



SERVICE DATA

CHAIN SAW

ECHO: CS-500ES

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

	page
1 SERVICE INFORMATION	2
1-1 Specification	2
1-2 Technical data.....	3
1-3 Torque limits.....	4
1-4 Special repairing materials	4
1-5 Service limits.....	5
1-6 Special tools	6
2 CARBURETTOR ADJUSTMENT PROCEDURE ..	7
2-1 General adjusting rules.....	7
2-2 Presetting Idle adjust screw, L mixture needle and H mixture needle	7
2-3 Adjusting carburettor.....	8
3 SERVICE HINT for PET-9000	8

Reference No. **01-50D-01**

REVISED : 201201

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1 SERVICE INFORMATION

1-1 Specifications

Model		CS-500ES	
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 ³ (in ³)	50.2 (3.063)
	Bore	mm(in)	44.0 (1.732)
	Stroke	mm(in)	33.0 (1.299)
	Compression ratio		7.8
Carburettor	Type	Diaphragm horizontal-draught	
	Model	Walbro WT-1011 with Large D-shaped mixture needles	
	Venturi size-Throttle bore	mm(in)	13.5-15.85 (0.531-0.624)
Ignition	Type	CDI (Capacitor discharge ignition) system Digital magneto	
	Spark plug	BPMR8Y	
Starter	Type	ES (effortless)-start	
	Rope diameter x length	mm(in)	3.8 x 750 (0.150 x 29.5)
Fuel	Type	Premixed two-stroke fuel	
	Mixture ratio	50 : 1 (2 %)	
	Petrol	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)
Exhaust	Muffler type	Spark arrester muffler	
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 related type	
Sprocket	Type	Floating rim	
	Number of teeth	7	
	Pitch	in	0.325

* Without guide bar and saw chain.

Cutting devices				
Guide bar	Part No.	38RV58-325	45RV58-325	50RV58-325
	Called length	cm	38	45
	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	

1-2 Technical data

Engine			
Idling speed	r/min	3,100 + 400 - 300	
Wide open throttle speed*	r/min	11,800 - 12,500	
Clutch engagement speed	r/min	3,900	
Engagement Minimum [†]	r/min	3,800	
Compression pressure	MPa (kgf/cm ²) (psi)	1.05 (10.7) (152)	
Ignition system			
Spark plug gap	mm(in)	0.6 - 0.7 (0.024 - 0.028)	
Minimum secondary voltage at 1,000 r/min	kV	14	
Primary coil resistance (Red Probe on stop terminal of module)	Ω	300 - 340	
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
Carburettor			
Idle adjust screw initial setting	turns in**		2
L mixture needle initial setting	turns out		1 1/2
H mixture needle initial setting	turns out		3 1/8
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	mL/min(U.S.fl.oz./min)		Factory set: 7 mL/min

BTDC: Before top dead centre.

