0

SERVICE DATA

CHAIN SAW

ECHO: CS-352ES

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.

CONTENTS

Reference No. **01-34D-01**
REVISED: 201201
ISSUED: 201102

1 SERVICE INFORMATION

1-1 Specifications

Model			CS-352ES
Dimensions	Length*	mm(in)	396 (15.59)
	Width	mm(in)	232 (9.13)
	Height	mm(in)	268 (10.55)
Dry weight*		kg(lb)	4.0 (8.8)
Engine	Type		YAMABIKO, air-cooled, two-stroke, single cylinder
	Rotation		Clockwise as viewed from the output end
	Displacement	$cm^3(in^3)$	34.0 (2.075)
	Bore	mm(in)	38.0 (1.496)
	Stroke	mm(in)	30.0 (1.181)
	Compression ratio		6.8
Carburettor	Type		Diaphragm horizontal-draught with auto-return choke
	Model		Walbro WT-991 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)	3.0 x 920 (0.12 x 36.2)
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.)	0.25 (8.5)
Exhaust	Muffler type		Spark arrester muffler with catalyst
Clutch	Type		Centrifugal, 3-shoe slide with 3-tension spring
Guide bar / Saw chain lubrication type			Pencil type Automatic oil pump
Oil	Tank capacity	L (U.S.fl.oz.)	0.26 (8.8)
Auto oiler	Type		Pencil shape, Clutch related type
Sprocket	Type		Spur
	Number of teeth		6
	Pitch	in	3/8

* Without guide bar and saw chain.

Cutting devices						
Guide bar	Type		30RC43S-3/8	30RC50M-3/8	35RC43S-3/8	35RC50M-3/8
	Called length	cm	30		35	
	Gauge	in	0.043, 0.050			
Saw chain	Type		Carlton N1C-BL		Oregon 91VX / 91VG / 90SG	
	Number of drive links		45	47	52	53
	Pitch	in	3/8			
	Gauge	in	0.043, 0.050			

1-2 Technical data

Engine			
Idling speed		r/min	3,000 +/- 300
Wide open throttle speed*		r/min	11,700 - 12,700
Clutch engagement speed		r/min	4,200
Minimum†		r/min	3,600
Compression pressure		MPa (kgf/cm^2) (psi)	0.94 (9.6) (136)
Ignition system			
Spark plug gap		mm(in)	0.6 - 0.7 (0.024 - 0.028)
Minimum secondary voltage at 1,500 r/min		kV	15.0
Primary coil resistance (Red Probe on stop terminal of module)		kΩ	1.2 - 1.6
Secondary coil resistance		kΩ	1.3 - 1.9
Pole shoe air gaps		mm (in)	0.3 - 0.4 (0.012 - 0.016)
Ignition timing	at 3,000 r/min	°BTDC	8
	at 8,000 r/min	°BTDC	34
	at 10,000 r/min	°BTDC	38
PET-9000 Parameter	Parameter 1		322
	Parameter 2		04
Carburettor			
Idle adjust screw initial setting		turns in**	1 1/2
L mixture needle initial setting		turns out	2 3/4
H mixture needle initial setting		turns out	3 1/4
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
Chain oil discharge volume at 7,000 r/min		mL/min(U.S.fl.oz./min)	Fixed 7.8 mL/min

BTDC: Before top dead center.

