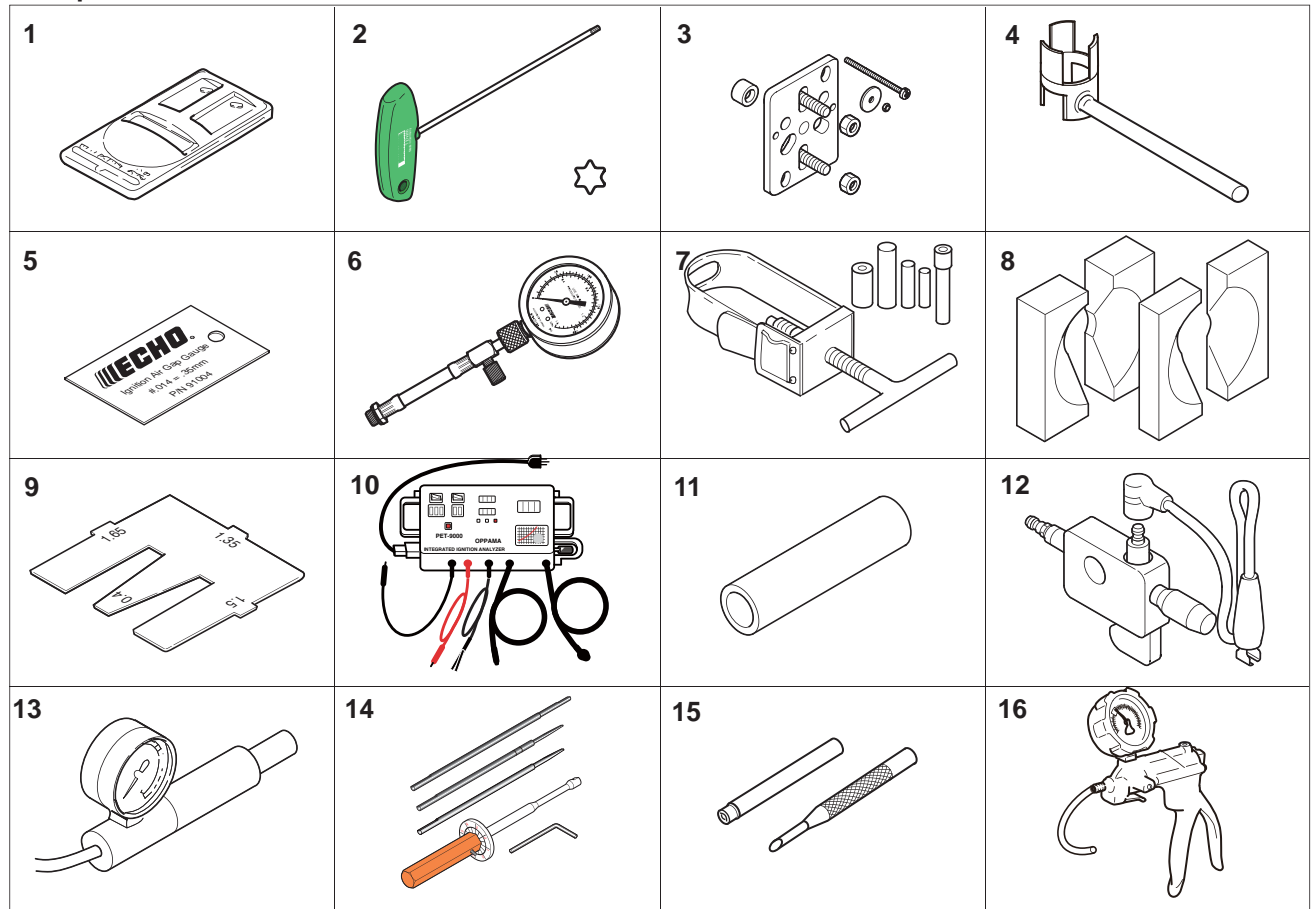
Material	Location	Remarks
Adhesive	Cushion	Loctite #406 (424) or equivalent
Liquid gasket	Crankcase seams	ThreeBond 1207D (P/N X686-000000)
Grease	Auto-oiler worm	EPNOC AP2 (Lithium based grease) P/N X695-000060
	Clutch needle bearing	
	Choke knob	
	Oil seal inner lips	
	Chain brake (metal contact part)	
	Throttle rod	
	Bevel gear, Screw, Chain tensioner	

## 1-5 Service Limits

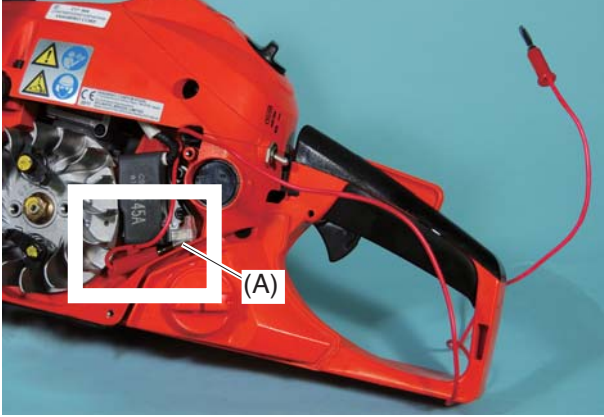


Description		mm (in)	
A	Cylinder bore	When plating is worn and aluminium can be seen	
B	Piston outer diameter	Min.	43.87 (1.727)
C	Piston pin bore	Max.	11.025 (0.4341)
D	Piston ring groove	Max.	1.6 (0.063)
E	Piston ring side clearance	Max.	0.1 (0.004)
F	Piston pin outer diameter	Min.	10.98 (0.4323)
G	Piston ring width	Min.	1.45 (0.057)
H	Piston ring end gap	Max.	0.8 (0.03)
K	Con-rod small end bore	Max.	15.025 (0.5915)
L	Crankshaft runout	Max.	0.02 (0.001)
M	Sprocket bore	Max.	12.75 (0.5020)
N	Clutch drum bore	Max.	73.5 (2.89)
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
2	X602-000340	Torx wrench (T27)	Removing and installing bolt
3	897501-03938	Puller	Removing magneto rotor
4	X640-000370	Clutch spanner	Removing and assembling clutch assembly
5	91004	Module air gap gauge	Adjusting pole shoe air gaps
6	91037	Compression gauge	Measuring cylinder compression
7	897702-30131	Piston pin tool	Removing and installing piston pin
8	897701-02830	Bearing wedge	Removing ball bearings on crankshaft
9	897563-19830	Metering lever gauge	Measuring metering lever height on Carburetor
10	900300	Ignition Analyzer: PET-9000	Measuring Ignition timing, Primary/Secondary voltage
11	897726-21430	Oil seal tool	Installing oil seals and clutch plate
12	897800-79931	Spark tester	Checking ignition system
13	897803-30133	Pressure tester	Testing Carburetor and crankcase leakage
14	Y089-000094	Carburetor adjustment tool	Adjusting Carburetor
15	500-500	Welch plug tool	Removing and installing welch plug
16	91149	Pressure tester	Testing crankcase leakages

**2 SERVICE HINT for PET-9000**

Remove starter and connect red probe (A) of PET-9000 when measuring Ignition timing as shown.

Reinstall starter to start engine.