* With 45 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

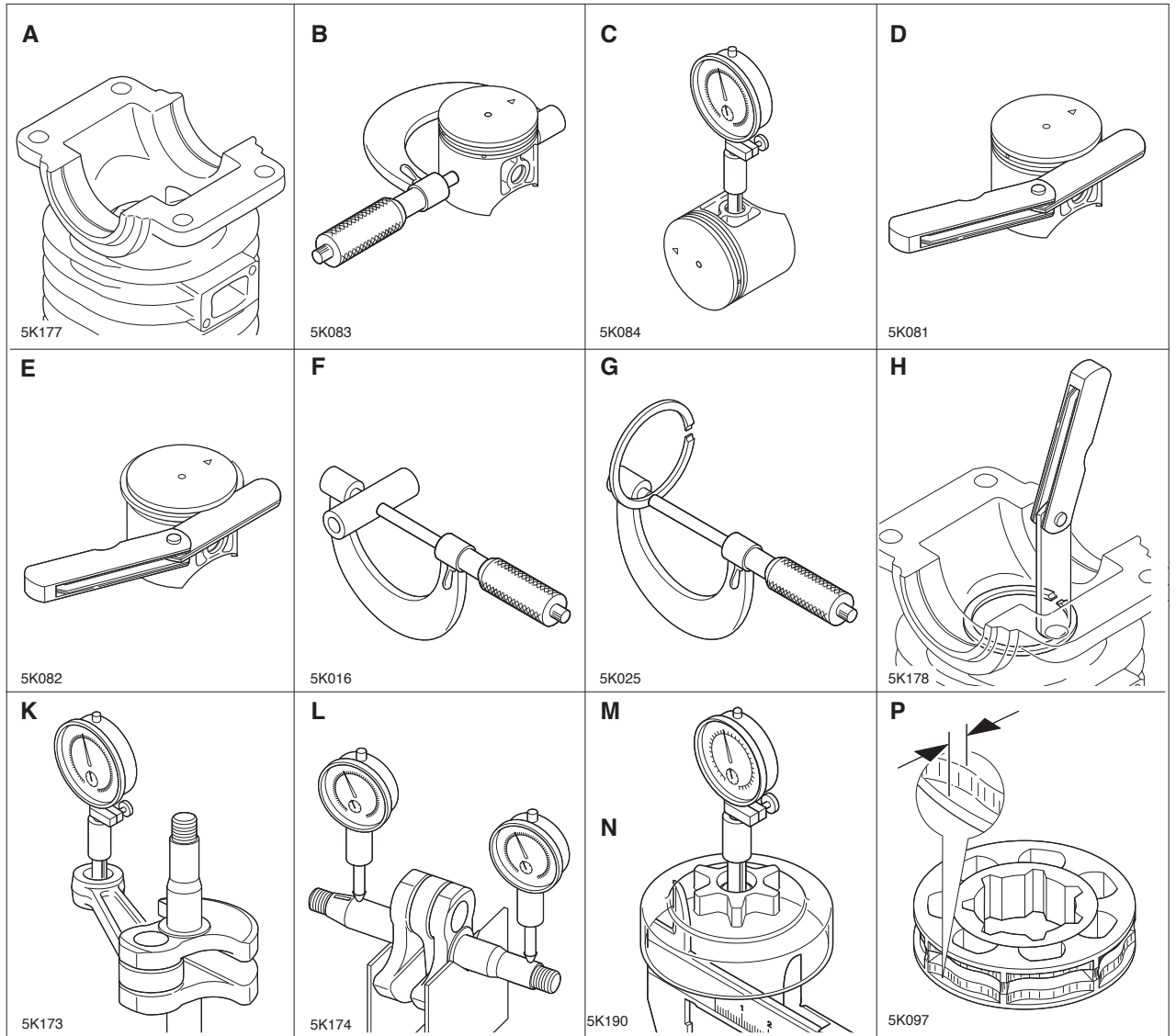
Descriptions	Size	kgf·cm	N·m	in·lbf		
Starter system	Starter pawl assembly	M5	90-120	9-12	80-105	
	Starter case	M5	20-30	2-3	18-25	
Ignition system	Magneto rotor (Flywheel)	M8	150-170	15-17	130-150	
	Ignition coil	M4	30 - 45	3 - 4.5	25 - 40	
	Ignition switch	M10	20 - 30	2 - 3	18 - 25	
	Spark plug	M14	130 - 170	13 - 17	113 - 150	
Fuel system	Carburettor	M5	20 - 30	2 - 3	18 - 25	
	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	(M side)	M5	40 - 55	4 - 5.5	35 - 48
		(D side)	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	
	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