* With 35 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

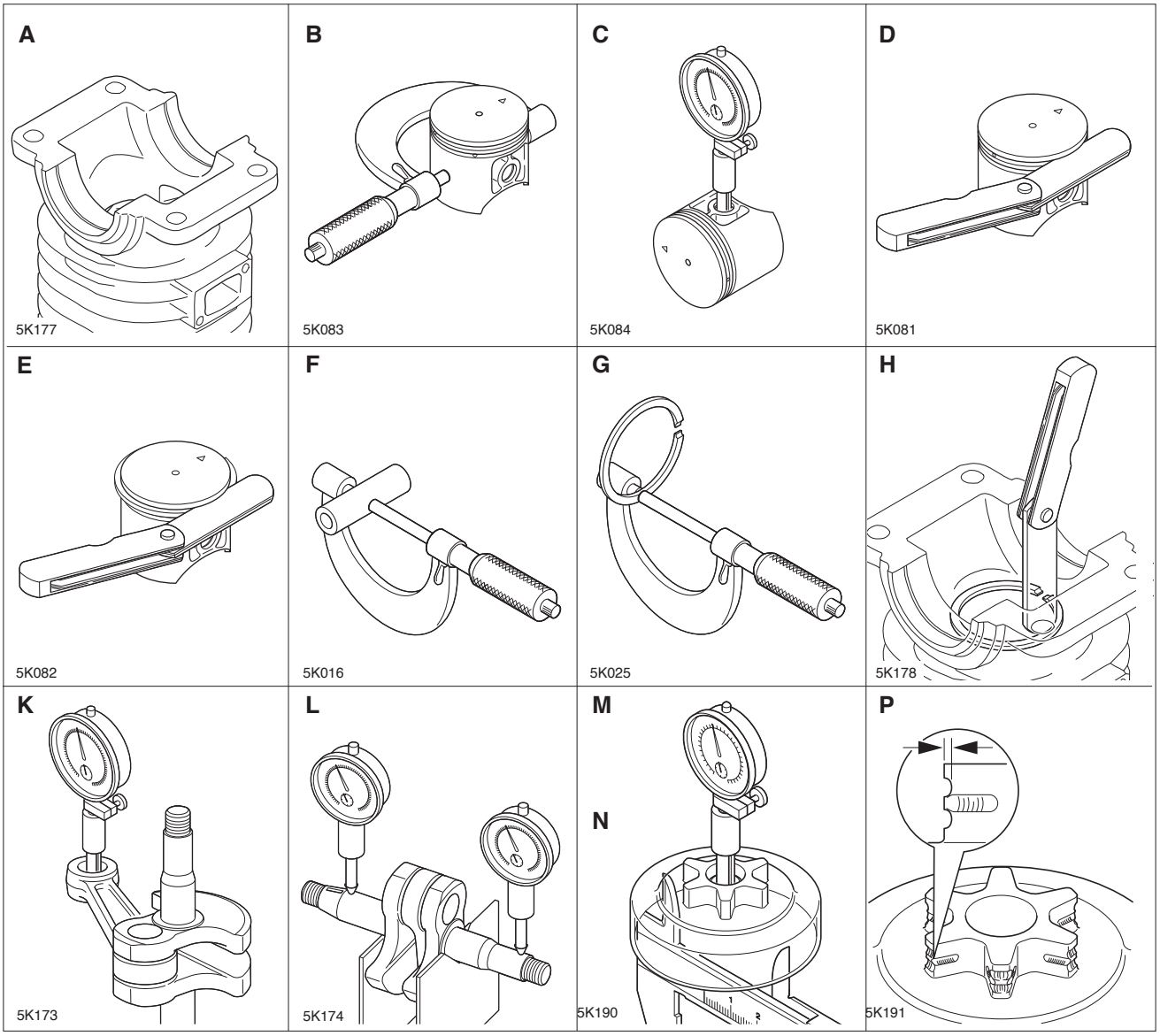
Descriptions		Size	kgf•cm	N•m	in•lbf
Starter system	Starter pawl	M5	30 - 50	3 - 5	26 - 45
	Starter case	M5	35 - 50	3.5 - 5	30 - 45
Ignition system	Magneto rotor (Flywheel)	M8	250 - 290	25 - 29	220 - 255
	Ignition coil	M5*	30 - 45	3 - 4.5	26 - 40
	ON/OFF switch	M6	15 - 30	1.5 - 3	13 - 26
	Spark plug	M14	130 - 170	13 - 17	110 - 150
Fuel system	Carburettor	M5	35 - 50	3.5 - 5	30 - 45
		M5	30 - 45	3 - 4.5	26 - 40
Clutch	Clutch hub	LM10	230 - 260	23 - 26	200 - 230
Engine	Crankcase	M5*	60 - 100	6 - 10	60 - 90
	Engine mount	M5	70 - 110	7 - 11	60 - 95
	Muffler	M5	70 - 90	7 - 9	60 - 80
	Intake insulator	M5	50 - 70	5 - 7	45 - 60
Others	Front handle	M5	30 - 50	3 - 5	26 - 45
	Rear handle assembly	M5	30 - 50	3 - 5	26 - 45
	Brake lever	M4	25 - 35	2.5 - 3.5	22 - 30
	Brake cover	M4	15 - 25	1.5 - 2.5	13 - 22
	Compression spring	M5	30 - 50	3 - 5	26 - 45
	Sprocket guard	M4	10 - 20	1 - 2	9 - 17
	Guide bar	M8	200 - 230	20 - 23	175 - 200
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