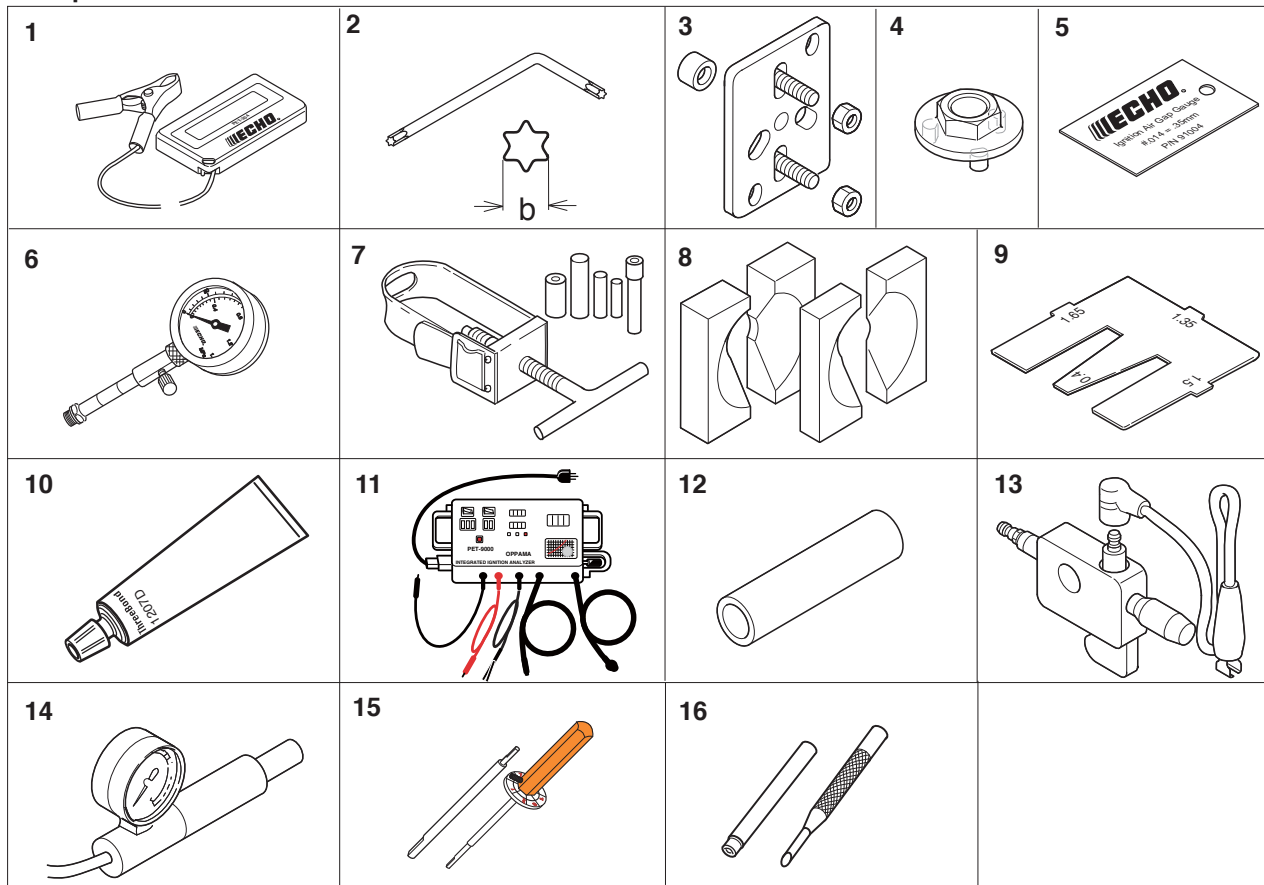
Material	Location	Remarks
Adhesive	Cushion	Loctite #406 (424) or equivalent
Grease	Auto-oiler worm	Lithium based grease or ECHO XTended Protection™ Lubricant
	Clutch needle bearing	
	Choke knob	
	Oil seal inner lips	
	Chain brake (metal contact part)	
	Throttle rod	
	Bevel gear, Screw, Chain tensioner	

1-5 Service Limits



Description		mm (in)
A	Cylinder bore	When plating is worn and aluminum 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	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

2 CARBURETTOR ADJUSTMENT PROCEDURE

2-1 General adjusting rules

A. Before adjustment, check the following items.

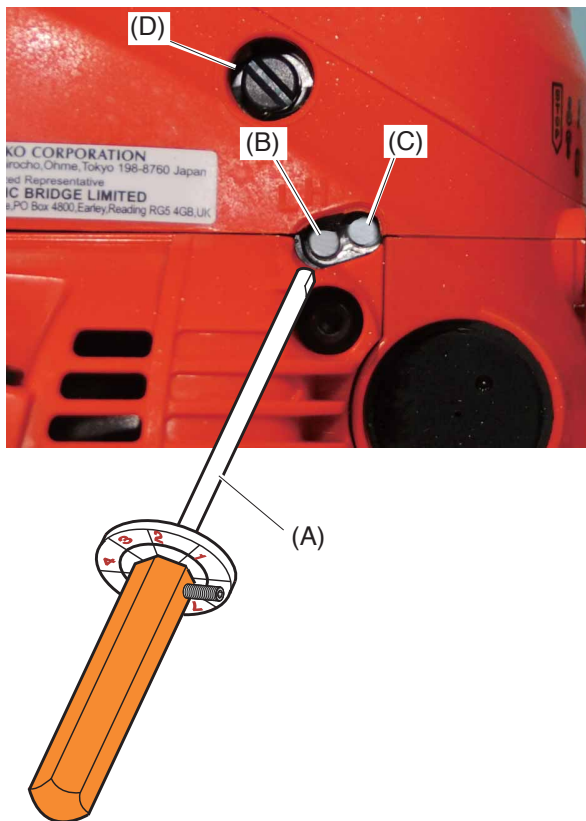
1. The correct spark plug must be clean and properly gapped.
2. The air filter element must be clean and properly installed.
3. The muffler exhaust port must be clear of carbon.
4. The fuel lines, tank vent and fuel filter are in good condition and clear of debris.
5. The fuel is fresh (> 89 octane : 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 38, 45 or 50 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 carburettor.