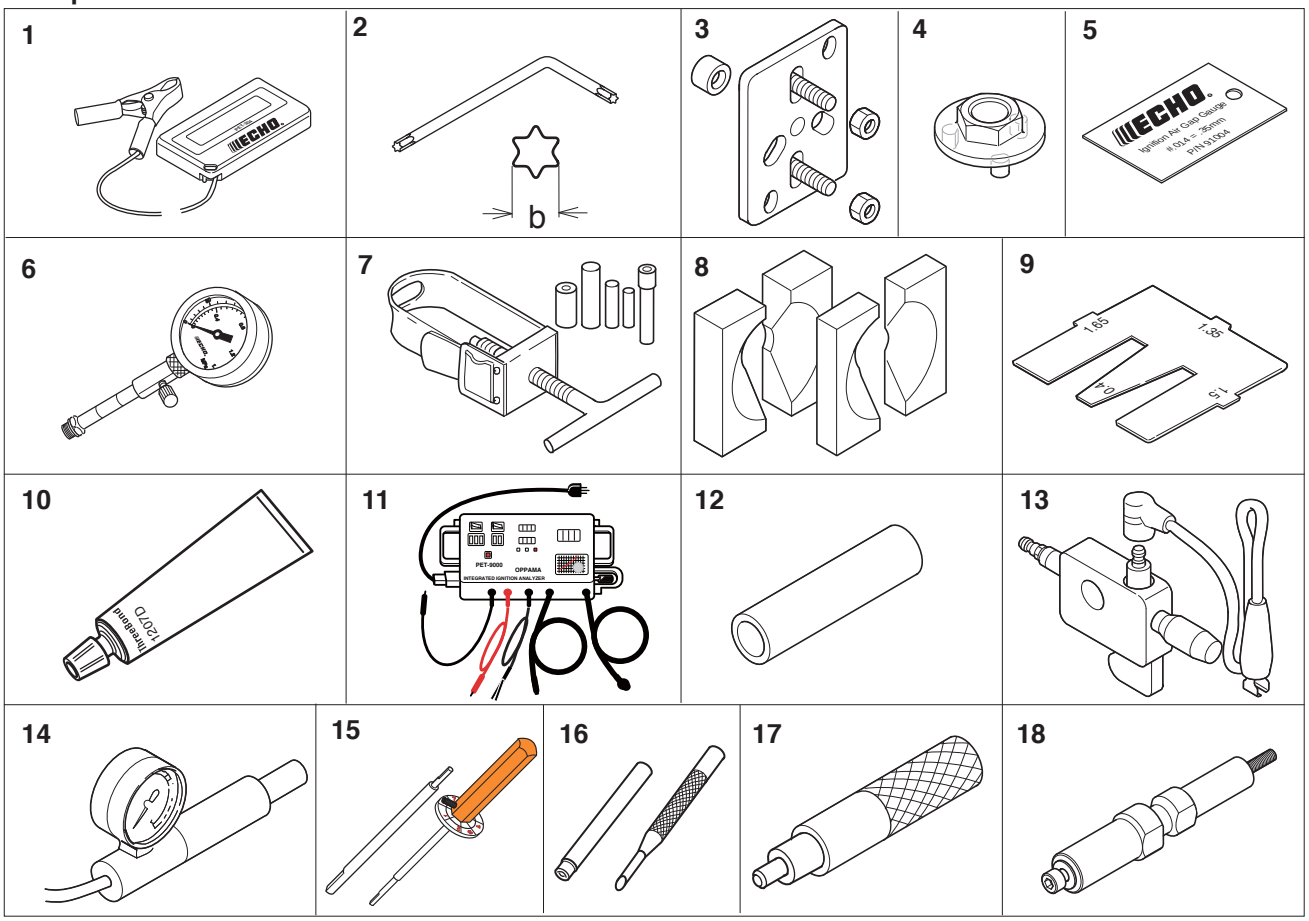
Material	Location	Remarks
Adhesive	Ball bearing outer / crankcase	Loctite #675 or equivalent
	Stud bolt	
Liquid gasket	Crankcase seams	ThreeBond 1207D
Thread locking sealant	Starter pawl	Loctite #242, ThreeBond #1324 or equivalent
	Ignition coil	Loctite #222, ThreeBond #1342 or equivalent
Grease	Clutch needle bearing	Lithium based grease or ECHO XTended Protection ^{TM} Lubricant
	Starter center shaft	
	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.	37. 91 (1.493)
C	Piston pin bore	Max.	8. 035 (0.3163)
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.	10. 80 (0.4252)
N	Clutch drum bore	Max.	61. 5 (2.42)
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	X605-000050	Torx L wrench	Removing and installing bolt
3	897501-03938	Puller	Removing magneto rotor
4	897505-16133	Clutch tool	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	897701-06030	Bearing wedge	Removing and crankshaft ball bearings
9	897563-19830	Metering lever gauge	Measuring metering lever height on carburettor
10	X686-000000	ThreeBond 1207D	Applying crankcase seam
11	900300	Ignition Analyzer : PET-9000	Measuring Ignition timing, Primary/Secondary voltage
12	897726-21430	Oil seal tool	Installing oil seals and clutch plate
13	897800-79931	Spark tester	Checking ignition system
14	897803-30133	Pressure tester	Testing carburettor and crankcase leakage
15	Y089-000090	D-shaped tool	Adjusting mixture needle
16	500-500	Welch plug tool	Removing and installing welch plug tool
17	X646-000030	Auto-oiler tool	Installing pencil type Auto-oiler
18	Y089-000130	Auto-oiler puller	Removing pencil type Auto-oiler