Start and run engine for 100 seconds 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 11,800 - 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 needles clockwise until lightly seated, and then turn out both mixture needles following turns:

L mixture needle (B) : 1 1/2,

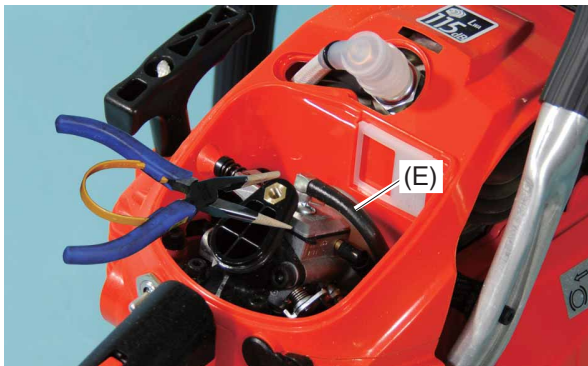
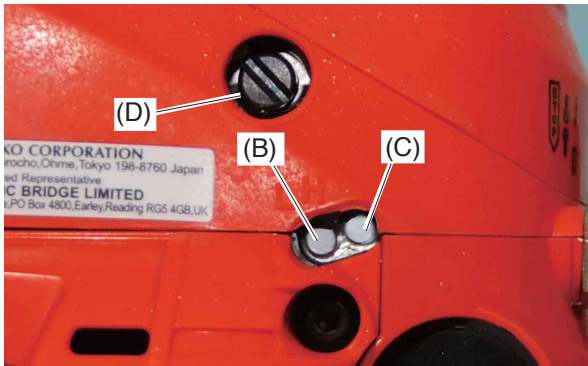
H mixture needle (C) : 3 1/8

NOTE: If needles are overtightened 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 Idle adjust screw (D) 2 turns clockwise. Reinstall air filter, and cleaner lid.

NOTE : The initial carburettor settings for Idle adjust screw, L 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. 11,400 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 speed to 3,500 r/min by turning Idle adjust screw (D). Engine speed should be stable at 3,500 +/- 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 2,900 r/min. The engine idle speed ranges is 2,800 - 3,000 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.

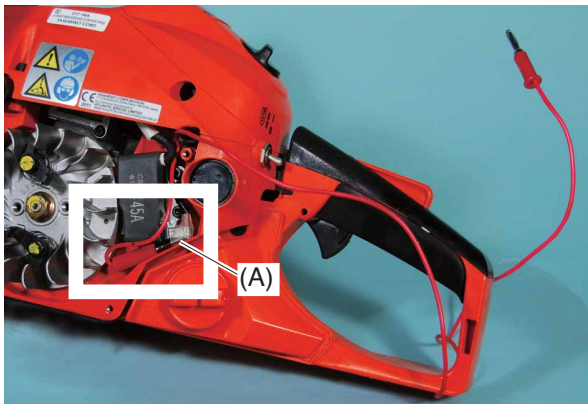
NOTE : If you want make sure idle rich size, pinch pulse pipe (E) as shown.

5. Before adjustment, WOT engine speed should be 11,400 r/min or less. If engine speed is higher, turn H mixture needle (C) anticlockwise until 11,400 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 11,800 - 12,000 r/min.

6. Start engine, and verify engine idle speed ranges from 2,800 to 3,500 r/min, and WOT engine speed ranges from 11,800 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 speed in field operation may vary from final adjustment specifications due to changing ambient conditions, fuel, and engine loads. Engine speed variances should be within the safe ranges for WOT and Idling speed as listed in Section 1-2 Technical data, otherwise the carburetor should be readjusted.

3 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.