2 CARBURETTOR ADJUSTMENT PROCEDURE

2-1 General adjusting rules

A. Before 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.

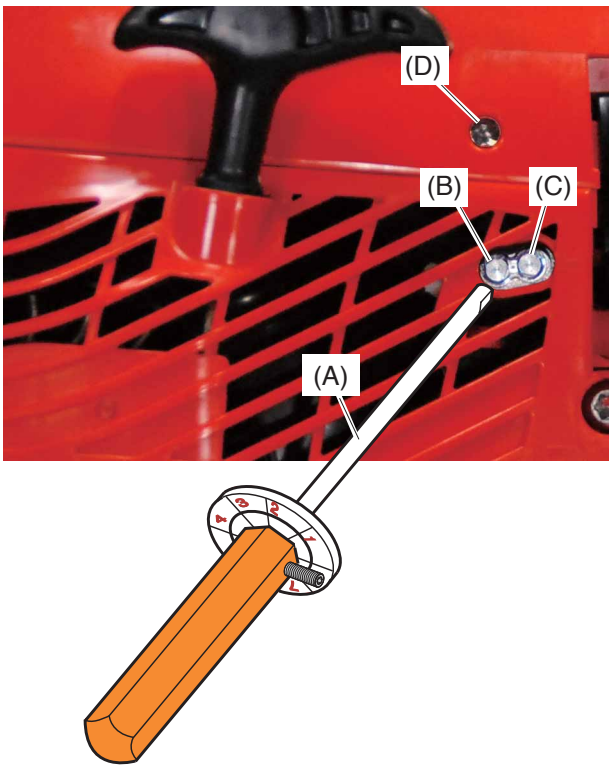
5. The fuel is fresh (> 89 octane : RON) and properly mixed at 50 : 1 with “ISO L-EGD” or “JASO FC/FD” 2-stroke oil.

6. The recommended bar and chain must be installed, and properly tensioned.

NOTE : In order to achieve proper carburettor adjustment, a 30 or 35 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 2,800 +/- 200 r/min. Make sure WOT engine speed in range 11,700 - 12,700 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 3/4

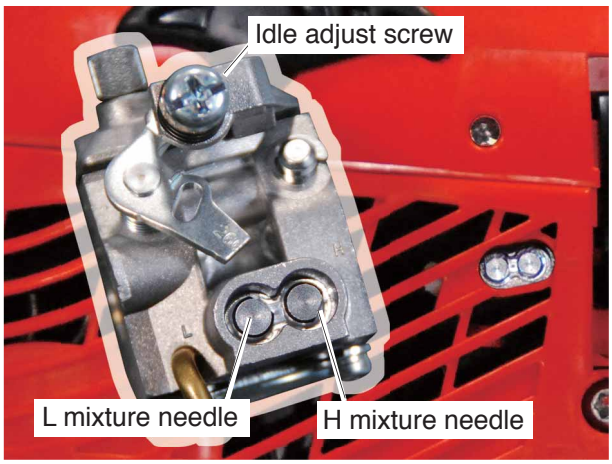
H mixture needle (C) : 3 1/4

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

2. Remove air cleaner lid and air filter 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 1/2 turns. Reinstall air filter, and 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 1 minute alternating engine speed between WOT and idle every 5 seconds. Turn H mixture needle anticlockwise until engine speed drops to approx. 12,000 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 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. Engine speed should be stable at 3,800 +/- 50 r/min after Idle adjust screw adjustment.

4. Turn L mixture needle anticlockwise reducing engine idle speed 1,000 r/min to set idle speed at 2,800 r/min. The engine idle speed ranges 2,700 - 2,900 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 12,000 r/min or less. If engine speed is higher, turn H mixture needle anticlockwise until 12,000 r/min is achieved. To make the final WOT engine speed adjustment, turn H mixture needle 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 12,200 - 12,400 r/min range.

6. Start engine, and verify engine idle speed ranges from 2,700 to 3,300 r/min, and WOT engine speed ranges from 11,700 to 12,700 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.